The Local Origins of Industrialisation:

The Case of the Derbyshire Lead Industry, c.1700-1830

A dissertation submitted in partial fulfilment of the degree of PhD in History, by:

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For my angel, Luca.

Abstract

This thesis explores the relationship between household and community ties and the process of industrialisation in Derbyshire during the eighteenth and early nineteenth centuries. Using a series of closely examined archival sources linked mainly to the local lead industry, it endeavours to provide new insights into the way in which households and communities operated, and contributed to processes of industrial and economic change. Networks of credit and trust are seen to have been particularly important in financing and organising industrial and commercial ventures. By reconstructing these local networks and retracing the webs of personal, familial and kinship relations, this thesis considers the continuing importance of sociability, community and reputation – usually studied in the context of the early modern era – in laying the foundations for precocious change in industrialising Derbyshire. Historical accounts of the Derbyshire lead industry have emphasised the long decline of the free mining community owing to the rise of capital-intensive mining in the late seventeenth and early eighteenth centuries. In contrast, this thesis identifies the Derbyshire lead miners more as 'middling' artisans than as proletariats, and shows their continuing prominence in local society, their role as employers and entrepreneurs, and their monopoly of knowledge and skill in the mining trade even in the face of challenges from enlightenment knowledge. Based on the case of Derbyshire, this thesis argues therefore that far from suffering at the hands of industrialists and capitalists, household and community structures and relationships played a crucial role in processes of industrialisation and economic growth, helping to establish a degree of stability and regularity in an otherwise tumultuous and unpredictable period.

Contents

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Figures

Maps and Images

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Abbreviations

AHR	The American Historical Review
AgHR	Agricultural History Review
BL	British Library
BPDMHS	Bulletin of the Peak District Mines Historical Society
C&C	Continuity and Change
CWPESH	Cambridge Working Papers in Economic and Social History
DAJ	Derbyshire Archaeological Journal
DRO	Derbyshire Records Office
EEH	Explorations in Economic History
EcHR	Economic History Review
HJ	Historical Journal
HWJ	History Workshop Journal
IRSH	International Review of Social History
JEH	Journal of Economic History
JMH	The Journal of Modern History
LHR	Labour History Review
ODNB	Oxford Dictionary of National Biographies
TNA	The National Archives
SH	Social History
SRO	Staffordshire Record Office (which now includes records formerly contained at Lichfield Record Office collections)
TNS	Transactions of the Newcomen Society
WHR	Women's History Review

Introduction

Representations of Derbyshire, its society, culture and economy, have been heavily influenced by the observations made by travellers and writers who journeyed through the county during the seventeenth and eighteenth century. Of particular note is Daniel Defoe's account, presented in Letter 8 of his *A Tour Through the Whole Island of Great Britain*.[1] He recounts his journey from Nottinghamshire, across 'that fury of a river called the Derwent' and arriving at 'Derby, the capital of the county.'[2] From there he describes his forays into the county's expansive mountainous region, called 'the Peaks', and his encounters with its local inhabitants, the Derbyshire lead mining community.[3] The picture he paints is far from favourable. He describes them as 'subterranean wretches', as a 'rude' and 'boorish' sort of people, who had been weathered and brutalised by the 'bleak' and 'desolate wasteland' in which they resided.[4] He reflects more warmly on the scattered sites of civil society in the county, the 'fine, beautiful and pleasant town' of Derby with its genteel residents retreating from the harsh surrounds of their country estates and manors, or Chatsworth House 'the jewel of the Peak' and the illustrious seat of the Duchy of Devonshire.[5] However, the observations he makes, and the picture he presents, could quite conceivably have been made from the comfort of his study, aided by nothing more than books, maps and correspondence.[6] Throughout the passage, he repeats a series of enduring prejudices, rooted in the fleeting impressions of earlier writers and travellers. Writing in 1681, for example, Charles Cotton, in his poem *The Wonders of the Peake* (1681), followed on from Thomas Hobbes's *De Mirabibus Pecci: being the wonders of the Peak in Derbyshire* (1678), in expressing a

[1] D. Defoe, *A Tour Through the Whole Island of Great Britain*, P. Rogers (ed.), (Harmondsworth, 1971), pp.457–78.
[2] *Ibid*¸ pp.457–8.
[3] *Ibid*, pp.459–68.
[4] *Ibid*¸ p.460.
[5] *Ibid*¸ pp.474–7.
[6] The editor of the volume presently used, provides a curious insight into the 'wild inventive streak' and almost 'demonic imaginative power' Defoe possessed, and it seems possible that some, if not most, of the encounters he describes and visits he recounts are products of fiction, or based on the accounts of others, see: *Ibid*¸pp.9–10. See also: K. Turner, 'Defoe's *Tour*: The changing face of things' *British Journal for Eighteenth–Century Studies*, 24(2), (2001), pp.189–206.

fearful fascination with the county's dramatic landscape, and their common aversion to the 'Hob nail Peakrills' who 'swear, curse, slaunder and forsw', as is by their very nature 'the *Peak Highlanders*'.[7] For Defoe, however, there was little even in the landscape to admire: he recounts seeing little of 'the wonder' observed by 'so great a man as Mr Hobbes, and after him Mr Cotton', and spends much of his time retracing their steps, deriding each of the wonders in turn as mere 'curiosities' or 'trifles'.[8]

These passing views of early modern Derbyshire, as an 'inhospitable' and 'desolate' wilderness, inhabited by an impoverished and uncouth people, have been allowed to endure, in part due to a lack of contravening evidence regarding the everyday lived experiences of the mining population, but also due to a paucity of detailed investigation – a deficiency which this thesis endeavours to address. Until recently, works relating to the everyday economic lives of the Derbyshire lead miners, their status in local society, and their role in processes of industrialisation and economic change, were limited. The valuable work of local historians has helped sustain and enrich this field of historical research, but academic historians, especially of the eighteenth century, have otherwise overlooked the subject.[9] To date, Andy Wood's *The Politics of Social Conflict: The Peak Country, 1520–1770*, has been the most influential work of professional scholarship to deal with the Derbyshire lead industry at length, and to consider the experiences of the lead mining community within its broader social, economic and cultural context.[10] Wood's study explores the origins of 'class' in early modern society, and posits the Derbyshire lead miners as the 'forefathers' of the modern 'working

[7] T. Hobbes, *De Mirabibus Pecci: being the wonders of the Peak in Derbyshire* (London, 1678); C. Cotton, *The Wonders of the Peake* (London, 1681), pp.18, 43.
[8] Defoe, *Tour*, p.461.
[9] This thesis is indebted to a number of important studies produced by local historians of particular mines, settlements, or districts of Derbyshire's lead mining region, see in particular: N. Kirkham, *Derbyshire Lead Mining Through the Centuries* (Truro, 1968); L. Willies, 'Technical and organisational development of the Derbyshire Lead mining industry in the eighteenth and nineteenth centuries', unpublished PhD thesis (Leicester, 1980); D. Kiernan, *The Derbyshire Lead Industry in the Sixteenth Century* (Chesterfield, 1989); J. Rieuwerts, *Lead Mining in Derbyshire*, I–III, (Ashbourne, 2007). There are also an array of works published in the Peak District Mines Historical Society Bulletin, and Derbyshire Archaeological Journal, which shall be referenced where appropriate.
[10] A. Wood, *The Politics of Social Conflict* (Cambridge, 1999, repeat/paperback ed. 2007). Other works have dealt with it in passing or as part of a wider study, see for example: K. Honeyman, *The Origins of Enterprise* (Manchester, 1982); J. Thirsk, *The Rural Economy of England* (London, 1984), pp.178–9; R. Burt, *The British Lead Mining Industry* (Redruth, 1987); M. Berg, *The Age of Manufactures, 1700–1830* (London, 1994). A major work on the medieval mining trade is that of Ian Blanchard's: 'Derbyshire Lead Production, 1195–1505' *DAJ*, 91 (1971), pp.119–40; idem, *Mining, Metallurgy and Minting in the Middle Ages* I–III (Stuttgart, 2005). See also David Kiernan's detailed exploration of the sixteenth century: Kiernan, *Derbyshire*.

class movement'.[11] He argues that through conflict and resistance to the impositions of 'elites', such as Defoe, the miners of Derbyshire helped forge 'a plebeian political project which, although defined through the exclusion of women and of the unskilled men, set itself in overt and public opposition to the interests of the 'great men' of the Peak.'[12] Wood adopts the discursive views of Defoe, and others like him, as a template for 'elite' prejudices toward the local miners, and appropriates them as evidence to construct a case for viewing Derbyshire society in polarised terms: divided between a detached and hostile 'elite', on the one hand, and an immiserated and persecuted 'plebeian' community of miners, on the other.[13] These conflicts exemplified in the Derbyshire case, he argues, helped establish 'definitions of social conflict which anticipated nineteenth-century languages of class,' and thus 'bequeathed important habits and traditions to the working-class culture of the early nineteenth century.'[14]

The evidence explored in this thesis suggests a very different picture of the mining community to that observed by Wood, and implied by the likes of Defoe, Cotton and Hobbes. It will be argued that far from representing a socially homogenised group, standing in unity against a hostile 'elite', the mining community of Derbyshire comprised an assortment of peoples, derived from a range of social and economic backgrounds, united not by a nascent sense of 'class', but by a more transient sense of common interest, and mutual obligation, centred on local power structures, and mediated through chains of dependence, reciprocity and trust.[15] Importantly, it will be shown that this common interest was not limited to practitioners of the mining trade, it also incorporated merchants, gentlemen, farmers and tradespeople, who shared common interests in the preservation of mining customs, and in the continued prosperity of the Derbyshire lead industry.[16] As for the 'miners' themselves, the evidence examined suggests that their prominent role at the Derbyshire lead mines, their control of the skills and knowledge of the mining trade, their mediation between those above and below them in the social

[11] Wood, *Politics*, pp.316–25.
[12] *Ibid*, pp.10–37.
[13] *Ibid*, pp.1–7.
[14] *Ibid*, pp.8–9.
[15] This conception of status in local society is neatly surmised by Henry French, see: H. French 'The search for the 'middle sort of people' in England, 1600–1800', *Historical Journal* 43(1) (2000), pp.277–93; H. French, *The Middle Sort of People in Provincial England, 1600–1750* (Oxford, 2007), pp.1–29.
[16] A matter taken up in chapter 2, below.

order, and their status as independent tradesmen, distinguishes them not as down-trodden proletariats, but as an entrepreneurial 'middling sort' in local society. In this thesis, the household and community structures of the Derbyshire lead miners, as well as their entanglement in local credit and exchange networks, will be explored in the context of wider research in the field.[17] Considered within this framework, it will be seen that the views of Defoe do not stand-out as the collective voice of an opposing 'elite', as Wood infers, but rather the voice of a London merchant turned gentleman, with no particular social or economic links to the region, no share in the proceeds of its natural resources, and no experience of transacting in local society.[18] In short, it offers a cursory view of the landscape and its inhabitants, based on what he had read in the accounts of earlier travellers, and from what little he could ascertain from his interactions with local inhabitants – a view which must be tested against the evidence and scholarly discussions considered in this thesis.

The thesis will explore the importance of locality, status, social networks, and household and family structures in the conduct of everyday social and economic affairs, building on recent research into the contours of social order and occupational structure in early modern England. Works by Keith Wrightson, and more recently, Craig Muldrew, Alexandra Shepard and Henry French, for example, have emphasised 'the language of sorts' and representations of status and 'worth', placing emphasis on the dynamics of local governance, access to local financial resources, and the importance of reputation and credibility in determining rank and status in local society.[19] It has revealed how relationships of dependence and independence, paternalism and deference, elite and common, age and gender, overlapped and interacted with those of interdependence, obligation, reciprocity and trust, to

[17] For more on the 'middling sort', see: P. Earle, *The Making of the English Middle class*, (London, 1989); J. Seed, 'From 'midding sort' to middle class in late eighteenth and early nineteenth century England', in M. Bush (ed.), *Social Orders and Social Classes in Europe since 1500* (London, 1992); M. Hunt, *The Middling Sort* (London, 1996); French, *Middle*; C. Muldrew, 'The 'middling sort': an emergent cultural identity' in K. Wrightson (ed.), *A Social History of England, 1500–1750* (Cambridge, 2017), pp.290–309.
[18] Wood, *Politics*, pp.7–9.
[19] K. Wrightson, 'The social order of early modern England: Three approaches' in L. Bonfield, R. Smith and K. Wrightson (eds.), *The World We Have Gained* (Oxford, 1986), pp.177–202; K. Wrightson, ''Sorts of people' in Tudor and Stuart England', in Barry and Brooks, *Middling*, pp.28–51. See also: A. Shepard, 'Manhood, credit and patriarchy in early modern England', *P&P*, 167 (2000), pp.75–106; C. Muldrew, 'Class and credit: social identity, wealth and the life course in early modern England', in H. French and J. Barry (eds.), *Identity and Agency in England, 1500–1800* (Basingstoke, 2004), pp.147–77; French, *Middle*, pp.1–29; A. Shepard, *Accounting for Oneself* (Oxford, 2015); Muldrew, 'Middling', pp.290–309.

create complex webs of social relations between individuals and household groups in local society.[20] Understood in this way, social status operated less as an overarching framework thrust upon early modern English society, as Wood has inferred in his work on Derbyshire, and more as a set of behaviours, characteristics, and relationships, negotiated at an interpersonal level during a period of rapid economic, social and cultural change.[21] Returning to Defoe, it is possible to reinterpret his view of the people who inhabited the peaks of Derbyshire in light of these historiographic insights. During a chance encounter with a Derbyshire lead miner, for example, Defoe describes how the miner appeared 'lean as a skeleton', 'pale as a dead corpse', 'his flesh lank', and his skin had a semblance 'of the lead itself.' He expresses fear and repulsion at this 'uncouth spectacle', the miner was 'clothed all in leather', with a brimless cap, carrying his tools, and a basket of lead weighing 'about three quarters of a hundred weight', which he had dragged to the surface using a rope tied to his waist.[22] Yet, these very same symbols and circumstances, which so repelled Defoe, were far from extraordinary in the context of north-west Derbyshire, and would have been viewed in a very different light by an inhabitant – even of genteel status – familiar with the structures and symbols of local society. After all, here was – as this thesis will highlight – an independent tradesman, who might employ others to assist him in his work, who owned his own tools, traded in a product few had the skill and knowledge to locate and extract, and who would have been accustomed to negotiating with merchants and gentlemen of Defoe's status, and carried with him, on this off chance, several shillings worth of ore.[23] This thesis will uncover the social and economic characteristics of this group of independent tradespeople and their knowledge and skills through a series of complementary local case studies. Far from representing victims of economic and industrial change, as Wood infers, the evidence explored here will suggest that the Derbyshire mining community played a crucial role in

[20] K. Wrightson, *English Society, 1580–1680* (London, 2003 ed.); C. Muldrew, *The Economy of Obligation* (Basingstoke, 1998), pp.148–56; French, *Middle*, pp.30–89; Shepard, *Accounting*, pp.82–113.
[21] For change, see especially Wrightson, *English*, pp.47–73, 157; Wrightson, 'Sorts', pp.28–51; Wrightson, 'Social', pp.177–202.
[22] Defoe, *Tour*, pp.466–8.
[23] D'Cruze, 'Middling', pp. Hunt, *Middling*, pp.1–21; French, *Middle*, pp.16–26.

driving the process of industrialisation at the local level, alongside a host of other 'middling' investors and creditors, overseers and practitioners involved in the mining trade.[24]

Crucial to this developing picture of local society, and central to the arguments presented in this thesis, is the operation of the early modern credit economy. The foremost study in this field has been Craig Muldrew's pioneering work *The Economy of Obligation: The Culture of Credit and Social Relations in Early Modern England*, which has contributed to a transformation in our understanding of early modern society and economy, shifting attention away from social 'conflict' and 'division' as drivers of change, and revealing an intricate system of checks and balances that helped govern habits and behaviours, and mediated between different groups at the interpersonal and local level.[25] Combining the latest research in early modern social and economic history with the theoretical insights provided by cultural anthropologists and sociologists, Muldrew has produced a coherent account of a financial system founded not on the rigid structures of economic determinism, as expounded by economists and econometricians, but rather on the more subjective, and 'messy', notions of trust, reciprocity and obligation.[26] His definition of 'credit', in particular, has gone further than previous attempts, by incorporating cultural as well as economic and social perspectives to generate a multi-faceted and pervasive concept, operating not only as a medium for financial transactions, but also as a cultural framework that helped shape the way individuals and groups thought and behaved at a variety of levels during the early modern period.[27] Credit has thus been transformed from an unintended consequence of change and institutional frailty (as diverse economic historians have suggested), to a pervasive feature of early modern economic life that helped drive change.[28] Whether in politics or religion, economy or society, gender or literature, this way of

[24] This subject shall be dealt with at length in Chapters 2 and 4.
[25] Muldrew, *Economy*, pp. 1–11.
[26] *Ibid*, pp. 1–11.
[27] *Ibid*, pp. 123–47, 315–33.
[28] T. Ashton, *The Industrial Revolution, 1760–1830* (Oxford, 1968 ed.), pp.78–89; B. Anderson, 'Money and the structure of credit in the eighteenth century', *Business History* 12 (1970), pp.85–101; P. Mathias, *The Transformation of England* (London, 1979), pp.88–115; J. Hoppit, 'The use and abuse of credit in eighteenth century England', in N. McKendrick and R. Outhwaite (ed.) *Business Life and Public Policy* (Cambridge, 1986), pp.64–78; J. Hoppit, *Risk Failure and English Business, 1700–1800* (Cambridge, 1987), pp.122–39. For a helpful overview of economic historian's approach to credit, see: M. Daunton, *Progress and Poverty* (Oxford, 1995), pp.236–60.

perceiving credit has seeped into the works of various writers, and influenced their interpretations of the early modern period.[29] The work of Margot Finn, in particular, has revealed how the 'character of credit' was represented in literature from the middle of the eighteenth century to the dawn of the twentieth, and revealed its popular use by Georgian, Victorian and Edwardian writers alike.[30] While in the field of gender studies, Amy Erickson, Beverly Lemire, and Alexandra Shepard have highlighted the multiplicity of roles played by different age and gender groups in the acquisition and use of credit and their contributions to economic and social change.[31]

This thesis aims to contribute to this growing body of research by exploring the relationship between the proliferation and use of credit, and the processes of industrialisation and economic change that came to define the latter stages of the early modern period, using the local case study of the Derbyshire lead industry. It will build on the detailed insights provided by Muldrew, Shepard, and Finn on 'the culture of credit', and consider more closely its practical role in everyday economic affairs, and its basis in household and community structures during the eighteenth century.[32] Whereas historians of industrialisation and economic growth have tended to adopt restrictive definitions of credit, which more or less align with its modern usage, this work shall adopt a much broader

[29] The literature dealing with issues of credit and reputation continues to expand, see for example: J. McCusker and K. Morgan (eds.), *The Early Modern Atlantic Economy* (Cambridge, 2000); A. Taylor, *Working Class Credit and Community Since 1918* (Basingstoke, 2002); M. Finn, *The Character of Credit* (Cambridge, 2003); A. Shepard, *Meanings of Manhood in Early Modern England* (Oxford, 2003); M. Poovey, *Genres of the Credit Economy* (London, 2008); F. Dabhoiwala, *The Origins of Sex* (Oxford, 2012), esp. pp. 54–65; L. Fontaine, *The Moral Economy* (Cambridge, 2014); A. Shepard, *Accounting for Oneself* (Oxford, 2015); C. Spence, *Women, Credit and Debt in Early Modern Scotland* (Manchester, 2016); B. Sheerin, *Desires of Credit in Early Modern Theory and Drama* (London, 2016); A. Kitch, *Political Economy and the States of Literature in Early Modern England* (London, 2016); J. Hoppit, *Britain's Political Economies* (Cambridge, 2017); C. Briggs and J. Zuijderduijn (eds.), *Land and Credit* (Basingstoke, 2018).

[30] Finn, *Character*, pp.317–27.

[31] A. Erickson, *Women and Property in Early Modern England* (London, 1993); Shepard, *Meanings*; B. Lemire, *The Business of Everyday Life* (Manchester, 2005). See also: B. Lemire, 'Petty pawns and informal lending: gender and the transformation of small–scale credit in England, 1600–1800', in K. Bruland and P. O'Brien (eds.), *From Family Firms to Corporate Capitalism* (Oxford, 1998); Shepard, 'Manhood', pp.75–106; A. Erickson, 'Married women's occupations in eighteenth–century London', *Continuity and Change*, 23 (2008), pp.267–307; A. Shepard and J. Spicksley, 'Worth age and social status in early modern England', *EcHR*, 64 (2011), pp.493–530; A. Shepard, 'Crediting women in the early modern English Economy', *History Workshop Journal*¸79(1), (2015), pp.1–24.

[32] Muldrew, *Economy*, pp.2–3; Finn, *Character*, pp.1–22; Shepherd, *Meanings*¸186–8. Alexandra Shepard's more recent work on notions of 'worth' and 'social status' have proven valuable, see especially: A. Shepard, 'Poverty, labour and the language of social description in early modern England', *P&P*, 201(1) (2008), pp.51–95; Shepard, *Accounting*.

interpretative framework, based largely on that devised by Muldrew.[33] Credit, in this thesis, will be considered as the foundation of the majority of financial transactions at the local level in provincial England, whether in the purchasing of goods from a local vendor, or the sourcing of capital for an industrial venture, actors were required to circumnavigate the credit economy, and were thus drawn into the sorts of moral equations noted above and discussed throughout this thesis.[34] By adopting this definition, the focus of economic transactions shifts to an individual's or family's embeddedness in local networks, their reputation among neighbours and friends, their social and material capital, and their status in local society.[35] Credit will thus also be treated as the embodiment of social status, and social status a reflection of wider perceptions of an individual's or household's 'worth' and 'creditworthiness' in local society.[36] Access to one required the nurturing and improvement of the other, and in an environment where currency was scarce and institutions weak, such interpersonal and localised systems of finance were crucial to the maintenance of everyday economic life.[37]

The Derbyshire lead industry, which had a protracted history of industrial activity, will thus offer telling evidence to explore the impact of the early modern credit economy on processes of industrialisation and economic change, while uncovering in the process a vivid portrait of dense household, kinship and community networks. For much of the medieval and early modern periods, the mining region of North West Derbyshire remained England's largest lead producer, and a major exporter to the continent. During the sixteenth and seventeenth centuries, in particular, lead was surpassed only by wool and iron, in the value of its export market, and Derbyshire remained the largest lead producing region in the country well into the eighteenth century, producing around 60 per cent of lead exported from Hull in the 1630s, and perhaps even greater proportions in the 1660s and 70s.[38]

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[33] Muldrew, *Economy*, pp.1–11; Finn, *Character*, pp.1–22; Shepard, *Accounting*, pp.277–302.
[34] Muldrew, *Economy*, p.329; Finn, *Character*, pp.317–27. For the London context, see: P. Temin and H. Voth, *Prometheus Shackled* (Oxford, 2013).
[35] M. Berg, 'Consumption in eighteenth– and early nineteenth–century Britain', in , in R. Floud and P. Johnson (eds.), *The Cambridge Economic History of Modern Britain*, I, (Cambridge, 2004), pp.357–87.
[36] The recent work of Alexandra Shepard has helped illuminate this relationship between 'credit', 'status', and 'worth', see: Shepard, *Accounting*, chps.2 and 3.
[37] For a particularly lucid discussion of the paucity of money, and the need for substitutes during the seventeenth and eighteenth centuries, see: Valenze, *Social*, pp.1–28. See also the recent work by Nuno Palma: 'Reconstruction of money supply over the long run: the case of England, 1270–1870', *EcHR*, 71(2) (2018), pp.373–92.
[38] Burt, 'Lead' , pp.254–8.

The eighteenth century saw mixed fortunes both at the national and local level. It began slowly as market instability and low lead prices triggered a decline in production from a high of 10,000 fodders a year in 1670 to around 6,000 by 1700.[39] Thereafter, the industry gradually recovered to reach sustained levels of over 10,000 tons a year in the 1750s, 60s and 70s. By the 1780s, however, output had fallen back to pre-1750s levels of between 5,000 and 7,500 tons of ore per year, which subsequently gave way to rapid decline in the 1790s and early 1800s.[40] This decline was the result of a combination of factors, triggered initially by interruptions to trade caused by the French Wars, and by increased competition from other lead producing regions and nations of Britain, including the North Pennines, Cornwall, Wales, and Scotland.[41] These factors combined to reduce the price of lead on the domestic market, which in turn, accentuated longer term problems related to the Derbyshire lead industry, including the wasting of accessible ore deposits, the increased financial burden of drainage, and the logistical challenges associated with transporting Derbyshire ore to relevant markets.[42]

At the heart of this industry was the artisanal mining community on which this thesis centres. This loosely defined social group was united by their adherence to a set of ancient 'free mining' customs practised in the Peaks of Derbyshire since at least the Anglo-Saxon period, and formally recognised in customary law during the Quo Warranto Inquiries of 1281-9.[43] These laws authorised

[39] The weight of a fodder varied from region to region, though for current purposes it may be considered as roughly equal to a ton, see: J. Rieuwerts, *Glossary of Derbyshire Lead Mining Terms* (Matlock Bath, 1998), p. 75.

[40] For more details on the sources of these estimates see especially: P. Riden, *Transport and Trade in the East Midlands, 1660–1840* (work in progress). I am grateful to Philip for providing me with an early copy of this work.

[41] For more on the impacts of war on the process of industrialisation, see: A. John, 'War and the English Economy 1700–1763', *EcHR*, 7 (1955), pp. 329–44; P. Dickson, *The Financial Revolution in England* (London, 1967), esp. chp.10; J. Williamson, 'Why was British Growth So Slow During the Industrial Revolution?', *JEH* 44 (1984), pp. 687–712; N. Crafts, 'British Economic Growth: Some Difficulties of Interpretation', *EEH*, 24 (1987), pp.245–68; Hoppit, *Risk*, pp. 122–39; P. O'Brien, 'The political economy of British taxation, 1660–1815' *EcHR* 41 (1988), pp. 1–32; J. Brewer, *The Sinews of Power* (London, 1989); J. Hoppit, 'Attitudes to credit in Britain, 1680–1790' *Historical Journal*, 33(2) (1990), pp. 305–22 R. Black and C. Gilmore, 'Crowding Out During Britain's Industrial Revolution', *JEH* 50 (1990), pp. 109–13. For Derbyshire: L. Willies, 'Prosperity and decline in Derbyshire lead mining', *PDMHS*, 9(5), (1986), pp. 251–82.

[42] *Ibid*, pp.278–9.

[43] J. Rieuwerts, *A History of the Laws and Customs of the Derbyshire Lead Mines* (Matlock Bath, 1987). For contemporary accounts of the Mining customs of Derbyshire, see: T. Houghton, *Rara Avis in Teris or the Compleat Miner* (Derby, 1729); G. Steer, *The Compleat Mineral Laws of Derbyshire*, (London, 1734); W. Hardy, *The Miner's Guide or Compleat Miner* (Sheffield, 1748), pp.39–42; J. Pilkington, *A View of the Present State of Derbyshire* (London, 1789), pp.111–5.

any person, or persons, to seek out and extract lead ore within a geo-administrative area known as 'the King's (or Queen's) field', on the condition that they first sought permission from their local 'Barmote Court' prior to commencing work. The courts were administered by officials called 'barmasters', assisted by 'deputy barmasters', and a jury of twenty-four 'experienced miners' usually selected from the local population.[44] Their roles' included assessing and collecting mineral duties, adjudicating disputes between various parties, and granting 'titles' to prospective miners. Titles were usually granted on the condition that 'proof' could be provided that the ground in question was ore bearing, and that a tribute could be made to the lord of the manor, called 'the Lord's Meer'.[45] Should these, and a number of other conditions, be met, then the ground was 'freed' from the regular laws of landownership and the miner was granted 'two Founder's Meers', or roughly 50 metres of land along a certain trajectory, where he could extract ore and transport it to the nearest highway without

Map 1.1: The principal settlements outlining the mining region of North West Derbyshire during the eighteenth century

[44] There were in fact several Barmote courts scattered across the Peaks of Derbyshire during this period. Each with their own slight modifications of the mining bye–laws and customs, see: Pilkington, *View*, pp.115–8
[45] See especially: J. Mander, *The Derbyshire Miners' Glossary* (Bakewell, 1824), pp.1–5, 42.

obstruction, either from competitors or landowners. The miner had only to pay a tax on every thirteenth 'dish' of ore to the lessee of mineral duties (which was the Duchy of Devonshire for much of the eighteenth century), called 'the lott', and remain active at the mine, then he could continue to work the vein indefinitely, applying for any additional meers via the Barmote Court. It was, therefore, within this customary framework that the occupational independence of the Derbyshire lead miners' was enshrined, enabling them to seek out and extract ore, without having the upfront capital or credit needed to purchase the land in which the ore was thought to be located.[46]

The area in which these customs operated, and upon which this study shall focus is illustrated in map 1.1.[47] It extended from Castleton in the north to Wirksworth in the south, Ashover in the east to Buxton in the west. Though the extent of mining activity shifted across the region over time, the map helps depict the spatial parameters of this study and demonstrates the extent of the lead industry in Derbyshire by the turn of the eighteenth century. The local economy was characteristically upland, with a sparsely distributed population, employed predominantly in pasture farming and rural industry.[48] After farming, the lead industry was the largest single employer in the north-west of Derbyshire, alongside frame knitting and limestone quarrying. Later in the eighteenth century, cotton became a major employer in the region, which included both the introduction of large cotton mills along the Derwent Valley, and an explosion in the number of artisanal producers housed in workshops working on subsidiary stages of the manufacturing process.[49] The period also witnessed a broader shift in the focus of industry and investment from the west to the east of the county. The introduction of canal and rail transport resulted in the opening up of the Derbyshire coal measures, and an expansion in its iron and steel manufacturing industries, while the growth of other regional economies, such as Lancashire, South Yorkshire, and the West Midlands, created strong regional markets for Derbyshire's natural resources.[50] The county thus remained at the forefront of the industrialisation

[46] Wood, *Politics*, pp.26–40.
[47] For other useful depictions of the mining area see especially: Kiernan, *Derbyshire*, pp.3–10; Wood, *Politics*, pp.29–35.
[48] J. Chambers, 'The Vale of Trent, 1660–1800', *EcHR*, Supplement 3 (1957), pp.5–18.
[49] For more see chapter 4, see also: S. Chapman, *The Early Factory Masters* (London, 1967) pp.77–100.
[50] See especially: J. Harris, *The British Iron Industry, 1700–1850* (Basingstoke, 1988); P. Riden, *The Butterley Company 1790–1830* (Chesterfield, 1990); C. Evans and G. Ryden (eds.), *The Industrial Revolution in Iron* (London, 2005).

process for much of the seventeenth, eighteenth and nineteenth centuries, and in contrast to other early industrialising regions, such as the Cotswolds, the Weald, and East Anglia, it was able to mould itself to prevailing economic currents, shifting from predominantly domestic lead and textile production during the eighteenth century, toward more coal, iron and steel-based heavy industry from the middle of the nineteenth century.[51] Much of this was undoubtedly due to Derbyshire's abundant natural resources, and its proximity to other industrialising regions; however, its success in developing and retaining relevant skills, knowledge and capital resources were also key.[52] Indeed, a central argument of this thesis is that the region's industrial success was heavily influenced by the strength of its economic and social networks, and the deep-rooted entrepreneurial culture of the local population.[53]

Industrialisation is a subject of long-standing debate and controversy in economic and social history, and is also at the centre of analysis in this thesis.[54] For the most part, research on the subject has focussed on measuring the pace, character and impact of economic and industrial change, with researchers disputing whether the Industrial Revolution of the late eighteenth and early nineteenth centuries was indeed a moment of revolutionary change, or a more gradual process of evolutionary development.[55] More recently, however, the focus of research has shifted beyond the boundaries set

[51] J. Thirsk, *The Rural Economy of England: Collected Essays* (London, 1984), pp.217–34; Berg, *Age*, pp.84–99; B. Short, 'The deindustrialization process: a case study of the Veald', P. Hudson, *Regions and Industries* (Cambridge, 1989), pp.156–74.

[52] For the more general case for Britain's resource advantage, and its contribution to the process of industrialisation, see especially: E. Wrigley, *Continuity, Chance and Change* (Cambridge, 1988), pp.68–97.

[53] In this way the thesis agrees with much recent work exploring the 'Industrial Enlightenment', see especially: J. Mokyr, *The Gifts of Athena* (Oxford, 2005); J. Mokyr, *The Enlightened Economy* (London, 2011); P. Jones, *Industrial Enlightenment* (Manchester, 2013).

[54] See especially: W. Rostow, *Stages of Economic Growth* (Cambridge, 1960); idem (ed.), *The Economics of Take-Off into Sustained Growth* (London, 1963); P. Mathias, *The First Industrial Nation*, (London, 1969); D. Landes, *The Unbound Prometheus* (Cambridge, 2003). See also: P. Mantoux, *The Industrial Revolution in the Eighteenth Century* (London, 1961); P. Deane, *The First Industrial Revolution* (London, 1965); M. Flinn, *The Origins of the Industrial Revolution* (London, 1966); R. Hartwell, *The Industrial Revolution and Economic Growth* (London, 1967); P. Deane and W. Cole, *British Economic Growth, 1688-1959* (1967); C. Harley, 'British industrialisation before 1841: Evidence of slower growth during the industrial revolution', *JEH*, 42 (1982), pp.267-89; N. Crafts, *British Economic Growth During the Industrial Revolution* (Oxford, 1985), pp.46-7; N. Crafts and C. K. Harley, 'Output growth and the British Industrial Revolution: A restatement of the Crafts-Harley view', *EcHR*, 45(4), (1992), pp.703-30. See also historiographical discussions in: Daunton, *Progress*, pp.125–47; J. Humphries, *Childhood and Child Labour* (Cambridge, 2010), pp.37–42; E. Griffin, *Liberty's Dawn* (New Haven, 2014), pp. 1–20.

[55] The literature on this subject is vast, and will be referenced where relevant throughout this thesis, for good overviews see: D. Cannadine, 'The present and the past in the English Industrial Revolution, 1880–1980', *P&P*, 103 (1984), pp.131–72; M. Berg and P. Hudson, 'Rehabilitating the Industrial Revolution', *EcHR*, 45(1), (1992), pp.24–50; P. Temin, 'Two views of the British Industrial Revolution', *The Journal of Economic History*, 57(1) (1997), pp.63–82; Griffin, *Liberty*, pp. 1–22.

by nations and states to consider the process of industrialisation in global perspective.[56] Works exploring the experiences of Britain in relation to its European counterparts, including the Dutch Republic, France, Italy and the German states of Prussia, Saxony, Bohemia, and Bavaria, as well as Asian, African and American economies, have tended either to downplay the 'exceptionalism' of British growth, emphasising its reliance on pan-European and pan-Asian patterns of technological, intellectual and economic change, or alternatively to laud Britain as a pioneer of industrialisation.[57] While this global approach offers useful context to the British case, it has so far done little to expand our understanding of the industrialisation process itself.[58] The problem lies not so much in the global perspective, but rather in the sorts of questions that are frequently asked, for example: 'why did Britain industrialise first?', or 'why did a certain economy not industrialise earlier?'[59] Such questions, do little to enhance our understanding of industrialisation, either in the British or global context, and tend to gloss over the ongoing debates and ambiguities in the respective national contexts.[60]

To achieve a more detailed understanding of industrialisation, to trace the pace and character of development, and to assess its causal roots, this thesis will start by exploring a particular industry

[56] See in particular: S. Engerman and P. O'Brien, 'The industrial revolution in global perspective', in Floud and Johnson, *Cambridge*, pp.451–64; R. Findlay and K. O'Rourke, *Power and Plenty*, (Oxford, 2007), pp.1–42; R. Allen, *The British Industrial Revolution in Global Perspective* (Cambridge, 2009), pp.135–55.

[57] See, for example: P. O'Brien and C. Keyder, *Economic Growth in Britain and France 1789–1914* (London, 1978); J. de Vries, and A. van der Woude, *The First Modern Economy* (Cambridge, 1997); K. Pomeranz, *The Great Divergence* (Princeton, 2000); S. Broadberry, and B. Gupta, 'The early modern great divergence: wages, prices and economic development in Europe and Asia, 1500–1800', *EcHR*, 59 (2006), pp.2–31; T. Hatton, K. O'Rourke and A. Taylor (eds), *The New Comparative Economic History: Essays in Honor of Jeffrey G. Williamson* (Cambridge, 2007); Allen, *British*; P. Parthasarathi, *Why Europe Grew Rich and Asia Did Not: Global Economic Divergence, 1600–1850* (Cambridge, 2011); P. Malanima, 'When did England overtake Italy? Medieval and early modern divergence in prices and wages', *European Review of Economic History*, 17 (2013), pp.45–70. For a useful overview of debates, see also: L. De La Escosura, 'Introduction' in L. De La Escosura (ed.), *Exceptionalism and Industrialisation* (Cambridge, 2011 ed.), pp.1–12; J. Mokyr, *The Enlightened Economy* (London, 2009), pp.1–13. See also collection of essays in: S. Broadberry, and K. O'Rourke (eds.), *The Cambridge Economic History of Europe*, I, *1700-1870* (Cambridge, 2010).

[58] R. Drayton and D. Motadel, 'Discussion: the futures of global history', *Journal of Global History* 13 (2018), pp.1–21. The pioneering work of Findlay and O'Rourke stands out in this regard, offering a detailed and deeply contextualised treatment of the role played by international trade in the industrial revolution and more widely, but as a study exploring the process of industrialisation it takes an inevitably general view, which masks the very processes and structures with which this thesis is concerned, see: *Power*, pp.311–64.

[59] See, for example, debate between Robert Allen and Jane Humphries concerning the 'high–wage economy' thesis: Allen, *Global*; J. Humphries, 'The lure of aggregates and the pitfalls of the patriarchal perspective: a critique of the high wage economy interpretation of the British Industrial Revolution', *EcHR*, 66(3), (2013), pp.693–714; R. Allen, 'The high wage economy and the industrial revolution: a restatement', *EcHR*, 68(1), (2015), pp.1–22.

[60] The precise character of British industrialisation is far from a settled case, see: J. Mokyr, 'Accounting for the Industrial Revolution', in Floud and Johnson, *Cambridge*, pp.1–27.

at the local level. The merits of 'the regional perspective', have been highlighted by Patricia Hudson, Maxine Berg, John Langton, and Derek Gregory, among others.[61] Drawing on F. F. Mendel's concept of 'proto-industrialisation', and writing in opposition to the 'slow-growth' thesis proposed by N. F. R. Crafts and Knick Harley, Hudson has shown how many of the structural changes observed in aggregate studies are best viewed from a regional perspective.[62] 'An identifying feature of the Industrial Revolution', she explains, 'was the marked dynamism of certain industrialising regions while in others manufacturing activity and its offshoots stagnated or declined.'[63] The limitation of aggregate approaches, and the importance of interpersonal and familial relations has more recently been emphasised by Emma Griffin, who in the context of the living standards debate, argued that: 'social, cultural and qualitative attempts to make sense of the human experience of economic modernization have been largely eclipsed by the inexorable march of statistics.'[64] The evidence presented in this thesis will support this approach and uncover the local dynamics of production and change which aggregate and quantitative studies cannot possibly reveal, and indeed are bound to obscure.

The approach adopted here will thus go beyond the regional perspective as practised by Hudson and Berg, for example, and uncover local family and household structures, the role played by hierarchies of gender and age, and consider the workings of credit in local society and its impact on processes of industrialisation and economic change. The term 'local' will prove useful here, rather than 'regional', due to its emphasis on individuals and their experiences, and the aforementioned

[61] See in particular: P. Hudson, 'The regional perspective', in Hudson, *Regions*, pp.5–38. See also: D. Gregory, *Regional Transformation and Industrial Revolution* (London, 1982); J. Langton, 'The industrial revolution and the regional geography of England' *Transactions of the Institute of British Geographers*, 9 (1984); D. Massey, *Spatial Divisions of Labour* (London, 1984); P. Hudson, *The Genesis of Industrial Capital* (Cambridge, 1986); Berg, *Age*; J. Stobart and N. Raven (eds.), *Towns, Regions and Industries* (Manchester, 2005).

[62] Hudson, 'Regional', pp.6–10; M. Berg and P. Hudson, 'Rehabilitating the Industrial Revolution', *EcHR*, 45(1) (1992), pp.24–50. For proto–industrialisation, see: F. Mendels, 1972 'Proto–industrializarion: the first phase of the industrialization process', *Journal of Economic History*, 32 (1972), pp.241–61; S. Pollard, *Peaceful Conquest. The Industrialisation of Europe, 1760–1970* (Oxford, 1981); P. Medick and J. Schlumbohm, *Industrialisation before Industrialisation* (Cambridge, 1981).

[63] P. Hudson, *The Industrial Revolution* (London, 1992), p.101.

[64] Griffin, *Liberty's*; E. Griffin, 'Diets, hunger and living standards during the British Industrial Revolution', *P&P*, 1 (2018), pp.71–111 esp. 72.

significance of such interactions in facilitating credit relations during this period.[65] In practice, the term is slippery, drawing both on spatial and social indicators, thus, localities may be distinguished by their infrastructure and geography, the 'parish', 'village' or 'township', for example, or alternatively by social relationships, 'communities', 'societies' or 'networks'. Locality – as seen here – moulds itself to the person or place in question, whether, for example, the lens is focussed on a labourer, tradesman, or merchant, or on a rural or urban settlement.[66] What distinguishes a locality from a 'region' or 'nation', therefore, is the immediacy of the processes and relationships in question, it describes a frame of reference that exists, principally, though not exclusively, at the level of the interpersonal or 'face-to-face', which may include correspondence over a long distance, but also assumes a level of familiarity and trust between individuals and groups that goes beyond the limits imposed by intermediation.[67] Moreover, the slipperiness of the term is crucial to the structuring of analysis in this thesis, as it permits the frame of study to expand or contract in response to the focus of analysis, thus the locality of a lead miner looks very different to that of a merchant or gentleman, and that of a rural village community to an urban parish. Yet, in each case, the social apparatuses under examination remain essentially the same, informed by similar cultural and social norms, and by the dynamics of interpersonal relations.[68]

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[65] For credit and its reliance upon locality and community, see: C. Muldrew, 'Interpreting the market: the ethics of credit and community relations in early modern England', *Social History*, 18(2) (1993), pp.163–83; C. Muldrew, 'The culture of reconciliation: community and the settlement of economic disputes in Early Modern England' *The Historical Journal*, 39(4) (1996), pp.915–42. See also: L. Fontaine, 'Antonio and Shylock: credit and trust in France, c.1680–1780', *EcHR*, 59 (2001), pp.39–57.

[66] For more on the concepts of locality and community, see in particular: M. Spufford, *Contrasting Communities*, (Cambridge, 1971), pp.xix–xxiii, 3–5; D. Hey, *An English Rural Community* (Leicester, 1974); A. Macfarlane, 'History, anthropology, and the study of communities', *Social History*, 2 (1977), pp.631–52; A. MacFarlane, 'Community: towards a variable conceptualisation for comparative research', *Social History*, 5 (1980), pp.105–29; A. Everitt, *Landscape and Community in England* (London, 1985); B. Short, 'Images and realities in the English rural community: an introduction', in B. Short, *The English Rural Community* (Cambridge, 1992), pp.1–18; P. Hudson and S. King, 'A sense of place: industrialising townships in eighteenth century Yorkshire' in R. Leboutte (ed.), *Proto–Industrialisation* (Geneva, 1996), pp.181–210; S. Thomas, *Creating Communities in Restoration England* (Brill, 2013). See also: P. Withington and A. Shepard, 'Introduction', in P. Withington and A. Shepard (eds.), *Communities in Early Modern England* (Manchester, 2000), pp.1–17.

[67] See especially the seminal essay by Patricia Hudson: 'Industrial organisation and structure', in Floud and Johnson, *Cambridge*, pp.28–56, esp. 53–5.

[68] For more discussions on the dynamics of interpersonal interaction at the local level during this period, see especially: Wrightson, *English*, pp. 230–6; Muldrew, *Economy*, pp. 123–47; Withington and Shepard, *Communities*, pp.1–12. See also collection of essays, in: N. Jones and D. Woolf (eds.), *Local Identities in Late Medieval and Early Modern England* (Basingstoke, 2007), esp. pp. 1–12; which explore the various interpretations of locality, and the importance of community network in medieval and early modern society.

In focussing on the dynamics of change at the interpersonal and local level, this study draws on the methodological framework provided by microhistory.[69] 'Microhistory', as Charles Joyner states, 'asks large questions in small places', for in the act of reducing the framework of analysis to the very small, but continuing to ask the same big questions of the evidence, a level of clarity and detail may be achieved that is extremely difficult to replicate in aggregation.[70] This approach, or 'historical practice' as Giovanni Levi defines it, acquired its name in the field of Italian Renaissance studies during the 1960s and 70s, but had its methodological antecedents in the earlier work of the Annales School in France.[71] In the context of early modern England, the pioneering work of Keith Wrightson and David Levine has proven particularly influential.[72] Their micro-studies centred on two geographically remote yet richly textured village communities, which Wrightson and Levine vividly describe as 'constellations of institutions', bound by 'a network of ties between kin, friends and neighbours', with 'a special claim on their loyalties' and 'a special place in their sense of personal identity.'[73] This way of envisioning local communities as 'constellations' has had a major impact on the approach adopted in this thesis, which comprises a close analysis of a number of local communities viewed in the context of the Derbyshire lead industry. In keeping with the microhistorical approach these communities will be placed firmly within their wider context, as part of regional and national systems that intersected and entangled one another, for, as populations expanded, individuals and families migrated, and trade networks multiplied, so too did the reach of these local networks. This

[69] See in particular: C. Ginzburg, *The Cheese and the Worms* (London, 1980); idem., 'Microhistory: Two or three things that I know about it', *Critical Inquiry*, 20(1), (1993), pp. 10–35; S. Gylfi Magnússon and I. Szijártó, *What is Microhistory* (London, 2013), pp. 1–12.

[70] For an interesting discussion of historiographical 'framing' over time, see: K. Wrightson, 'Introduction: Framing Early Modern England', in K. Wrightson (ed.), *A Social History of England, 1500–1750* (Cambridge, 2017), pp. 1–16. For more on the concept of Microhistory and its framework of analysis, see: G. Levi, 'On Microhistory', in P. Burke (ed.), *New Perspectives on Historical Writing* (Cambridge, 1991), pp. 93–113.

[71] See in particular work by Keith Thomas and Alan MacFarlane on the application of anthropology to social history: K. Thomas, 'History and anthropology' *P&P*, 24 (1963), pp. 3–24; A. Macfarlane. 'Historical anthropology', *Cambridge Anthropology*, 3 (1977), pp. 1–21. For Annales School, see especially: F. Braudel, 'Personal Testimony.' *Journal of Modern History* 44(4) (1972), pp. 448–467; H. Trevor-Roper, 'Fernand Braudel, the Annales, and the Mediterranean', *The Journal of Modern History*, 44(4) (1972), pp. 468–479; P. Burke, *The French Historical Revolution* (Cambridge, 1990); Magnússon and Szijártó, *Microhistory*, pp. 26–38.

[72] Wrightson and Levine, *Poverty;* idem, *The Making of an Industrial Society* (Cambridge, 1991). See also the pioneering work of Alan MacFarlane, *Witchcraft in Tudor and Stuart England* (London, 1977); idem., *The Family Life of Ralph Josselin* (London, 1977).

[73] Wrightson and Levine, *Poverty*, p. 75.

interplay between the general and particular, or as Wrightson termed it the 'nation and locality', will provide the backdrop to analysis in this thesis, as Levi noted: 'even the apparently minutest action of, say, somebody going to buy a loaf of bread actually encompasses the far wider system of the whole world's grain markets.'[74]

This thesis will thus be structured around a series of micro-level case studies of individuals, households and communities involved in the Derbyshire lead trade, and other local industries, during the eighteenth and early nineteenth centuries. Through a detailed reading of archival sources, including diaries, correspondence, account books and contemporary printed works, the constellation of social relations within the mining community of Derbyshire will be traced, and their complex and interwoven lives reconstructed through the flow of credit and capital via dense local networks. Chapter 1 will start by exploring a rare and hitherto unknown source: the diary of a Derbyshire lead miner, called John Naylor, covering the years 1789 to 1792, which will enable us to reconstruct in detail the social and economic structure of a Derbyshire mining household, adding depth and context to the caricature provided by Defoe, and discussed above.[75] While it covers only a brief period of time, the depth of evidence is extensive, including day-by-day accounts of his and his household's activities for 1095 consecutive days, commodity purchases, and a list of debts he owed to various creditors in the locality. The diary thus allows for a detailed study of everyday economic life during a dynamic period in history, with insights into patterns of work and consumption, the importance of household and community relations in accessing local credit facilities, and the role of credit as a tool for purchasing household amenities and meeting overhead costs associated with family business interests – including the purchase of tools and materials – prior to the receipt of income.

Chapter 2 will then broaden the frame of analysis to explore a workforce comprising hundreds of miners and wage labourers – including women and children – employed at a large capital mine called Miners Engine Mine, in the parish of Eyam, Derbyshire.[76] Using a series of account books,

[74] Levi, 'Microhistory', p. 96.
[75] DRO D7812/1: Lead miner's diary.
[76] The work of Lynn Willies has been particularly helpful in this analysis, see: L. Willies, 'Management and workers at Miners Engine Mine, Eyam, in the mid–eighteenth century', *BPDMHS*, 11(5), pp.223–32.

which survive for the periods 1737–1741, 1744–1745 and 1763–1765, this chapter will explore the makeup of the mine's workforce, investigate the different age and gender roles (performed both at the mine and within the mining household), and consider the role of family, kinship and other relationships in the division of labour, drawing on parish records to assist in the reconstruction of different family groups working at the mine.[77] As we shall see, this investigation will reveal a close-knit community of independent artisans, who operated a local system of labour organisation unique to Derbyshire – the Cope Bargain System, which allowed miners to retain control of employment opportunities at large-capital lead mines and cemented their independent status, as well as those of their dependants.[78] This gave rise to a distinct structuring of the mining workforce around the economic priorities of the mining household, with the labour of female and child relatives being utilised by the miners to supplement and enhance their household earnings, while at the same time providing a formidable barrier to entry from competing sources of labour. The work presented here, in conjunction with chapter 1, will show the importance of 'household-family' structures and kinship networks, especially in relation to the credit economy and processes of industrialisation, thus building on the recent work of Naomi Tadmor, Jane Humphries and Sarah Horrell in the history of family and the household.[79]

Chapter 3 will then explore further the importance of knowledge and skill in the Derbyshire mining trade, and discuss its broader role in the process of industrialisation. The key source here will be a little-known book, *The Miners Dictionary* (1747), written by a Derbyshire lead miner, called William Hooson, who lived and worked as a mine agent in the county of Flintshire, in North Wales,

[77] For the various accounts, see: DRO D7676/BagC/382: Miners Engine Cope Accounts 1737–1741; D7676/BagC/384 Miners Engine Accounts 1744–1746; D7676/BagC/386: Miners Engine Cope Accounts 1763–1765. For more on family reconstitution, see especially: D. Levine, *Family Formation in an Age of Nascent Capitalism* (New York, 1977), pp.153–74; E. Wrigley and R. Schofield, *The Population History of England 1541–1871* (Cambridge, 1989).

[78] The system did have equivalents in Cornwall and in the North Pennines, though its relationship to the mining customs practiced within the King's Field gave it a peculiar character, see chapter 2.

[79] To date these two literatures have ran parallel to one another in the fields of economic and social history, with very little overlap. This thesis offers an attempt to bring them closer together, see: S. Horrell and J. Humphries 'Women's labour force participation and the transition to the male–breadwinner family, 1790–1865', *EcHR*, 48(1), (1995), pp.89–117; N. Tadmor, 'The concept of the family–household in eighteenth–century England', *P&P*, 151 (1996), pp.111–40; S. Horrell and J. Humphries, 'The origins and expansion of the male breadwinner family: the case of nineteenth–century Britain', *IRSH*, 42 (1997), pp.25–64; N. Tadmor, *Family and Friends in Eighteenth–Century England* (Cambridge, 2001); Humphries, *Childhood*, pp.49–53.

during the mid-eighteenth century.[80] The book attracted a mixed reaction, including a fierce critique by a German physician, Diedrick Wessel Linden, who had trained in mineralogy at the Freiburg institute in Saxony, worked in Flintshire, and whose tract *A Letter to William Hooson a Derbyshire Lead Miner* was published in 1747.[81] The exchange between these two competing claimants to mining knowledge will be examined at length, revealing the importance of notions of 'experience' and 'practice', and exploring the different ways that both appealled to local gentry and merchant investors. It will also consider how knowledge and skill were utilised by practitioners and artisans in an increasingly competitive employment market, and the significant role played by networks of credit and trust in its acquisition, validation and dissemination.

Finally, Chapter 4 will explore in close detail the community of investors, shareholders and trustees, who helped finance Derbyshire lead, turnpike, canal, and cotton ventures during the eighteenth and early nineteenth centuries. The study will reveal a dense web of interpersonal and financial relationships, which interwove different sectors and industries, highlighting the main conduits through which capital and credit flowed locally and the role played by relationships of trust, reciprocity and obligation in acquiring the resources needed to finance capital ventures. Here we shall see a locally concentrated consortium of prominent individuals and families, who frequently invested alongside one another, forming partnerships and collaborations in a range of ventures often located within a narrowly defined local area, and which included a diverse cast of middling investors alongside merchants, gentlemen and aristocrats.

Altogether, this thesis will endeavour to explore the characteristics and mechanisms of a local industrial society, during the period 1700 to 1830, and thereby reflect on broader processes of economic and industrial change. It will interrogate the pace and character of change, its contexts and conditions, and above all, the importance of interpersonal relationships, and social and community ties in facilitating processes of change. In contrast to previous interpretations of the Derbyshire lead

[80] W. Hooson, *The Miners Dictionary*, (Wrexham, 1747). Its treatment has been restricted largely to specialists of the Derbyshire lead industry: J. Rhodes, 'Dr. Linden, William Hooson and North Welsh mining in the mid–18th century', *BPDMHS*, 3(5), (1963), pp.259–70; Wood, *Politics*, esp. pp. 8, 105–7, 164–9, and 305–6.
[81] D. Linden, *A Letter to William Hooson a Derbyshire Lead Miner* (Chester, 1747).

industry – and to several broader arguments concerning industrialisation – this thesis will seek to uncover the agency exercised by middling households, skilled artisans, their wives and children, and an array of practitioners and experts, who provided the man-power, ingenuity, and know-how, as well as the capital, credit and entrepreneurial endeavour, which proved indispensable in the process of industrialisation in the localities of Derbyshire and elsewhere.

Chapter 1
Credit, Consumption, and the Character of Work: The Case of the Naylor Household, c.1789-1792

On Monday 4th January 1790, a Derbyshire lead miner, John Naylor (Naylor) of Sheldon, in Derbyshire, recorded in his diary doing 'some little work about the home', having been housebound for two months prior with a 'very bad cold'. The next day he ventured out for the first time in weeks, to purchase some oatmeal from the nearby village of Monyash, and on Wednesday he was out 'getting moss for ye house' and was 'mossing a little of the house the remainder of the week.' On Monday 10th January, he visited Chelmorton to get his 'groove cloths' repaired, no doubt at a tailor's shop, and on the Thursday and Friday visited the neighbouring village of Ashford, and the town of Bakewell with his friends and fellow miners, Francis Bradbury and William Williamson.[1] Naylor was no doubt keen to reintegrate himself back into local society following his prolonged absence, spending this time reassuring creditors, employers and tradespeople that he was both alive and well, and ready to recommence his mining enterprises. Yet, even prior to his illness Naylor had spent much of 1789 working an unprofitable mine near to his home.[2] The mine, which he possessed in accordance with the free-mining customs of the Derbyshire lead industry, produced an average of £3 15s. 0d. per month at an average running cost of £2 15s. 0d. per month in 1789, or between £20 and £30 per year. Alongside these running costs, Naylor would also have had to pay a number of additional charges at a quarterly 'reckoning', including the mineral levy known as the lot,[3] the tithe paid to the clergy,[4]

[1] DRO, D7812/1: Lead miner's diary, pp. 33–34.
[2] *Ibid*, p. 1–20.
[3] For more on payment of lot, see Pilkington, *View*, pp. 116–117.
[4] For more on the tithe, see: J. Farey, *A General View of the Agriculture and Minerals of Derbyshire*, III, (London, 1811), pp. 370–371. See also: I. Bourne, *A Defence and Justification of minister's maintenance by* tythes, (London, 1659); S. Brand, 'An Ashover lead mining tithe dispute of the seventeenth century', *BDMHS*, 13(1), (1996), pp. 52–57.

transport fees to take his ore to market,[5] and fees to the local mining official known as the Barmaster.[6] From what remained, he had to maintain his household, purchase food and fuel, pay rent, and engage in the social obligations that being an effective member of the local mining community entailed.[7] As might be expected, his income could not match this long list of expenses and he consequently fell behind in the repayment of his debts. The situation reached crisis point in the winter of 1789, when he composed a list of the debts owed to fourteen creditors (table 2.1). The creditors were mainly vendors, landowners and fellow miners from the local area. Naylor's overall debt amounted at this point to £25 4s. 4d., or 55 percent of his total earnings in 1789.[8]

Fortunately, for Naylor, his circumstances altered dramatically in the subsequent months. On the 20th February he 'discovered some ore at maypit west forefield', and spent just under two weeks working at this 'new mine'. On the 10th March he 'bought plancks & boards' in Ashford, and began 'walling ye new shaft' from the 15th March. After just nineteen days of work he began 'knocking, buddling and washing' the ore extracted, and in thirty-two days he completed the task.[9] During this period he also expanded his workforce: hiring an additional female labourer, Margaret Harrison, to assist him for 10 ½ shifts, at 6d. a day, he also hired John Stone and William Williamson for a similar number of shifts each for about 11d. a day, while his eldest son John and youngest daughter Rebecca were more permanent features of his mining workforce, working several hundred days between them. The produce of this relatively brief period of frenetic activity was the near complete reversal of Naylor's financial situation. On the 30th April 1790 he 'measured 25 loads 4 dishes, 11 lotts, 4 tythes and 1 meer dish' of ore, worth a total of £56 4s. 0d. Thus, in a single stroke, recuperating all the losses

[5] M. Pawelski, 'Turnpikes and Local Industry: A study of the relationship between the lead industry and the turnpike system in eighteenth century Derbyshire', in C. Wrigley (ed.) *The Industrial Revolution: Cromford, The Derwent Valley and The Wider World*, (Cromford, 2015), pp. 55–71.
[6] For barmasters, see: Farey, *General*, p. 357; Kiernan, *Derbyshire*, pp. 6, 9; J. Rieuwerts, 'An Early Barmote Court Dispute and some facts relating to Flots, Floats, Flats and Pipes' BPDMHS, 11(3), (1990), pp. 145–147; H. Usher, 'Barmaster of Wirksworth', *Derbyshire Miscellany*, 12(5), (1991), p. 156; R. Slack 'Gentlemen barmasters: a seventeenth century mining dynasty', *BPDMHS*, 11(4), (1991), pp. 203–205; Wood, *Politics*, pp. 142–143.
[7] DRO, D7812/1, pp. 30–35, 113.
[8] *Ibid*, p. 26.
[9] For definition of 'knocking', 'buddling' and 'washing', see: J. Rieuwerts, *Glossary of Derbyshire Lead Mining Terms* (Matlock Bath, 1998), pp. 95, 33 and 165.

of the previous years.[10] Following this tremendous haul, he embarked on a relatively prosperous period that continued until late in 1791, when output began to slowdown once more. Naylor's final income receipt was recorded on the 20th June 1791; thereafter, he continued 'driving' and tunnelling in pursuit of his next lucky break. On 13th of January 1792 his final entry in the diary was 'we got through', what happened thereafter is unknown.[11]

Table 2.1: *Naylor's debts in December in 1789*

Names of Debtors	**Amount indebted**
Aaron Joel	£1 15s. 0d.
Wm Gregory	£4 0s. 0d.
Mr R: Needham	£0 12s. 6d.
Wm Skidmore	£2 1s. 7d.
Wm Bagshawe	£0 15s. 6d.
Rich Brushfield	£0 10s. 6d.
Henry Naylor	£2 2s. 0d.
Wm Bonsall	£0 9s. 0d.
J. B	£0 9s. 9d.
Thomas Needham	£0 18s. 2d.
Mr Roberts	£4 0s. 8d.
Mr Woodruff	£3 6s. 1d.
A. G.	£3 3s. 0d.
J. W.	£1 8s. 0d.
Total	£25 4s. 4d.

Thus, this vivid portrayal captured in Naylor's diary over the course of 1095 consecutive days, and including over 500 commodity purchases, and chronicling debts, settlements visited, and persons he employed or for whom he was employed, grants an unprecedented window into the life of a Derbyshire lead miner and his family, and provides the evidential basis for this chapter. Insights generated by the diary will centre on what Keith Wrightson termed 'the earthly necessities', or what Jan De Vries termed 'the industrious household economy', as it presents historians with a glimpse into how a struggling, but by no means destitute, middling household navigated the tumultuous course of everyday economic life, the opportunities and challenges it presented, the potential for both

[10] For more on measurements, see introduction. The valuation was based on a price of £2 6s. per load that Naylor records in 1790, the price later rises to £2 7s. per load in 1791.
[11] DRO, D7812/1, p. 105.

prosperity and plight, and the importance of interpersonal relationships, forged through interdependence and trust in a world devoid of institutional safeguards, where the failure of an individual or household to stay on top of their debts could spell ruination or serious hardship for an entire community enmeshed in webs of credit and interdependency.[12] This chapter will utilise this evidence to reflect critically on debates surrounding the issues of consumption and living standards during the Industrial Revolution, highlighting the importance of credit, as a means of regulating expenditure in the face of unpredictable earnings.[13] Recent studies by Jane Humphries, Emma Griffin and Judy Stephenson have criticised the methods traditionally used to construct wage and price indices for the eighteenth and nineteenth centuries, and questioned the aggregate approach more generally to measuring changes in living standards, though the role of credit remains as yet neglected.[14] The observations provided here support their critique, and suggest that a more historically sensitive and detailed study of everyday economic life is indeed useful for rendering insights into the impact that industrialisation had on living standards during this period, and the role played by credit in this process. Evidence provided by the diary will also facilitate a critical analysis of the claims made by various historians concerning 'time and work-discipline' prior to the introduction of the factory

[12] J. De Vries, 'The Industrial Revolution and the Industrious Revolution', *JEH*, 54(2) (1994), pp. 258–61; Wrightson, *Earthly*, pp. 87–113, 300–303; De Vries, *Industrious*. See also: B. Holderness, 'Credit in English rural society before the nineteenth century, with special reference to the period 1650–1720', *AgHR*, 24 (1976), 97–109; Hoppit, 'Attitudes', pp. 305–22; Muldrew, *Economy*, pp. 157–72.

[13] For select works on the standard of living, see: T. Ashton, 'The Standard of Life of the workers in England, 1790–1850', *JEH*, Supplement 9, (1949), pp. 19–38; E. Hobsbawm, 'The British Standard of Living 1790 – 1850', *EcHR*, 10(1) (1957), pp. 46–68; R. Hatwell, 'The Rising Standard of Living in England, 1800–1851', *EcHR*,13(3) (1961), pp. 397–416; E. Hobsbawm, 'The Standard of Living during the Industrial Revolution: A Discussion', *EcHR*, 16(1), (1963), pp. 119–135; R. Hartwell, 'The Standard of Living', *EcHR*, 16(1) (1963), pp. 135–146; A. Taylor, *The Standard of Living in Britain in the Industrial Revolution*, (London, 1975); P. Lindert, 'English Workers' Living standards during the Industrial Revolution: A New Look' *EcHR*, 36(1), (1983), pp. 1–25; N. Stephen and R. Steckel, 'Heights and Living Standards of English Workers during the Early Years of Industrialisation, 1770 – 1815' *Economic History Association*, 51(4) (1991), pp. 937–957; S. Horrell and J. Humphries, 'Old Questions, New Data, and Alternative Perspectives: Families' Living Standards in the Industrial Revolution', *JEH*, 52, (1992) pp. 849–880; C. Feinstein, 'Pessimism Perpetuated: Real Wages and the Standard of Living in Britain during and after the Industrial Revolution', *Economic History Association*, 58(3), (1998), pp. 625–58; J. van Zanden, 'Wages and the standard of living in Europe, 1500–1800', *European Review of Economic History*, 3 (1999), pp. 175–98; Humphries, *Childhood*, pp. 85–7; G. Clark, 'Farm wages and living standards in the Industrial Revolution: England, 1670-1869', *EcHR*, 54(3), (2001), pp.477-505; P. Antràs and H. J. Voth, 'Effort or efficiency? Factor prices and productivity growth during the English Industrial Revolution', *EEH*, 40 (2003), pp.52-77; Griffin, 'Diets', pp.71–111.

[14] See especially: J. Humphries, 'The lure of aggregates and the pitfalls of the patriarchal perspective: a critique of the high wage economy interpretation of the British industrial revolution', *EcHR*, 66(3) (2013), pp. 693–714; Griffin, *Liberty's*, pp. 1–20; J. Stephenson, "Real' wages? Contractors, workers, and pay in London building trades, 1650–1800', *EcHR*, 71(1) (2018), pp. 106–32; Griffin, 'Diets', pp. 71–111.

system and the strictures of industrial capitalism.[15] As an independent artisan, responsible for his own work schedule, and employed principally at his own mine, Naylor's case provides an important counterbalance to the predominantly urban and retail based evidence compiled by recent studies of early modern work.[16] Free from the constraints of the factory system, and from the dictates of a capitalist employer, rural artisans were thought to have operated a far less rigorous schedule.[17] Yet, the evidence presented here will suggest a very different picture, one of a self-motivated and disciplined individual, driven by necessity and social impulse, to be productive and to maintain his credit among his neighbours.

Evidently, the diary of John Naylor, which serves as the main source for this chapter is restricted to the experiences of a single miner, his household, and the individuals and households with whom he interacted and worked on a daily basis; particular care has been taken therefore not to overreach the available evidence. Yet, what the source offers in abundance, is detailed data which can assist us in understanding decision making processes made by and within this household on a daily basis: how they adapted to financial and economic crisis, the effort they made to honour debts, the sorts of goods they could purchase, and how these changed in view of earnings and the availability of work.[18] It furthermore allows for the reconstruction of the different roles played by men, women and children, their contribution to the maintenance of household credibility, and the sorts of work they commonly performed to support household income – a subject further explored in chapter 2 of this thesis.[19] Effort has also been made throughout this chapter to provide the broadest possible context to the events recorded in Naylor's diary, to assess where possible assumptions commonly made by economic and social historians concerning household earnings and consumption patterns, and to

[15] For traditional account of time and work-discipline and its roots in industrial capitalism, see: E. Thompson, 'Time, work–discipline and industrial capitalism', *P&P*, 38 (1967), pp. 56–97; D. Landes, *A Revolution in Time* (London, 1983).
[16] For revisionist account of time and work-discipline, see: M. Sauter, 'Clockwatchers and stargazers: time discipline in early modern Berlin', *AHR*, 112(3) (2007), pp. 685–709; N. Thrift and P. Glennie, *Shaping the Day* (Oxford, 2009), pp. 42–7; A. Cohen, 'The clockwork self: mechanical clockwork and early modern discipline' in A. Cohen (ed.), *Technology and the Early Modern Self* (Basingstoke, 2009), pp. 23–50; B. Blondé and G. Verhoeven, 'Against the clock: time awareness in early modern Antwerp, 1585–1789', *C&C*, 28(2) (2013), pp. 213–44.
[17] Thompson, 'Time', pp. 58–63.
[18] Feinstein, 'Pessimism', pp. 625–58.
[19] For a wider examination of this process see especially: *Ibid*, chps.1 and 2.

explore broader questions regarding the lot of ordinary people and families during this period of transformative economic and industrial change.[20] Though circumstances were far from easy, Naylor was nevertheless able to get by, and even flourish, during this challenging period, and the evidence suggests that miners such as he remained influential players in local society and the economy, even by the turn of the nineteenth century.[21] The principal value of this source, however, lies in the insight it provides into the 'history of the everyday', and the intimate portrayal it grants of a middling household battling to stabilise its domestic economy through a period of transition.[22]

The chapter will begin by reconstructing the Naylor household, on the basis of the diary and additional records, both to establish its membership, and retrace its process of expansion and contraction over the course of its life cycle, as children were born, nurtured, employed, and subsequently married.[23] Consideration will be given to the changing patterns of demand caused by the waxing and waning of household membership, to enable us to assess the situation that faced the Naylor household when the diary commenced in 1789. Section II will further expand the framework of analysis to uncover the wider communal context in which the Naylor's lived and worked, tracing their patterns of movement, the location of their creditors, suppliers and customers, and the places where they found work and leisure. While tracing Naylor household's network of interactions, a detailed map will also be produced offering fresh insights into the social universe of middling households during the early modern period. The regularity, predictability and character of Naylor's work and earnings will be examined in section III, using the data provided by his diary, which will be combined

[20] We contend especially with the overtly pessimistic interpretations rendered by economic and social historians, from Feinstein to Thomspon, for a wider discussion of this literature, see: Griffin, *Libtery's*, pp. 1–20, 241–7.

[21] This challenges the narrative driven by Andy Wood's analysis of the Derbyshire lead miners, for a stronger critique see chapter 2 below.

[22] For overview of this approach, otherwise known as 'Alltagsgeschichte', see: J. Brewer, 'Microhistory and the histories of the everyday life', *The Journal of Social History*, 7(1) (2010), pp. 87–109.

[23] This builds on a vast literature on family formation, and life–cycle economics, see for example: J. Hajnal, 'European marriage patterns in perspective' in D. Glass and D. Eversley (eds.), *Population in History: Essays in Historical Demography* (London, 1965), pp. 101–43; P. Laslett, 'Size and structure of the household in England over three centuries', *Population Studies*, 23(2) (1969), pp. 199–223; Levine, *Family*; J. Hajnal, 'Two kinds of preindustrial household formation system', *Population and Development Review* 8 (1982), pp. 449–94; Wrigley and Schofield, *Population*; R. O'Day, *The Family and Family Relationships, 1500–1900* (London, 1994), pp. 248–56; D. Cressy, *Birth, Marriage & Death* (Oxford, 1997). More recently the work of Naomi Tadmor and Jane Humphries have redefined the field in very different ways, see: Tadmor, *Family*, pp. 1–17; Humphries, *Childhood*, pp. 49–83.

with evidence compiled for workers employed in other industries and sectors in order to assess the trends revealed in Naylor's case. It will be argued that the Naylor household's pattern of work was driven by the demands imposed by the maintenance of credibility in local society, and by the need to sustain the material well-being of the household. Finally, section IV will reconstruct the Naylor household's pattern of consumption from 1789 to 1792. Using the lists of commodity purchases extracted from Naylor's diary, alongside work and earnings data, the centrality of credit, lent on the basis of trust, in the purchasing of everyday household amenities, and in the levelling out of consumption patterns will be highlighted once again during a period marked by economic and political uncertainty.[24]

In short, this chapter will highlight the centrality of the household economy to this eighteenth-century mining community and reveal the vitally important role played by locally sourced credit in processes of labour, consumption and expenditure patterns. How a household was perceived as a collective – financially, economically, and morally – was just as important as the average earnings of the household head in determining prosperity, and managing crises. The example of the Naylor household suggests that meeting debt requirements was a priority for middling households, such as Naylor's. It demonstrated to creditors that they could be trusted to honour their contracts, which in turn increased their credibility among neighbours and further enhanced their access to communal credit facilities.[25] Let us start, then, by establishing the history of the Naylor household, and its changing structure over time.

[24] Hoppit, *Risk*, pp. 19–29, 122–39, 161–75.
[25] Muldrew, *Economy*, pp. 157–72.

I. *Household*

By 1789, the Naylor household had entered what might be termed its terminal phase. The diary shows that its head, Naylor, and his wife, Ann, were living and working with their eldest son, John, and youngest daughter, Rebecca, but that both were actively seeking work independently of their parents, and were thus likely nearing maturity.[26] Yet, beyond these rather tangential observations the diary offers only scattered details about the household's travails over the course of its history. To overcome these gaps in knowledge, parish records have been consulted, generating a wealth of relevant contextual information, which have in turn been used to model the Naylor household's development over the course of its history.[27] This analysis allows for a more precise assessment of the challenges the Naylor's faced at the commencement of the diary, and more importantly, their ability to meet those challenges. The findings from this analysis suggest that the Naylor household followed a fairly typical

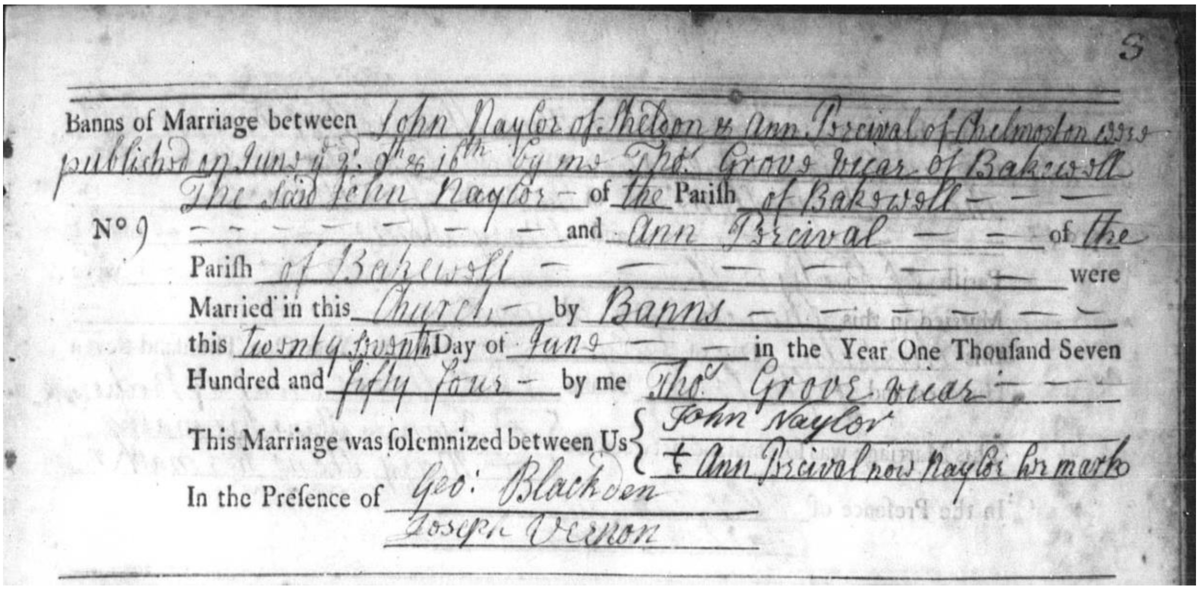
Banns of Marriage between John Naylor of Shelton & Ann Percival of Chelmorton were published on June ye 2. 9 & 16th by me Thos. Grove Vicar of Bakewell
No 9 The said John Naylor of the Parish of Bakewell and Ann Percival of the Parish of Bakewell were Married in this Church by Banns this Twenty seventh Day of June in the Year One Thousand Seven Hundred and fifty four by me Thos Grove Vicar
This Marriage was solemnized between Us { John Naylor / + Ann Percival now Naylor her mark
In the Presence of Geo: Blackden / Joseph Vernon

Image 2.1: *Marriage certificate of John Naylor and Ann Percival, 1754*

pattern of development, which corresponds with macro-level observations.[28] The model generated

[26] For more on the work habits of the Naylor household see section III below. See also: R. Wall, 'The age at leaving home', *Journal of Family History*, 3 (1978), pp. 181–202; I. Ben–Amos, 'Service and the coming of age of young men in seventeenth–century England' *C&C*, 3(1), (1988), pp. 41–64.
[27] See especially: DRO D2057: Bakewell Parish Records.
[28] M. Anderson, *Family Structure in Nineteenth Century Lancashire* (Cambridge, 1971); P. Laslett and R. Wall (eds.), *Household and Family in Past Time* (Cambridge, 1972); R. Schofield, 'Age–specific mobility in an eighteenth–century English parish', *Annales de Démographie Historique* (1970), pp. 261–274; J. Plumb 'The

also marries neatly with the observation made by Jan de Vries, Humphries, and others, regarding the centrality of the early modern household economy as an industrialising unit and the focal point of all manner of economic and commercial activities.[29]

Parish records show that Naylor was born in 1728 to John Naylor (1700-1749) and Hannah Hibbert (1700-1789) in the village of Sheldon, in Derbyshire. John was part of a mining dynasty dating back several generations, while Hannah's family were farmers from the nearby village of Monyash. Naylor appears to have been their only surviving child, and the sole inheritor of their possessions, which was both a blessing and curse, as the responsibility for their care in later life also fell largely to him.[30] This situation was exacerbated by John's premature death in 1749, which left Naylor in a position of responsibility at the comparatively young age of 21. During this challenging period, Naylor no doubt drew on the support and guidance of his neighbours, kin and widowed mother, Hannah, who at the age of 49 had no children or grandchildren to care for, and could, therefore, focus on contributing to household income, which, as several studies have demonstrated, could constitute a substantial sum.[31] Whatever the case, Naylor, and his mother, were able to successfully navigate this challenging period, and on the 27th June 1754, at the age of 26, he married Ann Percival at the parish

new world of children in eighteenth century England', *P&P*, 67 (1975), pp. 64–95; Wall, 'Age', pp. 181–202; D. Souden 'Movers and stayers in family reconstitution populations' *Local Population Studies*, 33 (1984), pp. 11–28; Wrigley and Schofield, *Population*; R. O'Day, *The Family and Family Relationships, 1500–1900* (London, 1994), 1–28. See also: Tadmor, *Family*, pp. 1–17; J. Field, 'Domestic service, gender and wages in rural England, c.1700–1860', *EcHR*, 66(1), (2013), pp. 249–72.

[29] J. de Vries, "Between Purchasing Power and the World of Goods. Understanding the Household Economy in Early Modern Europe," in J. Brewer and R. Porter (eds.), *Consumption and the World of Goods* (London, 1993); de Vries, 'Industrious', pp. 255–8; de Vries, *Industrious*, pp. 1–9. For more on the concept of the household–family see also: Tadmor, 'Concept', pp. 111–40. See also: J. Humphries, 'Household economy', in Floud and Johnson, *Cambridge*, pp. 238–67; Humphries, *Childhood*, pp. 241–4, 334–5.

[30] T. Wales, 'Poverty, poor relief and the life–cycle: some evidence from seventeenth–century Norfolk', in R. Smith (ed.), *Land, kinship and life–cycle* (Cambridge, 1984); M. Pelling, 'Old age, poverty, and disability in early modern Norwich: work, remarriage and other expedients', in M. Pelling and R. Smith (eds.), *Life, Death and the Elderly* (London, 1991), pp. 112–38; J. Whittle, 'Inheritance, marriage, widowhood, and remarriage: a comparative perspective on women and landholding in north–east Norfolk, 1440–1580', *C&C*, 13(1), (1998), pp. 33–72; Shepard, *Meanings*, pp. 231–45.

[31] B. Holderness, 'Widows in pre–industrial society: an essay upon their economic functions' in Smith, *Land*, pp. 423–42; P. Earle, 'The female labour market in London in the late seventeenth and early eighteenth centuries', *EcHR* 42, (1989), pp. 328–352; L. Botelho, "The old woman's wish': Widows by the family fire? Widows' old provisions in rural England, 1500– 1700' *The History of the Family*, 7 (2002), pp. 59–78; J. Whittle, 'Enterprising widows and active wives: women's unpaid work in the household economy of early modern England', *The History of the Family*, 19 (2014), pp. 283–300. For co–residence of elderly parents and adult children, see: S. Ottaway, *The Decline of Life* (Cambridge, 2009), pp. 150–5.

church in Bakewell.[32] Ann was the daughter of George Percival of the nearby village of Chelmorton, who appears to have been a reasonably comfortable middling farmer.[33] Naylor and Ann's marriage certificate shows that Naylor was able to write competently, while Ann signed the certificate with a mark (see image 2.1).[34] The overall impression given by the parish records is that the nuptial arrangement between the Percival's and Naylor's was made in good faith, and on comparatively even terms. Naylor was evidently in a position to provide by this stage, he was literate, in possession of a sought after skill, and was not, it seems, unduly hindered by his father's early death. Indeed, there is evidence to suggest that Naylor rose quite rapidly through the ranks as a miner, and was employed as mine agent at Maypit Mine near Sheldon, in the late 1770s and early 1780s.[35] Their marriage lasted 55 years, ending with their deaths in 1809.[36]

Over the course of their long marriage, Naylor and Ann had a total of seven children, including: Elizabeth (b.1755–), Hannah (b.1757–), Sarah (b.1760 –), Anne (b.1763 – d.1795), John (b.1766 – d.1841), George (b.1769 – d.1771), and Rebecca (b.1772 – d.1844). George, died in infancy, but the other six appear to have survived into adulthood.[37] The children were born in consistent three year intervals, which suggests that Ann likely tended each of her children herself, giving rise to a remarkably consistent procreative rhythm.[38] The lack of burial information for the eldest three daughters suggests that they likely died outside of the parish of Bakewell, while evidence for the remaining four shows that they remained in their parish of birth their entire lives.[39] The records also suggest that Naylor's mother, Hannah, may have remained a member of her son's household until her death in 1789, which was not uncommon during this period, as averages of 7.9 percent of labourers'

[32] The average age of marriage for men was between 27 and 28, and for women 25 and 26, right up to the end of the eighteenth century, see: Wrigley and Schofield, *Population*, p. 255.
[33] See the will and inventory of George Percival, now housed at the Staffordshire Record Office.
[34] This is typical of difference between male and female literacy rates, see: D. Cressy, *Literacy and the Social Order* (Cambridge, 1980), pp. 42–62, 118–42.
[35] This connection seems plausible, though examination of archival sources highlighted by Lynn Willies, have proven unforthcoming, see: L. Willies, 'Technical and Organisational Development of the Derbyshire Lead Mining Industry in the Eighteenth and Ninteenth Centuries' unpublished PhD Thesis (Leicester University, 1980), p. 137.
[36] At the comparatively advanced ages of 81 and 80, which far surpasses average life expectancy from birth as measured by Wrigley and Schofield, *Population*, p. 177.
[37] Which was no mean feat considering the levels of infant mortality during this period, see: *Ibid*, pp. 249–52.
[38] Cressy, *Birth*, pp. 15–34.
[39] For more on the working lives of women see Chapter 2 below.

and 12.3 percent of craftsmen's households included older generations in residence.[40] However, the sheer size of the Naylor household, the timing of their children's births, and the gender of the eldest four, would no doubt have placed a tremendous strain on the household's collective resources and some may well have entered into service during particularly difficult periods in the household's development.[41] This would certainly explain the disappearance of the eldest three daughters from the parish records of Bakewell and its surrounding area, though further analysis is required to confirm this hypothesis.[42]

The stages of development undergone by the Naylor household are illustrated in table 2.2. It provides an overview of the maturation of each child measured in five year intervals beginning with the birth of their first child, Elizabeth, in 1755, and ending with the commencement of the diary in 1789. It highlights a series of crisis periods in the family's development centred in particular on the 1760s and 70s, when the dependency ratio rose to 1:6.[43] This period may well have triggered the shedding of the elder daughters, who would have been aged between 13 and 15 at this time, and were thus of ideal age to commence service.[44] However, evidence explored here, and in Chapter 2, suggests that entry into service was far from an assumed path for children of mining households during this period.[45] If, as seems likely, the eldest daughters left home to enter into service, the decision appears to have been made of necessity rather than common procedure. For, when given the choice, as in the case of their youngest four children, the preference appears to have been the retention and utilisation

[40] Laslett, *World*, p. 96. See also: Ottaway, *Decline*, pp. 142–50.
[41] P. Laslett, 'Mean household size in England since the sixteenth century', in Laslett and Wall, *Household*, pp. 125–58 Wrightson, *Earthly*, pp. 30–3. See also: Anderson, *Family*; R. Wall, 'Regional and temporal variations in English household structure from 1650', in J. Hobcraft and P. Rees (eds.), *Regional aspects of British population growth* (London, 1979), pp. 89–113; A. Kussmaul, *Servants in Husbandry in Early Modern England* (Cambridge, 1981), pp. 70–8.
[42] Women who travelled and settled are particular difficult to trace due to English marriage laws, see: Erickson, *Women*, pp. 102–13, 129–54.
[43] For fuller discussion of dependency ratio, see: Wrigley and Schofield, *Population*, pp. 443–9.
[44] Kussmaul, *Servants*, p. 72. See also: S. Smith, 'The London Apprentices as Seventeenth–Century Adolescents', *P&P*, 61 (1973), pp. 149–61; M. McIntosh, 'Servants and the household unit in an Elizabethan English community', *Journal of Family History*, 9 (1984), 3–23; R. Wall, 'Leaving', pp. 77–101; I. Ben–Amos, *Adolescence and Youth in Early Modern England* (New Haven, 1994); C. Brooks, 'Apprenticeship, social mobility and the middling sort, 1550–1800', in J. Barry and C. Brooks (eds.), *The Middling Sort of People* (Basingstoke, 1994); P. Griffiths, *Youth and Authority* (Oxford, 1996), pp. 7–8.
[45] Kussmaul, *Servants*, pp. 70–2. For critical analysis of 'life–cycle service', see also: G. Mayhew, 'Life–cycle service and the family unit in early modern Rye', *C&C*, 6(2) (1991), pp. 201–26; Wall, 'Age', pp. 181–202; Wall, 'Leaving', pp. 77–101.

of child labour, rather than their release.[46] Further demographic work is needed to establish whether this pattern was a regional trend, or whether it was limited to the lead mining community, though recent aggregate and regional studies have emphasised the plurality of life choices made by early modern children.[47] The 1770s were also witness to a family tragedy, with the premature death of George at the age of three. The timing suggests it may well have been linked – directly or indirectly – to the resource challenges faced during these years, and certainly would not have been the first casualty of a crowded and financially strained household.

Table 2.2*: The Naylor Household, c.1755-1790*

Date	Elizabeth (b.1755)	Hannah (b.1757)	Sarah (b.1760)	Ann (b.1763)	John (b.1766)	George (b.1769)	Rebecca (b.1772)
1755	0						
1760	5	3	0				
1765	10	8	5	2			
1770	15	13	10	7	4	1	
1775	20	18	15	12	9	(D)	3
1780	25	23	20	17	14	(D)	8
1785	30	28	25	22	19	(D)	13
1790	35	33	30	27	24	(D)	18

Key

Dependant	0 - 15
Semi-independent	15 -20
Independent	21 or above
(D)	Passed away
	Not born

Another way of analysing the resource demands faced by the Naylor household at different times is through the use of food baskets as a measure of changes in consumption.[48] While this measure is inherently problematic, especially when applied to aggregate level analysis, its use in this context is justified by its more limited scope.[49] As table 2.3 shows, assuming all the Naylor children remained

[46] For more on the retention of children in mining households, see chapter 2. For other experiences, see also: Wall, 'Age', pp. 181–202; Mayhew, 'Life–cycle', pp. 225–6; Wall, 'Leaving', pp. 77–80.
[47] See especially: Humphries, *Childhood*, chp. 7.
[48] For theory behind food baskets, see: Allen, *British*, pp. 33–7.
[49] See for example criticisms of Allen's 'food basket': Humphries, 'Lure', pp. 697–703.

at home during their dependent phase, and discounting the hypothetical presence of Naylor's mother, the food demand of the Naylor household increased dramatically during the 1760s and 70s, reaching a peak of just under 7 food baskets by the start of the 1780s. This rapid increase in demand reflects both the growing number of children and their escalating dietary requirements linked to age (see table 2.4). However, what distinguishes the 1780s peaks in demand from those of the 1770s, was the household's capacity to meet its demands, as more of its young children transitioned into adolescence and early-adulthood, with some leaving home and entering into service.[50] Strains on living standards were thus as much cyclical, as they were structural, which reiterates the importance of household economics and demography as factors in standard of living measurements, as it was the composition, as well as the size, of households and populations that help explain fluctuations in prosperity over time.[51] Households of this period clearly went through cycles of extreme stress, interceded by periods of comparative ease, pitted by intermittent crises.[52] This cycle is confirmed in the case of the Naylor's by the rapid swing in resource demands experienced during the late 1780s and early 90s (table 2.3), as more and more of the Naylor children transitioned to adulthood. Thus, the evidence suggests that by the start of the diary in 1789, the Naylor's were experiencing a period of relative prosperity, measured in terms of low resource demand, and high productivity.

Yet, no sooner had one source of stress subsided than another commenced, as the 1780s and 90s also saw Naylor and Ann on the precipice of old age (table 2.3).[53] This brought with it a series of new challenges, as the household's productivity began to slump, and the threat of illness and injury increased considerably. Despite these challenges associated with age, research has shown that retirement was a rare luxury enjoyed only by the most prosperous in society during this period, for even those of middling status rarely had the material assets necessary to cease market activity all

[50] Wall, 'Leaving', pp. 77–101; Kussmaul, *Servants*, pp. 31–49; H. Cunningham, 'The employment and unemployment of children in England, c.1680–1851', *P&P*, 126 (1990), pp. 115–50.
[51] Wrigley and Schofield, *Population*, pp. 402–11, 443–50. See also: Wall, 'Age', pp. 181–202; Mayhew, 'Life–cycle', pp. 201–27; Wall, 'Leaving', pp. 77–101; E. Wrigley, R. Davies, J. Oeppen and R. Schofield, *English Population History from Family Reconstitution, 1580–1837* (Cambridge, 1997), pp. 3–18; Humphries, *Childhood*, pp. 63–8.
[52] Laslett, *World*, pp. 81–105; Wrightson, *Earthly*, pp. 51–6.
[53] Defining when 'old age' began, is itself a far from simple proposition during the eighteenth century, however, based on average life expectancy, it seems that the fifties were a key turning point, both physically and socially. See especially: Ottaway, *Decline*, pp. 16–8.

together.[54] As Peter Earle and Richard Grassby have noted, it was common for some wealthy businessmen and merchants to shift resources from trade into rent-seeking investments in preparation for retirement, but for the most part, the resources of ordinary tradespeople and petty-merchants were locked in dense webs of credit, or invested in trade stock, and so many were forced to continue trading in some capacity well into old age.[55] With age also came experience, however, and in the case of the Derbyshire mining community, where notions of 'practice' and 'experience' were considered essential to mastery of the trade (see chapter 3), older miners were frequently placed in positions of authority, as jurymen and barmasters of local barmote courts.[56] Entries in the diary show that Naylor regularly attended 'the Court Barmot Ashford', suggesting that he may well have been a juryman, thus occupying an important position in local governance.[57] Yet, it is also apparent that Naylor's age was beginning to impact on his health. His prolonged illness in the winter of 1789/90 brings into vivid relief the decline of a robust and industrious man, overcome by a 'cold' that he would no doubt have shaken off in his youth. As for Ann, the aging process was no less forgiving. Women were for the most part expected to continue unabated their household duties, as well as continue working as spinners, vendors, laundresses, and, in the case of the Derbyshire mining community, ore washers. [58] From what can be gathered of her activities in the diary, these expectations applied in Ann's case, and as will be shown further below, much responsibility and stress likely fell on her shoulders during her husband's illness.[59]

[54] K. Thomas, 'Age and Authority in Early Modern England', *Proceedings of the British Academy*, 62 (1976), pp. 205–48; R. Smith, 'Ageing and well–being in early modern England: pensions trends and gender preferences under the English old poor law, c.1650–1800', in P. Johnson and P. Thane (eds.), *Old Age from Antiquity to Post–Modernity* (London, 1998), pp. 64–95; P. Thane, *Old Age in English History* (Oxford, 2000); Ottaway, *Decline*, pp. 68–73.
[55] Earle, *Making*, pp. 114, 141–5; R. Grassby, *Kinship and Capitalism* (Cambridge, 2000), p. 407.
[56] The importance of 'practice' and 'experience' are examined at length in section I, chapter 3.
[57] For his attendance of the Ashford Barmote, see: DRO: D7812/1, pp. 10, 21, 75, 87, 99. For more on importance of local governance in determining social status, see: French, 'Social', pp. 66–99.
[58] For more on women's work, see for example: P. Sharpe, 'Literally Spinsters: A new interpretation of local economy and demography in Colyton in the seventeenth and eighteenth centuries', *EcHR*, 44(1) (1991), pp. 46–65; Erickson, 'Married', pp. 267–307.
[59] For more on 'ore–washers' see below, and section II, chapter 2.

Table 2.3: *Dietary requirements of the Naylor Household, c.1755-1790*

Date	Ann Percival (b. 1729)	John Naylor (b. 1728)	No. of children (avg. age)	No. of food baskets req.
1755	26	27	1 (0)	2
1760	31	32	3 (3)	2 2/3
1765	36	37	4 (6)	3 4/5
1770	41	42	5 (8)	5
1775	46	47	5(16)	6
1780	51	52	5 (18)	6 2/5
1785	56	57	3 (23)	6 4/5
1790	61	62	5 (28)	3 4/9

Table 2.4: *Essential calorific requirements of different gender and age groups.*

Gender/Age	Basic req. calories
Child 2-3	1000
Female 4-8	1200
Female 9-13	1600
Female 14-18	1800
Female 19-30	2100
Female 31-50	2000
Female 51+	1800
Male 4-8	1400
Male 9-13	1800
Male 14-18	2200
Male 19-30	2500
Male 31-50	2200
Male 51+	2000

Upon commencing the diary the Naylor household was thus entering into a period of transition. On the one hand, the stress of childcare, and providing for a host of dependants had subsided, but on the other, the household was experiencing a rapid decline in its productive capacity, while its chief providers, Naylor and Ann, faced the uncertainties of old age. Yet, as parish records show, the Naylor's still had some way to go. Naylor and Ann both lived for a further 20 years after the commencement of the diary, and would no doubt have continued to work for much of this period. With age came the inevitable decline of health and productivity, but as the next section will demonstrate, the reputability and experience that came with age also brought advantages when it came to navigating the local credit community.[60]

[60] See, in particular Shepard's exploration of the relationship between credit, masculinity and age: Shepard, 'Manhood', pp. 82–90.

II. *Community*

Since the defining works of Peter Borsay, Peter Clark, P. J. Corfield, and others, much emphasis has been placed on the role played by urban settlements in processes of change, and their impact on everyday economic life during the early modern and modern periods.[61] In different ways, each has argued that the processes of commercialisation, industrialisation and economic growth, which characterised the sixteenth, seventeenth and eighteenth centuries, commenced in the urban centres of Europe, from where it was disseminated into the 'rural hinterland'.[62] More recently, however, this perceived dependency has been questioned, with some historians arguing the reverse was true, and that many of the seeds of industrialisation were sown in the countryside.[63] David Levine and Keith Wrightson, for example, found that of all the social ties held by the residents of the village of Terling, in Essex, 70 percent were located within a 9 mile radius of the settlement and were overwhelmingly shared with residents of other rural communities.[64] Likewise, Jon Stobart's study of 'craftsmen-retailers' in Cheshire found that the majority facilitated customers living within their immediate localities, and that nearby urban centres had little or no impact on the location of their workshops or customer base.[65] It has also become increasingly apparent that village communities were not isolated or inward looking, but rather operated as focal points of sprawling social networks. Wrightson and Levine, for example, stressed the importance of long distance kinship and affiliate relations as well as dense local networks in the everyday lives of Terling's inhabitants.[66] Anne Mitson too has emphasised

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[61] P. Clark and P. Slack (eds.), *Crisis and Order in English Towns, 1500–1700: Essays in Urban History* (London, 1972); P. Corfield, *The Impact of English Towns, 1700–1800* (Oxford, 1982); P. Clark, *The Transformation of English Provincial Towns, 1600–1800* (London, 1984); P. Borsay, *English Urban Renaissance* (Oxford, 1989). See also for broader historiography: P. Clark, 'Introduction', in P. Clark (ed.), *The Cambridge Urban History of Britain*, II, *1540–1840* (Cambridge, 2000), pp. 1–24.

[62] See especially: J. De Vries, *European Urbanisation, 1500-1800* (London, 1984).

[63] B. Holderness, 'Rural tradesmen 1660–1850: a regional study in Lindsey', *Lincolnshire History and Archaeology*, 7 (1972), pp. 77–81; J. Martin, 'Village traders and the emergence of a proletariat in south Warwickshire, 1750–1851', *AgHR* 32 (1984), pp. 179–88; P. Ripley, 'Village and town: occupations and wealth in the hinterland of Gloucester, 1600–1700', *AgHR* 32 (1984), pp. 170–8; E. Wrigley, 'Urban growth and agricultural change: England and the continent in the early modern period' *Journal of Interdisciplinary History*, 15 (1985), pp. 696–705; B. Short (ed.), *The English Rural Community* (Cambridge, 1992), pp. 85–104.

[64] Wrightson and Levine, *Poverty*, p. 77; N. Cox, 'The distribution of retailing tradesmen in north Shropshire, 1660–1750', *Journal of Regional and Local Studies*, 13 (1993), pp. 4–22; N. Cox, *The Complete Tradesman* (London, 2016).

[65] J. Stobart, 'The economic and social worlds of rural craftsmen–retailers in eighteenth–century Cheshire', *AgHR*, 52(2) (2004), pp. 141–60.

[66] Wrightson and Levine, *Poverty*, pp. 73–109. See also: Wrightson, *English*, pp. 48–52.

the importance of familial and kinship ties in drawing together inter-parochial networks.[67] While R. M. Smith, Christopher Dyer, Henry French and several others have gone some way to dispelling the myth of the 'self-contained village' community in provincial England.[68] Even in the urban context, a number of studies have highlighted the importance of localised communities in the structuring of urban life, commonly influenced by proximity, shared occupation, business dealings, and supply chains, as well as the bonds of family, kinship and friendship. [69]

What unites these revisionist interpretations of rural and urban communities, is their recognition of the importance of interpersonal credit relations in the governing of everyday economic life, and the significance it attached to 'face-to-face' contact between creditors and debtors.[70] As the works of Muldrew and others have shown, the challenge of maintaining trust in an economy largely devoid of institutional oversight and financial intermediation, necessitated the creation of a large number of short-distanced and low-risk dealings, in order to maintain close surveillance of debtors – their spending, drinking, and moral habits.[71] Included in Naylor's diary are references to settlements he visited, whether to find work, purchase goods, collect money, repay debts, or visit friends and relatives, as well as lists of debts owed to different persons, their names, and residence.[72] This body of evidence allows us to reconstruct, in a limited way, the social and economic world of a Derbyshire

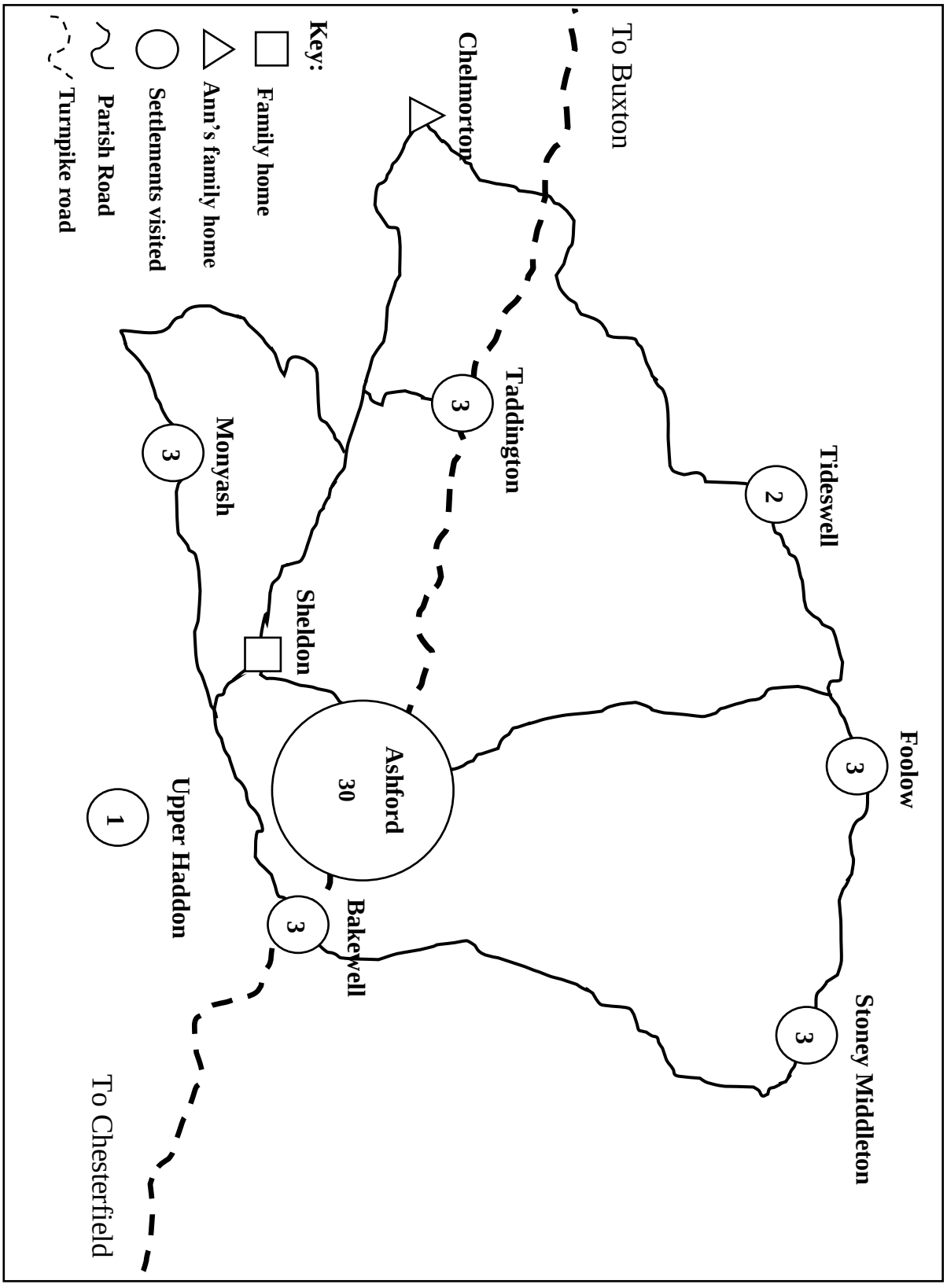
[67] A. Mitson, 'The significance of kinship networks in the seventeenth century: south–west Nottinghamshire', in C. Phythian-Adams (ed.), *Societies, Cultures and Kinship 1580–1850* (Leicester, 1993), pp. 24–77.
[68] R. Smith, ''Modernization'' and the medieval village community', in A. Baker and O. Gregory (eds., *Explorations in Historical Geography* (Cambridge, 1984), 140–79; H. French, 'Social status, localism and 'the middle sort of people' in England, 1630–1750', *P&P*, 166 (2000), pp. 66–99; C. Dyer, 'Introduction', in C. Dyer (ed.), *The Self Contained Village?* (Hatfield, 2007), pp. 1–5; H. French and R. Hoyle, *The Character of Rural Society: Earls Colne, 1550–1750* (Manchester, 2007). See also: Spufford, *Contrasting*; Wrightson, *English*, pp. 47–73; K. Wrightson, 'The family in early modern England: continuity and change', in S. Taylor, R. Connors and C. Jones (eds.), *Hanoverian Britain and Empire* (Woodbridge, 1998). For overview of kinship, see: N. Tadmor, 'Early modern kinship in the long run: reflections on continuity and change', *C&C*, 25(1) (2010), pp. 15–48.
[69] Earle, *Making*, pp. 240–249; D. Garrioch, *Neighbourhood, Community and Sociability in Paris in the Second Half of the Eighteenth Century* (Oxford, 1983), esp. chp. 1; J. Boulton, *Neighbourhood and Society* (Cambridge, 1987), pp. 206–27.
[70] See for example: Spufford, *Contrasting*, pp. 80–7; Boulton, *Neighbourhood*, pp. 97–8; Earle, *Making*, pp. 115–6; Mitson, 'Significance', pp. 62–7; French, 'Social', pp. 86–8; Muldrew, *Economy*, pp. 95–119.
[71] Finn, *Character*, pp. 67–76.
[72] Spufford, *Contrasting*, pp. 80–1, 212–3; Holderness, 'Credit', pp. 94–116; Muldrew, *Economy*, pp. 95–8.

lead miner, his network of associates, friends and creditors, and to retrace the locality in which he operated on a day-to-day basis.[73]

Map 2.1 provides an overview of this evidence, representing the geographical area in which Naylor and his family operated and the various settlements he visited over the course of the three years covered by his diary. The area extends 8.6 miles from East to West and 8.4 miles North to South.[74] It is intersected by one of the main routes between Bakewell and Buxton, which had direct connections to Chesterfield via the Bakewell, Chesterfield and Worksop turnpike.[75] Its focal points were the villages of Sheldon and Ashford: Naylor lived and worked in Sheldon, but conducted the majority of his business in the nearby village of Ashford. The other settlements mentioned are primarily places where he found alternative employment and occasionally purchased goods, with agricultural by-employment found mainly to the South and East, and other mining opportunities predominantly to the North and West. The village of Chelmorton, the birth place of his wife, was an important familial hub and was frequently visited by Naylor's children, if not by Naylor himself. The largest settlement in the area was the market town of Bakewell, which was located just 2 miles to the east of Sheldon. Yet, despite its size, amenities, and transport links, Bakewell played a comparatively minor role in Naylor's life. Instead, Naylor conducted the majority of his business from the much smaller settlement of Ashford. It was there that he purchased the majority of his household goods, repaired his tools, paid his rent on 'rent day', attended the 'Barmoot Court', and spent most of his time and money.[76]

[73] DRO: D7812/1; DRO: D2154/1
[74] Thus, marrying well with the social worlds of the Terling inhabitants, see: Wrightson and Levin, *Poverty*, p. 77. See also: Stobart, 'Economic', pp. 145–6.
[75] For more on the North Derbyshire road network, see: Pawelski, 'Turnpikes', pp. 55–71.
[76] DRO: D7812/1, pp. 10, 21, 75, 87, 99, 102. See also: J. Stobart and L. Bailey, 'Retail revolution and the village shop, 1660–1860', *EcHR*, 71(2), (2018), pp. 393–417.

Map 2.1: *Map showing Naylor's recorded visits to different settlements in the area, c. 1789-1792.*



In each of the settlements visited, Naylor gathered contacts, nurtured relationships and established a reputation, which allowed him to access work-opportunities, source credit and maintain

his household's material well-being.[77] Thus, the geographic area depicted in map 2.1 could just as easily have been represented in relational terms. For each settlement on the map was inhabited by people with whom Naylor had personal dealings: whether it was the food vendor Mr Woodruff of Ashford, the landowner, Mr Needham, of Monyash, the grocer William Roberts, of Taddington, his wife's family in Chelmorton, or the miners John Williams and Samuel Bagshawe, of Sheldon. The map also depicts a series of overlapping financial obligations, with over half of Naylor's 14 creditors residing in Ashford – a substantial number when compared with the average of 9 debts per person observed by Muldrew in a sample of 1710 probate accounts.[78] The map might also have been represented in terms of resource exchange and material production. Naylor got '2 pecks of oat meal' from Moniash, 'plancks & boards' from Ashford, he got a five pound 'brist of veal' from William Gregory of Tideswell, and purchased 'roap' from Bakewell. He was also a contributor to this system of resource exchange through the sale of lead, and when, for example, on 29th March 1790: 'Robert Heathcote and Joseph Hide had of me 1 dozen of timber for use at Grindlow Hollow mine', Naylor appears to have tried his hand at a variety of pursuits.[79] What this evidence shows is that the Naylor household's economic and social universe was orientated predominantly around a network of villages, located within a comparatively narrow geographic area. Though the family undoubtedly had connections further afield, including their eldest daughters who likely left the parish as children, it is nevertheless clear that the majority of the household's business dealings were conducted within an area easily accessible by foot.[80]

Within this community of creditors and business partners, family and friends, retailers and customers, the chief, near universal, mode of transaction was via credit, lent without interest and on the basis of trust.[81] These debts were often recorded in the ledgers of shopkeepers, the estate accounts of gentlemen, and scribbled down in the diaries and memoranda of tradespeople, but its principal mode of operation was via direct exchange between individuals who shared a common history,

[77] Levine and Wrightson, *Making*, pp. 205–230 and 329–343; Muldrew, *Economy*, pp. 103–9.
[78] *Ibid*, p. 104.
[79] DRO: D7812/1.
[80] Holderness, 'Rural', pp. 77–83; Wrightson, *Earthly*, pp. 75–8; Stobart, 'Economic', pp. 145–9.
[81] Muldrew, *Economy*, p. 104; Stobart and Bailey, 'Retail', pp. 406–14.

engaged in a shared community, and mixed in the same social circles.[82] Though other forms of lending were becoming increasingly common during the eighteenth century, such as bonds, bills of exchange, bank notes, and mortgages, the sorts of exchanges with which we are concerned – those conducted on a daily basis between members of local society – rarely involved such intricate mechanisms.[83] Instead, credit was usually extended informally, sometimes accompanied by an 'earnest payment', a pitcher or two of ale, or a solemn promise to honour the agreement.[84] Relevant records were then made in account books, diaries and ledgers (if at all), and debts later repaid following the receipt of income, or through a cancelling out, or 'reckoning', of various debts between webs of interconnected creditors and debtors. There are several practical reasons why local shopkeepers, labourers, suppliers, landowners, and employers might choose to conduct business in this way, versus other interest bearing methods. Perhaps the most important reason was convenience. Bonds, bills of exchange, and bank notes required ratification from a lawyer, banker or scrivener, documents had to be signed in the presence of witnesses, and a user had also to cash in the bill or bank note before its expiration.[85] The situations in which paper credit could be used were also more prescribed, linked as they were to the original signatories, and the bank or scrivener's office in which they were issued, while credit lent on an informal basis between family, friends, neighbours and business partners could be transferred and reckoned across dense local networks with little hassle.[86] The legal strictures, and liability, attached to paper credit thus presented an unnecessary burden in the execution of such transactions. Finally, interest surcharges were clearly not a priority in the majority of credit transactions during this period, instead the chief motivation for granting credit was to facilitate swift transactions in the absence of sufficient supplies of currency.[87] Thus, advancing credit was vital to clearing perishable goods from

[82] See in particular: Cox, *Complete*, pp. 165–96.
[83] T. Ashton, 'The bill of exchange and private banks in Lancashire, 1790–1830', *EcHR*, 15(1–2), (1945), pp. 25–35; L. Pressnell, *Country Banking in the Industrial Revolution* (Oxford, 1952); Anderson, 'Money', pp. 85–101; B. Anderson, 'The attorney and the early capital market in Lancashire' in F. Crouzet, *Capital Formation in the Industrial Revolution* (London, 1972), pp. 223–55; M. Miles, 'The money market in the early industrial revolution: the evidence from West Riding attorneys', *Business History* 23 (1981), pp. 127–46.
[84] Muldrew, *Economy*, pp. 106–7.
[85] Which in a rural community with few banks, and scarce supplies of specie, was often challenging, see: Pressnell, *Country*; Anderson, 'Money', pp. 85–101; Holderness, 'Credit', pp. 94–116; Muldrew, *Economy*, pp. 98–102.
[86] *Ibid*, pp. 108–9.
[87] Stobart and Bailey, 'Retail', pp. 406–14.

a vendor's store, to enabling a miner to commence work without having the upfront capital to pay labourers' wages, or allowing a reprieve in rent for a farmer during a difficult harvest period. Drawing interest from such transactions was thus an ancillary concern. There were already sufficient economic incentives for creditors to extent credit, and the transactions were secured by the social and cultural apparatus of the local village community, and could be claimed back through legal procedure should debts go unpaid.[88]

Evidence from the diary indicates that Naylor's borrowing habits are representative of broader trends during this period. As table 2.5 shows, around 65 percent of Naylor's total debt was owed to vendors and tradesmen for services rendered, a further 21 percent to labourers for their wages, 6 percent for overdue rent, and 8 percent for a loan provided by a man called 'Henry Naylor'.[89] Whether he was a member of Naylor's extended family is unclear, but the size of the debt combined with the absence of interest, suggests that it may well have been a private loan between kin.[90] Overall, these percentages marry well with those observed by Muldrew in his analysis of Hampshire probate accounts for the period 1623-1715.[91] The only significant deviation being the figure of just 2 percent, versus Naylor's 21, for labourers' wages, which is likely a reflection of Naylor's occupation, and his position as an employer of labour.[92] The importance of sales credit is also of particular importance. Recent research into early modern consumption and retail has emphasised the ubiquity of credit as a medium for the purchase of goods. Nancy Cox, for example, has claimed that 'granting credit appears to have been a normal part of the shopkeeping practice', while Jon Stobart and Lucy Bailey have claimed that 'credit was central to the economy of town and country alike: it facilitated transactions and helped to define a person's status and standing in society.'[93] The evidence observed here, and by Muldrew, relating to the borrowing habits of consumers appears to support these conclusions.[94] Naylor

[88] *Ibid*, pp. 123–47, 274–97. For more on risks associated with credit, see also: Cox, *Complete*, pp. 146–62.
[89] DRO: D7812/1.
[90] For financial support of kin, see: Tadmor, 'Kinship', pp. 25–7; I. Ben–Amos, 'Gifts and favours: informal support in early modern England', *JMH*, 72(2) (2000), pp. 295–338.
[91] Muldrew, *Economy*, p. 105.
[92] *Ibid*, pp. 104–6.
[93] Cox, *Complete*, p. 162; Stobart and Bailey, 'Retail', p. 406. See also: H. Mui and L. Mui, *Shops and Shopkeeping in Eighteenth–Century England* (London, 1989), pp. 201–20.
[94] Muldrew, *Economy*, pp. 104–6. For more on the consumption habits, see: C. Muldrew, *Food, Energy and the Creation of Industriousness* (Cambridge, 2011), chps. 2 and 3.

owed sizeable debts to four vendors, including: £4 0s. 0d. to William Gregory, £2 1s. 7d. to William Skidmore, £4 0s. 8d. to William Roberts, and £3 6s. 1d. to Mr Woodruff (see table 2.1). These debts were substantial, and demonstrate vividly the risks associated with extending credit on the basis of trust, as Cox put it 'debt remained a two-edged sword' for retailer and consumer alike, and although it brought advantages to retailers, it was also 'a nagging anxiety ever threatening to bring ruin.'[95]

Table 2.5: *Types of debt owed by Naylor, during the winter of 1789*

Type of Debt	Value	Percent
Sales credit (No interest)	£16 13s. 0d.	65
Wages (No interest)	£5 12s. 9d.	21
Rent (No interest)	£1 11s. 4d.	6
Loan (No interest)	£2 2s. 0d.	8
Total	£25 4s. 4d.	100

Evidence from the diary also illustrates the lengths Naylor went to maintain his credibility, and to meet his financial obligations. Repayment of debts generally took two forms in the diary: payment by instalment or payment in kind.[96] On the 13th February 1789, for example, Naylor was 'at Ashford, paid William Skidmore £3 3s. 0½d.', on 3rd October 1789 he was again at Ashford 'paid Wm Skidmore £3 3s 0d', and on the 3rd June 1790 he 'paid Rich: Brushfield bill, £2 2s. 0d.' Naylor usually paid these instalments promptly upon receipt of income. As table 2.6 shows, in each case income arrived just a few days prior to the payment of a debt. Moreover, this system of payment by instalment, combined with a running tab of credits appears to have been common practice during the eighteenth century. Mui and Mui, for example, observed how customers made frequent visits to shops in order to purchase small quantities of goods on credit, but also noted how repayment tended to be in 'rounded figures'.[97] Similarly, Stobart and Bailey identified a variety of instalment methods used to repay debts to shopkeepers, which varied on an individual basis depending on the customer's credit, and their relationship with the vendor.[98] Naylor commonly serviced his debts indirectly, through his

[95] Mui and Mui, *Shops*; Cox, *Complete*, p. 162.
[96] For more on these alternative payment methods, see: Cox, *Complete*, pp. 83–4; Stobart and Bailey, 'Retail', pp. 405–9.
[97] Mui and Mui, *Shops*, pp. 201–20
[98] Stobart and Bailey, 'Retail', pp. 406–8. See also: Cox, *Complete*, chp. 4.

or his family's labour. For example, on the 25th April 1789 Naylor was 'walling for Mr Bullock', in July and August of that same year he spent several days 'mowing' and 'hedging' for 'Mr Needham', 'J.W' and 'J.B', on the 26th October he 'collected wood for Mr Woodruff', and on the 9th August 1791 he was 'mowing for Mr Woodruff'. On occasion, he also sent his son, John, to work for creditors on his behalf. On the 12th August 1789, for example, Naylor 'finished [mowing] for George Mottrom', while 'John & Isaac [were] at Hay for Mr Needham', and the on 13th August 1790, Naylor was 'at mine' while John was 'at Taddington for Mr Roberts'. The diary also suggests that Naylor allowed others to pay off debts owed to him in this way. On 21st October 1789, for example, he was 'at mine, John Stone with me is ye first shift I owe him for debt.'[99]

Table 2.6: *The output of Naylor's mines, 1789-1792*

Date	**Loads of Ore**	**Earnings**
11 February 1789	5	£11 5s. 0d.
8 June 1789	4	£10 10s. 0d.
22 August 1789	5	£11 10s. 0d.
2 October 1789	4	£11 5s. 0d.
30 April 1790	24	£56 2s. 0d.
31 May 1790	9	£22 10s. 0d.
28 September 1790	18	£42 3s. 6d.
1 January 1791	15	£34 10s. 6d.
11 June 1791	22	£50 12s. 0d.
Total	106	

Thus, as can be seen, Naylor spent a great deal of time servicing and repaying his debts, whether by instalment or through his labour. He travelled widely within the locality (see map 2.1) was employed in a variety of skilled and semi-skilled tasks from 'walling' to 'mowing', 'hedging' to 'woodcutting', and remained in regular contact with a dense web of individuals, all in order to maintain his credibility, stay abreast of his financial obligations and help provide for his family. It is, therefore, unsurprising that the network of creditors, affiliates and collaborators with whom Naylor

[99] For more on the diverse methods used to repay debt via labour, see: Muldrew, *Food*, pp. 233–45

was engaged were limited to within an area roughly 8 miles squared. The sheer volume of work required to maintain these networks suggests that without the resources and time to maintain a more extended network of correspondents, the majority of middling tradesmen and labourers were forced to concentrate their time and effort. How this system of credit, and its communal embeddedness influenced patterns of work is a matter of some importance to the present argument. Evidently, Naylor was drawn away from his primary occupation to perform work on behalf of his creditors as a means of repayment, but to what extent credit influenced the character of Naylor's work will now be considered.

III. *Work*

In his pioneering study 'Time, work-discipline, and industrial capitalism', E. P. Thompson presents a powerful depiction of the clock – conceived of as a mechanical object, rooted in technological innovation, manufactured using industrial techniques, and distributed by the market – as a vehicle for social, economic and cultural change, which helped lay the ground work for the industrial revolution of the late eighteenth and early nineteenth centuries.[100] According to Thompson, prior to the advent of the clock and its subversion by industrial capitalism, time was measured by the regular rhythms of agrarian life: the dull distant tone of the church bell, the rising and setting of the sun, the daily routines of livestock, and the cyclical passing of the seasons, saints days, and church festivals. In this environment, Thompson argues, work was orientated around the completion of tasks, rather than the allocation of time, thus the fisherman or crofter's daily routine 'might vary from fishing to farming, building, mending of nets, thatching, making a cradle or a coffin', which was, in turn, determined by 'the logic of need, before the crofter's eyes.'[101] It was only with the advent of 'clock-time', and its use in the administration of the industrial workforce during the late eighteenth and early nineteenth centuries that a culture of 'time-discipline' was born.[102] Yet, this rather deterministic model of the relationship between industrialisation, capitalism and time-discipline has been met with some

[100] Thompson, 'Time', pp. 56–97. See also: Landes, *Revolution*, pp. 1–16; H. Voth, 'Time and work in eighteenth-century London', *JEH*, 58 (1998), pp. 29–58; *Time and Work in England, 1750–1830* (Oxford, 2000).
[101] Thompson, 'Time', p. 59.
[102] *Ibid*, pp. 70–9.

reservation, especially in recent studies.[103] Nigel Thrift and Paul Glennie, for example, have claimed that 'Thompson's notion of time-discipline is both too narrow and too contextually specific', discipline could take a variety of forms in different contexts, which suggests the importance of 'other means of time-discipline which conceive of time more flexibly – but which still demand very considerable rigour.'[104] Using the case studies of Bristol and London, they show that clock time, and awareness of it, significantly predates the industrial revolution, referencing all manner of exchanges, productive processes and religious observances, which demanded strict time-discipline but that fell outside of the remit of industrial capitalism. This reinterpretation of time has been supported by Blondé and Verhoeven's study of seventeenth-century Amsterdam, and by Sauter's examination of eighteenth-century Berlin.[105] In line with these recent studies, it shall be argued here using evidence from John Naylor's diary that an important factor driving this disciplined approach to time and work in so called 'preindustrial' societies and communities, which has yet to be considered by historians, was credit, and its emphasis upon notions of industry, frugality and good moral behaviour.[106]

Naylor's diary provides a valuable insight into the work patterns of an independent artisan employed in a rural industry, but who was, for the most part, free from capitalist oversight. The way the diary is structured is itself demonstrative of a number of important facets of time and work discipline amongst this underrepresented cohort in industrialising England. The diary takes the form of a day-book, which lists the tasks Naylor performed on a daily basis, with a brief description of who was there and where it was performed. Thus, on those days when Naylor was working alone at his mine he would commonly state simply 'at mine', when he was visiting a settlement he writes 'at Ashford' or 'at Bakewell', and when he worked for somebody else, again he commonly referenced the individual's name and the field or mine where he worked, for example: 'at Cowlow for Mr Needham' or 'at Butts Rake myself'. He might also include a more detailed description of the task he performed, so when at his mine he notes whether he was 'drawing', 'washing', or 'driving', similarly,

[103] Thrift and Glennie, *Shaping*, pp. 42–7.
[104] *Ibid*, p. 47.
[105] Blondé and Verhoeven, 'Against', pp. 213–44; Sauter, 'Clockwatchers', pp. 685–709. See also: Cohen, 'Clockwork', pp. 23–50.
[106] Muldrew, *Economy*, pp. 148–56; Finn, *Character*, pp. 76–89.

when working 'at home' he referenced 'mossing', 'walling', 'roofing the stable' or 'gardening', and when working for others he might note whether he was 'mowing', 'hedging' or 'walling'. Time is referenced only on one occasion, on 7th August 1789, when he records working 'for Joshua Robinson at Long Roads 3 in afternoon John and me at Ditch Furlong'. For the most part, however, time is delineated in portions of days, and less frequently with reference to 'morning' and 'afternoon', thus Naylor was 'Mowing for George Mottrom and at Peeches mowing for Mr G:M and for Mr Needham 1/2 day', 'at hay for Mr Needham 1 day both John and me', and 'at mine 1/2 day'. He might also note what he was doing for the entire week, sometimes in advance and sometimes in retrospect, for example: 'at mine all this week' or 'at mine, John Williams has been 4 days this week for us.'[107]

Table 2.7: *Naylor's activities recorded in his diary between 1789 and 1791*

Task/diary entry	**No. of days**	**Total (%)**	**1789**	**1789 (%)**	**1790**	**1790 (%)**	**1791**	**1791 (%)**
Mining at his mine	426	39	139	38	135	37	152	42
Drawing at his mine	87	8	34	9	1	0	52	14
Washing/dressing ore	103	9	7	2	78	21	18	5
Extending his mine works	82	7	4	1	15	4	63	17
At church/festivals	158	14	54	15	52	14	52	14
No mining	37	3	16	4	12	3	9	2
No mining due to illness	64	6	60	16	4	1	0	0
No mining due to weather	15	1	8	2	5	1	2	1
At another mine	33	3	10	3	21	6	2	1
Visiting local town or village	29	3	6	2	16	4	7	2
Casual and agricultural work	61	6	27	7	26	7	8	2
Totals	1095	100	365	100	365	100	365	100
Days spent at own mine	698	64	184	50	229	63	285	78
Days spent working elsewhere	123	11	43	12	63	17	17	5
Days spent not working	274	25	138	38	73	20	63	17
Totals	1095	100	365	100	365	100	365	100

It is immediately clear that Naylor's approach to work was orientated around the completion of tasks, while references to 'clock-time' are almost entirely absent from his diary. Yet, as has been noted in other cases, this does not, therefore, imply that time was entirely absent from the equation.[108] The Derbyshire mining community appears to have generally adhered to a period known as 'mineral

[107] DRO D7812/1.
[108] Thrift and Glennie, *Shaping*, esp. chp. 6.

time', which William Hooson, in his *The Miners Dictionary* of 1747, describes as an 'eight Hours Space, and included between eight in the morning, and four in the afternoon', during which hours it was commonly known that miners would be venturing underground.[109] As Hooson goes on to note, it was important to respect this timeframe for all manner of reasons:

> This time is exactly to be observed in some cases, for during this time a Man should make no fires in his works, for fear of doing his Neighbour any damage by smoak, where their Grounds are cut together, and the Air has a free passage between them; also Purchasers are all to go away from the Works when that time is expired; and Miners working on Wages by the Day, are obliged to Work that time for a Day's Work.[110]

As we can see, time was of crucial importance to the miners' daily work routine, both for safety and legal purposes. Wages for labourers were to be paid by the day, but this necessitated a common definition of what constituted a 'day's work' in hours.[111] Moreover, certain activities that posed a threat to neighbours were to be avoided during these hours, and commercial trading was limited to this period, most likely to prevent tax evasion.[112] Naylor, as an employer of labour, and a conscientious neighbour would no doubt have adhered to 'mineral time', but as the diary shows he preferred to organise his schedule in terms of tasks and days, rather than hours. Thus, time remained an important feature of 'task-orientated' work, even in cases where it is not referenced explicitly in diaries or accounts.[113] This is partly because time-discipline could take a variety of forms, and as Thrift, Glennie and several others have shown, it was possible to measure time with great accuracy by means other than mechanical clocks.[114] In the case of the miners, working underground without access to clocks, or the sun, and with no

[109] W. Hooson, *The Miners Dictionary* (Wrexham, 1747). For more on Hooson and his text, see chapter 3 below.
[110] Hooson, *Miners*: 'Mineral Time'.
[111] This point is argued by Thrift and Glennie in relation to workers employed in the urban context: *Shaping*, pp. 1–21.
[112] The tax in question was known as the 'cope', which was paid by the purchasers of ore from miners, see: Mander, *Derbyshire*, pp. 17–8.
[113] Thompson, 'Time', pp. 58–63.
[114] Thrift and Glennie, *Shaping*, pp. 42–7; Cohen, 'Clockwork', pp. 23–50; Blondé and Verhoeven, 'Against', pp. 213–44.

chance of hearing church bells, or observing the routines of animals, time was commonly measured by the gradual burning of a candle – with each taking roughly an hour to burn.[115]

The diary also provides insights into Naylor's pattern of work on a weekly, monthly and yearly basis. Thompson famously defined the preindustrial work pattern as 'one of alternate bouts of intense labour and of idleness', claiming this to be the case 'wherever men were in control of their working lives.' He notes the gradual intensification of work over the course of the week, thus: 'on Monday and Tuesday, according to tradition, the hand-loom went to the slow chant of *Plen-ty of Time, Plen-ty of Time*: on Thursday and Friday, *A day t'lat, A day t'lat*.'[116] He puts this down principally to 'heavy week-end drinking' and 'the temptation to lie in an extra hour in the morning', which in turn, pushed work into the evening and later in the week.[117] Thompson also observes a broader irregularity in work patterns over the course of the year, with a scattering of saints days, holy days and feasts, alongside the regular observance of 'Saint Monday', which disrupted schedules, reduced productivity and caused employers in domestic industries a great deal of distress.[118] However, analysis of Naylor's work records generally do not support this characterisation of 'preindustrial' work. The tasks Naylor performed have been collated in table 2.7, which categorises all 1095 days according to a number of specific criteria. As can be seen, Naylor spent the majority of his time working at his own mine, a total of 698 days or 64 percent of the total. He spent another 123 days working elsewhere, either at other local mines, visiting local towns or villages, or performing agricultural work, and around 274 days not working. 'Mining' was the most common task performed, followed by 'washing/dressing ore', while the most common reason for his absence from work was to attend church and religious festivals. There is no mention of leisure time, while 60 of the 64 days of illness occurred in 1789 alone. Much of the agricultural work he performed was seasonal, while wage work carried out at other mines tended to take place during

[115] Indeed, candles were often made with the express purpose of taking around an hour to burnout: Willies, 'Management', pp. 225–6.
[116] Thompson, 'Time', pp. 73–4.
[117] *Ibid*, pp. 74–6.
[118] *Ibid*, pp. 74–7 See also: D. Reid, 'The decline of Saint Monday, 1766–1876', *P&P*, 71 (1976), pp. 76–101.

periods when his own mine was unproductive. In 1791 he worked 83 percent of the year, and spent just 63 days not working, which if the 54 Sundays of that year are subtracted leaves just 9 days off for reasons other than the Sabbath. Evidently, Naylor mixed his primary occupation with a variety of other tasks, though, as has been noted, much of this occurred within the context of honouring debts, and as favours to neighbours. Considered in aggregation, therefore, Naylor's activities on a yearly basis reveals very little indulgence in leisure, with very few saints days observed. Indeed, the only religious day Naylor regularly observed was Ascension Day, while Christmas Day and much of Holy Week he worked almost every day other than Sunday.[119]

This characterisation of Naylor's work is confirmed by tables 2.8 and 2.9, which explore in close detail his pattern of work over the course of the week, and compares it with similar data collected by Hans-Joachim Voth for London residents in 1800, and labourers working on the construction of the Cheshire Canal in 1801.[120] First, table 2.8 illustrates the astonishing regularity of Naylor's weekly routine, even in the more tumultuous year of 1789, he maintains a strict, almost regimented, discipline, working 6 days a week every week, with no evidence to suggest that Saint Monday or any other regular feast days were observed. There is no evidence for an intensification of work activity over the course of the week, and in 1791, it nears levels of regularity that would challenge a factory rota. The fact that work continued to be regular in 1789 and 1790 is also significant, as it is in these years that Naylor's work was at its most varied, mixing agricultural by-employment with waged and independent mining. Yet, despite moving frequently between settlements, and switching employer on a daily basis, Naylor was able to sustain a regular 6 day working week. Even when compared with the routines of other workers, as in table 2.9, Naylor stands out as a particularly disciplined worker, though it is apparent that all of the examples considered reveal regular work schedules.[121] In

[119] This was found to be the case in other examples too, see especially: Voth, *Time*, pp. 85–106.
[120] Voth, 'Time', pp. 29–58; Voth, *Time*, pp. 1–16.
[121] This is in line with Voth's wider argument that industriousness was a feature of the late eighteenth and early nineteenth century: Voth *Time*, pp. 1–16. See also Jan de Vries's theory of an 'Industrious Revolution': de Vries, *Industrious*, pp. 122–85.

the case of the Old Bailey records, Saturday and Sunday work was more common than in the other examples, however, this was entirely due to weekend trading, and does not suggest any particular fluctuations in industriousness over the course of the week. Thus, the evidence explored in these tables indicates how regular work remained even outside of the factory setting.[122] Clearly, Thompson's juxtaposition of time and work discipline with the growth of the factory system and industrial capitalism cannot be sustained by the growing body of evidence arising from an array of different case studies.[123] Even in those trades considered 'traditional', such as lead mining or retailing, work was highly routinized, and structured. So, if not the strictures of a capitalist employer, what was motivating independent artisans and tradespeople, such as Naylor, to practise such regimented work schedules?

Table 2.8: *Distribution of work over the course of the week in 1789,1790 and 1791*

Day of the Week	(1) John Naylor Count 1789	(2) Percent of Overall Total	(3) John Naylor Count 1790	(4) Percent of Overall Total	(5) John Naylor Count 1791	(6) Percent of Overall Total
Sunday	0	0.0	1	0.3	2	0.5
Monday	38	10.4	50	13.7	48	13.2
Tuesday	38	10.4	51	14.0	50	13.7
Wednesday	39	10.7	48	13.2	51	14.0
Thursday	35	9.6	47	12.9	51	14.0
Friday	40	11.0	49	13.4	51	14.0
Saturday	37	10.1	46	12.6	51	14.0

Part of the answer lies in the irregularity of Naylor's earnings. As figure 2.1 shows, while his pattern of work – measured on a weekly and yearly basis – was regular and disciplined, his earnings were inconsistent and unpredictable, occurring in lump sums at varying times, reliant as it was on the output of his mining endeavours. The unpredictability of earnings during this period has often been put down to irregular work patterns, but as Naylor's case shows, in a period where consistent wage work was difficult to acquire outside of the factory setting, and where many worked independently,

[122] Voth, 'Time', pp. 35–41.
[123] See also: Sauter, 'Clockwatchers', pp. 685–709; Thrift and Glennie, *Shaping*, pp. 244–78; Cohen, 'Clockwork', pp. 23–50; Blondé and Verhoeven, 'Against', pp. 213–44.

whether in domestic industries, or, like Naylor, in artisanal trades, earnings were themselves inherently irregular regardless of work patterns.[124] Indeed, this fact may well have been a motivation for Naylor to be more industrious and proactive in acquiring additional work, both in order to cover any potential shortfalls in the productivity of his mine and to pay off outstanding debts. This is particularly well illustrated in the period between January 1789 and April 1790 (figure 2.1). During this period Naylor's income from his mine was poor (see also table 2.6), and so he was forced to engage in a variety of secondary tasks, in part, to cover for variations in his primary source of income. Thus, while work conducted 'at mine' fluctuates during this period, it is also clear that 'working elsewhere' mirrored these changes, thus giving rise to the consistent work pattern observed in tables 2.7, 2.8 and 2.9. There is no way to ascertain the contribution wage work made in financial terms to Naylor's overall earnings, as he does not record them in his diary, but it is clear that simply performing the work in conjunction with his primary income source was an important way of presenting an image of industriousness, regardless of whether or not the work significantly increased his earnings.

Table 2.9*: Distribution of work over the course of the week combined with evidence from Old Bailey and Cheshire Canal records*. Source: Voth, 'Time', table 8, p. 49

Day of the Week	(1) John Naylor Count 1789-1791	(2) Percent %	(3) Old Bailey 1800 Count	(4) Percent %	(5) Cheshire Canal Count	(6) Percent (%)
Sunday	3	0.4	35	6.2	199	3.4
Monday	138	16.5	79	13.4	974	16.4
Tuesday	141	16.9	85	14.7	976	16.5
Wednesday	140	16.8	99	17.1	945	16.0
Thursday	135	16.2	85	14.7	910	15.4
Friday	142	17.0	90	15.5	958	16.2
Saturday	136	16.3	106	18.4	962	16.2

This image of industriousness was in turn related to another important motivation for disciplined work patterns during this period, namely: access to credit from local community sources. A crucial factor in an individual's reputation for creditworthiness during this period was his or her

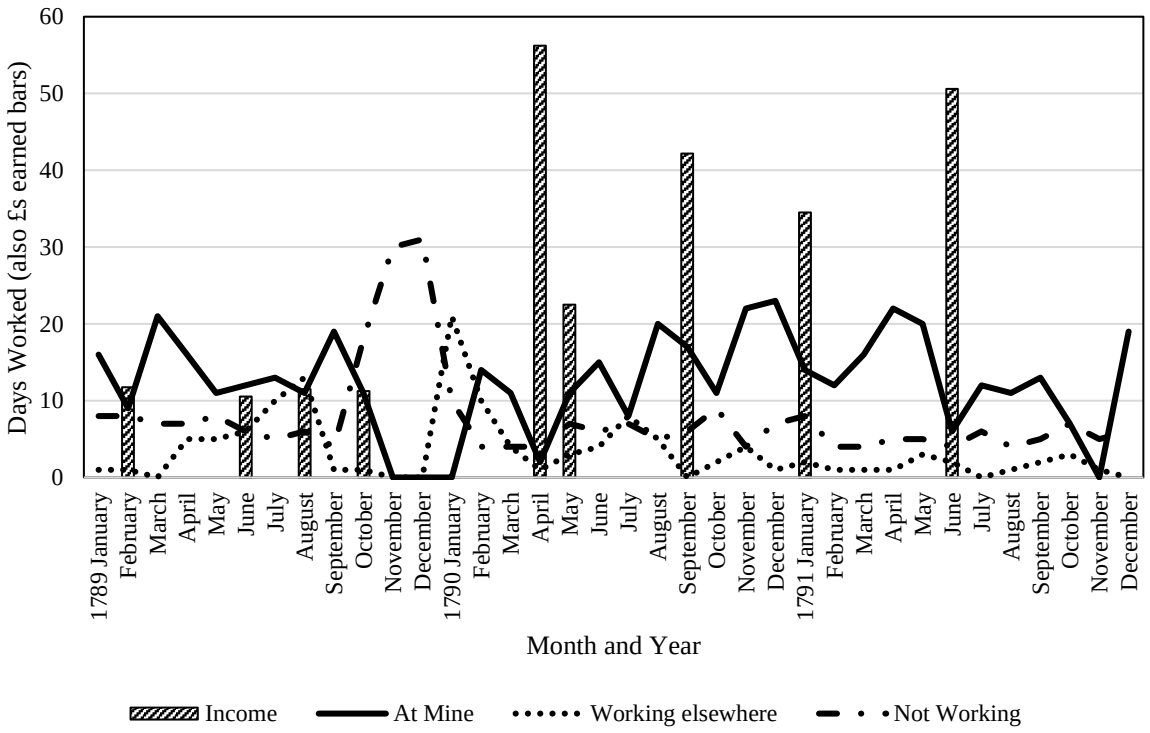
[124] For irregularity of work, see especially: Landes, *Revolution*, pp. 67–82; Thompson, *Making*, pp. 207–32, 259–96.

perceived work ethic and productivity.[125] Benjamin Franklin provides the clearest iteration of this relationship, stating:

> The most trifling of actions that affect a man's credit are to be regarded. The sound of your hammer at five in the morning, or eight at night, heard by a creditor, makes him easy six months longer; but if he sees you at a billiard-table, or hears your voice at a tavern, when you should be at work, he sends for his money the next day.[126]

This quote, taken from Franklin's *Advice to a Young Tradesman*, written in 1748, has often been interpreted as a premonition of a capitalist future.[127] Yet, the system to which he refers, the early modern credit economy, is very much a product of Franklin's past and present.[128] Work and credit, just as much as 'time and money', are considered interdependent, and it is the social performative

Figure 2.1: *Graph combining Naylor's earnings and pattern of work, 1789-1792*



Note: The bars are representative of income levels and do not marry perfectly with the vertical axis, for more precise totals, see table 2.6.

[125] Muldrew, 'Interpreting', pp. 77–8; Muldrew, *Food*, chp. 7.
[126] B. Franklin, 'Advice to a Young Tradesman' (1748), in L. Labaree (ed.), *The Papers of Benjamin Franklin*, III, *January 1, 1745, through June 30, 1750*, (New Haven, 1961), pp. 304–308.
[127] M. Weber, *The Protestant Ethic and the Spirit of Capitalism* (London, 1992 ed.), p. 51; Thompson, 'Time', pp. 88–9
[128] Muldrew places the origins of the credit economy in the sixteenth century, see: *Economy*, pp. 1–7

features of this work that are of particular importance for Franklin. It was important not only to work or earn during this period, but also to be seen working and earning. This performative function of work marries well with the evidence provided by Naylor's diary. During the financial hardships of 1789, for example, he spent more and more of his time performing work away from his mine, either for creditors, or for other members of local society, whether 'walling', 'mowing', 'hedging' or wood-cutting, or working for wages at large capital mines. Similarly, upon recovering from his illness in the spring of 1790, he embarked on a mini-tour of several settlements in the local area, both to seek out work, but also to meet and reassure creditors and friends.[129] These tasks brought Naylor additional funds, but also drew him increasingly into the public sphere, providing sureties for his creditors and advertising to neighbours his diligence and honesty. Thus, the maintenance of credit was a powerful driver of work discipline long before the introduction of capitalist rotas and work schedules. Naylor was motivated by the need to maintain a reputation for industriousness, honesty and thrift, which was as crucial as his real earnings to acquiring credit, and transacting with other members of local society.[130]

Though the lens has been fixed on Naylor's contributions to the household economy, the demands posed by credit encompassed all of its members, including women.[131] The diary offers a useful record of the work performed by John and Rebecca, but is rather less helpful in the case of his wife, Ann. Naylor records working alongside John at his mine on 78 occasions, and references 16 cases when John worked separately from his father. In general, John went further afield in pursuit of secondary employment than his father, and was more likely to invest time in seasonal work even during periods when the mine was productive. On 5th August 1791, for example, Naylor notes how he and 'J: W' were 'at mine', while his 'son John was with us' only 'until hay time', he also notes periods when John went 'sheering' and 'mowing' during the spring and summer months, and when he worked at the large capital mine of 'Dirtlow' chiefly during the autumn and winter months. Naylor kept a

[129] D7812/1, pp. 11–44
[130] Muldrew, 'Interpreting', p. 171
[131] Erickson, *Women,* pp. 34–8; Spicksley, "Fly", pp. 187–207; Finn, *Character*, pp. 265–73, 310–2; Shepard, 'Crediting', pp. 1–24. See also the collection of essays in B. Lemire, R. Pearson and G. Campbell (eds.), *Women and Credit* (Basingstoke, 2001).

particularly close eye on his son's leisure pursuits, no doubt to ensure that John was not being over indulgent or thriftless, which would in turn damage the household's credit.[132] This may not have been entirely unwarranted, for John was certainly engaged in a more colourful social life than his father. [133] On 18th April 1789, for example, Naylor was 'at mine', while 'John goes to Sheffield', on 20th July he records being 'at mine myself, John goes to Upperhaddon', and 30th October 1790, Naylor and John Williams were 'getting some stone', while 'son John goes to Haven fair'.[134] In contrast, Rebecca is mentioned on just 11 occasions in the diary, all of which refer to days when she helped 'dress' or 'wash' ore at her father's mine. In contrast to his son, Naylor appears to have taken little interest in Rebecca's alternative work and leisure, neither of which are mentioned in the diary. Meanwhile Ann is entirely absent from the accounts, and so her work activity is more difficult to determine.[135] Yet, despite the paucity of direct evidence, it is possible to deduce the sorts of work Ann would have performed using the detailed record of her husband's work in the diary. Naylor records on several occasions performing work at home, which suggests the presence of a number of important production centres within the household.[136] On 2nd February 1790, for example, Naylor was at home 'gardening', on the 12th, 14th and 19th August, he was 'mowing our own at Crooked Stone', 'getting hay' and 'got the hay out from Crooked Stone'. On 14th July Naylor had his 'cow bull'd' and 'for a second time' on 18th August.[137] On 25th, 26th and 27th November he was 'setting up a knock stone' while 'John was falling wood for ye stable', they were then 'wooding the stable' and 'at stable covering' thereafter. And finally, he spent the 13th and 14th May 1791 'walling ye garden'. Thus, while Naylor was responsible for constructing and repairing these various sources of productivity, including a small plot of land, vegetable garden, and stable, his work records suggest that he was not responsible for their

[132] Muldrew, *Economy*, pp. 157–72.
[133] This may well have been part of a process of socialisation, and integration, establishing himself in the local area and forging new relationships, for more see Chapter 2.
[134] D7812/1.
[135] For discussion of the value of single women in the credit economy, see: Spicksley, "Fly", pp. 187–207.
[136] For more on the household as a productive unit, see: L. Weatherill, *Consumer Behaviour and Material Culture in Britain, 1660–1760* (London, 1988), pp. 93–111, 137–66; C. Shammas, *The Pre–Industrial Consumer in England and America* (Oxford, 1990); De Vries, 'Industrious', pp. 258–60; Muldrew, *Food*, pp. 208–59.
[137] The value of owning a cow was substantial during this period. Yet, both Muldrew and Shaw–Taylor note an 8 percent decline in ownership among labouring families over the course of the eighteenth century, see: L. Shaw–Taylor, 'Labourers, cows, common rights and parliamentary enclosure: The evidence of contemporary comment, c. 1760–1810', *P&P*, 171, (2001), pp. 95–126; Muldrew, *Food*, p. 251.

day-to-day operation, that responsibility undoubtedly fell to Ann, with help from Rebecca. What is more, the timing of goods purchases recorded in the diary suggest that it was Ann, not Naylor, who was responsible for travelling to local villages on a daily basis to purchase goods on credit, which supports the findings presented by Erickson, Shepard, and Lemire on the prominent role played by women in the use of credit in local society.[138]

The Naylor household was thus an industrious and disciplined productive unit, working toward the collective prosperity of all its members and contributing to its perceived creditworthiness. Naylor, as the principal earner, and an independent tradesman, was naturally the most significant factor in this equation, but he was not the only factor. His wife, son and daughter also made important contributions, engaging in a variety of tasks to help boost the household's earnings. This helped both in a material, and performative way, as the more productive the household was seen to be, the more secure was their credit. Thus, based on the evidence presented here, it is clear that households were incentivised to be more – rather than less – disciplined in their use of time prior to the advent of 'industrial capitalism'. A household's reputation for industriousness was vital to not only increasing its credibility in local society, but also, as the next section will demonstrate, in determining its everyday consumption habits.

IV. *Consumption*

In the year 1798, the Reverend Thomas Gisborne published his 'A general view of the situation of the mining poor' in a collection of works, entitled: *The Reports of the Society for the Bettering the Condition and Increasing the Comforts of the Poor*. In it, he provides a vivid account of the spending habits of the mining communities of Derbyshire and Cornwall, and its implications for their general well-being. He describes how although 'the earnings… of the miners' are 'precarious', they were 'on average great; and in many instances very far exceed all prospects of gain, which a labourer in

[138] Lemire, *Business*, pp. 16–55; Erickson, 'Married', pp. 267–307; Finn, *Character*, pp. 265–73, 310–2; Shepard, 'Crediting', pp. 1–24.

husbandry can propose to himself.' Yet, despite the miner's access to superior resources, Gisborne also notes how he:

> is not disposed to adjust the scale of his expenses to the *average* of his earnings. Being accustomed to the occasional receipt of considerable sums of money, money too which has flowed in suddenly upon him, rather from good fortune than from proportionate exertions, he then often raises his expenditure and mode of living to a pitch, to which the labourer in agriculture ventures to aspire. He feeds on a better diet, and wears clothes of finer materials than the husbandman. And, in general, he persists in this manner of life, in spite of a change of circumstances.[139]

This 'natural propensity is cherished and aggravated', according to Gisborne, by 'the ease with which he obtains credit, in comparison to those classes of labourers, whose gains, tho' steady are limited.' Thus, 'if he happens to be unsuccessful, he is trusted nevertheless at shops, and permitted to run up long scores at public houses; through the hopes entertained by the shopkeeper and the publican that a day will come when fortune will smile on the debtor.'[140] The evidence thus far examined has confirmed a number of these characterisations of the Derbyshire mining community. As we have seen, Naylor's income was indeed 'precarious', though 'on average great', he also commanded a substantial amount of credit in the locality, and evidently enjoyed the trust of his creditors who continued to extend him goods and services on credit even during the difficult years leading up to 1790. However, the account also points to further avenues of investigation that have yet to be considered, centred particularly on the household's consumption habits and standard of living. What, for example, was the relationship between the irregular character of earnings and household expenditure? Was the Naylor household, as Gisborne suggests, disposed to lavish expenditure patterns despite the precariousness of their earnings? What role did credit play in this process? Did it, as Gisborne suggests, 'cherish' and 'aggravate' the mining household's propensity to extravagance? Were the miners' given preferential treatment by local tradespeople due to their potentially high earnings?

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[139] T. Gisborne, *A general view of the situation of the mining poor* in *The Reports of the Society for the Bettering the Condition and Increasing the Comforts of the Poor*, I (London, 1798), p. 225.
[140] *Ibid*, pp. 225–6.

These and other lines of inquiry have clear implications for debates surrounding consumption and the standard of living during this period; yet, the role of credit has featured little in established literatures. Where it has appeared, it has often been in the context of what McKendrick, Brewer and Plumb pioneeringly termed 'the rise of a consumer society.' Here credit's function was more closely aligned to that observed by Gisborne, conceived of as a tool for enabling conspicuous consumption, a means by which a household could spend beyond their ordinary means, a vehicle for acquiring objects of desire, and a product of a speculative and increasingly profligate consumer society.[141] Yet, even here, the role played by credit in the reallocation of household resources has barely featured. Jan De Vries makes no mention of credit in his important work exploring 'the industrious revolution', while Weatherill and Shammas have considered the issue only in passing.[142] The subject is even more neglected in the literature exploring the standard of living.[143] As Emma Griffin and others have noted, the standard of living debate has to date been largely concerned with comparing and contrasting aggregate estimates for real wages and commodity prices, with lively debate centred almost exclusively on the weighting given to different sectors of the economy, and the value given to different products on the market.[144] Rarely have social or cultural issues entered into the discussion, while the question of credit has been entirely overlooked. In contrast, studies of retail and retail practices have long acknowledged the importance of credit in the purchasing of all manner of goods. Nancy Cox, for example, acknowledges the benefits of credit use not only for the customer but also for the retailer, while Jon Stobart and John Styles have separately acknowledged its centrality in seventeenth and eighteenth century retailing practices.[145] The analysis conducted here shall focus on the everyday use of credit as a means of managing household expenditure and consumption. It shall consider its impact on where and how the Naylor household acquired their goods, and explore the effect it had on their expenditure patterns relative to earnings. The limited reach of the evidence studied naturally restricts

[141] N. McKendrick, J. Brewer and J. Plumb, *The Birth of a Consumer Society* (London, 1985), pp. 86–8, 203–30, 232–7, 259–62.
[142] De Vries, *Industrious*; Weatherill, *Consumer*, pp. 112–36; Shammas, *Pre-Industrial*, pp. 198–9, 242, 269.
[143] See footnote 15 for list of relevant works.
[144] Griffin, 'Diets', pp. 71–111. See also: Humphries, 'Lure', pp. 693–714; Stephenson, 'Real', pp. 106–32.
[145] Cox, *Complete*, p. 146; J. Styles, *The Dress of the People* (New Haven, 2007), pp. 147, 173; J. Stobart, *Sugar and Spice* (Oxford, 2013), esp. chp. 6.

the breadth of conclusions – there will be no attempt, for example, to quantify the impact of credit more generally. Nevertheless, a number of areas for consideration have been identified and their implications for the standard of living debate considered.

Alongside the detailed record of work activities, Naylor's diary includes a series of monthly shopping lists, which account for over 500 different commodity purchases made by the Naylor household over the course of the period 1789 to 1792. This list of purchases forms the backbone of analysis in this section, and has the benefit of appearing alongside detailed records of work and earnings covering the same period. Some caution must be taken when using the diary as a source for the Naylor household's expenditure patterns, however. As table 2.10 shows, certain items, like flour, oatmeal and meat, are covered in great detail by the diary, but others, such as sugar, salt, cheese, and peas, appear less frequently than might be expected, while a number are almost entirely absent from the records, in particular clothes, jewellery, furniture and other luxury items. Whether this is a reflection of the shortcomings of the source or an accurate reflection of the household's expenditure patterns during this three-year period, is not entirely clear. The totals provided for food expenditure (table 2.10) marry well with estimates provided Charles Feinstein, and more recently Craig Muldrew, for 'working-class expenditure' for the period 1788 to 1792.[146] In both cases, estimates suggest that around 60 percent of regular household expenditure was devoted to flour, oatmeal and bread, a further 15 percent to meat, including beef, mutton, and bacon, and as table 2.10 shows, these proportions are close to those observed in the case of the Naylor household.[147] For 'clothes' and other luxuries, however, the diary is less reliable. It mentions just one purchase of 'stockings' for a shilling on 9th September 1789, and a visit to the tailors in January 1790. Yet, the absence of such goods from the record does not necessarily imply that the evidence provided by the diary is deficient. Rather, it is likely that the Naylor household produced many of these missing items themselves. We have already mentioned the fact that the Naylor's had access to a stable, garden and additional plot of land, which would have given them access to vegetables, livestock, and hay. It was also common for families,

[146] Feinstein, 'Pessimism', p. 635; Muldrew, *Food*, pp. 141–55. See also: C. Shammas, 'Food expenditure and economic well–being in Early Modern England' *JEH*, 63(1) (1983), pp. 89–100; Horrell, 'Home', pp. 561–604.
[147] Feinstein, 'Pessimism', pp. 631–3.

even of middling status, to make their own clothes using manufactured fabrics, which might well have been done by Ann at home, though there is no direct evidence in the diary.[148] The regular purchase of malt and hops indicates that the Naylor's were brewing their own ale, supplemented, no doubt, by purchases from the local tavern, though again precise quantities are not available.[149] While the presence of a cow in the work records, suggests that the Naylor household was producing its own milk, butter and cheese, which as several studies have shown, comprised a substantial boost to the household living standards.[150] Thus, while the diary does not provide a complete record of the goods consumed by the household during this period, on balance the evidence is sufficient to provide a detailed examination of expenditure patterns over the course of the three years, and its relationship to work and earnings.[151] To begin, we will explore where and how the Naylor household acquired their goods, before expanding upon their pattern of expenditure over time.

Naylor's diary comprises regular accounts not only of the goods the household purchased, but also the vendors from whom the goods were sourced. These included Mr. Woodruff and William Skidmore of Ashford, John Williams of Monyash, and William Roberts of Taddington (see map 2.1 for location of settlements). As table 2.11 shows, by far the most common supplier to the Naylor household was Mr Woodruff, who provided 76 percent, or just over £40 worth of the goods purchased, followed by Skidmore with 15, Williams with 5 and Roberts with 4 percent. While there is little evidence to suggest there was any particular specialisms among the vendors, there are trends in the

[148] Wetherill, *Consumer*, pp. 210–11; M. Overton, J. Whittle, D. Dean, and A. Hann, *Production and Consumption in English Households, 1600–1750* (London, 2004), pp. 179–80; Muldrew, *Food*, p. 163. See also the detailed analysis in: C. Muldrew, '"Th' ancient Distaff" and "Whirling Spindle": measuring the contribution of spinning to household earnings and the national economy in England, 1550–1770', *EcHR*, 65 (2012), pp. 498–526.

[149] For classic overview of brewing and the rise of the industry, see especially: P. Mathias, *The Brewing Industry in England, 1700–1830*, (Cambridge, 1959).

[150] Shammas, 'Food', pp. 89–100; J. Humphries, 'Enclosures, common rights and women: the proletarianization of families in the late eighteenth and early nineteenth centuries', *JEH*, 50(1) (1990), p. 26; Shaw–Taylor, 'Labourers', pp. 95–126; Muldrew, *Food*, p. 251.

[151] This irregularity in recording is a common plight of the early modern historian of consumption, and is particularly prevalent in the probate inventories, see: M. Spufford, 'The limits of the probate inventory', in J. Chartres and D. Hey (eds.), *English Rural Society*, 1500 – 1800 (Cambridge, 1990), pp.139–74; idem., 'Long–term rural credit in sixteenth– and seventeenth–century England: The evidence of probate accounts' in T. Arkell, N. Evands, and N. Goose (eds.), *When Death do us Part* (Oxford, 2000), pp. 213–28. The judgement related to flour and oatmeal was based on the estimates for household consumption provided in: Muldrew, *Food*, table 3.11, p. 215.

Table 2.10: *Commodities purchased by the Naylor Household, 1789-1792*

Commodity	Amount purchased (£ decimalised)	Percent
Bacon	2.09	4
Meat (Beef, Lamb, Veal)	6.11	11
Coal	3.97	7
Candles	3.45	6
Cheese	2.79	5
Flour (course and ground)	15.19	26
Malt and Hops	3.64	6
Oatmeal	17.20	30
Powder	1.00	2
Salt and Sugar	0.21	0
Soap	0.20	0
Sundries (Wood, Brush, Lime)	1.11	2
Tobacco	0.85	1
Tea and Treacle	0.26	0.5
Total	58.09	100

sourcing of certain types of goods.[152] The shopping lists show that Woodruff supplied the overwhelming majority of the household's bulk purchases, namely: flour, oatmeal, wood, candles, and coal. Roberts predominantly supplied meat, though he also supplied a number of other items, such as treacle, sugar, tea, and soap. Skidmore and Williams supplied predominantly flour and oatmeal, alongside the occasional purchase of salt, soap, tea and tobacco, but both were far from first choice suppliers of these goods – a position firmly occupied by Woodruff.[153] In general, the evidence indicates that the most important factors influencing the Naylor household's choice of supplier were, in descending order: convenience, access to credit, and price. As table 2.12 shows, Woodruff charged higher prices on average than Williams, Skidmore and Roberts, yet, it was only when the other three's prices fell below a certain threshold that the Naylor's switched supplier. Evidence from Naylor's work activity indicates that this was likely due to the established credit relationship the household shared with Woodruff, who, as we saw in section III, allowed Naylor to repay part of his debt through labour,

[152] This aligns with the findings presented by Stobart and Bailey, 'Retail', pp. 396–9. See also: Cox, *Complete*, pp. 120–7.
[153] Stobart and Bailey, 'Retail', pp. 405–6.

while the other vendors mentioned appear to have only accepted cash.[154] The distance from the Naylor household undoubtedly played an important role in determining the choice of vendor in the first instance, though, as has been noted elsewhere, it was perhaps not as influential as some have claimed.[155] The time and energy expended in travelling to Taddington or Monyash, versus Ashford naturally factored in to their decision, but between vendors in the same village, it seems credit was the crucial factor, more so than price. The diary thus highlights the complex webs of local information available to households, which helped them make informed choices about where they sourced their goods, undermining the popular view of village shops as 'monopolists' during this period. Evidently, Woodruff and Skidmore were competing with one another, as well as other vendors from neighbouring villages, and were thus forced to adopt different retail practices in order to attract customers and gain a competitive edge – practices that worked to the advantage of the consumer, as well as the retailer.[156]

Table 2.11: *Percentage of goods purchased from vendors, 1789-1792*

Vendor	Percent of total expenditure
William Woodruff	76
William Skidmore	15
John Williams	5
William Roberts	4
Total	100

Table 2.12: *Average price of oatmeal and flour purchased from different vendors, 1789-1792*

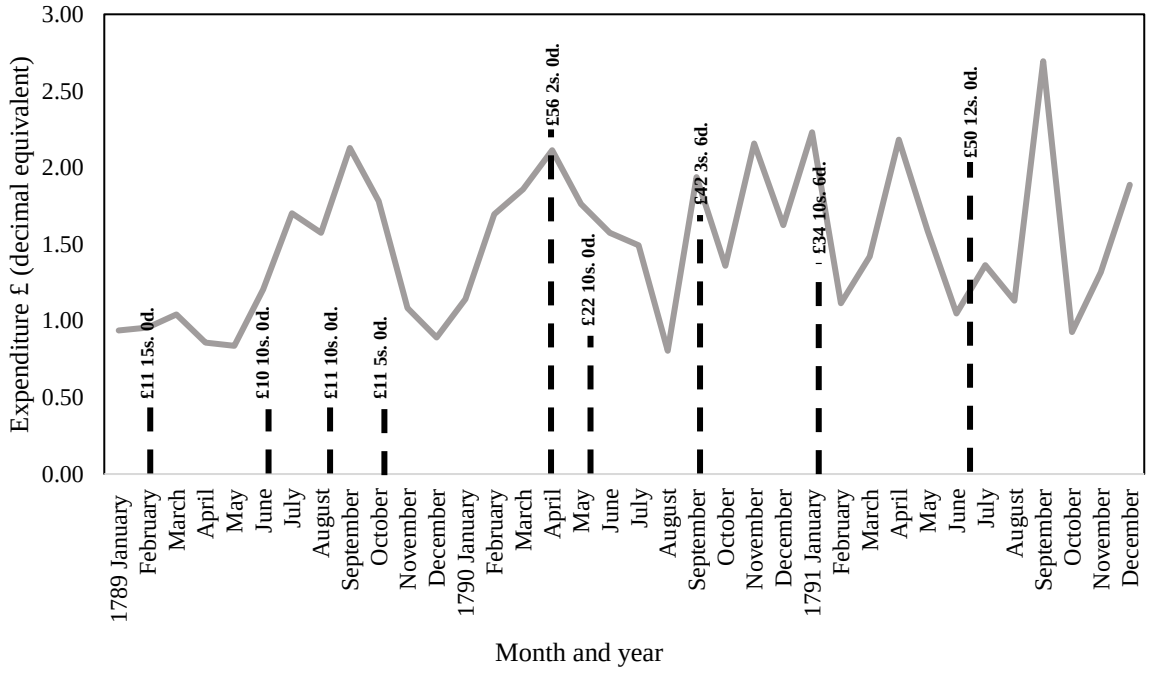
	Average price in pence per unit			
Goods	Woodruff	Williams	Skidmore	Roberts
Oatmeal	13	12.6	9.7	12.5
Flour	26	25	23	-

Given the importance of credit in determining where the Naylor household purchased its goods, it is also important to consider its impact on their pattern of expenditure. Figure 2.2 depicts the

[154] Which may also explain the differences in price with Woodruff charging slightly higher prices to cover the risk of allowing non–cash repayment for debts, see also: Mui and Mui, *Shops*; Cox, *Complete*, pp. 83–4, 85–90.
[155] Stobart and Bailey: 'Retail', pp. 403–6.
[156] For more on this broad debate, see especially: *Ibid*, p. 408.

expenditure patterns and earnings of the Naylor household over the course of the period 1789 to 1792. As can be seen, the trend is prone to fluctuations, with peaks in expenditure in September 1789, April 1790, and September 1791. Comparison with earnings shows that the peaks in expenditure do not marry neatly with the increases in earnings, in some cases pre-empting income, and in other cases apparently unrelated. Moreover, as figures 2.3 and 2.4 show, these fluctuations were not, as Gisborne claimed, a result of increased expenditure on food, which remained at between 20 and 30 percent of total expenditure for much of the period, barring the peak in September 1789, which came at a period of particular hardship for the Naylor household. Thus, if the fluctuations in expenditure were not a result of more lavish spending habits in times of prosperity, what else might have caused these fluctuations? Figure 2.5 suggests that it was largely a result of increased expenditure on durable goods such as coal, wood, candles, gunpowder and ingredients for brewing ale, which were important not only to household consumption, but also to Naylor's mine operations.[157] The observed purchasing patterns of these goods suggests that it was better to purchase them in bulk, rather than on a needs basis, as in the case of regular food items, with the decision commonly determined by the availability

Figure 2.2: *Graph showing Naylor household expenditure and earnings, 1789-1792*



[157] As Muldrew has shown, it was common for farmers and other employers to home–brew ale to be consumed by wage–labourers, see: Muldrew, *Food*, pp. 210–2, 226–31.

of earnings or low prices.[158] Either way, the evidence provided by Naylor's diary indicates that the Naylor household's expenditure on food was not prone to dramatic fluctuates in line with changes in income, as Gisborne claimed; rather fluctuations were principally linked to the bulk purchase of durable goods such as coal, wood, and candles, when price conditions were favourable and earnings more consistent.[159]

The fact that earnings were unpredictable, and yet, expenditure remained for the most part stable, suggests that the Naylor household's access to credit had the opposite affect to that noted by Gisborne.[160] It was precisely because of the availability of credit that the Naylor household was able to free themselves from the limits imposed by their irregular income, allowing them to adapt their expenditure to their immediate needs, and to take advantage of changing price conditions. The flexibility afforded by credit is demonstrated by the consumption patterns of the household's two largest items of expenditure, flour and oatmeal. As figure 2.6 demonstrates, the two were treated as substitute goods by the Naylor household, with increases in expenditure on one resulting in a proportionate decline in expenditure on the other.[161] This remained the case throughout the period in question, with oatmeal generally favoured during the earlier period and flour during the later. Moreover, as figure 2.7 shows, this pattern in consumption was a result of changes in price, rather than changes in earnings, or consumption preferences, as has been claimed elsewhere.[162] Between January and October 1789, and January and April 1790, for example, the price of flour was significantly higher than that of oatmeal, while between August and October 1790, and June and September 1791, the reverse was true, and as figure 2.6 clearly shows, in each case consumption altered accordingly. The flexibility afforded by credit thus allowed the Naylor household to take advantage of these changes in the price of various goods, and to delay bulk purchases or shift supplier with comparative ease. Had they been reliant solely on cash earnings, the Naylor's would have been

[158] For helpful discussion of the way that household's distributed its resources, see especially: Muldrew, *Food*, esp. chps.2 and 4.
[159] Gisborne, *General*, pp. 223–6
[160] *Ibid*, pp. 225–6.
[161] See especially: C. Shammas, 'The eighteenth–century English diet and economic change', *EEH*, 21(3), (1984), pp. 254–69.
[162] For useful discussion, see: H. Voth, 'Living standards and the urban environment', Floud and Johnson, *Cambridge*, pp. 280–3.

forced to purchase goods not when prices were favourable, but rather when they had access to the requisite cash, which would in turn have given rise to a more turbulent expenditure pattern.

The picture presented offers an optimistic account of the role played by credit in the acquisition of everyday household amenities. Thanks to the availability of credit, and the household's standing in local society, it was able to navigate the recurrent challenges it faced over the course of its lifecycle. Illness, stagnated earnings, underemployment and death, were frequent and often catastrophic challenges facing the early modern household, to which might be added indebtedness and

Figure 2.3: *Graph showing Naylor household expenditure on food compared with total expenditure, 1789-1792*

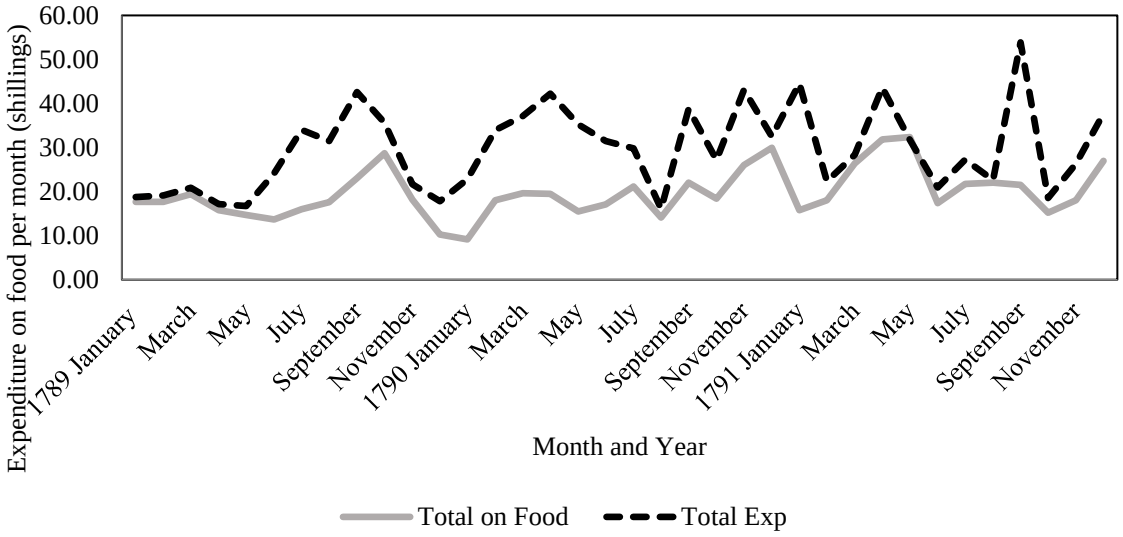
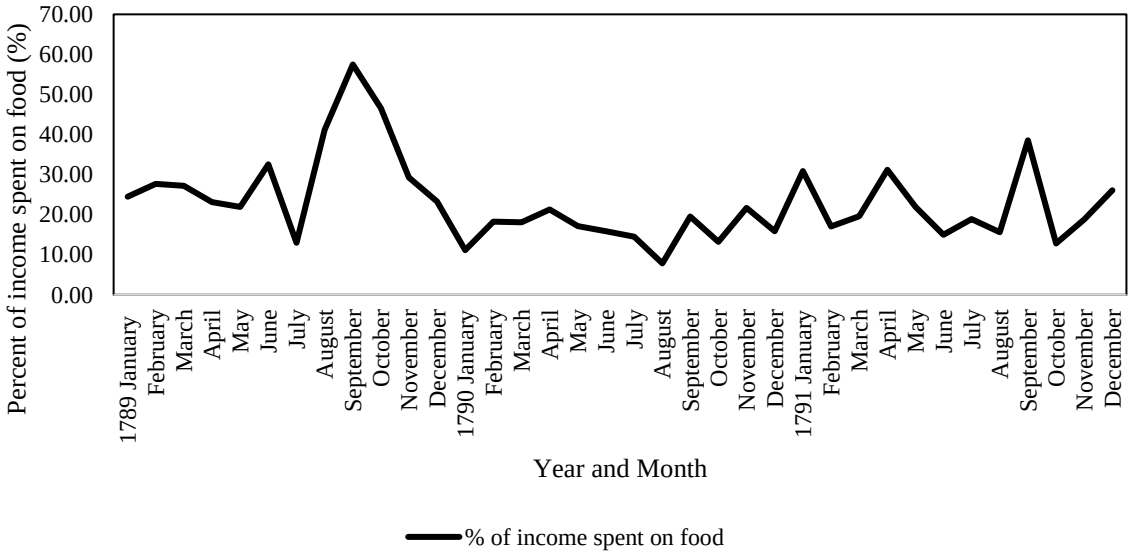
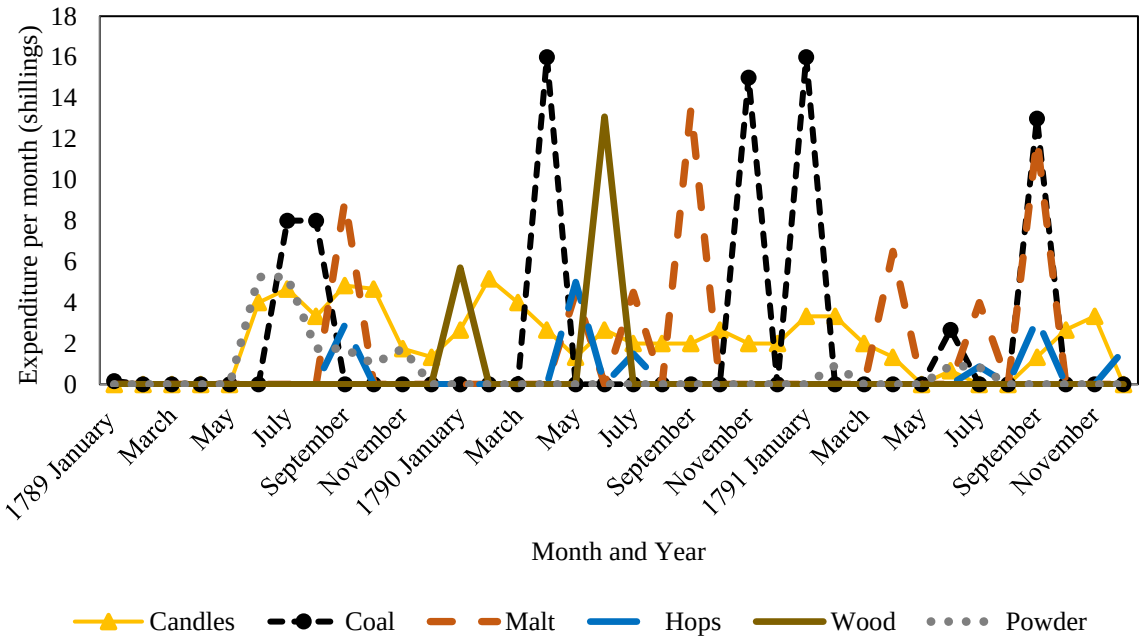


Figure 2.4: *Graph showing Proportion of Naylor Household's earnings spent on food, 1789-1792*



litigation.[163] Yet, while credit offered an important means of mitigating many of these challenges, it was not a panacea for all early modern woes. As Julian Hoppit has demonstrated, the abuse of credit facilities, both public and private, was itself a widely referenced plight in eighteenth-century society, and for every promoter of credit there were several detractors waiting in the wings.[164] The economic historian B. L. Anderson described credit as 'a constantly surging, periodically shifting, element; it was the taproot of a speculative society which, in the absence of any monetary and credit control, guaranteed the recurrence of crisis.'[165] Yet, as Muldrew and others have noted, these critical interpretations of the early modern credit economy are rooted in the work of classical economists such as Adam Smith and Thomas Malthus, which formed part of a wider reform movement that continued into the nineteenth century.[166] These and other reformers tended to decry the abuses of their forefathers, and emphasised the limitations of credit, as John Stuart Mill put it: 'Credit has a great, but not, as many seem to suppose, a magical power; it cannot make something out of nothing.'[167] Credit

Figure 2.5: *Graph showing Expenditure on non-food products, 1789-1792*

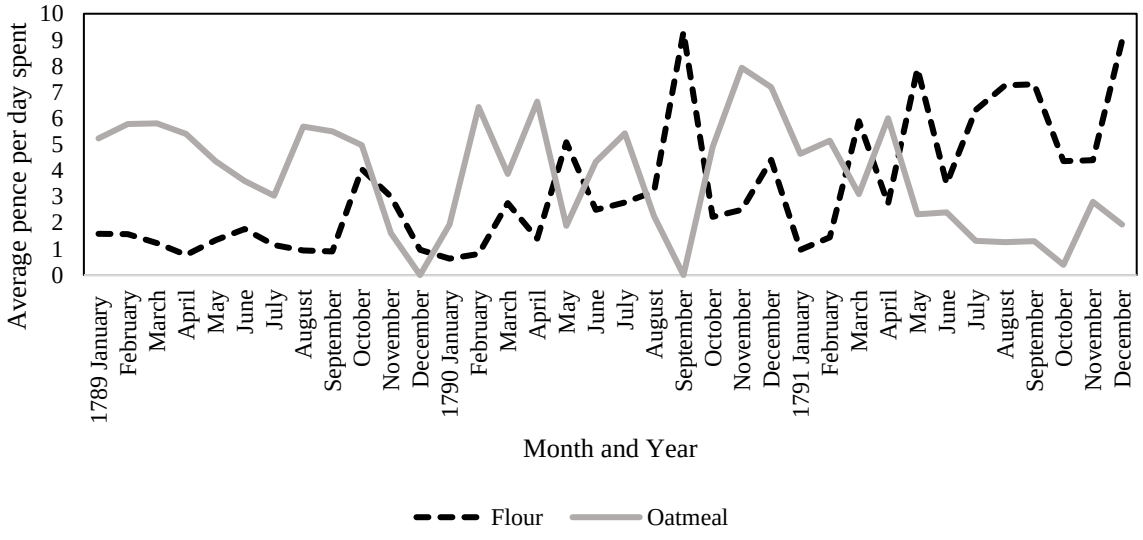


[163] See especially: P. Laslett, *The World We Have Lost – Further Explored*, (London, 2000 ed.); Wrightson, *Earthly*, pp. 51–63,145–8, 194–201, and 325–30. Hoppit, *Risk*, pp. 18–28.
[164] Hoppit, 'Attitudes', pp. 308–16.
[165] Anderson, 'Money', p. 100.
[166] Muldrew, 'Interpreting', pp. 163–7; Hoppit, 'Attitudes', pp. 305–8; Finn, *Character*, pp. 279–82. Smith was particularly critical, see for example: A. Smith, *Wealth of Nations*, II (London, 1951), pp. 43–53, 389–430. Malthus took a more pragmatic view, though was also conscious of 'the great evils' that might arise from its over–use, see: T. Malthus, *Principle of Political Economy* (London, 1836), pp. 411–3.
[167] J. Mill, *Principles of Political Economy*, II (London, 1848), pp. 36–49.

thus inhabited a challenging place in popular conceptions during the eighteenth and nineteenth centuries. As Margot Finn observed, 'personal debt and credit relations in the novel constantly expose the social and cultural forces that constrained contractual individualism in English market culture'. In other words, by tying individuals and households into overlapping financial obligations, policed and enforced by neighbours and friends, credit could be seen alternatively as a safety net or noose, depending upon one's perspective.[168] As Daniel Defoe neatly put it in his *The Complete English Tradesman*: 'Credit, next to real stock, is the foundation, the life and soul of business for a private tradesmen', it is 'the choicest jewel the tradesman is trusted with'; yet, should he for whatever lose his credit be damaged or his reputation besmirched, he will be unable to 'trade for a shilling more.'[169]

Despite these caveats, the evidence examined here provides the foundations for a number of general claims concerning the impact of credit on household financial management, and their implications for the standard of living debate.[170] First, credit afforded greater flexibility in the expenditure patterns of households, allowing them to adapt more nimbly to changing price and market conditions than was otherwise possible. This enabled households to allocate their resources more

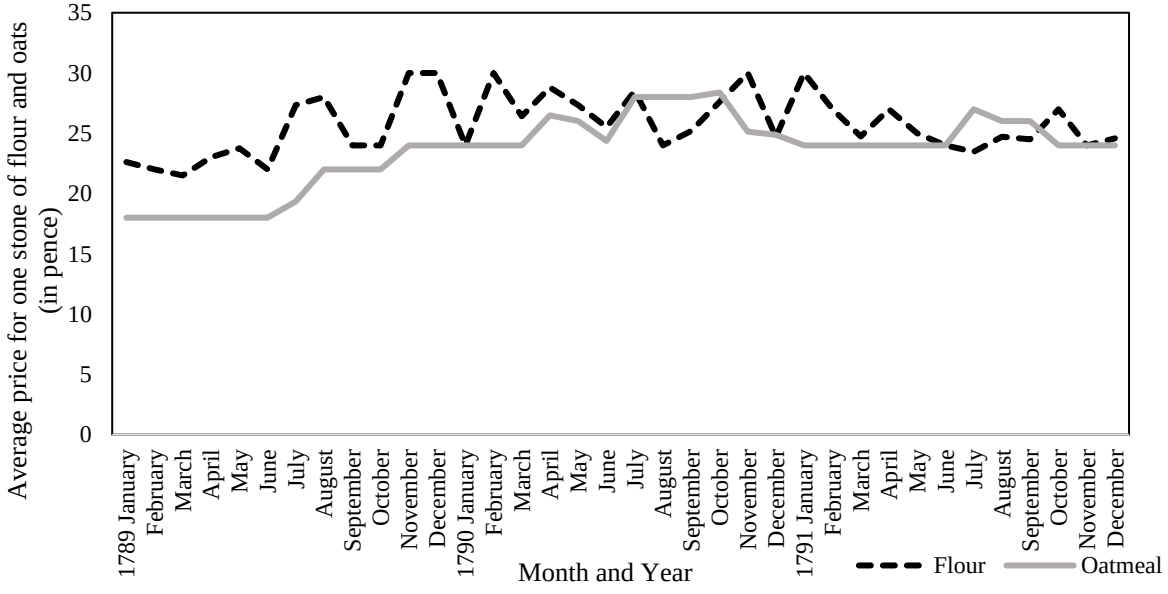
Figure 2.6: *Graph showing expenditure in pence per day on Flour and Oatmeal, 1789-1792*



[168] Finn, *Character*, pp. 25–6, 62–3.
[169] D. Defoe, 'The Complete English Tradesman' in *The Novels and Miscellaneous Works of Daniel Defoe*, I (Oxford, 1841), pp. 269, 274.
[170] For important insights into household and standard of living see the work by Jane Humphries and Sarah Horrell, though neither explore in any detail the impact of credit: Horrell, 'Home', pp. 561–604; Horrell and Humphries, 'Old', pp. 849–90; Humphries, *Childhood*, pp. 84–7.

effectively, and to purchase goods based on favourable price conditions rather than the availability of cash.[171] Second, the widespread use of credit allowed households to smooth their consumption patterns in the face of irregular and often unpredictable earnings. It allowed households to plan their consumption in advance of earnings, thereby reducing the variability of expenditure on a weekly, monthly and yearly basis, and limiting the household's reliance on the income of its household head.[172] Finally, as the evidence examined above demonstrates, credit was also key to maintaining a healthy flow of goods into and out of shops, which helped shopkeepers clear their shelves of perishables, and overcome the inadequacies of the cash economy at the local level.[173] This allowed retailers to reduce wastage, and households to maintain more regular diets and expenditure patterns. Overall, these claims present the case for a cautiously optimistic view of pre-industrial living standards and raises yet more questions regarding the representativeness of real wages as an indication of prosperity during this period.[174] Evidently, households were not restricted to a simple comparison of wage and price levels, they were able to adapt and alter their consumption levels to reflect predominant market conditions, draw on goods produced within the domestic sphere, and were reliant on a variety of

Figure 2.7: *Chart showing value of flour and oats, 1789-1791*



[171] Muldrew, 'Hard', p. 92.
[172] See especially: Horrell and Humphries, 'Old', pp. 849–90; Horrell and Humphries, 'Origins', pp. 25–64.
[173] For benefits of credit to retailers, see especially: Cox, *Complete*, pp. 146–62. For limits of the cash nexus, see: Muldrew, 'Hard'; Finn, *Character*; Valenze, *Social*.
[174] Humphries, *Childhood*, pp. 85–7; Humphries, 'Lure', pp. 693–714; Stephenson, 'Real', pp. 106–32; Griffin, 'Diets', pp. 71–111.

income streams, which mixed wage and independent work in a complex and often unpredictable manner. Producing an exact figure for the effects credit use had on living standards more generally is beyond the reach of the evidence examined here. It is particularly difficult, for example, to discern whether access to credit increased the total amount of goods consumed by the Naylor household, or whether, as seems likely, the benefits arose predominantly from the flexibility credit afforded in the allocation of its limited financial resources. Yet, as Jan de Vries and others have demonstrated, the potential benefits arising from better planning and resource allocation on the part of households could be substantial, a factor that has yet to feature in the established literature.[175]

Conclusion

This chapter has explored the economic and social life of a Derbyshire lead miner, his household, and the local community with which he was engaged, during a pivotal period in the economic and social history of Great Britain, using a diary he kept between 1789 and 1792. The image presented is intimate, providing an insight into the way the Naylor household overcame the challenges it faced on a daily basis, its embeddedness in networks of credit and exchange, and its patterns of work, earnings and expenditure over the course of a three year period. Unlike other diaries from a similar period, there is no mention of the household's religious or political persuasion, no account of their views on current affairs, nor does it delve into the emotions and sentiments shared between family, neighbours and kin.[176] Naylor's diary was above all a practical tool, used by an artisan miner to keep track of his independent mining concern. Nevertheless, the account it affords remains compelling, offering valuable insights into a number of processes and developments that occurred over the course of the seventeenth and eighteenth centuries. In particular, this chapter has considered the centrality of credit in the conduct of everyday economic and social affairs. As we have seen in section I, the calculation of credit was intricately bound to changes in the household economy over the course of its life-cycle, encompassing all of its members, and altering dramatically in relation to its age, gender and

[175] De Vries, *Industrious*, pp. 71–2; Muldrew, *Food*, chp. 6. For a particularly useful examination of related issues, see: Muldrew, 'Hard', pp. 78–120.
[176] See especially: A. MacFarlane (ed.), *The Diary of Ralph Josselin* (Oxford, 1991); D. Vaisey (ed.), *The Diary of Thomas Turner* (Oxford, 1984). For important works on both, see: MacFarlane, *Family*; Tadmor, *Family*, pp. 25–35.

dependency ratios.[177] Naylor, as the household head, was undoubtedly the most significant contributor to this equation, but as we saw, the household was not solely dependent on his earnings.[178] Rather, as section II revealed, credit was negotiated at the communal level, between networks of interconnected households and businesses, entangled in dense webs of credit, interdependence and kinship. The paucity of currency in circulation, and the irregularity and unpredictability of everyday economic life during this period meant that reliance on credit for the payment of wages, the purchase of goods, and the disbursement of all manner of financial obligations, was ubiquitous, the overwhelming majority of which were negotiated between households and individuals, rather than institutions and organisations. As Muldrew has noted, the interpersonal character of credit contributed to a fading of the lines between the social and economic spheres during the early modern period, which as Erickson, Shepard, Spicksley, and others, have shown, meant that such apparently unrelated events, as marriage, birth and death, became crucial to the operation of the early modern credit economy.[179]

However, this chapter has endeavoured to go further than simply restating these general observations, and has explored the impact credit-use had on patterns of work, expenditure and consumption. In section III, we saw how Naylor's unpredictable earnings and limited access to cash, increased the household's dependency on credit, which in turn, incentivised them to practise a more disciplined and rigorous approach to work. Naylor forewent many of the traditional holidays, feasts and festivals that Thompson believed were typical of preindustrial work patterns, practicing a system of rigorous self-disciplining reinforced by the surveillance of his friends, neighbours, and creditors, which was more than a match for the strictures of the factory rota.[180] The combination of self-discipline and community surveillance ensured that everyone in local society was conscious of their financial obligations, lived within their means, and repaid their debts in a timely and reliable manner,

[177] Shepard, *Accounting*, pp. 35–7.
[178] For a broader discussion of the issue, see in particular: Humphries, *Childhood*, pp. 84–102. See also: Muldrew, *Economy*, pp. 157–8.
[179] *Ibid*, pp. 123–47. For importance of birth, marriage and death, see: Erickson, *Women*, pp. 102–14; A. Erickson, 'Coverture and capitalism', *HWJ*, 59 (2005), pp. 1–16; Shepard and Spicksley, 'Worth', pp. 493–530; Shepard, 'Crediting', pp. 10–5. See also: L. Davidoff and C. Hall, *Family Fortunes* (London, 2002 ed.), pp. 219–252; Hunt, *Middling*, pp. 125–46; Cressy, *Birth*, pp. 1–14; Lemire, *Business*, pp. 16–8.
[180] Thompson, 'Time', p. 76.

which again was crucial to the effective operation of the local credit economy.[181] This system of credit, and the Naylor household's ability to navigate it, also played an important role in the acquisition of everyday household amenities. As was demonstrated in section IV, the Naylor household purchased most, if not all, of its goods on credit, and sourced them from a number of vendors located across a network of local settlements. We saw how the Naylor household shifted their supplier in response to changes in the price and supply of various goods, but it was also apparent that the amount of credit a vendor was willing to extend, and the terms upon which it was extended, were similarly crucial in determining their choice of retailer.[182] The ubiquity of credit also impacted the Naylor household's pattern of expenditure. The ability to purchase goods on credit, prior to the receipt of earnings, and on the basis of trust, was crucial to the household's ability to maintain a regular and decent standard of living, despite the irregularity of earnings. Credit allowed the Naylor household to smooth its expenditure, and to adapt their consumption to prevailing market conditions, freeing them from the limitations imposed by their cash earnings. It was noted how this flexibility in the allocation of household resources enhanced their standard of living, allowing them to purchase goods on favourable terms, and to adapt their consumption to prevailing market conditions. Whether the use of credit fundamentally increased the overall quantity of goods purchased, particularly in terms of luxury goods, clothes, furniture and so on, demands further research, though it seems apparent that the benefits accrued from the flexibility in the allocation of household resources was significant and is deserving of serious consideration by historians of living standards during this period.

In summary, this chapter has demonstrated the importance of credit in the management of everyday economic and financial affairs, and the centrality of the household as the unit around which this system was organised. Credit helped liberate households from the limitations imposed by the irregularity of earnings, and the limitations of the cash nexus, and helped bring regularity and structure to the local economy. Thus, far from representing a source of inherent instability in the economy, as some historians have argued, credit appears to have been crucial to the regular operation of the local

[181] Muldrew, *Economy*, pp. 148–72.
[182] Cox, *Complete*, pp. 83–8, 120–7; Stobart and Bailey, 'Retail', pp. 396–406.

economy, easing the flow of goods and services in the market, and as we shall see in the next chapter, was also key to the structuring of the industrial workplace, and the divisions of labour at the Derbyshire lead mines.

Chapter 2
The Division of Labour at the Derbyshire Lead Mines: The Case Miners Engine Mine, c.1737–1765

In his *A Tour Through the Whole Island of Great Britain*, published in 1727, Daniel Defoe offers a rare glimpse into the everyday lives of a Derbyshire lead mining family living upon Brassington Moor, near to the town of Wirksworth, in Derbyshire.[1] Defoe and his entourage were in pursuit of a local landmark known as 'the tomb of the giant', when they happened on a woman and her children and stopped to ask them for directions. The woman told them of 'a flat stone of great size' that lay atop a rocky outcrop, and went on to say that if her husband had been at home 'he might have shown it to them'. This mention of home drew Defoe to inquire as to its location. Her response astonished him, for she pointed to what he described as 'a hole in the rock' declaring 'here, sir'. Amazed by the primitive nature of her dwelling Defoe asked if 'all these children live here too?' 'Yes, sir', she said, 'they were all born here', and so too was her husband, 'and his father before him.' Defoe's interest was piqued and so he asked the woman if she might allow them to have a look inside their home, undoubtedly expecting to witness the 'misery' and 'poverty' that such a 'primitive' abode suggested. However, to his surprise, he entered 'a neat and tidy' dwelling, which he described as: 'a large hollow cave…parted into three rooms' with 'a chimney', 'shelves with earthen ware, and some pewter and brass'. There was also 'a whole side of bacon hanging up in the chimney…pigs and a sow running about at the door', 'a little lean cow feeding upon a green place just before the door', and a small enclosure upon which 'good barley' was growing. This 'appearance of substance' drew Defoe to inquire after her husband's trade; she told him that 'he worked in the lead mines' for about 'five pence

[1] The branch of his visit that covers Derbyshire, and from which this introduction draws heavily, can be found in letter 8 of Defoe, *Tour*, pp. 449–515.

a day'. As for herself, she says that 'when she was able to work, she washed the ore, but looking down on her children and shaking her head, she intimated, that 'they found her so much business she could do but little.' Yet, despite their apparently humble circumstances, Defoe found that the 'five small children live very pleasantly', they were 'plump and fat, ruddy and wholesome', while the woman 'looked plump, well–shaped, clean, and (for the place) a very well looking, comely woman.' As for her husband, the woman conveyed warm sentiments that appear to have moved Defoe and his entourage, describing how 'she was very happy… for he worked very hard and they wanted for nothing that he could get for them'.

This passage was, prior to the discovery of John Naylor's diary, one of the few sources available that offered an insight into the lived conditions of a Derbyshire mining household during the eighteenth century.[2] It is alive with personality and colourful description, and provides a rare account of economic life from a female perspective, albeit via the medium of a man's pen. The depiction is reminiscent of the findings made in the previous chapter in relation to home production and the household economy, and describes a household that, like the Naylor's, operated a mixed economy of mining and small scale agriculture. Over the course of the encounter, Defoe's assumption that this was an impoverished household deserving of sympathy, was gradually overturned. The household owned livestock, rented or owned additional land where crops were grown, their home had been in the family for generations, and the household presented itself in a 'polite' and 'comely' manner. But despite this 'appearance of substance', the view of the Derbyshire lead miners as an impoverished and subjugated class of labourers has endured.[3] In his *The Politics of Social Conflict*, Andy Wood commences his work by exploring the same passage from Defoe. But rather than attempting to tackle the bias that the source contains and drawing meaning from Defoe's observations, Wood argues that the use of such sources by historians has perpetuated 'elite prejudices' towards 'the plebeian inhabitants' of the Derbyshire mining region. In his view, 'social historians of the early modern period have all too easily turned to contemporary elite antiquaries and travellers for descriptions of local

[2] Derbyshire Record Office (DRO) D7812/1: Lead miner's diary.
[3] See in particular: A. Wood, 'Custom, Identity and Resistance: English Free Miners and their Law, c.1550–1800', in P. Griffiths, A. Fox and S. Hindle (eds.) *The Experience of Authority in Early Modern England* (Basingstoke, 1996),pp. 249–85; Wood, 'Social',pp. 31–50.

cultures.'[4] However, as section IV of this chapter will demonstrate, instead of redressing these 'elite' prejudices, as he claims to do, Wood's adoption of a Marxian analytical framework reconfirms and in many instances reinforces the elite perceptions of the Derbyshire mining community, denying them an essential role in the story of industrialisation.

In this chapter, the analysis of 'class' and the division of labour will attempt to move away from prescriptive labels such as 'elite' and 'plebeian', or 'upper', 'middle' and 'working' classes, and instead examine social, economic and political divisions at the local level and the networks of credit and obligation that intersected them.[5] Central to this interpretation are a series of account books produced at Miners Engine Mine in the parish of Eyam in Derbyshire, for the period between 1737 and 1765.[6] These accounts offer unique insights into the hierarchical structures of the Derbyshire lead mines, and allow for a comparative analysis of the different groups of workers employed in the extractive process, which included: 'women', 'lads' and miners or 'copers' (as they are described in the accounts). By examining the relationships between these different groups, an alternative to the Marxian framework for understanding the social structure of the Derbyshire mining community may be established, which in turn, allows for a re–evaluation of the social status of the Derbyshire lead miners. In line with the works of Keith Wrightson, Henry French, Craig Muldrew and Alexandra Shepard, the analysis carried out below will explore the language of social description from the local perspective and endeavour to reconstruct social status in the context of the early modern credit economy.[7]

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[4] Wood, *Politics*, pp. 1–11.

[5] An important basis for this analytical approach is the work of Henry French, see in particular: French, *Middle*, pp. 141–200.

[6] The majority of the wage data has been drawn from: DRO D7676/BagC/382: Miners Engine Cope Accounts 1737–1741; D7676/BagC/384 Miners Engine Accounts 1744–1746; D7676/BagC/386: Miners Engine Cope Accounts 1763–1765. Other related documents include: D7676/BagC/384: John Hales stoppage notes 1741–1747; D7676/BagC/385: Accounts 1759–1784; however, these documents do not provide the same consistent record of individual earnings as found in the former documents. In compiling, the data used below a regularised accounting procedure was required in order to build a coherent dataset spanning a protracted period.

[7] Wrightson, 'Sorts', pp. 28–51; French, 'Social', pp. 66–99; Muldrew, 'Class', pp. 147–77; A. Shepard, 'Honesty, worth and gender in early modern England, 1560–1640', in French and Barry, *Identity*, pp. 87–105; Shepard and Spicksley, 'Worth', pp. 493–530; Shepard, *Accounting*, pp. 1–32. See also; P. Corfield, 'Class by name and number in eighteenth century Britain' in P. Corfield, *Language, History and Class* (Oxford, 1991 ed.), pp. 101–30.

Alongside these considerations the Miners Engine accounts also offer insights into the organisation of labour more generally at the Derbyshire lead mines and present a unique perspective of the women and children who worked there between 1737 and 1765. The accounts record the earnings of just over 300 named individuals, from the 'copers', or miners, who were paid piece–rates, to the 'women' and 'lads' who received wages. The presence of such a range of age and gender groups is significant. For as recent scholarship in the area has shown, comparing the social and economic contributions made by different age and gender groups is restricted by their occupation of 'separate spheres' of employment.[8] This notion of 'separate spheres' has been critiqued by Amanda Vickery, who, in a seminal article, argued that the focus upon change in women's history masked important continuities in the experiences of women and children since the seventeenth century, continuities that led Judith Bennett, in an equally important work, to describe women's history as a 'History that stands still'.[9] More recently, a new wave of economic and social historians, have begun to reframe the question entirely. Historians such as Pamela Sharpe, Amy Erickson, Judith Spicksley and Alexandra Shepard, agree that 'neither change nor continuity' in their prescriptive forms, are 'satisfactory as… explanatory or descriptive schemes.'[10] Instead, they have presented, through a series of careful and targeted studies, a more optimistic account of the economic contributions made by women, children and indeed men as members of household economies, an interpretation that marries well with the findings presented in chapter 1.[11] Even so, the underlying problem of a lack of source material

[8] P. Earle, 'The female labour market in London in the late seventeenth and eighteenth centuries' *EcHR*, 42(3) (1989), pp. 328–53; Davidoff and Hall, *Family*; L. Davidoff, 'The role of gender in "the first industrial nation": agriculture in England, 1780–1850' in R. Crompton and M. Mann (eds.), *Gender and Stratification*, (Cambridge, 1986), pp. 190–213; Horrell and Humphries 'Women's', pp. 89–117; J. Humphries, 'Women and paid work' in J. Purvis (ed.), *Women's History: Britain, 1850–1945* (London, 1995), pp. 85–106. See also: E. Boserup, *Women's Role in Economic Development* (New York, 1970); A. Tilley and J. Scott, *Women, Work and the Family* (London, 1978), pp. 31–60; P. Hudson, 'Women and Industrialisation' in Purvis, *Women's*, pp. 20–42.

[9] A. Vickery, 'Golden age to separate spheres? A review of the categories and chronology of English women's history', *HJ*, 36(2) (1993), pp. 383–414; J. Bennett, 'History that stands still: women's work in the European past', *Feminist Studies*, 14 (1988), pp. 269–83.

[10] For quote, see: P. Sharpe, 'Continuity and change: women's history and economic history in Britain', *EcHR*, 48(2) (1995), pp. 353–69.

[11] Sharpe, 'Literally', pp. 46–65; M. Berg, 'What difference did women's work make to the Industrial Revolution' *History Workshop*, 35(1), (1993), pp. 22–44; Erickson, *Women*; P. Sharpe, *Adapting to Capitalism: Working Women in the English Economy, 1700–1850* (Basingstoke, 1996); J. Spicksley, "Fly with a Duck in Thy Mouth': Single Women as Sources of Credit in Seventeenth-Century England', *SH*, 32(2), (2007), pp. 187–207; Erickson, 'Married', pp. 267–307; Shepard, 'Crediting', pp. 1–24.

pertaining to their shared experiences remains a major barrier to the establishment of new 'explanatory or descriptive schemes'.[12]

In the case of Miners Engine, we are fortunate to be confronted by a series of accounts that record the employment of individual men, women and children working at the same industrial workplace and who were members of the same local community.[13] The accounts are relatively simple in format: they comprise lists of names and wages paid for five to six week periods, but what makes them particularly useful is their regularity over several decades. The accounts survive and are largely complete for the periods 1737–41, 1744–45 and 1763–65.[14] Similarly, the employment patterns practiced at the mine appear to have been comparatively stable, with very few changes in the workforce during each respective period. Alterations do occur in the structure of the workforce over time, but as will be shown in sections II and III, there was a surprising level of continuity, as children and young adults appear to have remained employed at the mine throughout their development. The limitations of the sources centre on the restricted access to the individual it provides. For although the names and earnings of each worker are provided, the source suffers from a lack of evidence pertaining to their specific age, their relationships with other workers, their place of residence and the tasks they performed at the mine. In order to fill these gaps, parish records and contemporary printed sources that relate to the divisions of labour at the Derbyshire lead mines have been consulted. This combination of sources has produced a detailed portrayal of the work performed by the women, lads and copers at the mines. It has also revealed how those roles altered over the course of the economic life–cycle and demonstrate the importance of familial, kinship and community relations in the acquisition of work.[15] In general, these findings have important implications for understanding the

[12] Sharpe, 'Continuity', p. 356.
[13] For other examples of works dealing with mixed gender workforces, see: E. Gilboy, 'Labour at Thornborough: an eighteenth–century estate', *EcHR*, 3(3), (1932), pp. 388–98; A. Hassel Smith, 'Labourers in late sixteenth–century England: a case study from north Norfolk', part I, *C&C*, 4(1), (1989), pp. 11–52; A. Hassel Smith, 'Labourers in late sixteenth–century England: a case study from north Norfolk', part II, *C&C*, 4(3), (1989), pp. 367–94; J. Burnett, 'Labourers at the Oakes: changes in the demand for female day–labourers at a farm near Sheffield during the Agricultural Revolution', *JEH*, 59(1), (1999), pp. 41–67.
[14] See footnote 6.
[15] Anderson, *Family*; pp. 103–66; K. Wrightson, 'Household and kinship in sixteenth–century England', *HWJ*, 12 (1981), 151–8; Mitson, 'Significance', pp. 24–76; Tadmor, *Family*, pp. 18–43; A. Plakans and C. Wetherill, 'Households and kinship networks: the costs and benefits of contextualisation', *Continuity & Change*, 18(1), (2003), pp. 49–76; Humphries, *Childhood*, pp. 151–71 and 210–55.

role of different age and gender groups both at the workplace and as contributors to the household and local economy.

The Miners Engine accounts are also useful sources for understanding how the organisation of labour at the Derbyshire lead mines altered in response to the processes of economic growth and industrialisation. Whereas Wood argues that this growth resulted in the 'proletarianisation' of the mining workforce and the marginalisation of the 'traditional small producers' by 'aristocrats, merchants and gentlemen', the evidence examined here suggests that the miners were able to maintain and even enhance their status as 'masters of the trade', thanks largely to the structural features of the Cope Bargain System.[16] Through their monopoly of trade knowledge and their control over the employment of labour at the capital mines of the eighteenth century, the miners were able to acquire a share in the proceeds of capital investment. Sections II and III will highlight the miners' dominance of the industry and demonstrate how they were able to restrict access to employment opportunities to a relatively narrow group of family, kin and friends. As will be explained below, this was achieved by the implementation of an 'apprenticeship–like' system in the training of the 'lads', and by the practice of employing women and children in entry level tasks at the mine surface, which effectively priced–out external sources of competition. Section IV will then reflect upon how this control over the labour force impacted the credit and social status of the miners in local society and compare their position with those of the wage labourers they employed. But first, let us begin by introducing the principal method of labour organisation used at large capital lead mines in Derbyshire, the Cope Bargain System.

I. *The Cope Bargain System*

The Cope Bargain System (CBS) was a system of labour organisation used at capital mine operations, owned and funded by investment partnerships in north–west Derbyshire during the seventeenth, eighteenth and nineteenth centuries. It was a system centred on the sub–contraction of the extractive

[16] See section I below for a more detailed discussion. See also: Wood, 'Social', pp. 48–9; Wood, *Politics*, pp. 85–6 and 104–5.

process. It involved small groups of miners, called 'copes', bargaining with capitalist mine owners to obtain the rights to extract ore along certain portions of a mine. The copers put forward offers to extract the ore for a certain rate or price per load or per ton, based on a mutual assessment of the potential costs and risks. Thus, the more accessible the ore was deemed to have been, the lower was the rate; conversely, the more difficult the process, the higher the rate. John Farey, in his *A General View of the Agriculture and Minerals of Derbyshire* (1811), provides a detailed contemporary account of the CBS, which is relevant to preceding centuries. Farey describes how: 'The Miners who dig the Ore are usually called Copers, from their working at a certain Cope or price per Ton or per Load of Ore which they get in some large works'.[17] Likewise, in 1798, the Reverend Thomas Gisborne, in a report produced on behalf of 'The Society for Bettering the Condition and Increasing the Comforts of the Poor', describes a similar situation: 'in Derbyshire the workmen frequently take on a mine, or a bargain for a determinate period, as three months, on the terms of receiving a settled price for each measure of ore which they shall produce'.[18] While, in 1630, a commissioner surveying the Derbyshire mining region on behalf of the Duchy of Lancaster, Roger Kenyon, described how 'the private men, owners of lead mynes thereabout… set in workemen, the sinkers, winders, drawers, etc., at day wages', but as for 'the Myners, viz. those that get the oare', they were 'usualie sharers in the oare'.[19]

Clearly, this system afforded the copers a tremendous degree of independence, as once a bargain was struck the copers were free to commence ore extraction on their own terms. They were in effect masters of their trade, as the structure of the Derbyshire lead mines was similar to that found in other urban trades. The coper, like a master craftsman, was responsible for hiring labourers, maintaining his own equipment, and for employing his own methods in ore extraction, whether by pickaxe, fire setting, gunpowder or any number of other methods.[20] Thus, in July 1634, Commissioners working on behalf of the Duchy of Lancaster reported to the Chancellor of the Duchy estates, Lord Newburgh, that many of the most 'skilled and expert' miners employed at the Cliviger works in Lancashire, 'haveinge formerlie beene workemen in the best workes of Derbyshire and

[17] J. Farey, *General View of the Agriculture and Minerals of Derbyshire*, I (London, 1811), p. 366.
[18] Gisborne, 'General', p. 224.
[19] R. Sharpe France, *The Thievely Lead Mines, 1629–1635*, (Preston, 1951), pp. 94–5.
[20] For more on the methods used by the Derbyshire lead miners, see Chapter 3 below.

Yorkshire… have wanted no helpe, necessaries or matterialls'.[21] That said, their independence and receipt of income from mine proceeds also brought substantial risks, as Gisborne notes: 'the working miner is almost always in some measure a gambler', for 'the ore may be found deposited in ample or in scanty veins', and 'may be with ease, or great difficulty detached from its bed', thus 'his bargain proves good or bad, according to circumstance.'[22] The high–risk, high–reward nature of the miners earnings was an essential feature of their identity, for 'he [the miner] is buoyed up with the sanguine hopes of a gamester: and, for what he cannot pay today, [he] draws on the favourable luck of tomorrow.'[23]

The financial risks faced by the miners were heightened further still by the manner in which they received their earnings. Once the ore was mined, it first had to be measured and taxed by a local judicial officer known as the Barmaster.[24] This visit usually took place on a quarterly or half–quarterly basis at what was known as a reckoning, and it was only then that the ore could be sold, accounts balanced and miners' earnings distributed.[25] The disconnect between the commencement of work and its reimbursement was highlighted by Farey, who writes: 'at the end of the bargain', when the miners have dressed and prepared the ore for sale, 'it is weighed if by the Ton, or measured if by the Load, in the presence of the Bar–Master… and at pay–day, which is usually a fortnight after the ending of the quarter or half quarter, they receive money for the Quarters Reckoning.'[26] The time–lapse between work and pay could be anywhere between eight and fourteen weeks, but during this protracted period of time the price of lead could alter, rent could increase, debts accumulate and food prices fluctuate. The Derbyshire lead miners were thus particularly exposed to the turbulence of the local economy, as fluctuations in the market could either dramatically hamper or enhance their earnings. However, the risks associated with the mining trade were widely understood and broadly embraced by the mining

[21] Sharpe France, *Thievely*, p. 194.
[22] Gisborne, 'A general', pp. 224–5.
[23] *Ibid*, p. 225.
[24] For a description of the Barmaster and his responsibilities, see: Farey, *General*, pp. 357–8.
[25] The concept of a 'reckoning' also related to the reckoning of debts, see: Muldrew, *Economy*, pp. 107–8. For more on reckoning in a Derbyshire mining context, see chapter 4 below.
[26] *Ibid*, pp. 366–7.

community, who above all else, defended their economic independence and the possibility of rapid enrichment.

Similar bargain systems were in operation in other mining regions of England, though, as Gisborne notes, the proprietors in these regions generally adapted their employment system 'to prevailing custom and local circumstances.'[27] In the North Pennines, for example, William Forster, in 1781, describes how 'the Miners take a certain piece of ground, commonly called a length in which they propose to raise ore, for a certain time at so much a Bing[28] according to the richness of the Mine or working.' He notes that 'the price of procuring the Ore depends much upon the hardness' of extraction, with the cost of 'Candles, Gunpowder, the expenses of drawing the Ore or Stone from the mine, dressing and preparing it fit for the process of Smelting' borne entirely by the miners.[29] At the lead, copper and tin mines of Cornwall, a similar method of labour organisation was employed known as the 'tribute' system.[30] Like the Derbyshire and North Pennine miners, the Cornish miners 'were paid a proportion of the value of the ore which they produced', and competed with one another over 'pitches', or portions of ore bearing ground. These pitches 'were put to the men at a form of auction known as the survey or setting' where they presented rates to the mine's proprietors based upon their estimation of the ore content of the pitch.[31] Bargain systems were thus a common feature at English non–ferrous metal mines, where supervision was hampered by a combination of the remote and often hostile conditions of work, and the acute lack of trade knowledge and skill on the part of the mine investors. It was, therefore, more efficient to grant miners a share in the proceeds of the mine to encourage self–regulation rather than relying on managerial oversight.[32]

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[27] Gisborne, 'General', p. 224.
[28] The 'Bing' was the measure used to weigh ore in the Pennine lead mining region. It is similar to the Derbyshire dish or load, though the exact volume is different. See, C. Hunt, *The Lead Miners of the North Pennines in the eighteenth and nineteenth centuries*, (Newcastle–Upon–Tyne,1984), pp. 9–16.
[29] W. Forster, *A treatise on a section of the strata from Newcastle upon Tyne to Cross Fell,* (Alston, 1821), pp. 332–3.
[30] J. Rule, ''The Perfect Wage System?' Tributing in the Cornish Mines' in J. Rule and R. Wells (eds.) *Crime, Protest and Popular Politics in Southern England, 1740–1850* (London,1997), pp. 53–65; C. Mills, 'A hazardous bargain: occupational risk in Cornish mining 1875–1914', *LHR*, 70(1), (2005), pp. 53–71.
[31] Rule, 'Perfect', p. 55.
[32] For other accounts of bargain systems, see: A. Raistrick and B. Jennings, *A History of Lead Mining in the Pennines* (Newcastle–upon–Tyne, 1983), pp. 285–6; Burt, *British*, pp. 134–149; Rule, 'Perfect', p. 54; Wood, *Politics*, pp. 104–5.

What appears to have distinguished the CBS of Derbyshire from the systems used in the Pennines and Cornwall, was the degree of economic independence practised by its miners. Whereas in Yorkshire and Cornwall, landowners had exploited the mines directly prior to the introduction of the bargain system; in Derbyshire, the CBS was introduced into a region that had long been associated with small–scale independent enterprise.[33] This is illustrated in the type of credit relations that existed between the miners and mine owners of these different regions. In a report for the 1842 Royal Commission into *Children's Employment*, 'Dr Mitchell' provides a detailed account of the work conditions of the North Pennine mining community.[34] Although the source dates from the mid–nineteenth century, it provides an insightful description of the credit systems predominant at the mines in the North Pennines during the eighteenth century. Mitchell describes how, once a bargain was agreed: 'an account is opened against each miner, and he receives say 40s., which is called lent–money, on the first Friday in every month, which is entered [into the accounts] against him.' After three months' work, the miners were expected to sell the ore they had produced and repay their debts to the mine's proprietors; however, should the miner be 'found not to have earned as much as stands in the books against' him by the end of the year, then 'the balance is struck and entered against him in next year's account.'[35] This 'may go on for year after year' and drew the miners into debt–dependency upon their employers. For as Mitchell notes, these formal debt obligations, while offering an important lifeline to the miners, also meant that 'a miner will very rarely, scarcely ever, leave the mine in which he has been working… and go to another master with whom he might open another account'.[36] The works of Roger Burt and John Rule, describe a similar practice in operation known as 'subsist', or subsistence money, at the Cornish mines during the eighteenth and nineteenth centuries. This system worked in a similar manner to the Pennine 'lent–money' system and thus created a similar 'financial hold over the men and lessened their ability to change their place of employment'.[37]

[33] For antiquity of Derbyshire free mining practices, see: Blanchard, 'Derbyshire', pp. 119–40.
[34] For a full account of the 'lent–money' or subsist system in the Pennines, see: Hunt, *Lead*, pp. 63–70.
[35] *Children's Employment: First Report of the Commissioners, Mines*, Appendix, Pt. 2, (London, 1842), p. 744.
[36] *Ibid*, pp. 744–5. For more on 'lent–money', see also: Hunt, *Lead*, pp. 67–8.
[37] R. Burt (ed.), *Cornish Mining: Essays on the Organisation of the Cornish Mines and the Cornish Mining Economy* (Newton Abbey, 1969), p. 11; Rule, 'Perfect', p. 57.

A formalised system of 'lent–money' or 'subsist' was not a predominant feature of the financial structure of the Derbyshire lead industry. For though there was a similar demand for short–term credit, references to the extension of 'Cope–money' at the commencement of work are comparatively infrequent. Instead, the miners appear to have been engaged in a myriad of informal credit relationships within the local community, with miners more commonly borrowing and extending credit on their own account, rather than relying on formalised credit structures provided at the institutional level.[38] This enabled the Derbyshire miners to retain their independence and engage in several mining operations simultaneously. John Farey, for example, states that 'it is not customary for the Owners to advance any of the Cope Money on account'. Likewise, Thomas Gisborne observes how the 'profligacy' of the miners was both 'cherished and aggravated by the ease, with which he [the miner] obtains credit' from shopkeepers, innkeepers and local businesspeople alike.[39] In Chapter 1, the operation of such interpersonal networks of credit within the local community were revealed through the case study of John Naylor. Close analysis of his diary revealed his reliance on communally sourced or informal credit, both in the maintenance of his household and in the pursuit of prospective mining ventures.[40] While such networks almost certainly existed in the North Pennine and Cornish mining communities, the prevalence of credit sourced from their employers suggests that the miners of these regions may have found it more challenging to acquire credit on their own accounts. This may indicate a potentially significant difference in the social status of the Derbyshire miners compared with their Cornish and Pennine counterparts, for as the works of Muldrew and Shepard have convincingly shown, the ability to control and generate credit independently was an important indicator of social status.[41]

The CBS effected not only the relationship between the miners and mine owners, but also the relationship between miners and wage labourers. Whereas in other major industries labourers were employed directly by the owners of capital, at the Derbyshire lead mines labourers were hired and

[38] For distinction between formal and informal credit, see: Holderness, 'Credit', 97–109. For different contexts of credit use, see: Muldrew, *Economy*, pp. 103–119; Finn, *Character*, pp. 1–22.
[39] Gisborne, 'General', pp. 225–226; Farey, *General*, p. 366.
[40] DRO D7812/1: Lead miner's diary.
[41] A point that will be dealt with further in section IV below, see also: Muldrew, 'Class', pp. 147–77; A. Shepard, 'Poverty, labour and the language of social description in early modern England' *P&P*, 201 (2008), pp. 51–95.

controlled by the miners or 'copers', who were themselves sub–contracted to perform the extractive process. The details of how this system operated in practice, and the relationships that it engendered, will be examined at length in the sections below. For now, it suffices to note that their position as independent tradesmen and employers of wage labour afforded the miners an elevated position in local society. As will be shown in sections II and III, dependency within the Derbyshire mining community was determined predominantly by age and gender, as well as familial, kinship and social ties, all of which influenced an individual's ability to acquire employment, access credit and advance in the mining trade. In the case of the 'women' employed at the Derbyshire lead mines, these factors will be shown to have enabled them to obtain regular and valuable employment within the locality, and in the case of the lads' shows that a system of training and educational development, akin to the apprenticeship system, developed to equip them with the trade knowledge and social contacts required to become a lead miner in Derbyshire. Having relied heavily on contemporary printed sources in this section, the remainder of the chapter will attempt to supplement these and other sources with a detailed analysis of the Miners Engine Cope Accounts (cope accounts) for the period 1737 to 1765. Using these accounts, the experiences of the 'women', 'lads' and 'copers' will be explored individually, and their statuses both at the mines and in society more generally will be assessed within the local context.

II. *'Women'*

Defoe's encounter with the housewife of the Brassington Moor household, explored in the introduction to this chapter, remains one of the most influential portrayals of the role of women in the Derbyshire mining community.[42] Its longevity is, in large part, due to its adherence to a range of gendered norms and expectations, and to its presentation of a clear division of labour between the sexes, which echoed the ideals promoted in conduct books and domestic advice manuals circulating at the time.[43] During the encounter, the housewife repeatedly confirms her contentedness, she was 'very happy' with her husband, she 'wanted nothing that he could not do for them', and 'two or three

[42] For works that utilise this account, see: Berg, *Age*, pp. 101–2.
[43] Tadmor, *Family*, pp.89–91; L. Gowing, *Domestic Dangers: Women, Words and Sex in Early Modern London* (Oxford, 1996), pp. 24–8; Shepard, *Accounting*, pp. 214–31.

times made mention of how contended they were.'[44] This idealised vision of 'conjugal happiness' was cemented by the husband's fulfilment of his role as provider.[45] Throughout the encounter he was depicted as the one 'doing' and 'getting', while the wife was at home 'caring' and 'maintaining'; to explain the 'appearance of substance', for example, Defoe naturally inquired 'after her husband's trade'.[46] Nostalgic, as this view of the early modern household–family is, the sharp divisions of labour it promotes has been exposed to critical analysis in a range of important works and is similarly questioned by the evidence presented below, and in the previous chapter.[47] As Amanda Vickery and Pamela Sharpe have argued, the 'simple model' of 'separate spheres' is no longer adequate as a representation of the complex varieties of productive activity that women were engaged with during this period.[48] This was demonstrated in Chapter 1 by the experiences of Anne and Rebecca Naylor, who, as 'wife' and 'daughter', contributed in a variety of direct and indirect ways to the household economy.[49] Using the evidence provided in the Miners Engine accounts, combined with parish record analysis and contemporary printed sources, this section will endeavour to expand our understanding of the gender divisions of labour and the roles of women in the mining community of Derbyshire, and highlight the contributions women made both to the public and privates spheres: as contributors to household economies, as wage labourers at capital intensive mine operations, and as important conduits in familial, kinship and community networks.

As the Miners Engine accounts show, female workers, or 'women', as they are described in the accounts, were prominent members of the mining workforce.[50] Between 17 and 30 'women' were employed at any one time amounting to 138, or 36 per cent of the total workforce employed between 1737 and 1765.[51] Unfortunately, the tasks these women performed were not recorded in the accounts; however, useful insights may be gleaned from the detailed descriptions provided by Farey in his

[44] Defoe, *Tour*, pp. 462–5.
[45] Shepard, 'Manhood', pp. 75–106; Shepard, *Meanings*, pp. 188–95.
[46] Defoe, *Tour*, p. 464.
[47] For critique of model in the context of the 'household–family', see: Tadmor, 'Concept', pp. 111–40. For critique of 'separate spheres' model in relation to women's work see: Sharpe, 'Continuity', pp. 353–69.
[48] Vickery, 'Golden', pp. 383–414; Sharpe, 'Continuity', pp. 353–69.
[49] DRO D7812/1: Lead miner's diary. See also: Shepard and Spicksley, 'Worth', pp. 493–530.
[50] DRO D7676/BagC/382; D7676/BagC/383; D7676/BagC/386.
[51] The accounts only cover periods in which the mine was active between 1737 and 1765: DRO D7676/BagC/382; D7676/BagC/383; D7676/BagC/386.

General View (1811). As Farey's account suggests the women were employed almost exclusively at the mine surface, where they predominantly 'washed ore' in preparation for sale.[52] Although women did, occasionally, venture underground in the performance of various tasks, and there are references to women mining underground at small independent mine ventures in the seventeenth and eighteenth centuries, the overwhelming majority appear to have remained at the mine surface, which is confirmed by a number of other contemporary sources.[53] In 1798, Gisborne, for example, noted that 'at almost every mine, there are a number of women, daughters in general of the mining poor, who earned their livelihood by picking and washing the ore, and performing other operations of the same nature.'[54] Likewise, in 1789, the antiquarian and travel writer, James Pilkington, observed in his *A View of the Present State of Derbyshire*, that 'before the lead is disposed of, it is beaten or knocked into small pieces, washed, and sifted…this part of the business is performed by women, who are hired by the miners.'[55]

As for the task of ore washing itself, Farey provides a lengthy description of its various features and posits it carefully within the overall extractive process.[56] According to his account, the process of ore washing commenced once the lead ore reached the mine surface, where it was first taken to the 'Striking Floor' and sorted into grades determined by the size of each fragment and its ore content. 'Knockings' were the largest pieces, and were taken straight from the 'Striking Floor' to the 'Bank', where the 'Banksman' broke it down into smaller pieces using a 'two–handed breaking or balching hammer'. Meanwhile, the smaller 'Ridlings' and 'Picking–Stones' were carried from the 'Striking Floor' in 'Whiskets' by 'Women called Swillers'. The 'Swillers' then placed the 'Ridlings' into large sieves with 'inch wire openings', called 'Riddles', and submerged them into tubs of water called 'Swilling Tubs'. Once submerged, 'she then gives a twisting and brisk motion' to the sieve 'by which operation the dirt is washed off the Ridlings and sinks into the Swilling Tub.' The smallest fragments of ore produced by the 'Striking' and 'Knocking' processes – 'the Fell' and 'Knock–bark'

[52] Farey, *General*, pp. 372–3.
[53] R. Slack, 'Women and the Lead Trade in 17th century Wirksworth, Derbyshire' *BPDMHS*, 15(6), (2004), pp. 46–8.
[54] Gisborne, 'General', p. 228.
[55] Pilkington, *View*, p. 118.
[56] Farey, *General*, pp. 372–6.

– were then gathered together and brought to women called 'Washers'. They sorted through these finer fragments using a fine wire sieve, and by 'dexterous shakes and tosses' brought the heavier lead particles to the bottom of the sieve and skimmed off the finer material using a small wooden board called a 'Limp'. This process was repeated until even the tiniest particles of lead ore were separated from its 'intermixed or adhering' stone and dirt.[57] It was thus a slow, repetitive and dexterous task, performed in exposed and often harsh conditions at the mine surface, predominantly by women, and like other forms of so–called 'women's work' it was allocated an inferior status and received a correspondingly meagre wage.[58]

The low pay and 'inferior' status of women's work has been a subject much debated and studied by economic and social historians of the early modern period. Judith Bennett, for example, argued that women's wages were typified by their basic level and lack of progression since at least the medieval period.[59] However, others, such as Sharpe, Erickson, and Shepard, have argued that the economic and social impact of women's work far outreached the sum of their wages.[60] More recently, Jane Humphries and Jacob Weisdorf have tested these assertions using aggregate wage estimates for the period 1260 to 1850.[61] They found that unskilled women's wages did indeed 'stand still' for the majority of the medieval period, with average wages remaining at or around 2d. per day until the start of the seventeenth century. Thereafter, women's average wages began to increase more in line with their male counterparts: from around 3d. per day at the start of the seventeenth century to 9d. by the end of the eighteenth.[62] The increases were not, however, the same for all women, nor were they sufficient to counteract the impacts of price inflation during a period of unprecedented population

[57] *Ibid*, pp. 375–6.
[58] For definition and discussion of 'women's work', see: Earle, 'Female', pp. 337–44; Berg, 'Difference', pp. 22–44; Erickson, 'Married', pp. 267–307.
[59] For discussion of stasis in female earnings and other issues between Judith Bennett and Bridget Hill, see: Bennett 'History', pp. 269–283; B. Hill, 'Women's history: a study in change, continuity or standing still?', *WHR*, 2(2), (1993), pp. 5–22; J. Bennett, 'Women's history: a study in continuity and change', *WHR*, 2(2), (1993), pp. 173–84. For discussion of this debate, see: Sharpe, 'Continuity', pp. 353–356; Shepard 'Crediting', pp. 1–4.
[60] Erickson, 'Married', pp. 267–307; Shepard and Spicksley, 'Worth', pp. 493–530; Shepard, 'Crediting', pp. 1–24.
[61] J. Humphries and J. Weisdorf, 'The wages of women in England, 1260–1850', *JEH*¸ 75(2), (2015), pp. 405–47.
[62] *Ibid*, p. 430.

growth.[63] Wage increases were most pronounced for domestic servants, and those able to find annual employment in factories or as clerks, whereas 'casually employed women', such as the ore washers of the Derbyshire lead industry, were, according to Humphries and Weisdorf, becoming 'increasingly dependent upon men'.[64] The data examined here shows that women employed at Miners Engine earned far below even the most pessimistic of estimates for national averages during the mid to late eighteenth century. They were paid an average of 3½d. per day between 1737 and 1765, with a high of 5d. per day earned during the prosperous year of 1739, and a low of 2d. per day earned in 1745 (see figure 3.1). Moreover, these average wage levels appear to be representative of women's wages in the Derbyshire lead industry more generally during the eighteenth century.[65] In his conversation with the housewife of the Brassington Moor household Defoe found that she earned just 'three–pence a day' if 'she worked hard', in 1724.[66] Thus even adjusting for regional variations, the wages received by women at the Derbyshire lead mines appear to have been far below the basic levels required to support an independent living during the eighteenth century.

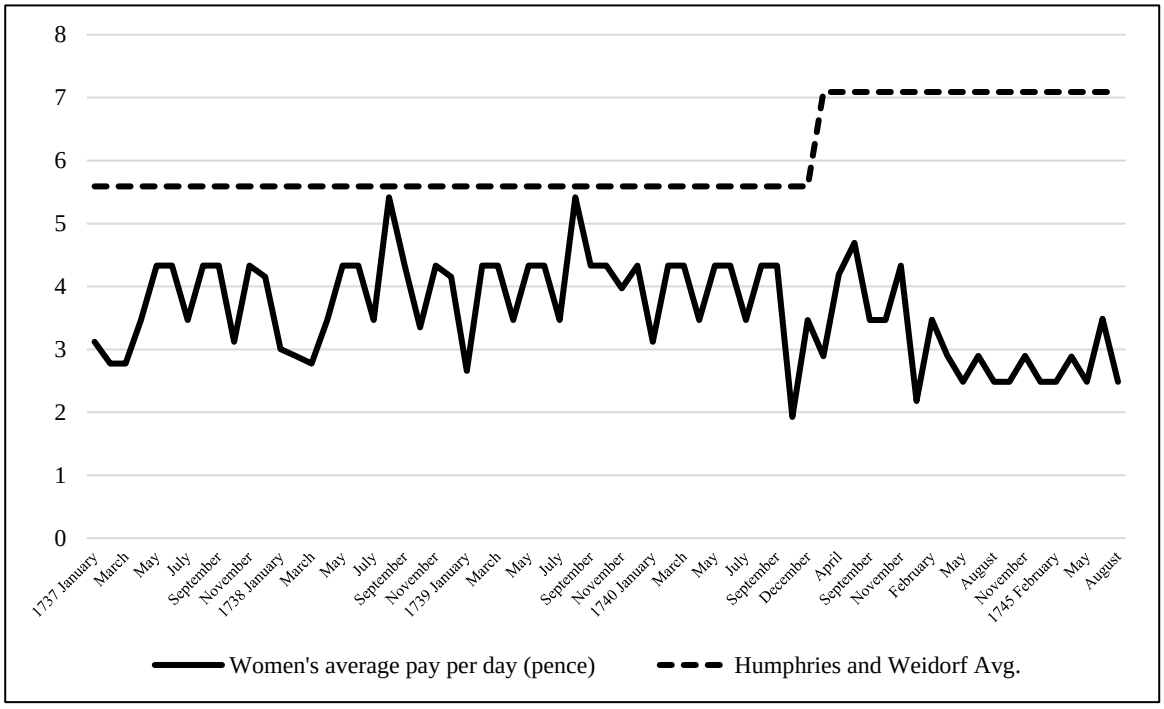

Figure 3.1: *Graph showing average wage per day for women employed at Miners Engine Mine compared with Humphries and Weisdorf estimates, 1737–45*

[63] Wrigley and Schofield, *Population*, table 7.8, pp. 208–9.
[64] Humphries and Weisdorf, 'Wages', p. 430.
[65] For seventeenth century wages, see: Sharpe, *Thievely*, pp. 94–5
[66] Defoe, *Tour,* p. 464.

These initial observations appear to support Humphries and Weidorf's assertion that women 'were becoming increasingly dependent on men' over the course of the eighteenth century.[67] This 'dependency' thesis was first outlined by Pinchbeck, in the 1930s, who argued that the onset of industrial capitalism spelt the end of a 'golden age' for female employment and gave rise to the increased separation of the domestic and public spheres.[68] This was later redefined by Horrell and Humphries as 'the transition to the male–breadwinner household'.[69] They argued that women's labour market participation was eroded during the eighteenth century by a mixture of falling real wages, the centralisation of manufacturing industry, the mechanisation of productive processes, changes in household structure, and institutional resistance to female employment in a number of key industries.[70] However, though the Miners Engine accounts show that women received comparatively low wages, which precluded an independent living, they do not offer evidence of falling participation rates or an increasing reliance on male earnings. Instead, the accounts highlight the importance of women's financial contributions both to the household economy and the industrial workplace. Table 3.1 illustrates the employment patterns of female workers at Miners Engine between 1737 and 1740. It shows that during the first four years of the accounts, the 'women' were able to achieve a substantial degree of continuity in their employment. They worked a combined total of 15,960 days and earned a total of £262. A stable core of seventeen women worked 972 days each, with no apparent breaks or seasonality in their employment. As a result, these women were able to make valuable contributions of £5 a year to their respective households, while simultaneously saving the copers a total of £248 when compared to the cost of 15,960 days of male wage labour.[71]

The familial and kinship bonds that the women shared with other members of the mining workforce further enhanced the value of their already substantial contributions. To illustrate this point,

[67] Humphries and Weisdorf, 'Wages', p. 430
[68] I. Pinchbeck, *Women Workers and the Industrial Revolution 1750–1850* (London, 1930). See also, Sharpe, *Adapting*, pp. 8–11.
[69] Horrell and Humphries, 'Women's', pp. 89–117; C. Creighton, 'The rise of the male breadwinner family: a reappraisal' *Comparative Studies in Society and History*, 38 (1996), pp. 310–37; Horrell and Humphries, 'Origins', pp. 25–64; C. Creighton 'The rise and decline of the 'male breadwinner family' in Britain', *Cambridge Journal of Economics*, 23 (1999), pp. 519–41.
[70] Horrell and Humphries, 'Women's', pp. 108–12.
[71] This calculation was based upon the average wages paid to the 'lads' for the same period, see section III.

surname analysis has been performed for the period 1737 to 1765. Though this measure is notoriously problematic, as it assumes that a common surname is the only indicator of familial and kinship ties, if taken within a sufficiently narrow context, such as a single mine, it can offer an approximation of the familial closeness of a workforce.[72] In this case, 85 per cent of the women mentioned in the accounts shared surnames with other women, 70 per cent shared surnames with 'lads', 61 per cent shared surnames with 'copers', and 65 per cent shared surnames with two or more individuals from the respective groups.[73] Elizabeth Skidmore, for example, was 42 years of age when the accounts commenced, was married to Samuel Skidmore, who was 52 and a senior coper at the mine, and also had three sons, George, Arthur and Thomas, who were 20, 18 and 15 respectively, all of whom were employed as 'lads' at the mine.[74] Likewise, a senior coper, Charles Wilson, hired his daughter Martha

Table 3.1: Employment pattern of women employed at Miners Engine, 1737–40

Name	Date joined workforce	Breaks in employment	Number of days worked c.1737–1740	Total earnings (£) 1737–1740	Average pay per day (d.)
Sarah Hill	January 1737	–	972	15	3.70
Elizabeth Goos	January 1737	–	972	15	3.70
Elizabeth Skidmore	January 1737	–	972	15	3.70
Isabel Mellor	January 1737	–	972	15	3.70
Ann Hall	January 1737	–	972	15	3.70
Hannah Johnson	January 1737	–	972	15	3.70
Alice Martin	January 1737	–	972	15	3.70
Dowrethy Bright	January 1737	–	972	15	3.70
Ann Young	January 1737	–	972	15	3.70
Helen Burr	January 1737	–	972	15	3.70
Widow Barber maid	January 1737	–	972	15	3.70
Elizabeth Smith (Eyre)	January 1737	–	972	15	3.70
Mary Hunter	January 1737	–	972	15	3.70
Elizabeth Barker	January 1737	–	972	15	3.70
Alice Hardy (Brittlebank)	January 1737	–	972	15	3.70
Elizabeth Hatfield	January 1737	–	972	15	3.70
Mary Needham	January 1737	–	972	15	3.70
Ann Townsend	July 1739	–	180	2 3/4	3.67
John Middleton maid	July 1739	–	180	2 3/4	3.67
Ann Burr	December 1739	–	48	0.66	3.30

[72] Surname analysis has been used in several important studies, see in particular: P. Laslett 'Introduction: comparing illegitimacy over time and between cultures', in P. Laslett, K. Oosterveen, and R. Smith, *Bastardy and its Comparative History* (Harvard, 1980).
[73] DRO D7676/382; D7676/383; D7676/386.
[74] L. Moffat, 'Skidmore lead miners of Derbyshire, and their descendants, 1600–1915', http://www.skidmorefamilyhistory.com (accessed, 12/10/2016), pp. 22–23.

and son William to work alongside him in his cope, described in the accounts as 'Charles Wilson & Co.'.[75]

The prevalence of family and kinship ties has important implications for the value of women's work, both as contributors to household finances and as members of the mining workforce. First, as the above evidence indicates, the copers were able to pay relatively low – even uncompetitive – wages to ore washers by harnessing the labour of their female relatives. This not only reduced labour costs, but also reduced the amount of income lost to exogenous sources of labour and maximised the share of mine proceeds acquired by the miners and their families. The availability of such a cheap and plentiful source of labour also allowed the copers to allocate their time more profitably, pursuing, for example, other mining ventures or alternative income streams, such as home production or agricultural by–employment.[76] Second, the employment of women may also have contributed to the expansion of productivity in the Derbyshire lead industry more generally, during a period of rapid industrial and economic growth. In an article on women's work, Maxine Berg argued that women's labour market participation was most pronounced in the 'industries at the forefront of technological and organisational innovation', and drew linkages between the expansion of productivity in these 'new industries' and 'the deployment of a largely female workforce with attributes firstly of high labour intensity with female patterns of labour discipline along with technical dexterity, and only secondly of low wages.'[77] However, while Berg considered mining to be a traditional industry, 'which underwent very little innovation over the period', the evidence explored in relation to Miners Engine suggests that many of the benefits that she ascribes to female labour in the 'new industries' also apply to mining.[78] Certainly, 'labour intensity', 'technical dexterity' and 'discipline' were observed features of women's work at the mines, and their major contribution, particularly at large capital mines (see table 3.1), indicates a correlation between female participation and expanding industrial productivity.

[75] D7676/BagC/386.
[76] For further discussions of importance of home production and agricultural by–employment, see chapter 1, and the case study of John Naylor: DRO D7812/1: Lead miner's diary.
[77] Berg, 'Difference', pp. 22–44.
[78] *Ibid*, p. 29.

An estimate of the total 'value added' by women's work to the Derbyshire lead industry during the eighteenth century is restricted by the lack of aggregate data related to their overall participation levels. However, it is apparent that the value of women's work at the Derbyshire lead mines went far beyond the sum of their relatively meagre wages. Their work benefited the household economy directly, in the form of wage receipts, and indirectly, by enhancing the earnings of their male relatives, not to mention the value of their domestic contributions, which were also significant.[79] Additionally, their major contribution to the mining workforce helped to boost productivity in the industry and increased the profitability of mining ventures for the copers and mine owners alike. All of these contributions highlight the important role played by women, and the major influence that family, kinship, and household economics had on the structure of the mining workforce.

Age and status also had an important part to play in female participation at the Derbyshire lead mines, with implications for the character of women's work and the importance of familial and kinship networks at the industrial workplace.[80] The accounts reveal that the category of 'women' included not only wives, like Elizabeth Skidmore, but also single women of various ages engaged in similar tasks at the mine surface.[81] There were a total of 24 individuals identified as 'maids', 'wenches' and 'daughters' in the Miners Engine accounts, which constitute roughly 18 per cent of the total number of women employed at the mine between 1737 and 1765. They included, 'widow Barber maid', 'Needham maid', 'Francis Barker wench', 'Margaret Turner wench', 'Hannah Palfrey and daughter', 'Sarah Barber and daughters', and 'Alice Knowles and daughter'.[82] In each case where 'maid', 'wench' or 'daughter' appears in the accounts, the forename of the individual or individuals are omitted and replaced by a parent or guardian's name, which usually belonged to either the mother or father depending upon household circumstances and accounting preferences. The use of such

[79] See Chapter 1 for a more detailed analysis of the contributions made by Anne Naylor to the household economy.
[80] For more on female age, status and work participation, see especially: A. Erickson, 'Marital status and economic activity: interpreting spinsters, wives and widows in pre–census population listings', *CWPESH*, no. 7, (2012), pp. 1–18.
[81] For more on the role of single women in industry, see: Sharpe, 'Literally Spinsters', pp. 44–65; Spicksley, 'Fly', pp. 187–207; T. de Moor and J. van Zanden, 'Girl power: The European marriage pattern and labour markets in the North Sea region in late medieval and early modern period' *EcHR*, 63(1) (2010), pp. 1–33.
[82] D7676/BagC/382; D7676/BagC/383; D7676/BagC/386.

naming conventions suggests that the majority of these young 'women' were living as dependents within parental households. Consequently, it is quite straightforward to identify their familial and kinship ties. Just under 83 per cent of the 'maids', 'wenches' and 'daughters' mentioned in the accounts shared surnames with other workers at Miners Engine and two–thirds shared surnames specifically with copers. Some included the full name of a working coper in their title, such as 'Robert Middleton maid' and 'Thomas Middleton maid', while others included just the surname, such as 'Hancock wench' and 'Barker wench'. Clearly, the Derbyshire lead mines presented households with the unique opportunity to employ their daughters and young children in shared family ventures, rather than releasing them into service or apprenticeships, as was common in many other labouring and middling communities during the eighteenth century.[83] Such employment patterns not only solved the problem of what Alan Macfarlane described as, the 'shedding of the young' into service 'just when they were reaching the age at which they would begin to become producers instead of consumers', but also enhanced the earnings of their male relatives by offering a cheap and readily available source of labour.[84]

Finding daughters' employment in the local economy and retaining their membership of the household had a range of additional benefits that were peculiar to this age group. [85] Recent investigations by Lemire, Spicksley, Erickson and Shepard, in particular, have revealed important areas of female economic activity that have been otherwise neglected.[86] Lemire, for example, has revealed the intricate networks of informal credit and small–scale exchange that flourished in the commercial centres of early modern England, and found that it was women who 'habitually initiated

[83] Kussmaul argues that around sixty percent of fifteen to twenty–four year olds were servants in England between 1574 and 1821, see: Kussmaul, *Servants*, p. 3. For more on leaving home and life–cycle service, see: Snell, *Annals*, pp. 270–319; C. Brooks, 'Apprenticeship, Social Mobility and the Middling Sort 1550–1800' in Barry and Brooks, *Middling*, pp. 52–83 L. Schwarz, 'English servants and their employers during the eighteenth and nineteenth centuries' *EcHR*, 52(2), (1999), pp. 236–56.
[84] Macfarlane, *Family*, p. 146.
[85] For discussion of focus upon 'occupational identity' in the history of women's work, see: Sharpe, 'Continuity', pp. 356–359.
[86] Lemire, 'Petty' in Bruland and O'Brien, *Family*, pp. 112–38; J. Spicksley, 'A dynamic model of social relations: celibacy, credit and the identity of "spinsters" in seventeenth–century England' in French and Barry (eds.), *Identity*, pp. 106–46; Spicksley "Fly', pp. 187–207; Shepard and Spicksley, 'Worth', pp. 493–530; Erickson, 'Marital', pp. 1–18; Shepard 'Crediting', pp. 1–24.

many of the arrangements for petty borrowing.'[87] Likewise, Spicksley, based upon her analysis of over 1,500 wills and inventories of single women between 1601 and 1700, concluded that they were 'more deeply embedded in the credit market than any other social group'.[88] While Shepard has compared the role of women in the household economy to that of an accountant or 'asset manager'.[89] Alongside these proactive roles in the credit economy, however, was the equally important role of single women as conduits of family credit.[90] Davidoff and Hall, for example, emphasised the importance of marriage within middling business networks, as it 'could widen contacts and increase resources'.[91] While Tadmor, in her study of the household–family, identified an array of different relationships that existed between individuals, which included contractual and occupational, alongside the more traditional marriage, kinship and family ties. In the case of Thomas Turner, for example, Tadmor revealed how his paternal relationship with his domestic servant, Hannah Marchant, also brought him into contact 'with many of Hannah's 'friends' that is her relatives by blood and marriage.'[92] As Tadmor explains, these relationships were not only personal, but also instrumental: 'he employed them, lent them money, assisted them in various legal matters, gave them away at their weddings, and entertained them at Christmas.'[93] Eligible daughters of labouring and middling households, thus carried intrinsic, as well as practical 'worth' in the early modern credit economy, which goes part of the way to explaining why some households, such as those of the Derbyshire mining community, chose to retain their daughters at home.[94]

In the case of the Derbyshire lead mining community, the benefits of maintaining daughters, employing them, and eventually marrying them to sons of other mining households, akin to the practices of the middling families described by Davidoff and Hall, are clear. In a rather damning, though undoubtedly exaggerated, assessment 'of the mining poor', Gisborne offers an insight into the

[87] Lemire, 'Petty', p. 134.
[88] Spicksley "Fly', pp. 205–7.
[89] Shepard 'Crediting', pp. 15–9.
[90] Spicksley, 'A dynamic', pp. 121–4.
[91] A subject that will be revisited in chapter 4. Davidoff and Hall, *Family*, pp. 215–22; Sharpe, *Adapting*, pp. 19–370. For a particularly influential work on the importance of women within business networks, see: Grassby, *Kinship*, pp. 312–40.
[92] Tadmor, *Family*, pp. 29–30.
[93] *Ibid*, p. 30.
[94] For gender and worth, see: Shepard and Spicksley, 'Worth', pp. 493–530; Shepard, *Accounting*, pp. 173–4.

marriage patterns of Derbyshire mining families during the eighteenth century.[95] He explains how 'a young mining labourer' often 'takes a hasty liking' to one of the many young single women employed at the lead mines, 'and marries her without thinking about consequences'. However, 'the wife' is unlikely 'to have found the mine an excellent school, either of virtue or of economy', which Gisborne argued presented yet 'another circumstance in the situation of the miners... unfavourable to domestic frugality and good management'.[96] Gisborne believed that the marriage practices of the miners were the natural consequence of the proximity of their working environments and of their moral weakness: 'circumstanced as the parties are, it is natural that the case should be so'.[97] However, the evidence examined above suggests that such arrangements may have been an intended consequence of endogamous marriage practices in the mining community of Derbyshire and that they were almost certainly of great financial and social benefit.[98] Endogamy allowed mining households to pool resources, integrate into local credit and exchange networks, and share knowledge and expertise, which, in turn, offered vital avenues for employment, and access to potential sources of labour and capital in the pursuit of future independent mining ventures.[99]

Identifying the number of single women of marital age, or those on the cusp of adulthood, however, is far more challenging than in the case of the 'maids', 'wenches' and 'daughters'.[100] Once a young woman reached maturity, it seems that the above noted naming conventions ceased, and they were instead recorded in the accounts under their full names. Thus, 'Robert Middleton maid' (see table 3.1) appears in the accounts as 'Elizabeth Middleton' from 1744 onwards.[101] While, 'Hancock wench', who first appears in 1744, appears as 'Martha Hancock' later in 1763.[102] Another way of

[95] Gisborne, 'General', pp. 223–8.
[96] *Ibid*, p. 228.
[97] *Ibid*, pp. 228–9.
[98] *Ibid*, p. 229.
[99] For further details of the structure and practical uses of credit linked to the Derbyshire lead industry, see Chapter 1, for networks of knowledge exchange, see Chapter 3, and for importance of circulating capital within familial and community networks, see Chapter 4.
[100] Wrigley and Schofield estimated that the mean age of first marriage for this period was between 24.9 and 26.2. See: Wrigley and Schofield, *Population*, p. 255. Thus, for present purposes, 'marital age' will be considered over the age of twenty.
[101] Elizabeth was still working for her father, Robert, and alongside her mother, Ann, throughout this period, which makes identification easier, see: DRO D7676/382; D7676/383
[102] Martha was identified as the daughter of Anthony and Helen Hancock, and sister of George, using parish records, see also: DRO D7676/383; D7676/386

identifying young single women is to monitor surname alterations over the course of the accounts, which may indicate the occurrence of a marriage. Alice Brittlebank, for example, worked continuously at Miners Engine until November 1737, when her name disappears from the accounts.[103] While it is possible that Alice left the Miners Engine workforce at this time, she would have been the only female worker to leave during that month and was replaced immediately by Alice Hardy, who remained at Miners Engine until August 1745.[104] The disappearance of 'Alice Brittlebank', and her immediate replacement by 'Alice Hardy', thus suggests that Alice Brittlebank became Alice Hardy through marriage rather than substitution.[105] There is also direct evidence that mining households endeavoured to retain and employ their daughters at the mines during early adulthood provided by the diary of John Naylor, examined in the previous chapter.[106] These examples, combined with those of the 'maids', 'wenches' and 'daughters' examined above, highlight the important role played by young single women at the Derbyshire lead mines, and draws attention to their prolonged membership of their parental households.

The evidence drawn from the Miners Engine accounts indicates that these important contributions also continued beyond the bounds of marriage. In his seminal article exploring the female labour market in late seventeenth and early eighteenth century London, Peter Earle revealed a range of patterns in female employment that remain at the forefront of our understanding of women's work during the early modern period.[107] He centred his analysis on the depositions of female witnesses in the church courts of London, and showed how women's employment patterns could vary with literacy levels, age and social status, among other factors.[108] The evidence presented thus far, appears to substantiate many of Earle's general observations, in particular, his emphasis on the importance of women's contributions to the household economy and their commencement of paid employment from a young age.[109] However, there are also a number of important differences between the two case

[103] DRO D7676/382
[104] DRO D7676/382; D7676/383
[105] Unfortunately, no valid birth, marriage or death records were found for Alice Brittlebank or Alice Hardy, but the evidence provided by the accounts and the context of the name change is suggestive.
[106] DRO D7812/1: Lead miner's diary
[107] Earle, 'The Female' pp. 328–53.
[108] *Ibid*, pp. 328–53.
[109] *Ibid*, pp. 336–46.

studies, which are indicative of regional differences in the female labour market.[110] Specifically, Earle's observation that 'it was unusual for husband and wife to work together at the same trade' in London, is at odds with the evidence examined here.[111] The Miners Engine accounts show that around a third of the women employed at Miners Engine were married, and, of those, around 90 per cent worked alongside their husbands at the same mine, many of whom hired them directly.[112] Alongside Samuel and Elizabeth Skidmore, for example, were a number of other married couples, including Robert and Ann Middleton (m.1723), Caleb and Sarah Hill (m.1723), Francis and Ann Townsend (m.1724), Anthony and Helen Hancock (m.1725), their son George and his wife Sarah Hancock (m.1762), John and Grace Drable (m.1743), Ralph and Elizabeth Bramwell (m.1749) and John and Alice Knowles (m.1755). Additionally, the presence of women, such as Hannah Palfrey, Sarah Broomhead, Sarah Barber, Martha Vickers, Helen Burrows, and Hannah Blackwell, who were recorded as mothers, in mother and daughter collectives, and had 'copers' and 'lads' of corresponding surnames employed at the mine, suggest that it was common for married women to work alongside both their husbands and children at the Derbyshire lead mines. Thus, in contrast to Earle's findings in London, the Derbyshire lead industry appears to be an example of what Alice Clark described in her classic work as a 'family industry', in which 'the wife of every master craftsman… could share his work.'[113] Their continued involvement as wage labourers highlights the valuable economic functions of married women both as producers in the household economy, and as contributors to the mining trade. Moreover, in a workforce so densely populated by young single women, matriarchs such as Elizabeth Skidmore, Ann Middleton and Martha Vickers, assumed important positions of authority: as mentors, guardians, and mediators between different family and kinship groups; all of whom would have been vying with one another to improve their standing within the mining community via marriage and courtship. Considered as such, the Derbyshire lead mines appear to have been not only

[110] For considerations of regional variations in the pattern of female employment, see: Sharpe, *Adapting*, pp. 38–71.
[111] Earle, 'The Female', p. 338.
[112] D7676/BagC/382; D7676/BagC/383; D7676/BagC/386
[113] A. Clark, *The Working Life of Women in the Seventeenth Century* (London, 1919), p. 10. For discussion of this point, see: Earle, 'Female', pp. 328–9 and 346; Erickson, 'Married', pp. 267–307.

important sources of employment and productivity, but also centres of sociability and communal interaction.

The final sub–category of female worker to be considered here is that of 'widows'. Recent research into the role of women in the processes of industrialisation and economic growth, have tended to draw attention to their important contributions to the early modern economy.[114] However, in the case of Miners Engine the evidence suggests that their contributions were rather more limited than observed elsewhere. The lists of female workers provided in the accounts contain no clear evidence for the presence of widows at Miners Engine mine. This marked absence suggests that unlike many other artisanal manufacturing industries during this period, the wives of the Derbyshire lead miners appear not to have continued in their husband's trade following his death.[115] The reason for this situation is twofold. First, as noted above, the wages paid to women at the Derbyshire lead mines were uncompetitive and were insufficient to support an independent living during this period. Thus, despite the fact that 'Widow Barber maid' found continuous employment at Miners Engine between 1737 and 1740 (table 3.1), her mother, 'Widow Barber', never makes an appearance in the accounts.[116] To continue maintaining a household, which her daughter's title suggests she did, 'Widow Barber' required a more substantial source of income than could be offered by wage employment at the mines. Exactly what form this income took is unclear; however, analysis of wills, inventories and court depositions of widows have shown that many turned to more commercial occupations, such as livestock rearing, retail, domestic manufacturing, and money lending.[117] This change in the economic role of widows correlates with their experiences in the Derbyshire lead industry. It was common, for example, for wives to inherit their deceased husband's shares and possessions in mining ventures and thus adopt the role of small–scale investor and moneylender within the local mining community. In

[114] For break–through studies of economic role of widows, see: Holderness, 'Widows', pp. 423–42; Grassby, *Kinship*, pp. 312–40; S. Ottaway, 'Providing for the elderly in eighteenth–century England', *C&C*, 13, (1998), 391–418. For more recent research into their role in the economic developments of the eighteenth century, see: Sharpe, 'Literally', pp. 44–65; H. Barker, *The Business of Women: Female Enterprise and Urban Development in Northern England, 1760–1830*, (Oxford, 2006), pp. 77–8; Erickson, 'Married', pp. 267–307; Whittle, 'Enterprising', pp. 283–300.
[115] Erickson, 'Married', pp. 267–307.
[116] DRO D7676/382; D7676/383; D7676/386
[117] Spufford, 'Long–term' in Arkell, Evands, and Goose, *Death*, pp. 213–28; Whittle, 'Enterprising', pp. 283–300.

1675, the miner, Richard Walker of Brassington, left in his will: 'all his rights and title of, in and to his Mynes, veynes or meeres of ground in possession or ptes of possession' to his wife Margaret. While in 1685, George Steeple left his wife, Dorothy, and daughter, Mary, 'all my groves & meeres of ground that I have within the Wapentake of Wirksworth equally between them'.[118] Moreover, evidence drawn from 'Reckoning Books' (see chapter 4), suggests that some widows continued to actively invest in mine shares after the death of their husbands, even if many did not take a direct role in their management. This more commercially orientated role also extended to the sale of ore, which appears to have been a potential source of income for wives and widows alike. Margaret Bagshaw of Brassington, for example, purchased five loads of ore from Griffe Grange mine in 1702, and had previously purchased a total of 96 loads 7 dishes (24 tons) in 1692 and 249 loads 6 dishes (62 tons) in 1697.[119] Though widows were not prolific investors or creditors in the Derbyshire lead industry, these alternative avenues did offer a lucrative source of additional income, which could be combined with other activities such as spinning, home production or retailing to create a sustainable living following the death of their husbands.

The second reason for their absence from the mining workforce is related to the complex social networks that had to be negotiated to access employment opportunities at the mines.[120] Acquiring employment often hinged on the position of a male householder within the mining community and their ability to generate work for family and kin. Gaining a foothold in these networks, however, could take many years, and as will be shown below, men were socialised from a very young age into these networks. A widow's ability to acquire a sustainable income from mining, or indeed wage labour, was thus restricted by the irregularity of work, the meagre wages paid to ore washers, their lack of integration into a male dominated social sphere, and the widows own advanced age. For those widows unable to adapt to independent life and find alternative sources of income – or potentially remarry – the consequences could be disastrous.[121] Between 1745 and 1762, Samuel

[118] Slack, 'Women', pp. 46–7
[119] *Ibid*, p. 47
[120] See section I of this chapter on the CBS for more details.
[121] A point emphasised, perhaps to excess by: Holderness, 'Widows' in Smith, *Land*, pp. 423–42

Skidmore passed away leaving his wife, Elizabeth, with two semi–dependent sons: John and Robert. Their four eldest children had already married and established their own households by the time their father died, but John and Robert were still adolescents and had yet to establish themselves within the mining community. Without her husband, and despite her elder sons' connections with the industry, it seems that Elizabeth was unable to help John and Robert progress any further in the lead trade.[122] Consequently, she was forced to send them both to Sheffield, where they undertook apprenticeships with George Beal of Stannington, a scissorsmith with the Cutlers Company.[123] Both appear to have achieved prosperity in their new trade. Robert later founded his own business with his son, Arthur, called 'Robert Skidmore & son', and Robert's will shows that he was able to pass on his business and quantities of clothing and furniture to his six surviving children.[124] Unfortunately, for Elizabeth, her fate was far less favourable. She passed away in October 1762 at the age of 67, a pauper, in the parish of Eyam.[125]

The evidence examined thus far has revealed a family–centric industrial workforce, whose structure and composition were founded largely on the bonds of family and kinship between interrelated mining households. The system of labour organisation used at Miners Engine enabled women to access and maintain regular employment beginning in early childhood and continuing up to, and beyond, marriage, thanks, in large part, to the positions held by male relatives in the lead industry. This was confirmed by the experiences of widows, whose access to employment could be disrupted following the death of a husband in the trade. The female workforce was thus largely composed of the wives, daughters and kin of the miners, which in turn reflects the importance of family and kinship networks to the division of labour at the Derbyshire lead mines. Access to employment often hinged upon a male household–head's position and reputation within the mining community and his ability to acquire employment for his family. Thus, the value of women's work was greatly enhanced by the filial relationships they shared with their employers, the copers. Their

[122] Elizabeth's eldest son, Arthur, appears listed as a coper in the Miners Engine accounts between 1763 and 1765, which indicates that he had assumed his deceased father's position within the mining community, however, this does not appear to have benefited John and Robert. See: DRO D7676/386.
[123] Moffat, 'Skidmore' pp. 29–30.
[124] *Ibid*, pp. 29–30.
[125] *Ibid*, p. 22.

performance of time consuming and unprofitable tasks at the mine surface, at below average wages, greatly increased the productivity and profitability of mining ventures, and reduced the amount of income lost to competing sources of labour. Therefore, the contributions made by women, both to the mines and household economy, came in a variety of direct and indirect forms, which suggests that when assessing the value of women's work during this period it is necessary to place their work within its wider household and community contexts. These and other findings will be taken forward into the next section, which explores the experiences and contributions of the 'lads' or young men and boys, employed as wage labourers at Miners Engine during the same period.

III. *'Lads'*

Much of what has been written about early modern masculinity and the 'coming of age of young men', has proceeded from the understanding that the overwhelming majority of 'early modern youths' departed from their parental homes as children to commence a period of service or apprenticeship, where they generally remained – barring the occasional break or interruption – until they entered maturity, married and commenced their own independent households.[126] Ann Kussmaul, for example, estimated that 'around 60 per cent of the population aged fifteen to twenty–four' were in service between 1574 and 1821.[127] Likewise, Snell estimated that the average starting age of agricultural servants and urban apprentices was 14.5 and 14.2 respectively, during the eighteenth and early nineteenth centuries.[128] While in the case of London, Rappaport argued that the 'completion of apprenticeship was a significant milestone in a man's life, an important step in the transition to adulthood taken by approximately two–thirds of all adult males in early modern London.'[129] This view of the early modern life cycle is rooted in the classic work of historians, demographers and social

[126] See in particular: Kussmaul, *Servants*, p. 70. For wider literature see also: Schofield, 'Age–specific', pp. 261–274; Plumb 'New', pp. 64–95; Wall, 'Age', pp. 181–202; Souden 'Movers', pp. 11–28; Ben–Amos, *Adolescence*, pp. 54–61; Griffiths, *Youth*, pp. 161–9; Field, 'Domestic', pp. 249–72.
[127] Kussmaul, *Servants*, p. 3.
[128] K. Snell, *Annals of the Labouring Poor*, (Cambridge, 1985), pp. 322–34. Joan Lane also estimates that the average starting age for apprentices was 14, see: J. Lane, *Apprenticeship in England, 1600-1914* (London, 1996), p. 17. See also: J. Rule, *Experience of Labour in Eighteenth–Century Industry*, (London, 1981), pp. 97–8; Cunningham, 'Employment', pp. 115–50.
[129] S. Rappaport, *Worlds Within Worlds: Structures of Life in Sixteenth-Century London* (Cambridge 1989), p. 326.

theorists, such as Peter Laslett, Richard Hall, E. A. Wrigley, Alan MacFarlane and Keith Wrightson, who together comprised, what has been described as the first 'revisionist school' of family history.[130] In a series of important works, they each argued that networks of family and kinship in early modern England had remained shallow since at least the late–medieval period, as demographic pressures, distance from family, and greater economic independence from a young age, triggered a shift toward more nucleated household structures.[131] This consensus led some historians, such as Ben–Amos, to argue that 'for the English Family, the departure of a young man and his entry into service was *ipso facto* the beginning of the 'dispersion phase'', which resulted 'in a young man's marriage and setting up of an independent household.'[132] For Ben–Amos, the process of leaving home was of central importance to the 'social maturation, or socialisation, of young men', whereby 'the emphasis on future independence and therefore separation of children from their parental home… were formative.'[133] However, just as recent research has drawn attention to the complex arrangement of the early modern household and to the variety of ways that family and kin interacted; it must be acknowledged that not all young men left their parental households as children during this period.[134] As will be shown, for those young men who remained at home, the process of social maturation, their relationships with family and kin, and their pursuit of an independent livelihood shared many differences and similarities with their counterparts in urban trades and agricultural labour. Consequently, the patterns revealed here may help to identify some of the more pertinent features of early modern masculinity that applied to young men from a variety of social, economic, and regional backgrounds.

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[130] For historiography of family and kinship, see: Tadmor, 'Kinship', pp. 15–48; L. Pollock, 'Little Commonwealth I: The household and family relationships', in Wrightson, *Social*, pp. pp. 60–84. For discussion of importance of household economies and kinship networks, see: Plakans and Wetherell, 'Households', pp. 49–76. For prominent 'revisionist' literature, see: E. Wrigley, *An Introduction to English Historical Demography* (New York, 1966); Macfarlane, *Family*; Laslett, *World*, pp. 14–5; Laslett, 'Introduction' in Laslett and Wall, *Household*, pp. 1–90; Wrightson and Levine, *Poverty*; Wrightson, *English*, pp. 52–9. For general account of 'the old master narrative', see: Wrightson, 'Family, pp. 1–22.

[131] P. Laslett, 'Mean household size in England since the sixteenth century', in Laslett and Wall, *Household*, pp. 125–58; P. Laslett, 'Characteristics of the western family considered over time', in P. Laslett, *Family Life and Illicit Love in Earlier Generations* (Cambridge, 1977), pp. 12–49; Wall, 'Leaving', pp. 77–101; Tadmor, 'Kinship', pp. 15–48.

[132] Ben–Amos, 'Service', p. 43.

[133] *Ibid*, pp. 58–9.

[134] See in particular: Tadmor, *Family*, pp. 18–43 and 103–7; Humphries, *Childhood*, pp. 84–124 and 151–71. For discussion of children remaining at home, see: De Vries, *Industrious*, chp. 5.

The 'lads' employed at the Derbyshire lead mines during the eighteenth century, like the 'women' explored above, appear to have remained at home and continued to work alongside their family and kin throughout childhood, adolescence and into early adulthood. In order to reconstruct the tasks they performed, wages they received and familial and kinship ties they shared with other members of the workforce, evidence has been drawn from the Miners Engine accounts, parish records and contemporary printed sources.[135] This combination of sources helps to address the limitations of the Miners Engine accounts, as identified above, which offer detailed records of wages paid to named individuals, but lacks other important information, such as the age of workers, their relationships with other members of the workforce, and the tasks they performed. A total of 142 lads were employed at Miners Engine over the course of the period covered by the accounts, and, like the women, they comprised a variety of different age and status groups: from children, employed at the age of nine or ten, right up to elderly miners who sometimes reverted back to wage work in the twilight of their mining careers.[136] The category also included established miners who occasionally performed wage work to enhance their independent earnings, and a small number of adult men who were permanently employed as wage labourers at the mines.[137] This section will focus upon the experiences of those who commenced employment at the mines as children and will compare their experiences of training and development with those of the apprentices in urban trades.[138] The section will begin by exploring the familial and kinship ties the lads shared with other members of the mining workforce, it will then examine the employment and wage structure at Derbyshire lead mines, and finish by comparing the experiences of the lads with those of the servants and apprentices explored in the prevailing literature.

The Miners Engine accounts suggest that the lads, like the women, were involved in a series of interlocking familial and kinship relations with other members of the mining workforce.[139] In total,

[135] See in particular: DRO D7676/382; D7676/383; D7676/386; Farey, *General View*, pp. 366–78.
[136] For listings of the lads, see: DRO D7676/382; D7676/BagC/383; D7676/386. It was common practice during this period for the elderly to continue supporting themselves well into old age, see: Ottaway, *Decline*, pp. 65–115.
[137] See, for example, John Naylor's pattern of work, which included occasional wage work at local mines in Chapter 1: DRO D7812/1. See also the case of Ralph Vickers: Willies, 'Management', pp. 227–8.
[138] Kussmaul, *Servants*, pp. 31–48 and 70–96; Snell, *Annals*, pp. 228–69.
[139] For works discussing the significance of kinship networks in the movement of peoples, see: P. Clark, 'The migrant in Kentish towns 1500–1700', in Clark and Slack, *Crisis*, 135–9; Boulton, *Neighbourhood*, 259–60; Mitson, 'Significance', pp. 24–76; Plakans and Wetherell, 'Households', pp. 49–76.

around 80 per cent of the lads shared surnames with other workers employed at the mine: with 60 per cent sharing surnames with copers, and 75 per cent sharing surnames with women. On average, the lads shared surnames with 3.38 members of the workforce, which rises to 4.29 if those without repeated surnames are excluded. The figures suggest that if a lad shared a surname with another member of the mining workforce then it is probable that he shared surnames with several members.[140] This is confirmed in figure 3.2, which categorises the surname frequencies. It reveals an increment in frequency between those with '1' shared surname and those with '4', which then falls sharply in the range of '5' to '12', but remains significant with 28 per cent of the lads sharing surnames with '5' or more individuals at the mine. The lads with the highest number of shared surnames were all members of the 13 largest surname groupings at Miners Engine, which together comprised 62 per cent of the workforce.[141] They included twelve Barbers and eight Halls; seven Skidmores, Bagshawes, Martins, Middletons and Turners; six Burrows, Drables, and Hancocks; and five Blackwells, Hills and Redferns. Some of these surname groupings were composed of complete nucleated households; in the case of the Skidmores, for example, father, mother, four sons and daughter worked together at the mine. In other cases, surname groupings included complex family structures with married children continuing to work alongside parents and younger siblings, for example, the Hancocks included a father, mother, two sons, a daughter and a daughter–in–law.[142] While the two largest surname groupings, the Barbers and Halls, reveal the presence of extended kinship groupings composed of several interrelated household families.[143] Thus, despite the obvious limitations of surname analysis, noted above, the exceptionally high frequencies of repeated surnames combined with parish record analysis, suggest that family and kinship ties were a prevalent, though not a universal, feature of the lad's experience at the Derbyshire lead mines.

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[140] Similar observations were made by Michael Anderson in his classic work exploring the factory workers of Preston during the nineteenth century, see: Anderson, *Family*, pp. 66–7.

[141] There were in total 88 members of the top 13 surname groupings, see: DRO D7676/382; D7676/383; D7676/386.

[142] It is unclear whether George and Sarah Hancock lived with George's parents, though the fact that they were still working together indicates the retained importance of family and kinship ties in the acquisition of work in the Derbyshire mining community.

[143] 'Widow Barber maid' appears not to have been a member of this extensive kinship group. She was the only Barber recorded in the 1737–1740 accounts, whereas the other eleven Barbers all appear in the 1763 to 1765 accounts.

The Miners Engine accounts also show that it was common for the sons of miners to work alongside their fathers in the same trade. In the 1741 to 1744 accounts, such practices were made explicit by the use of father and son collectives, examples of which include: 'Benjamin Young & son', 'Charles Wilson & son', 'John Drable & son', 'John Knowles & son', 'Francis Story & son', 'Robert Heald & son', 'Francis Turner & son', and 'Ralph Morton & son'.[144] Likewise, Samuel Skidmore acquired work for each of his four sons at Miners Engine, while 'Humphrey Rowland Senior' found work for his son 'Humphrey Rowland Junior'.[145] Such patterns in the employment of young men are markedly different from those presented in recent quantitative analyses of labour markets for other industries during the early modern period.[146] In their examination of London indenture records for the period 1600 to 1749, Leunig, Minns and Wallis found 'fewer than 4 per cent of apprentices entered a company whose trade matched their father's occupation', and using surname analysis, found 'fewer than 7 per cent of apprentices with unusual surnames had their master's surname'.[147] Likewise,

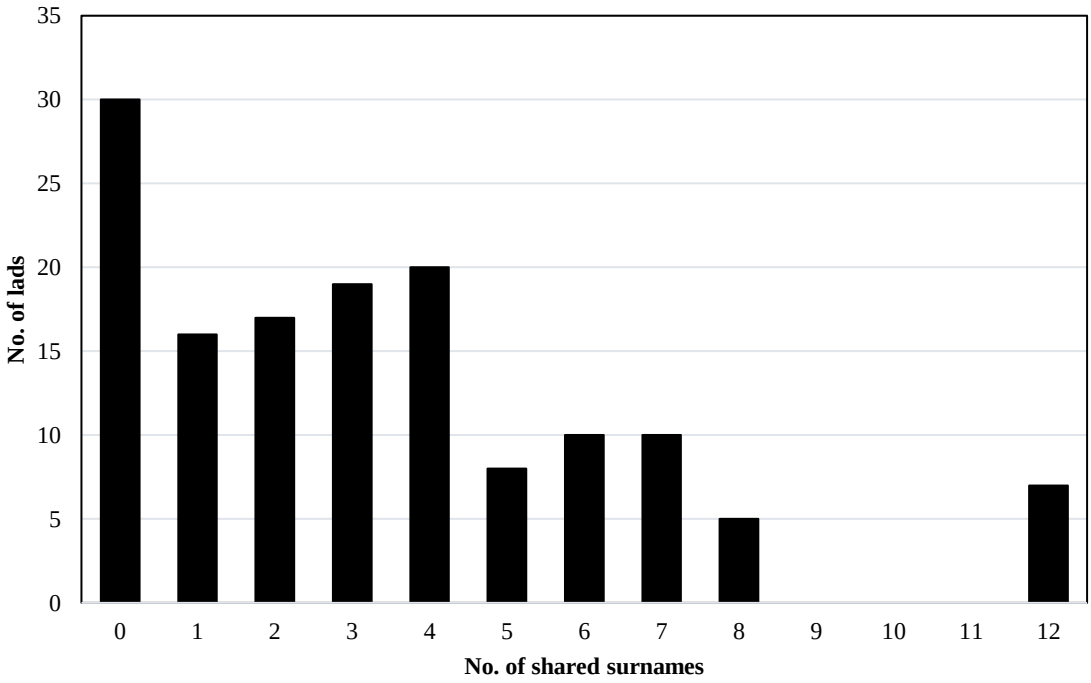


Figure 3.2: *Graph showing frequencies of shared surnames for 'Lads' at Miners Engine*

[144] DRO D7676/383.
[145] DRO D7676/382; D7676/383; D7676/386.
[146] For examples, see: Schofield, 'Age–specific', pp. 261–74; T. Leunig, C. Minns and P. Wallis, 'Networks in the premodern economy: the markets for London apprenticeships, 1600–1749', *JEH*, 71(2), (2011), pp. 413–43.
[147] Leunig, Minns and Wallis, 'Networks', pp. 423–4 and 426.

Humphries found that of a sample of 182 working–class autobiographies containing records of apprenticed boys, just 8.7 per cent were apprenticed to their father, 9.3 per cent to their uncle and 0.5 per cent to their grandfather.[148] Evidently, the case of the Derbyshire lead industry reveals a very different set of circumstances to those presented in the studies quoted above, with over 60 per cent of the lads sharing surnames with the copers, and clear evidence of fathers working alongside their sons.

Aside from the bonds of family and kinship, the accounts also highlight the importance of relationships of credit, trust and friendship between non–kin members of the mining workforce.[149] In a letter sent in January 1743, John Nodder asked the mine agent, George Heyward, whether he could find work for George Wild, at Miners Engine: 'which I should think a favour to your obedient servant', adding that Wild 'has a friend he recommends, which I desire you would let go in as a workman.'[150] This intricate series of recommendations, in which John Nodder utilises his relationship with Heyward to recommend not only his own friend, but also his friend's friend, illustrates the influence that notions of trust, reputation and 'creditworthiness' had within the mining community during this period.[151] The everyday organisation of such relationships were examined at length in Chapter 1 in the case of the Naylor household, and it seems that similar networks were in operation at large capital mines such as Miners Engine. Relationships of family, friendship and kinship were clearly interwoven, and were as crucial to the structuring of the mining workforce, as it was in the acquisition of goods and services from vendors, in local society.

As in the case of the women, the lads commenced paid employment at the Derbyshire lead mines from a relatively young age; however, unlike the women, the tasks they performed and the wages they received altered over the course of their working lives. As noted above, the Miners Engine accounts lack direct evidence pertaining to the tasks performed at the mine, consequently, Farey's *A*

[148] For wider discussion, see: Humphries, *Childhood*, pp. 272–3.
[149] As figure 3.2 indicated, those lads who did not share surnames with other members comprised just over 20 per cent of the Miners Engine workforce. For more on importance of relationships between non–kin, see: Wrightson, *English Society*, pp. 47–73; Muldrew, *Economy*, pp. 1–13; Shepard, 'Manhood', pp. 75–106; Tadmor, *Family*, pp. 175–92.
[150] DRO D7676/383; Willies, 'Management', p. 228.
[151] For outline of importance of trust, reputation and credibility in the communal context, see: Muldrew, 'Interpreting', pp. 163–83.

General View, has once again been consulted, alongside several other works, in order to reconstruct the sorts of tasks the lads might have performed.

The sources available suggest that young men employed at the Derbyshire lead mines followed a structured path toward increasingly prestigious, skilled and remunerative work; characterised by the transition from more feminine occupations performed at the mine surface, toward more masculine occupations performed underground.[152] According to Farey, boys and girls commenced employment at the mines as 'servers', who assisted the 'ore–washers' by transporting ore between the various stages of the washing process, and by 'charging' and 'discharging' their sieves between operations.[153] As the boys entered adolescence, however, they began to acquire new opportunities to broaden their experiences and work underground in the transportation of ore from the vein to the mine surface.[154] Farey, describes how 'Boys, called Setters–on,' carried ore in stages 'of about 12 yards', passing their baskets or 'whiskets' to other 'boys' positioned along 'the sole or Gate of the Mine', which was then carried a stage further until it arrived 'at the bottom of a turn, or underground shaft'.[155] Other tasks performed by the lads during adolescence included 'Striking' and 'Knocking', which involved breaking down large fragments of ore and rubble into more manageable sizes, and 'drawing', which involved the operation of a winch or windlass that brought the extracted ore and rubble to the mine surface.[156] The final stage in the lads' development came when they began to work alongside the miners in ore extraction. It was only at this stage that they could begin to learn the various methods and techniques involved in mining by directly observing the miners at work.[157] They learnt how to use the various tools of the trade, how to construct safe tunnels, how to utilise 'fire setting' and gunpowder to loosen stubborn rock.[158] They learnt about the importance of good ventilation and drainage; developed a theoretical understanding of vein formation, stratigraphy,

[152] For more on gender divisions of labour in Derbyshire, see: Kirkham *Derbyshire*, pp. 22–31 and 74–8; Wood, *Politics*, pp. 184–6.
[153] Farey, *General*, pp. 375–6; see also section II above.
[154] For similar point, see: L. Willies, 'Technical development in Derbyshire lead mining, 1700–1880', *BPDMHS*, 7(3), (1979), pp. 117–20.
[155] Farey, *General View*, p. 368.
[156] *Ibid*, p. 367 and 372–4.
[157] Hooson, *Miners*: appendix, proposition III and 'veins' (note: reprinted copy of Hooson's text does not include page numbers).
[158] Mander, *Derbyshire*, pp. 9 and 13.

geology, and mineralogy, and acquainted themselves with the technical skills of surveying, prospecting, and dialling.[159] Though textbooks containing explanations of the various theoretical and technical aspects of mining were beginning to appear in print in England by the mid to late eighteenth century, the dissemination and practical implementation of these skills remained in the hands of the miners.[160] Consequently, this final stage was of vital importance in the development of the lads, as it was only then that the skills and knowledge of the mining trade could be acquired.

The wage data recorded in the Miners Engine accounts provides evidence to support this structured development path observed in printed works. Figure 3.3 compares the wages received by the 'copers', 'lads' and 'women' employed in the five weeks leading up to the 29 January 1737. The highest earners were the 'copers', who collected equal shares of proceeds amounting to a total of just over £33 or roughly £2 each. The lowest earners were the 'women', who received just 9s. each in the form of fixed wages. While the lads filled the intermediary gap, between the higher and lower earners.

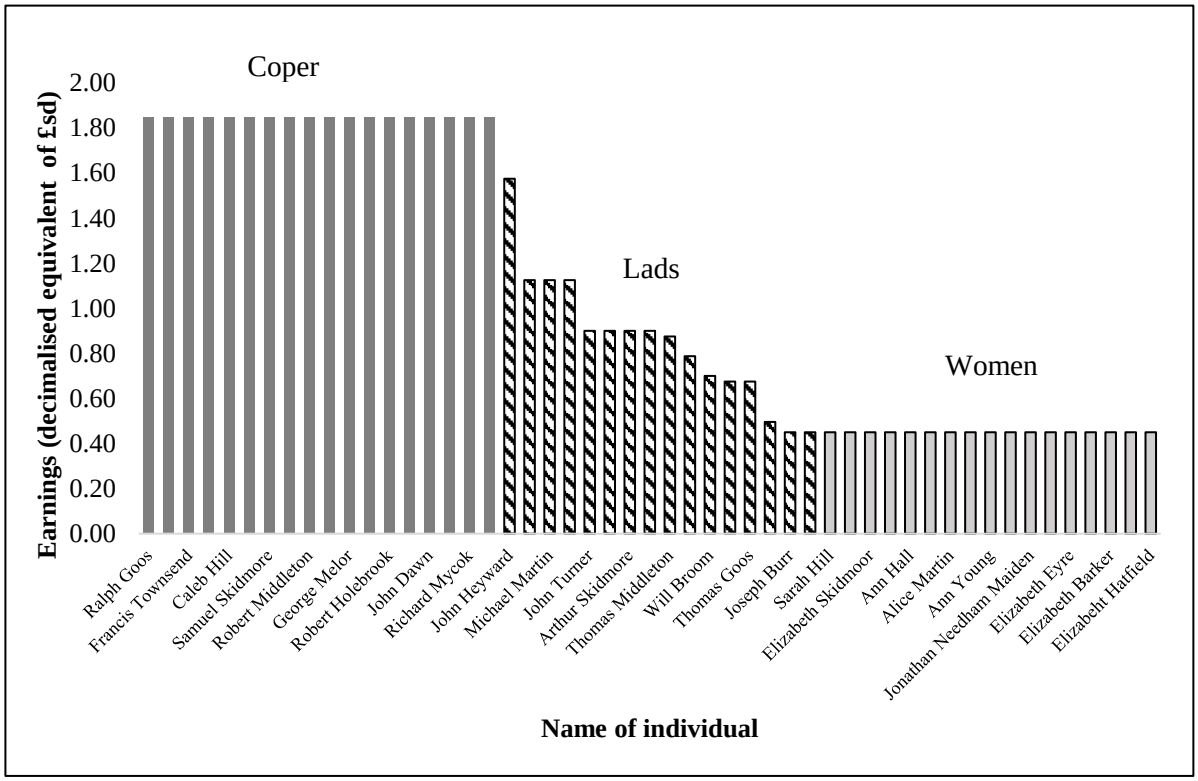


Figure 3.3: *Graph showing wages of different groups in the 5 weeks leading up to 29th January 1737*

[159] For more on each of these technical aspects, see: T. Houghton, *Rara Avis in Terris or the Compleat Miner* (Derby, 1729), pp. 31–37; Hooson, *Miners*: 'Wind–Pipes', 'Veins', and appendix; D. Linden, *A Letter to William Hooson a Derbyshire Miner* (Chester, 1747), pp. 10–68.
[160] See Chapter three for a full discussion.

Their wages increased incrementally from a low of 9s. to a high of £1 11s. 6d., which appears to have reflected each lad's age and the task they performed. William Bramwell, for example, was in receipt of the lowest wage of all the lads, and was likewise one of the youngest, at just twelve years of age. Arthur Skidmore received an intermediary wage of 7d. per shift and was at a similarly intermediary age, of eighteen. While Thomas Jackson, who was one of the highest earning lads at the mine, was also one of the oldest, at twenty–four years of age. In contrast to the women examined above, therefore, the wages paid to the lads appear to have mirrored their development in terms of age, responsibility and skills, which confirms the gender division of labour observed in the previous section.

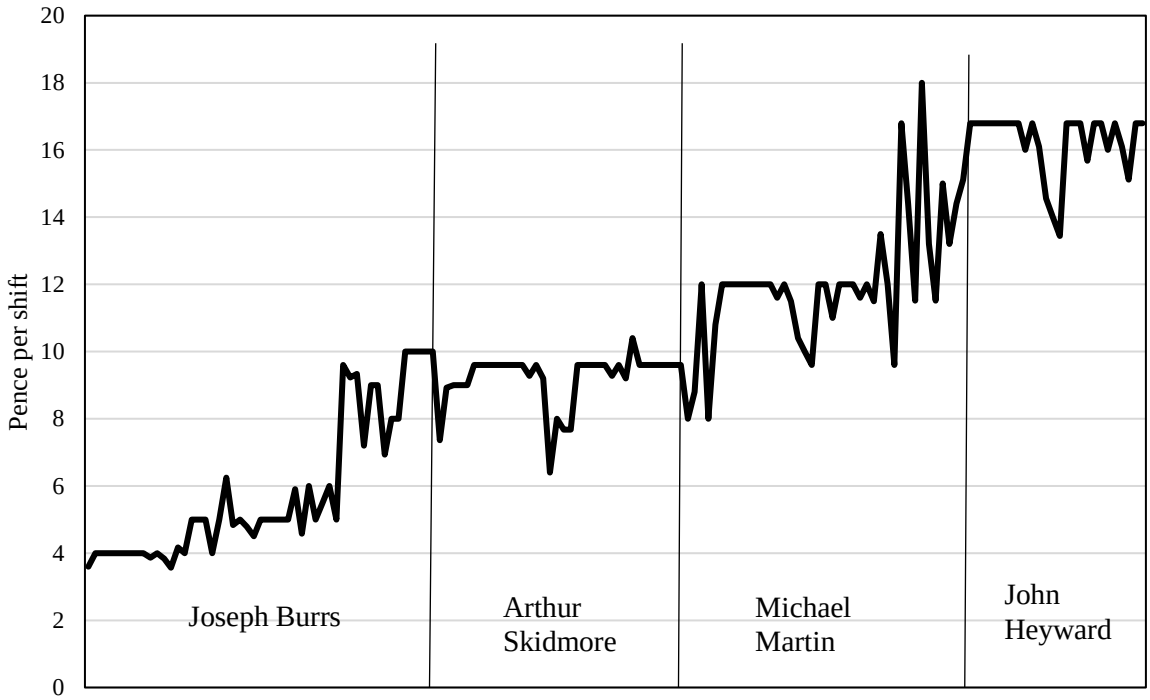
Furthermore, the wage structure of the Derbyshire lead mines appears not only to have reflected the lads' development, but also to have influenced its course. Figure 3.4 presents the wages received by four lads between 1737 and 1741, arranged in order of age.[161] This arrangement is intended to illustrate the evolution of the lad's earnings over the course of their lives, with Joseph Burrows commencing in 1737 at the age of twelve, Arthur Skidmore at eighteen, Michael Martin at twenty, and John Heyward in his mid–twenties (see figure 3.3). Combining their data in this way offers a near continuous record of the lads' wages between the ages of twelve and twenty–five, and represents the various tasks they performed over the course of their development: from ore washers to those on the cusp of achieving the status of miner. The graph indicates that the wages received by the lads increased at a gradual, but constant, rate of roughly a penny per shift each year over the course of their development, with the occasional leap in earnings triggered by the uptake of different tasks. In the latter quarter of Michael Martin's segment, for example, his wage levels exhibit a sharp increase from around 11d. to 15d. per shift, likewise, in the first quarter of John Heyward's segment, his wages increased sharply to a plateau of just under 17d. per shift, where it remained until he joined the ranks of the copers, in April 1739.[162] In both cases, the sharp increase resulted in a permanently higher

[161] The lads were selected based on continuity of employment at Miners Engine, between 1737 and 1740. In the case of Joseph Burrows, those dates have been extended to 1745 when he would have been the same age as Arthur Skidmore in 1737. See: DRO D7676/BagC/382; D7676/BagC/383.
[162] DRO D7676/BagC/382.

average wage, which suggests that they were a result of a promotion rather than impromptu wage fluctuations. Moreover, the lads' wages appear to have continued to increase even while they moved between mining ventures.[163] Thus, Joseph Burrows left the workforce in 1739 in receipt of 5d. per shift, and returned four years later at 9d. per shift.[164] The wage structure in operation at Miners Engine thus offered clear financial incentives to the lads. They were encouraged to commence and maintain their employment in the lead trade from a young age, as wages accrued incrementally in line with age, skill and experience; they were incentivised not only to complete their training and acquire miner status, but also to remain mobile in pursuit of employment opportunities as their progress followed them from mine to mine. Structured as such, the system not only reflected the lads' development, but also directed its course.

The success that the Derbyshire lead industry had in training and developing the lads is demonstrated by the rate at which they transitioned to the status of coper. Recent quantitative analysis

Figure 3.4: *Graph showing wage changes over the course of a lad's development*



[163] It is unsurprising that the lads' wages progressed in this manner, as the labouring population had to remain mobile in pursuit of new employment opportunities, see: Wood, 'Social', pp. 31–58; Wood, *Politics*, pp. 57–66. Moreover, this mobility may have been encouraged by mining households, as helped young men to expand their social connections, see Chapter 1: DRO D7812/1: Lead miner's diary.

[164] This is represented in the final quarter of his segment in figure 3.4, see also: DRO D7676/BagC/382; D7676/BagC/383.

of indenture records has emphasised the comparatively low completion rates of apprenticeship contracts, and the noticeably small numbers of apprentices who became freemen in the town or city of their indenture.[165] In the case of Bristol, Ben–Amos found that around 60 per cent of apprentices departed in the first two years of their contract, and that right up to the middle of the seventeenth century, the proportion of apprentices who became 'freemen' of the city was as low as 30 per cent.[166] While in a larger sample of 1,590 apprentices enrolled between 1600 and 1630, she found that just 262 went on to become citizens of Bristol, of whom 67 per cent 'took their freedom between one and ten years after their term ended'.[167] In the London context, Rappaport observed similar patterns, with roughly 40 per cent of apprentices completing their contract, while of the remainder, 15 per cent died, 1 per cent married, and 44 per cent left either prior to, or immediately after, the completion of their contract.[168] More recently, Wallis has been able to expand and revise these findings, though his overall conclusions tell a very similar story.[169] Although formal records for the commencement of training do not exist in the case of the Derbyshire lead industry, it is possible to infer success rates from the number of lads who acquired coper status at Miners Engine in the later years of the accounts. They show that of the 96 copers, recorded between 1737 and 1765, roughly 57 per cent had been previously employed as lads at Miners Engine, which increases to 70 per cent if those who were already copers at the commencement of the accounts are excluded. If the same calculation is made using the total number of lads employed at the mine instead, then the accounts suggest that around 40 per cent achieved the status of coper at Miners Engine. However, this figure only accounts for those who carried on working specifically at Miners Engine; those who became copers at other mines, or who commenced their own independent endeavours remain unaccounted in this data. Thus, the figures discussed above are indicative of an incredibly high success rate in the training of the lads and suggests a striking level of continuity in the sourcing and retention of labour at the Derbyshire lead mines.

[165] See in particular: P. Wallis, 'Apprenticeship and training in premodern England', *JEH*, 68(3), (2008), pp. 832–61.
[166] Ben–Amos, *Adolescence*, pp. 109–32,
[167] I. Ben–Amos, 'Failure to become freemen: urban apprentices in early modern England', *SH*, 16(2), (1991), pp. 155–72.
[168] Rappaport, *Worlds*, pp. 291–304.
[169] Italics are his own, see: Wallis, 'Apprenticeship', pp. 834–5

Considering the fact that these figures relate to only one mine in a locality which contained several operational mines at the time, and that the category of lads included also adult wage labourers and retired miners, these figures suggest that the system adopted by the Derbyshire lead industry was outstanding in its ability to train and retain skilled tradesmen.

At the centre of the industry's success in the retention of trade knowledge were the familial and kinship bonds that permeated its workforce. These bonds provided a steadfast and reliable framework for the transference of trade knowledge, which helped the industry avoid many of the ambiguities and tensions that resulted from the use of apprenticeship contracts in other trades. Recent research into the concept of the 'household–family' has highlighted the efficacy of contractual relationships in the context of the early modern household.[170] Likewise, the processes of urbanisation and industrialisation have been attributed with the growing prevalence of contract–based employment, which enabled rural youths to establish themselves in the expanding urban centres of early modern England.[171] However, despite their prevalence, contractual relationships between apprentice and master remained a significant source of conflict, social tension and 'disorder' during this period.[172] Kussmaul described how 'the annual patriarchal relation of master and servant was not always easy,' and noted that 'the difficulties in dealing with servants on a daily basis apparently overcame whatever abstract thankfulness farmers felt for the servant's presence'.[173] Indeed, references found in correspondence, court cases and memoirs, attest to the array of abuses committed by apprentice and master alike, which often resulted in the early termination of a contract. As Griffiths observes 'young people could be disobedient, stubborn, lewd, and refuse to serve, or they could run from their masters, steal from them, insult them, threaten them, hit them, or scatter abroad'.[174] Similarly, masters were cited for a range of abuses including excessive punishments, neglect of training responsibilities,

[170] Tadmor, *Family*, pp. 27–30.
[171] J. Humphries, 'English apprenticeship: A neglected factor in the first industrial revolution' in P. David and M. Thomas (ed.), *The Economic Future in Historical Perspective* (Oxford, 2003), pp. 73–102.
[172] J. Dunlop, *English Apprenticeships and Child Labour* (London, 1912), pp. 172–98; Kussmaul, *Servants*, pp. 44–48; Snell, *Annals*, pp. 253–8; Rappaport, *Worlds*, pp. 232–8; Ben–Amos, *Adolescence*, pp. 100–9; Griffiths, *Youth*, pp. 299–313.
[173] Kussmaul, *Servants*, pp. 44–5.
[174] Griffiths, *Youth*, pp. 324–41 and 354.

inadequate provision of food and clothing, and poor living conditions.[175] Such abuses, which largely arose from the contested authority of the adopted householder and ambiguities over contractual arrangements, often hindered the regular transference of skills and knowledge from master to apprentice in urban trades. In the case of the Derbyshire lead industry, however, the retention of trade knowledge within interlocking family and kinship networks helped to offset the impact of contractual dispute. The relationship between parent and child, though far from absolute, was less contestable than that of the relationship between master and apprentice, and thus created a more stable social environment in which the training and development of the next generation of miners could progress.[176]

The use of wage incentives at the Derbyshire lead mines must also be accredited for the industry's success. In the guild context, the payment of wages to apprentices was prohibited under the 1563 Statute of Artificers, which continued to be enforced well into the eighteenth century. In 1744, for example, the Pewterers Company of London was told that 'a Master by his Oath could not give his Apprentice Wages', while, in 1704, the Hostmens' Company of Newcastle received complaints of 'severall ill–disposed brethren, who regarded not the publick good, but their own private Interest, did give great wages to their apprentices'.[177] This prohibition of wages was cited by Adam Smith, in his influential critique of the apprenticeship system, as a great impediment to 'the natural liberty' of young men to exercise 'what species of industry they please', and encouraged apprentices 'to be idle' as they had 'no immediate interest to be otherwise.'[178] Nevertheless, some historians have defended the prohibition of wages, arguing that the long–term benefits bestowed on the apprentice through effective training sufficiently offset the lack of remuneration.[179] Epstein, for example, has argued that the strict rules governing apprenticeship contracts were necessary in order to police the potentially volatile relationship between master and apprentice, stating that 'guild coercion was… essential as a means

[175] *Ibid*, pp. 313–24; Wallis, 'Apprenticeship', pp. 834–5.
[176] Such relationships are examined at length by Tadmor, see especially: 21–5, 74–82.
[177] For quotes, see: C. Welch, *History of the Worshipful Company of Pewterers of the City of London Based Upon Their Own Records*, II (London, 1902), p. 191; Dunlop, *English*, pp. 178–9
[178] A. Smith, *An Inquiry into the Nature and Causes of the Wealth of Nations*, edited by K. Sutherland, (Oxford, 2008 ed.), p. 121
[179] For important works in the 'rehabilitation' of early modern craft guilds, see also: S. Epstein, H. Haupt, C. Poni, and H. Soy (eds.), *Guilds, Economy, and Society* (Seville, 1998).

of enforcing apprenticeship rules in the presence of training externalities in transferable skills.'[180] This regulatory framework supposedly helped to enforce contracts without implementing a competitive wage structure, which helped to both reduce the financial risks to the master and limit competition between guilds and masters over apprentices.[181] However, the case of the lads suggests that 'guild coercion' was not essential either to the protection of the master's financial interests or to the efficient transference of skills.[182] The use of wage incentives at the Derbyshire lead mines helped to boost productivity, increase profits, and incentivised the lads to complete their training and obtain the status of miner. They offered the lads a tangible measure of progress, which, as Adam Smith argued, encouraged them to be more 'industrious', as they could derive 'a benefit from every exertion' and enabled them the means to establish independent households and mining ventures from an earlier age.[183] Thus, the wage structure of the Derbyshire lead mines benefited both the lads and their employers in equal measure and demonstrates clearly that strict regulatory oversight was not necessary for the effective transference of trade knowledge.

The impact that this alternative development path had on the maturation of the lads is open to interpretation and may explain why systems such as this were comparatively rare. Contemporaries of the early modern period perceived youth, or adolescence, as a critical stage in the formation of a conscientious and industrious citizen, capable of providing for a family and engaging positively in the wider community. As Griffiths points out, youth was widely considered 'a marginal stage in life… in which people were being prepared for participation in adult society; a 'dark' stage which had to be steered towards a virtuous course.'[184] As noted above, paramount to the successful navigation of this dangerous period in a young man's life, was the formative experience of service and an early departure

[180] Epstein, 'Craft', pp. 688–93.
[181] *Ibid*, pp. 688–93.
[182] For a critique of the arguments of Epstein and others regarding the view that guilds were 'essential' to the proliferation of skills and knowledge, see: S. Ogilvie, 'Guilds, efficiency, and social capital: evidence from German proto–industry' *EcHR*, 57(2), (2004), pp. 286–333.
[183] Smith, *Inquiry*, pp. 121–5.
[184] Griffiths, *Youth*, p. 354. See also: Ben–Amos, 'Service'; Shepard, *Meanings*, p. 23.

from home.[185] Failure to do so often drew condemnation and the pejorative title of 'masterless'.[186] Thus, William Gouge, in 1622, warned parents not to 'suffer their children to live like little masters at home, and pass over all their youth in idleness.'[187] Similarly, the Reverend Thomas Gisborne, in 1798, stated that 'the first evil, in the situation of the miners' was 'the very little education and religious instruction, which their children in general receive.' This, he argued, was a consequence of their employment at the mines from a young age, and their subsequent lack of engagement with suitable authority figures; the remedy for which, Gisborne believed, was 'the institution of Sunday schools'.[188]

Thus, the lads of the Derbyshire lead industry occupied a grey area in relation to contemporary moral teachings on youth. On the one hand, they remained at home with their parents and kin throughout their youth, which many saw as problematic due to their potential overindulgence in parental tenderness, and their consequent inducement to idleness. On the other hand, the lads were encouraged by their parents to be industrious, sociable and proactive in their pursuit of an independent living from an early age. Thus, in some respects, they matured more rapidly than their counterparts in service did: their receipt of wages, early interaction with the opposite sex and the prevalence of endogamy, were conducive to economic independence and household formation.[189] However, in other equally important respects, their rapid ascent to independence, early exposure to the workplace and intermingling with older lads, workmen and members of the opposite sex, were seen as potential sources of vice, including 'drunkenness', 'imprudence', 'profanity', sexual promiscuity, and dereliction of religious duty.[190] It is, therefore, important to consider the social alongside the economic context, for as Griffiths notes 'work was a moral, as well as an occupational category.'[191] In many

[185] For consideration of youth and its hazards, see: Schofield, 'Age–specific', pp. 261–274; Wall 'Age', pp. 181–202; Kussmaul, *Servants*, pp. 3–11; Earle, *Making*, pp. 85–105; Rappaport, *Worlds*, pp. 232–8 and 291–322; Ben–Amos, 'Service', p. 43; Griffiths, *Youth*, pp. 351–9; Shepard, *Meanings*, pp. 188–95.
[186] Kussmaul, *Servants*, pp. 33–34; A. Beier, *Masterless Men: The Vagrancy Problem in England, 1560 – 1640*, (London, 1985), pp. 1–7; Griffiths, *Youth*, pp. 351–3.
[187] W. Gouge, *Of Domesticall Duties* (London, 1622), p. 535.
[188] Gisborne, 'General', pp. 235–6.
[189] This is revealed in demographic studies that point to comparatively high average age of marriage during this period, see in particular: Wrigley and Schofield, *Population*, pp. 421–30.
[190] Gisborne, 'General', pp. 235–8.
[191] Griffiths, *Youth*, pp. 374–89.

respects, this point is vital to understanding the longevity of the apprenticeship system and the relative scarcity of systems akin to that used at the Derbyshire lead mines. For despite its shortcomings, the perceived moral and social value of the institution of apprenticeship and service helped to prolong its relevance well into the nineteenth century.[192] Meanwhile, the less conventional avenues of development, such as that followed by the lads, continued to be viewed with suspicion even by the end of the eighteenth century.[193] Gisborne, for example, notes how 'the labourer in industry is commonly attached to some particular family… hence, the master acquires an influence over the conduct of his workmen', and exerts 'it in promoting their comfort, and guarding them from extravagant and profligate courses.' In contrast, 'the connection, which subsists between the proprietor of a mine and the working miner, is comparatively slight' thus 'the latter considers himself as independent; frequently shifts his quarters; and is little under the control of authority, or of persuasion.'[194]

In sum, the process of social maturation and career development experienced by the lads employed at the Derbyshire lead mines was different, but also similar, in many ways, to that of the apprenticeship system used in urban trades. The lads were exposed from an early age to the working environment of the mines and were paid wages from their commencement of productive work at around the age of twelve. They generally worked alongside their family and kin, and remained as dependants in their parental households until they departed – in their mid–twenties – to commence independent life as householders and miners. The wage and employment structure of the mines provided gradual, but constant, progress and rewarded the lads financially for their skills development and devotion to the mining trade. The system incentivised the lads to commence and remain employed at the Derbyshire lead mines, and equipped them with the skills and finances required to achieve economic independence at a relatively young age. The success of the system was reflected in the comparatively high proportion of lads that obtained the status of miner or coper, which appears to

[192] Kussmaul, *Servants*, pp. 120–134; Snell, *Annals*, pp. 228–70; Ben–Amos, *Adolescence*, pp. 69–83; Griffiths, *Youth*, pp. 388–9; Brooks, 'Apprenticeship', pp. 52–83; Pelling, 'Apprenticeship', pp. 33–56; Epstein, 'Craft', pp. 705–7; Humphries, *Childhood*, pp. 256–306.
[193] Ben–Amos, *Adolescence*, pp. 226–31; Griffiths, *Youth*, pp. 382–89; Shepard, *Meanings*, pp. 70–92.
[194] Gisborne, 'General' p. 228.

have been at least two–thirds of initiates. In general, the evidence examined above compares favourably with the growing body of evidenced linked to the apprenticeship system. The lads were able to acquire trade knowledge without being exposed to potentially exploitative guild regulations, and were encouraged to remain in the mining trade not through 'guild coercion', but via wage incentives and the maintenance of tight–knit familial and kinship networks, which provided a stable social environment in which the lads could develop and integrate.[195] This relatively closed system helped to protect the miner's position of authority over the lead industry and ensured that family and kin were given priority when acquiring trade knowledge and skill. Having established how the lads matured into their role as 'masters of the trade', the next section will now consider how their status at the workplace translated into status in local society more generally.

IV. *'Copers'*

In an influential study of seventeenth century society, Andy Wood observed what he considered to be the early formation of a distinct working class culture in the lead mining region of North West Derbyshire.[196] The miners, encased in customary law and proactive in its defence, were pitted, by Wood, as a united front against the encroachment of 'a hostile employing class' of 'tyrannical landlords' and merchants, who, over the course of the seventeenth and eighteenth centuries, colluded to undermine the customary rights of the Derbyshire free miners.[197] He viewed the miners as victims of industrialisation, as a squeezed 'working class', pressed from above by merchant capitalists and from below by a swelling tide of 'landless poor' who 'created a cheap labour force which could be utilised by aristocrats and gentlemen investing in mining enterprises.'[198] This combination of efforts, processes and developments, he argued, resulted in the decline of free mining in Derbyshire, but 'there was nothing inevitable' about this process of decline, for 'capitalism in North West Derbyshire had its origins in the acts of ideological, legal and physical coercion carried out at the behest of a coalition

[195] Ogilvie, 'Guilds', pp. 286–333.
[196] See in particular: Wood, 'Social', pp. 31–58; Wood, 'Custom', in Griffiths, Fox and Hindle, *Experience*, pp. 249–85; Wood, *Politics*, pp. 316–25.
[197] Wood, *Politics*, pp. 102–112.
[198] Wood, 'Social'pp. 39–40; Wood, *Politics*, pp. 97–8 and 116–24.

of aristocrats, gentlemen and merchants throughout the whole of the seventeenth century.'[199] The period and theme of this present study limits the extent to which issues such as radicalism, protest and plebeian politics during the sixteenth and seventeenth centuries may be examined. What it does provide, however, is an opportunity to explore the applicability of Wood's narrative of class conflict to the social and economic context of the eighteenth century. For, assuming Wood is correct, the processes he identifies in the seventeenth century ought to reveal themselves in the organisation of labour at capital–intensive mine operations during the eighteenth and early nineteenth centuries. To explore this further the evidence provided by the Miners Engine accounts, and what has been discussed above in relation to the 'women' and 'lads', will be used to compare the authority and status of the miners with other groups in local society. The findings draw attention to the negotiability of social status within the local context and the importance of controlling access to employment opportunities, the maintenance of an independent living, and the garnering of reputation within local society.[200] But first, let us consider the terms and classifications being used in this discussion, before exploring the evidence provided by the Miners Engine accounts.

Dispute and social conflict have featured prominently in discussions related to class and status in society during the early modern period.[201] In a catalogue of works on the subject E. P. Thompson, drew on an array of examples of protest, civil disorder and discontent, in order to explore the origins of working class consciousness, ranging from the grain riots of the eighteenth century to the Chartist movement of the nineteenth century and beyond.[202] While in the case of Derbyshire, Wood has presented the history of free mining as one of class conflict between a coalition of landowners and merchants against the free mining population.[203] However, while such dichotomies offer intriguing

[199] Wood, 'Social'pp. 40–1.
[200] See in particular, Muldrew, 'Class', pp. 147–77; French, *The Middle*, pp. 141–200; Shepard, *Accounting*, pp. 82–113.
[201] H. Perkin, *The Origins of Modern English Society*, 1780–1880 (London, 1969); J. Brewer and J. Styles, *An Ungovernable People* (London, 1980); H. Perkin, *The Structured Crowd*, (Brighton, 1981); J. Clark, *English Society, 1660–1832* (Cambridge, 2000 ed.); A. Wood, *Riot and Popular Politics in Early Modern England* (Basingstoke, 2002); J. Walter, *Crowds and Popular Politics in Early Modern England* (Manchester, 2006).
[202] Thompson, *Making*, pp. 781–820; E. Thompson, 'The moral economy of the English crowd in the eighteenth century' *P&P*, 50, (1971), pp. 76–136; E. Thompson, 'Patrician society, plebeian culture', *Journal of Social History*, 7(4), (1974), pp. 382–405; E. Thompson, *Custom in Common* (London, 1991).
[203] Wood, 'Social', pp. 39–40; Wood, *Politics*, pp. 98–102.

historical narratives, it is rare for dispute and social conflict during the early modern period to be so clear–cut in practice. At the founding of the Hucklow Edge Old Vein, which was the vein along which Miners Engine Mine was located, for example, a series of disputes ensued between the prospective partners in several mining enterprises (which included the Miners Engine consortium) and the local freeholders of the liberty.[204] Following a series of trials performed by 'an eminent [local] miner' at the turn of the eighteenth century, it was discovered that the Hucklow Edge Old Vein, which had been worked near to the village of Stoney Middleton in the preceding century, extended along Hucklow and Eyam Edges, in the direction of the villages of Eyam and Foolow.[205] The discovery of this rich vein of ore attracted the attention of both the mining community and the freeholders of the parish of Eyam. The freeholders had been granted a legal pardon by King John in the twelfth century, allowing them to resist encroachments upon their land in direct contravention of the free–mining customs practised throughout the 'King's Field' of Derbyshire.[206] Consequently, although the vein was promptly divided up amongst the various mining partnerships after its discovery in 1711, the freeholders of Eyam withheld access to their land and demanded generous compositions to reimburse them for the substantial damages that such heavy industrial activity would naturally entail.[207]

At first glance, this dispute encompasses all the hallmarks of Marxian class conflict, with the landowners of Eyam uniting to obstruct the liberty of the free mining population; denying them access to their livelihoods in order to preserve their landed privileges. Indeed, Wood references this dispute in his own work to illustrate how 'legal changes…between c.1590–1660 conditioned the pattern of capitalist development into the eighteenth century', describing how 'in the parish of Eyam, the lord and freeholders had combined to marginalize free mining customs by the 1660s', allowing them to grant their mines '*en masse* as consolidated titles to groups of entrepreneurs.'[208] However, Wood's interpretation of this dispute misrepresents both the process of events and the social configuration of the opposing sides.[209] First, the freeholders of the parish of Eyam were not the 'tyrannical landlords',

[204] G. Hopkinson, 'Lead mining in the Eyam district in the 18th century' *DAJ*, 80 (1960), pp. 80–97.
[205] *Ibid*, p. 80.
[206] *Ibid*, pp. 80–1.
[207] *Ibid*, pp. 82–3.
[208] Wood, *Politics*, p. 122.
[209] The events are covered in detail by George Hopkinson, see: Hopkinson, 'Eyam', pp. 80–4.

Wood imagines, but rather an assortment of husbandmen, yeomen and lesser–gentry bound by custom and common interest. The land under question had been sold by the Marquis of Halifax to his tenants in 1664, while the custom itself dates back to the twelfth century. Thus, the motivations Wood assigns to the various parties concerned are implausible, as the landowners could not have known about the substantial quantity of ores contained beneath their land when the custom was conceived, nor even when the land was divided amongst its tenants four centuries later.[210] Second, the group described as 'miners', who were being obstructed by the freeholders, were not solely of the 'labouring sort', nor were they as low down the social scale as Wood infers, but rather they included amongst them lead merchants, ironmasters and landowners from across Derbyshire and south Yorkshire, headed by the influential lead proprietor and wealthy landowner, Richard Bagshawe of Castleton.[211] One of the first attempts to dismiss 'the miners' was made by Charles Potts, guardian of the Eyam Hall estates, who seized the demarcation 'stowes' placed by the miners near to the villages of Foolow and Eyam.[212] However, this act of defiance on behalf of a major local landowner was placated when Potts was invited, on behalf of his ward, Thomas Wright, to invest in mine shares in return for his compliance.[213] Unperturbed by Potts's betrayal, the remaining freeholders continued to resist the mine partnerships' encroachments on their land, which culminated in a public dispute between Mrs Butler, a local shopkeeper, and Richard Bagshawe, who 'in an imperious and insulting manner cracked his whip at her and told her she should have no other recompense than that.'[214]

This dispute between the freeholders of Eyam and the proprietors of the mines places emphasis on the status, hierarchy and allegiances of the opposing social groups; however, a close critical reading of the event does not reveal a clear 'class' conflict, as Wood states, nor can the groups involved be demarcated in polarised terms of 'elite' and 'plebeian'.[215] The landowners of Eyam included a range of large and smallholders, who may even have included resident free miners who

[210] *Ibid*, pp. 80–4.
[211] *Ibid*, p. 81–2.
[212] See in particular DRO D7676/BagC/703: Bradshaw v. Potts re the exemption of freehold land at Eyam from mining customs.
[213] See various settlements made between Thomas Wright and proprietors of mines: DRO D7676/716; D7676/731; D7676/747.
[214] Quoted in: Hopkinson, 'Eyam' p. 83.
[215] Wood, *Politics*, pp. 98–9, 304–18.

commonly owned or rented land alongside their income from mining.[216] Moreover, though the mine partnerships were comprised predominantly of merchants, industrialists and landowners, they received the active support of the mining communities of neighbouring parishes, who were well placed to profit from the valuable cope bargains that could be struck with the investment partnerships. Thus, the unifying factor in this dispute appears not to have been an intrinsic sense of class, but rather a more mutable and negotiable sense of common interest in local affairs between diverse social groups.[217]

The above examples also draw attention to the challenges of assigning an overarching class identity to what was a socially and economically diverse community. The term 'miner' was used by contemporaries of the seventeenth and eighteenth centuries in different contexts to address a range of individuals engaged in the industry. This was made particularly apparent in local disputes over the payment of the lead tithe, where merchants, proprietors, investors and landowners were often labelled as 'miners', alongside practitioners of the trade.[218] In a famous dispute in the parish of Ashover, in 1657, a number of local 'miners', including: 'Samuel Taylor Esq., Thomas Cowper Gent., Edward Hodgkinson the elder, Ralph Mather and Arthur Nicolson' were brought before the Court of the Exchequer, by the rector of Ashover, Immanuel Bourne, for their refusal to pay the lead tithe.[219] Twenty–eight witness depositions were read out at the hearing, of which around a quarter were provided by gentlemen, just under half by yeomen, and around twenty per cent by labouring miners.[220] The overwhelming majority of the witnesses testified in favour of the defendants, with many stating that the tithe had been traditionally paid out of charity rather than by compulsion of law. That said, there was a noted difference in the level of compliance exhibited by miners of different social and

[216] *Ibid*, pp. 82–3.
[217] A concept explored at length by Wrightson and others, see: 'The Politics of the Parish in Early Modern England', in Griffiths, Fox & Hindle, *Experience*, pp. 10–46; C. Muldrew, 'The Culture of Reconciliation: Community and the Settlement of Economic Disputes in Early Modern England', *HJ*, 39(4), (1996), 915–42; S. Hindle, 'Hierarchy and Community in the Elizabethan Parish: The Swallowfield Articles of 1596', *HJ*, 42(3), (1999), pp. 835–51; French, *The Middle*, pp. 1–30.
[218] S. Brand, 'An Ashover lead mining tithe dispute of the seventeenth century', *BPDMHS*, 13(1) (1996), pp. 52–7.
[219] Immanuel Borne published a polemical text defending the clergy's right to collect the tithe in the years following his confrontation with the miners of Ashover, see: I. Borne, *Defence and Justification of Ministers' Maintenance by Tithes* (London, 1659). For quote see: Brand, 'Ashover', p. 52.
[220] Brand, 'Ashover'p. 57.

economic statuses revealed in the depositions. Thus, George Colley stated that he 'beleeveth that several psons in the Parish of Ashover… would not pay any kind of tithe if they did not heare or conceive that the Lawe would compel them to pay the same'.[221] However, other less influential miners were more susceptible to coercion by the local rector. In 1637, John Everard, a miner from Morton, paid four loads of ore as composition to Bourne and another year 'paid half a crown' at the behest of the rector.[222] While, John Grene, a miner from Ashover, testified that in 1653 he and his partners paid ten shillings 'to obtayne their peace and quiet' from Bourne's harassment ' and to avoid the charge of a suit… they being poore men.'[223] Resistance to the payment of the tithe thus arose predominantly from those merchants, landowners and miners who had the financial capacity to meet Bourne and other clergymen's charges at court, yet their resistance paid divdends to less prosperous miners too. Their efforts proved successful. Bourne's case was defeated at court and the tithe remained a charitable contribution in the parish of Ashover.[224]

Wood argues that in such instances a landowner or merchant could periodically abandon their 'elite identity' and adopt the garb of 'miner', which enabled him to 'shove his own interests down the gullet of a plebeian community' and entice the miners into allegiances with the very people they 'found most obnoxious'.[225] However, just as Gareth Stedman Jones questioned the use of the term 'working class' in relation to the Chartist movement of the nineteenth century, so too must Wood's use of the term 'miner' be questioned in relation to the mining community of North–West Derbyshire.[226] Far from representing a homogenous plebeian community, as Wood infers, the mining community of eighteenth–century Derbyshire was fiercely entrepreneurial and competitive, which helped to precipitate its social and economic stratification, with the most successful miners, merchants and investors rising to the ranks of lesser gentry, while many of its less successful practitioners

[221] Quoted in: Brand, 'Ashover', p. 54.
[222] *Ibid*, pp. 54–5.
[223] *Ibid*, pp. 54–5.
[224] Wood spends some time exploring tithe payments, though once again presents them as a series of binary class conflicts, see: Wood, *Politics*, pp. 303–4.
[225] *Ibid*, pp. 219–20.
[226] G. Jones, *Languages of Class*, pp. 168–9.

remained at or around the status of labourer.[227] It was also common for miners, who owned or rented land, to claim the status of yeoman in local society, as revealed in the tithe disputes, where a substantial yeoman contingent was mobilised against the payment of the lead tithe.[228] It is, therefore, difficult to establish from these overlapping social groups a coherent depiction of class that encompasses the complexity of the Derbyshire miners as a social group. Instead, it seems apparent that akin to other rural tradesmen, the miners were composed of various sorts of people drawn together by common interests in the mining trade and membership of local networks of credit and sociability.[229]

The 'language of sorts', first proposed by Wrightson, resonates strongly in the context of eighteenth–century Derbyshire, where the process of industrialisation resulted in a protracted period of relative prosperity, helping to drive social mobility and stratification within the mining community.[230] From its inception, the 'language of sorts' was a social vocabulary with national scope, however, at its core was a 'localism' that has helped to sustain its relevance long after its inception.[231] As Wrightson notes, the language of sorts 'reflected not only the processes of economic, social and cultural change in English local society, but also the realities of power relations in the local community.'[232] French expanded the framework for localism further and used the language of sorts to describe various 'inhabitants' based on their role in parish governance and engagement in local economic affairs.[233] While more recently, the works of Muldrew and Shepard have drawn attention to the basis for social distinction in the context of the early modern credit economy.[234] For Muldrew, the individual established their social status by cultivating a reputation within the local credit

[227] Social stratification was a distinct feature of the period more generally, and has been identified as the primary motive factor in the early formation of the 'middling sort', see: Wrightson, 'Sorts', p. 41.
[228] Brand, 'Ashover', pp. 54–5. See also the case of George Heyward in chapter 3.
[229] See discussions in: Wrightson, *English,* p. 43; Wrightson, 'Sorts', pp. 28–51. See also: Shepard, 'Poverty', pp. 51–95.
[230] Wrightson, *English Society,* p. 37; K. Wrightson, 'The social order of early–modern England: three approaches' in L. Bonfield, R. Smith, and K. Wrighston (eds.), *The World We Have Gained: Histories of Population and Social Structure* (Oxford, 1991), pp. 177–202; K. Wrightson, 'Estates, degrees and sorts: changing perceptions of society in Tudor and Stuart England', in Corfield, *Language*, pp. 30–52; Wrightson, 'Sorts', pp. 28–51.
[231] *Ibid*, pp. 28–30.
[232] *Ibid*, p. 40.
[233] French, 'Social', pp. 66–99.
[234] Muldrew, 'Class', pp. 147–77; Shepard, 'Poverty', pp. 51–95

community.[235] Likewise, Shepard has drawn attention to the concept of 'worth' in early modern English society, observing, through witness depositions at court, how individuals of both genders carried with them a sense of 'worth' in relation to their neighbours. According to Shepard, this method of self–identification gave rise to a myriad of social distinctions, running throughout early modern society, which was determined primarily by gender, age, occupational markers, economic independence, financial prudency, 'creditworthiness' and the possession of skill.[236] Thus, it is argued here that, presented in the language of sorts, and based upon the criteria discussed above, the Derbyshire miners – taken as an amalgamation of their diverse members – appear not as hapless victims of the process of industrialisation, but rather as adaptive entrepreneurs whose monopoly of skill, engagement in the local community, access to new profit making opportunities and status as small–scale employers of wage labour, distinguishes them as a 'middling sort of people' in local society.

Defining precisely who 'the middling sort' were, however, has proven to be a major challenge for historians of early modern English society.[237] Earle, in his influential monograph, *The Making of the English Middle Class*, provided an important disjuncture in the history of class, redefining what was widely understood to be the preindustrial 'middle class' using the more historically appropriate term the 'middling sort of people'.[238] He began his enquiry by describing how 'very few middling people' during the early modern period 'were the sort of capitalists that Marx had in mind when he analysed the bourgeoisie.'[239] Rather, in Earle's view, what distinguished many tradespeople from 'the mechanic part of mankind was the fact that their activities not only fed and clothed them, but also enabled them to accumulate on a regular basis and so improve.' It was, therefore, 'accumulation and improvement, as well as the employment of capital and labour, which were the essential features of

[235] Muldrew, 'Class', pp. 169–71
[236] Shepard, 'Poverty', pp. 51–95
[237] Despite strong social, economic and cultural evidence pertaining to a distinct 'middling sort of people' in early modern English society, the term does not enter common discourse until the turn of the eighteenth century, see: Wrightson, 'Sorts', pp. 41–4; French, 'Social', pp. 67–9; Muldrew, 'Class', p. 149. See in particular: J. Barry, 'Introduction' in Barry and Brooks, *Middling*, pp. 1–27; Hunt, *Middling*, pp. 1–21.
[238] Earle, *Making*, pp. 3–16.
[239] *Ibid*, p. 4.

the middle sort of people.'[240] This interpretation of 'the middling sort' as 'accumulators', 'improvers' and controllers of 'capital and labour' of varying degrees, mirrors the position occupied by the Derbyshire lead miners.[241] As a consequence of the structural safeguards provided by the CBS, the miners of the eighteenth century retained not only control of their own labour, but also the labour of those they hired to assist them, and as part of their contracts, the miners were also required to invest their own capital to hire additional labour, and to repair and maintain their equipment. Thus, if we consider the financial risk–taking involved in mining, the potential for exceptional profts, and the social status it engendered, then the Derbyshire lead miners reveal themselves to be, what Earle termed a class of 'petty capitalists'.[242]

Data drawn from the Miners Engine accounts supports this revised classification of the Derbyshire lead miners and their social status both at the mines and in local society. Table 3.2 depicts the yearly earnings of the 'women', 'lads' and 'copers' who worked at Miners Engine between 1737 and 1765. In total, the copers collected 65 per cent of profits from the labouring process, and earned more than double the combined earnings of the women and lads for the same period. Moreover, while the earnings of the women and lads reveal a downward trend over the course of the period, the copers' earnings resist this same trend, shifting upwards after a slump in 1745. In general, the copers' yearly earnings appear more stable, changing by an average of just -9 per cent from year to year, compared with averages of -31 per cent and -32 per cent for the women and lads respectively. As figure 3.5 shows, this relative stability was achieved despite dramatic fluctuations in the copers' earnings on a monthly basis, which shifted from highs of 73s. per month, to lows of zero.[243] On the other hand, the women and lads' monthly earnings appear to be comparatively stable, with women remaining at just under 10s. per month for the majority of the period, while the lads' earnings fluctuated a little more, at between 10s. and 20s. These different patterns in earnings are a reflection of the means by which they were acquired. In the case of the miners, they received their income from the proceeds of the

[240] *Ibid*, pp. 4–6.
[241] For quote, see: Wrightson, 'Sorts', p. 49.
[242] See, in particular, Katrina Honeyman's examination of the Derbyshire mining community: Honeyman, *Origins*, pp. 20–33.
[243] DRO D7676/BagC/382; D7676/BagC/383.

extractive process, while the women and lads were paid wages by the miners. It is also clear from figure 3.5 that the copers' earnings were cyclical in nature, with peaks during the summer months and troughs during the winter. The copers' earnings are, in many ways, comparable to those observed in the case of John Naylor for the period 1789 to 1792; suggesting that the social and occupational differences between an independent miner working at his own mine and one contracted to work at a large capital mine were negligible. Like Naylor, the copers of Miners Engine appear to have occupied a 'middling station' in terms of their earnings: making more than the labourers they employed, but less than a lead merchant or landowner. In both cases, the miners were able to maintain their authority and access to profit making opportunities through their monopoly of trade knowledge, and role as intermediaries and entrepreneurs within local society.

Table 3.2: *Average Yearly Income of Lads, Women and Copers: 1737–45 and 1763–65*

Year	Avg. Yearly Income Lads (£)	Avg. Yearly Income Women (£)	Avg. Yearly Income Copers (£)
1737	10.33	4.92	17.20
1738	9.98	5.06	25.73
1739	9.99	5.17	16.40
1740	7.12	4.74	20.99
1741	6.58	4.93	17.25
1744	2.54	4.31	16.96
1745	2.74	4.46	9.59
1763	1.30	1.10	11.11
1764	0.81	1.12	17.41
1765	1.18	1.26	15.41

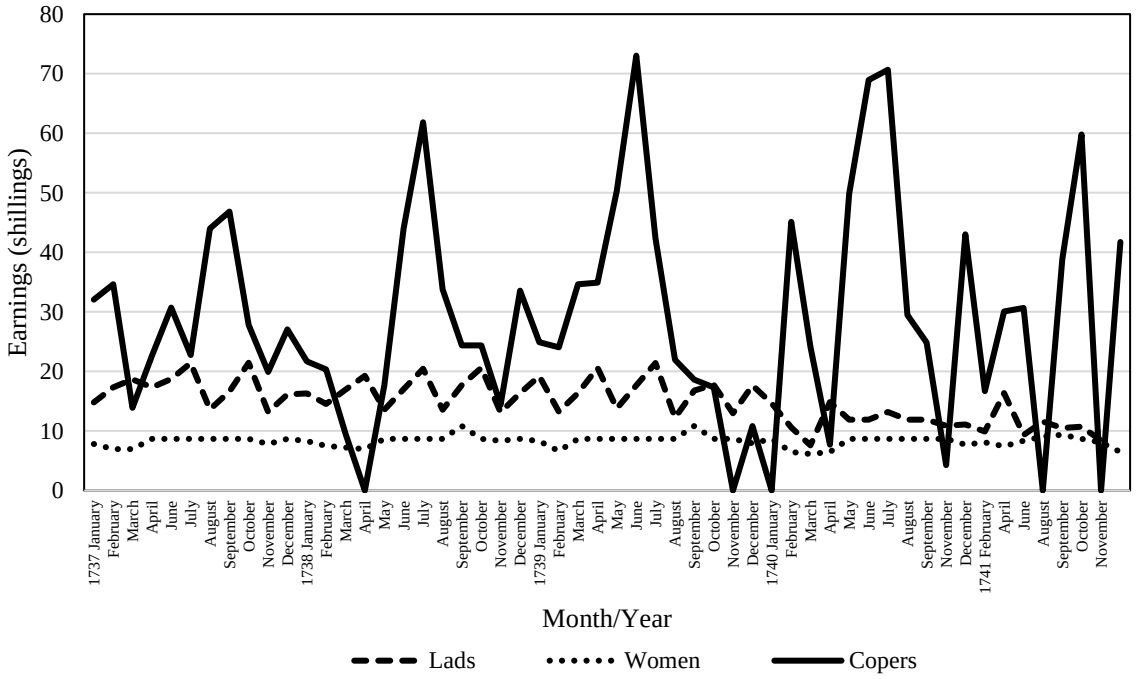
(The amounts presented in this table are the decimalised equivalent of £. s. d.)

Table 3.3: *Composition of the mining workforce: 1738–45*

Group	Share of workforce (%)	Average number of days worked in 5 weeks	Share of overall time worked at the mine (%)	Share of overall earnings (%)
Women	32	25	44	12
Lads	36	15	30	23
Men	32	15	26	36
Work Materials	–	–	–	29

The discrepancy between the earnings of the miners and their employees, identified above, became yet more pronounced during the latter period covered by the accounts. From 1763, when we see the largest falls in the earnings of the lads and women (see table 3.2), the copers were able to maintain a comparatively stable and generous share of overall profits (see table 3.5). They collected between 50 and 70 per cent of the cope's total income on a monthly basis, which, if taken as a combined total, means that of the £1197 paid out in labour costs between 1763 and 1765, the copers collected £785 or 65 per cent. This was achieved not only against the backdrop of falling productivity, but also of structural reorganisations at the mine, following the accusations of corruption levelled against the mine agent, George Heyward, in the 1740s. From around 1740 onwards, the mine owners elected to reduce the size of the copes in operation at the mine, by offering smaller bargains over which the copers could compete.[244] Table 3.4 demonstrates this process, revealing how both the size and number of copes employed at Miners Engine altered over the course of the period: from one cope comprised of eighteen copers in 1737, to eighteen copes comprised of roughly three copers each in 1765. This was a conscious decision by the mine owners to reduce the influence that George Heyward

Figure 3.5: *Graph showing average monthly earnings at Miners Engine Mine, 1737–41*



[244] For relevant dates, see: D7676/BagC/383; D7676/BagC/386

practised over the workforce and to encourage the copers to compete with one another for mine contracts, as the CBS intended.[245]

However, the evidence explored above suggests that the impacts of these structural alterations were most keenly felt not by the copers, but rather the wage labourers they employed. This was particularly apparent in case of the lads, who witnessed the most dramatic fall in average earnings during this period. The average yearly earnings of a lad fell from £10 in 1737 to below £1 by 1765, which was mirrored by a substantial fall in the number of days worked by each lad from an average of 23.5 days per month between 1737 and 1740, to just 8 days from 1740 onwards (see table 3.2). Some well–connected lads were able to overcome this dramatic alteration in employment by obtaining work at several copes simultaneously after 1740.[246] Arthur Skidmore, for example, worked 3 shifts for 'Robert Middleton & Co.', 11 shifts for 'Caleb Hill & Co.' and 12 ½ shifts for 'Henry Dooley & Co.' in February 1744. [247] However, the majority of the lads experienced a substantial fall in the regularity of their employment at Miners Engine, which likely drew many to seek employment at other mines in the area.[248] This is further illustrated by the increase in the number of different lads names recorded in the accounts, from around 23 in 1737 to over 50 by 1763. Not only did the lads work fewer shifts overall, but it also appears that their average earnings per shift declined over the course of the period, from around 10 pence in the 1730s and 1740s to just over 6 pence per shift by the 1760s. Thus, the data suggests that there was a clear shift towards a younger and more casually employed male wage labour force at Miners Engine from 1740 onwards. However, this does not appear to have been part of a broader trend in the pattern of work at the Derbyshire lead mines, rather it was due to a combination of the structural changes enacted by the proprietors of Miners Engine, and the direct efforts by the copers to reduce expenditure and maintain their share of proceeds by employing younger lads on a more casual basis.

[245] For full account of charges levelled against George Heyward, see: Willies, 'Management', pp. 228–32
[246] For other examples, see: Willies, 'Management', pp. 227–8.
[247] DRO D7676/BagC/383.
[248] DRO D7676/BagC/386.

Table 3.4: *Average size and number of copes*, 1737–65

Year	Number of Copes	Average Number of Copers per Cope
1737	1	18
1738	1	18
1739	1	18
1740	1	19
1741	2	10
1744	3	8
1745	4	7.5
1763	17	2.5
1764	11	3
1765	18	3

Table 3.5: *Copers, Lads, and Womens' share of overall income 1763–65*

Year and Month	Coper's share of income (%)	Lad's share of income (%)	Women's share of income (%)	Left over from calculation (%)
1763 January	71	10	12	6
April	55	11	12	23
July	62	13	12	13
October	68	13	10	9
December	61	11	10	19
1764 March	59	12	12	17
June	72	7	9	12
1765 January	73	14	12	0
March	62	12	11	15
June	47	8	9	36

The copers' ability to protect, and even enhance, their earnings, despite structural changes and falling productivity, demonstrates the degree of authority they retained over the extractive process and points once more to their middling status, both at the mines and in society more generally. Additionally, the evidence, thus far examined, suggests that this authoritative position was predicated on the hierarchical structures of the household and the systems of paternalism and deference that determined the locus of authority in both the household and society alike.[249] As noted above, the

[249] For social theory of paternalism and deference, see: E. Wolf, 'Kinship, Friendship and Patron–Client relations in Complex Societies', in M. Bainton (ed.), *The Social Anthropology of Complex Societies* (London, 2004 ed.), pp. 1–22; N. Abercrombie and S. Hill, 'Paternalism and Patronage', *British Journal of Sociology*, 27 (1976), pp. 413–29; J. Pollock 'The Classical Theory of Deference' *AHR*, 81(3) (1976), pp. 516–23. For early modern context, see in particular: Wrightson, *English*, pp. 65–9; French, *Middle*, pp. 201–61.

Miners Engine workforce was characterised by the strong familial and kinship ties that intersected the various groups employed at the mine, and the pivot, upon which this system turned, was the entrepreneurialism and independence of the miners. As masters of the mining trade and heads of mining households, they controlled vital employment avenues for family, kin and neighbours alike, and, therefore, would naturally have assumed an important position in local networks of paternalism and deference.

Although paternalism, as a social construct, 'presupposes unequal access to resources' and is primarily concerned with justifying and preserving that unequal access, the focus of historical analysis upon the paternalism and deference of social extremes, such as existed between rural labourers and landed elites or proletariats and industrial capitalists, masks the everyday paternalism that existed between less polarised social groups, such as farmers and servants, masters and apprentices, or parents and children.[250] As Abercrombie and Hill explain, the industrial paternalism of the nineteenth and twentieth centuries often looked back to the 'traditional family organisation', as it offered 'an adaptable model… and a set of values which legitimized social relations.'[251] They turned, in particular, to 'the extended household system of production, found among small masters and capitalist employers in pre–industrial England', which relied upon 'patriarchal control and the subordination of junior family members' function effectively.[252] The 'small masters and capitalist employers' that Abercrombie and Hill describe, mirror the positions held by the Derbyshire lead miners as heads of mining households and masters of the mining trade. The prevalence of familial and kinship ties across the mining workforce was illustrated in sections II and III of this chapter, and was shown to have enabled the miners to reduce labour costs and enhance household income, but also served to cement their control over the extractive process. Whether like Samuel Skidmore, who acquired employment for his three sons, daughter and wife, or like Anthony Hancock, who employed his son, daughter, wife

[250] H. Newby, *The Deferential Worker* (London, 1977); D. Roberts, *Paternalism in Victorian England* (New Brunswick, 1979); P. Joyce, *Work, Society and Politics* (New Brunswick, 1980); A. Wood, 'Deference, paternalism and popular memory in early modern England', in Hindle, Shepard and Walter, *Remaking*, pp. 233–53.
[251] Abercrombie and Hill, 'Paternalism', p. 419.
[252] *Ibid*, p. 419.

and daughter–in–law, the miners enveloped themselves with dependants, and appear to have utilised their patriarchal authority to secure their status at the mines.

Moreover, the paternalism of the miners was not restricted solely to the confines of the household; it also permeated into local society more widely due to their important role in local labour markets and credit networks. The case of John Naylor, explored in the previous chapter, demonstrated how the miners' independent status and ability to create employment opportunities enhanced their access to credit, which in turn created an array of dependents, including friends and neighbours, as well as family and kin.[253] Likewise, in sections II and III of this chapter, it was shown that while around 65 per cent of the Miners Engine workforce shared surnames with copers, around 35 per cent did not, which is indicative of the retained importance of non–familial relations between friends and neighbours in local society.[254] Evidently, the miners' role in local society, engagement in credit networks, control of important employment avenues, and position as intermediaries between capital and labour, placed them above large portions of the local population, including women, children, the elderly, the unemployed, and wage labourers, and on a par with other independent tradesmen, farmers and small landowners of the 'middling sort'.[255]

It was, therefore, the miners' unique position as intermediaries or brokers between capital investors and wage labourers that was the key to their authority and status in local society during the eighteenth century.[256] Their monopoly of trade knowledge and enjoyment of customary privileges, enabled the free miners to negotiate and cooperate with, as well as resist and revolt against, their social superiors, which in turn, created investment and employment opportunities for their dependants, and further cemented their social status. This position is portrayed with particular clarity in a letter written by the lead merchant and local landowner, Peter Nightingale of Lea, in 1794, to Abraham Bracebridge Esq. of Castle Street upon Thames, in London. In it, Nightingale warns Bracebridge not to invest in the lead mines near to Matlock at that time: 'on account of the suppressed price of lead', warning that

[253] DRO D7812/1; see also: Wolf, 'Kinship', pp. 1–20; Muldrew, *Economy*, pp. 123–5.
[254] Mitson, 'Significance', pp. 24–76.
[255] For more on the intricacies of social differentiation amongst the general population, see: Shepard, 'Poverty', pp. 71–92.
[256] D'Cruze, 'Middling', pp. 181–207.

the 'Overseers for their salary & miners that they may be employed, will always encourage Gentlemen to spend money.'[257]

Conclusion

This chapter has explored the division of labour at capital lead mines in Derbyshire during the eighteenth century, focussing, in particular, on the interpersonal relationships between more than 300 workers employed at various times Miners Engine mine between 1737 and 1765. It has revealed a tight–knit family–centric industrial workforce, which was both mobile in its employment (albeit within a specific locality) and independent of large–scale capitalist employers. As was shown in section I, the CBS operated on a contractual basis between mine owners and miners, which afforded the latter a significant degree of independence to execute the extractive process in whatever manner they deemed suitable. They could employ additional labourers, purchase and maintain their own equipment and allocate their time free from managerial oversight. This system not only secured the miners' independence in a capitalist context, but also granted them a share of the proceeds of capital investment. This position granted the miners authority and influence both at the mines and in local society more generally. Their control of employment avenues and their role as intermediaries established an array of dependants and provided them a prominent position in local credit networks. Overall, therefore, this position of power and privilege distinguished the Derbyshire lead miners as a 'middling sort of people' in local society, which stands in contrast with interpretations provided by others who have studied the Derbyshire mining community, but corresponds with the observations made in chapter 1.[258]

Importantly, it was shown that the position and authority of the miners was rooted in the patriarchal structures of the household economy. Sections II and III, which explored the experiences of the 'women' and 'lads', showed that the wage labourers the miners employed were very often sourced from within familial and kinship networks.[259] Thus, it was common for the miners to work

[257] DRO D3585: The letter–book of Peter Nightingale of Lea.
[258] Wood, 'Custom', pp. pp. 249–85; Wood, 'Social', pp. 23–40; Wood, *Politics,* pp. 316–25.
[259] A point that relates closely to the findings presented in: Mitson, 'Significance', pp. 24–76.

alongside their wives, daughters and sons, as well as brothers, sisters, nieces and nephews. The comparative analysis of earnings, carried out in section IV, showed that the miners earned significantly more than the 'women' and 'lads', but as was noted in sections II and III, this difference may have been inflated by the payment of below average wages on the basis of familial and kinships ties. Evidently, the miners used the labour of their family and kin to retain a larger share of the mine's proceeds and to forestall exogenous competition by suppressing average wages. Yet while these practices were evidently exploitative, they were not necessarily detrimental to the women and lads, as they were set to gain collectively as members of mining households. They could acquire regular and sustainable employment, which maximised their household's collective earnings and thus enabled them to remain within their parental households well into early adulthood.

As demonstrated in section III, employment at the mines also granted the lads, in particular, access to the skills and knowledge of the mining trade, which they acquired through a structured programme of work and development between the ages of twelve and twenty–five, akin to apprenticeship in urban trades. In contrast, however, evidence explored in section III revealed that the lads received wages throughout their early development, which increased with both age and skill, and, arguably, contributed to the higher proportion of lads transitioning into miners when compared with transition rates from apprentice to master. In the case of the women, section II highlighted the limited prospects for development on offer as they received the same fixed wage throughout their lives. Despite its apparently exploitative character, female employment at the Derbyshire lead mines attracted an unusual combination of young single and married women, who were often interrelated inhabitants of mining households.[260] Other economically active groups, such as widows and independent spinsters, were not as prolific, as access to employment often hinged upon direct connections with established miners. This suggests that while the wages paid to women were far below average for the period, their direct familial and kinship ties with the miners and lads significantly enhanced the value of their work to both the mining household and the lead industry more generally. These employment practices thus enabled the sons and daughters of mining households to remain

[260] See in particular discussions in: Earle, 'Female', pp. 328–53; Erickson, 'Married', pp. 267–307.

rooted in their local communities, which, in turn, helped to protect their communal customs and privileges, by restricting membership to a relatively narrow group of interrelated households. Endogamy was likely prolific, but as the demographic studies required to support such an assertion are yet unavailable, this remains at best an assumption founded on the evidence presented here. What this study has shown, however, is that the mining community of Derbyshire was relatively conservative and nepotistic in its employment practices, which were determined principally by the need to safeguard its monopoly of the mining trade.

Finally, it must also be noted that not all the women and lads were directly related to the miners via the bonds of family and kinship. Others were bound by non–filial relationships forged within the local community via networks of credit and sociability. In Chapters 1 and 2 of this thesis, there has been a strong emphasis upon the important role played by credit in the conduct of local economic affairs. The findings made here confirm that the case of John Naylor, and his network of financial relationships, can be treated as a template for the miners employed at Miners Engine and elsewhere, during the eighteenth century.[261] The intricate web of credit relations that underlay the mining community were vital to the everyday functioning of the industry, helping to ease financial transactions, encourage investment and tie over mining households between income receipts. However, as the path–breaking work of Muldrew has shown, these credit relations were not only functional in nature, but also moral.[262] They relied on interpersonal relationships, trust and reputation, and were thus inherently local in outlook. Indeed, recent work on the early modern credit economy has drawn attention back to the local context and to the household economy, as important canvases for processes of economic and social change during the period. This study of the Derbyshire lead industry supports these general observations, but also highlights its peculiar traits, which helped to influence the process of industrialisation. The next chapters will proceed to explore the networks of

[261] Especially considering that Naylor's diary dates from a relatively late stage in the history of the Derbyshire lead industry, and it may, therefore, be assumed that in earlier periods these sorts of relationships would have been more prolific, see: DRO D7812/1.
[262] Muldrew, *Economy*, pp. 1–7 and 148–57.

skill and knowledge retained within the Derbyshire mining community and the local origins of capital investment in the Derbyshire lead industry.

Chapter 3
‘A Robust and Enterprising People’: The Skills and Knowledge Economy of the Derbyshire Lead Miners

In the early to mid–1740s, a Derbyshire lead miner, named William Hooson, elected to put pen to paper and composed a treatise about his trade, which he completed and published in 1747 under the title: *The Miners Dictionary*.[1] Hooson was almost certainly born in Derbyshire, and learned his trade at the Derbyshire lead mines, though parish records reveal no additional information, and he is not mentioned in any tax or land records for relevant periods.[2] The title–page of his *Dictionary* reveals that his observations were based on ‘more than FORTY YEARS Practice and Experience, at the MINES in the High and Low PEAK in *Derbyshire*, *Shropshire*, *South* and *North–Wales*, and the *North* of *England*.’ At the time of publication mine records indicate that he was working as a mine agent near to the town of Holywell in the county of Flintshire, North Wales, where he remained until his death on 27th November 1770.[3] As shall be shown, he was first employed by a company of Derbyshire proprietors, who invested in the region’s mines and brought with them the skilled labour of the Derbyshire miners. Yet, despite this long and varied career, it is clear that Hooson continued to identify himself as ‘a Derbyshire lead miner’. Moreover, the title–page of his *Dictionary* also clarifies his intended audience. Hooson describes how: ‘The whole work’ ought to be ‘of great Use to all MINERS and

[1] The 1979 reprinted edition of Hooson’s work is unpaginated, accordingly, page references have not be provided for quotations. The reader is instead encouraged to follow the directions provided in the main body of the text, see: W. Hooson, *The Miners Dictionary* (Wrexham, 1747), reprinted by the Institute of Mining and Metallurgy, (London, 1979).
[2] Searches were carried out both at the DRO and the SRO, see also: D. Edwards (ed.), *Derbyshire Hearth Tax Assessments 1662–1670* (Chesterfield, 1982). Andy Wood refers to him as ‘William Hooson a miner of Youlgreave’: *Politics*, p. 8. However, it is unclear how he arrived at this conclusion there is no evidence given in the book, and the parish records have proven unforthcoming, see: DRO D3644: Youlgreave, All Saints parish record, 1558-1998.
[3] Burial records survive at the Flintshire Record Office, and his will also survives at the National Library of Wales, see: Rhodes, ‘Dr. Linden’, pp. 259–70.

GENTLEMEN, who have MINES in their own Lands, and to all such as are concern'd in MINES.' He dedicates his work 'To all Gentlemen Undertakers in Mines', to whom 'the Kingdom in General are so much Indebted, for the Staple Commodity of Lead, Tin, and other Metals and Minerals; and the poor Miners in particular for their comfortable subsistence.' The subscription list reveals further details about his intended audience. It contains the names of 46 gentlemen, all of whom owned land in Flintshire, with many engaged in either ongoing or prospective mining ventures near to the settlements of Halkyn and Holywell.[4] It was, therefore, a work targeted at a genteel readership in the county of Flintshire, intended to inform them of the methods and practices of the Derbyshire lead miners.[5]

The work received a mixed reception.[6] It benefited initially from significant local interest, thanks largely to the backing of local gentlemen and investors, but it also drew the critical eye of an eccentric German–born physician living in Flintshire at the time, Diederick Wessel Linden, who published his response in the same year, entitled: *A Letter to William Hooson, a Derbyshire Lead Miner*.[7] Linden appears to have been educated at the elite mining academy of Freiberg, in East Saxony, and migrated to Britain around the year 1740; however, like his artisanal counterpart, little is known about him beyond what is contained in his published work.[8] He was an outspoken Catholic, a prominent figure within the Catholic community of North Wales, and remained in regular contact with German migrants living in London.[9] He is best known for his later work on the chemical properties of mineral water, and the health benefits of bathing in hot springs, but his response to Hooson's work, which focusses on the subject of mining and mineralogy, appears to have been his breakthrough publication in

[4] The list also contains a number of Welsh representatives of the London Lead Company, a Quaker organisation that began to invest particularly in the burgeoning lead fields of Wales and the North of England, see: A. Raistrick, *Two Centuries of Industrial Welfare: The London (Quaker) Lead Company, 1692–1905* (London, 1938); Raistrick and Jennings, *History*; J. Rhodes, 'The London Lead Company in North Wales, 1692–1792' unpublished PhD thesis, (Leicester, 1972).
[5] Rhodes, 'Dr. Linden', pp. 260–1 and 268–9.
[6] *Ibid*, pp. 260–1.
[7] D. Linden, *A Letter to William Hooson a Derbyshire Lead Miner* (Chester, 1747).
[8] For more on Linden's origins, see: Rhodes, 'Dr. Linden', p. 260, and C. Mullett, 'Public Baths and Health in England, 16th–18th Century', *Supplements to the Bulletin of the History of Medicine*, 5 (Baltimore, 1946), pp. 29–30; for his education see below, and Linden, *Letter*, p. 57.
[9] Rhodes, 'Dr. Linden', pp. 261–8.

the English language.[10] It is an extremely critical and impassioned work, exposing a range of social, cultural and economic tensions that were prevalent in Flintshire society at the time. Linden complains bitterly about 'the ill Usage I have met with, and the various Affronts I have received in *England*', and describes how 'Even here in this little Place, where I have taken all the Pains imaginable without Fee or Reward, to serve both Rich and Poor, I find I am under the Lash and Censure of some Idle People'.[11] His criticisms of Hooson's work focus on his comparatively low social status, his lack of a basic theoretical understanding of 'the very Ground–works and Pillars of Mining', and his lack of university training, which appears to have been an essential requirement for the mining officials in many other European states.[12] Linden also directs a good deal of criticism against the Flintshire lead industry, questioning their methods, organisation, and lack of leadership, while highlighting their technological backwardness. His opening words explain that 'this noble Art [of mining] here is but in its Infancy', and warns that 'if they don't soon put their Hands and Heads to work for its Improvement, they themselves and their posterity will repent of it.'[13]

This dispute between Hooson and Linden demonstrates the importance of Flintshire as a microcosm of wider processes of industrialisation and technological development occurring throughout Western Europe in the prelude to the Industrial Revolution. Over the course of the eighteenth century, the county was transformed from a sparsely populated and remote farming region with few industrial concerns, into an important mining and manufacturing centre with substantial lead and coal mining operations. Due to its proximity to the sea, the expansion of the nearby cities of Manchester and Liverpool, and its ample supplies of cheap labour and fuel, it was also transformed into a dynamic cotton manufacturing area toward the end of the eighteenth century.[14] However, due to the speed of these changes and their unprecedented

[10] For a full bibliography of Linden's works, see: G. Rousseau, 'Matt Bramble and the sulphur controversy in the XVIIIth Century', *Journal of the History of Ideas*, 28(4) (1967), p. 579. Relevant works shall be referenced below.
[11] Linden, *Letter*, p. vi.
[12] *Ibid*, p. iv.
[13] *Ibid*, p. 13.
[14] For detailed analysis of the Flintshire lead industry and its rapid expansion at the turn of the eighteenth century, see in particular: W. Lewis, *Lead Mining in Wales* (Cardiff, 1967), pp. 121–47; A. Dodd, *The*

character, the skills, knowledge and expertise of the local population struggled to match the demands posed by industrialisation.[15] Consequently, the region witnessed an influx of skilled migrants from various mining regions and cotton manufacturing areas – particularly Derbyshire – in order to meet the growing skills shortage, and to take advantage of the opportunities presented by increased capital investment.[16] The first reference to a direct connection between the Derbyshire and Flintshire mining areas dates from the reign of Edward I, when officials overseeing small–scale mineral operations in Flintshire were ordered by the King: 'to take two miners and three other suitable workmen in the Peak of Derbyshire, bring them to Flint and put them on the lead works there: with full power to imprison the disobedient.'[17] This trickle of skilled labour continued throughout the fifteenth, sixteenth and seventeenth centuries, but it was not until the eighteenth century that migration became more sustained, as economic and regulatory conditions made industrial scale mining in Flintshire and the rest of North Wales more viable.[18]

It is within this context of rapid economic and industrial change that the tensions and ruffled tempers exhibited in the above dispute ought to be understood. It is important to note that both of these men were – to varying extents – 'foreigners' in Flintshire, and in publishing their respective works, they represent two competing approaches to mining in a region that was

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Industrial Revolution in North Wales (Cardiff, 1933), p. 171. For more general insights, see: M. Bevan–Evans, 'Gadlys and Flintshire lead–mining in the eighteenth century', *Flintshire Historical Society Journal*, part 1, 18 (1960), pp. 75–130; R. Burt, 'Lead production in England and Wales, 1700–1770' *EcHR*, 22(2), (1969), pp. 249–68. The growth of the Flintshire cotton industry commenced later in the eighteenth century, linked in particular to the efforts of the industrialist and entrepreneur, John Smalley, who was a partner to Richard Arkwright during his early years in Preston. When Arkwright moved to Derbyshire, Smalley moved to Flintshire and established his own cotton spinning works, see: E. Foulkes, 'The cotton–spinning factories of Flintshire, 1777–1866', *The Journal of the Flintshire Historical Society*, 21 (1964), pp. 91–7.

[15] For more on the skills shortage of North Wales during the eighteenth century, see: Lewis, *Lead*, pp. 74–91 and 121–43.

[16] Increasingly historians have come to appreciate the complexities of early modern migration, see in particular the arguments put forward by: C. Pooley and J. Turnbull, 'Migration and Urbanisation in North–West England: a reassessment of the role of towns in the migration process' in D. Siddle (ed.), *Migration, Mobility and Modernization* (Liverpool, 2000), pp. 186–214. See also: H. Southall, 'Mobility, the artisan community and popular politics in early nineteenth–century England', In G. Kearns and C. Withers (eds.), *Urbanising Britain*, (Cambridge, 1991), pp. 103–130.

[17] J. Rhodes, 'Derbyshire influences on Lead Mining in North Wales in the 17th and 18th Centuries' *BPDMHS*, 3(6), (1968), p. 340.

[18] Bevan–Evans, 'Gadlys', pp. 75–130; Lewis, *Lead*, pp. 44–74 and 147–70; Rhodes, 'Derbyshire', pp. 339–42.

still in its early phases of development.[19] Hooson's *Dictionary* exhibits the artisanal knowledge and practical expertise of the Derbyshire mining community, while Linden's *Letter* demonstrates a theoretical understanding of mining and mineralogy acquired at an elite mining academy on the European mainland.[20] Both tracts highlight the remarkable fluidity of human capital during a period of precocious change, the pervasiveness of 'improvement' as an ideology in eighteenth–century society and culture, and the importance of community and reputation in facilitating processes of knowledge dissemination and industrialisation.[21] The works of Hooson and Linden thus present the opportunity to reflect on wider debates concerning the role of human capital in processes of industrialisation and technological development during the eighteenth century.[22] The literature exploring this subject has primarily focussed on the influence exerted by the expanding natural sciences on industry and technology. Early works, such as those of George Clark, Abraham Wolf, and Arthur Rupert Hall, perceived a direct relationship between the intellectual developments of the seventeenth and eighteenth centuries and the subsequent technological and industrial developments of the late–eighteenth and nineteenth centuries.[23] This view was expanded and enriched by the work of A. E. Musson and Eric Robinson, who scrutinised a great deal of evidence to demonstrate the connections between the early industrialists of the eighteenth century and their university trained

[19] The term 'foreigners' is used repeatedly by Linden to describe himself and other migrants to Flintshire, see: Linden, *Letter*, pp. viii and 9. However, as a range of studies have revealed, its frame of use was far wider during this period than it is at present, and could be used to describe someone from outside of a village community as well as the country, for a helpful overview of the literature, see: A. Games, 'The English and 'Others' in England and Beyond', in Wrightson, *Social*, pp. 352–69.

[20] For a useful comparative study of works written by artisans and intellectuals, see: P. Long, *Artisan/Practitioners and the Rise of the New Sciences, 1400–1600* (Corvallis, 2011), chps. 2 and 4

[21] For recent study of the effects of human capital during the Industrial Revolution, see: A. de Pleijt, A. Nuvolari and J. Weisdorf, 'Human capital formation during the First Industrial Revolution: Evidence from the use of steam engines', *CAGE* Online Working Paper Series, (2016), pp. 1–43. For works on the culture of improvement see especially: R. Friedel, *A Culture of Improvement* (Cambridge, Mass., 2007); P. Slack, *The Invention of Improvement* (Oxford, 2015), pp. 1–14. See also: P. Warde, 'The idea of improvement, c.1520–1700', in R. Hoyle (ed.), *Custom, Improvement and the Landscape in Early Modern Britain* (Farnham, 2011), pp. 127–48; J. Mokyr, *A Culture of Growth: The Origins of the Modern Economy* (Princeton, 2016), pp. 247-66.

[22] Mokyr, *Gifts*, esp. chp. 2; Berg, 'Skill', pp. 133–5; Slack, *The Invention*, p. 229.

[23] G. Clark, *Science and Social Welfare in the Age of Newton* (Oxford, 1937); A. Wolf, *A History of Science, Technology and Philosophy in the Eighteenth Century* (London, 1938); A. Hall, *The Scientific Revolution, 1500–1800* (London, 1954); A. Hall, 'What did the Industrial Revolution in Britain owe to science?' in N. McKendrick (ed.), *Historical Perspectives: Studies in English Thought and Society* (London, 1974); A. Hall, 'On knowing and knowing how to…' *History of Technology*, 3 (1974), pp. 91–104.

counterparts.[24] At the same time, the economic argument for a connection between science, technology and industry was outlined in the works of David Landes and Peter Mathias, who both drew attention to the important linkages between the flow of human capital and the diffusion of technological innovation at the national and international scale.[25] More recently, Joel Mokyr has established a basis in economic theory for the importance of 'useful knowledge' in processes of economic and industrial development, and has argued that Western Europe witnessed an 'Industrial Enlightenment' during the eighteenth century, which preceded and precipitated the Industrial Revolution of the late–eighteenth and nineteenth centuries.[26]

The question of whether there was a significant link between science and industry has thus largely been settled on the side of a positive link; however, the question of how novel ideas and technology were disseminated beyond the locality of their creation, remains a matter of debate.[27] Mokyr, for example, emphasised the contributions made by scientists and elites in society, arguing that 'Technological advance in the period of the Industrial Revolution was a minority affair… the dynamics of competition are such that in the long run the few drag along the many.'[28] Likewise, Margaret Jacob and Larry Stewart have traced the diffusion of Newtonian science across Europe, drawing particular attention to the contributions made by a small number of well–connected devotees, who disseminated Newton's ideas amongst industrialists and inventors during the eighteenth century.[29] Conversely, the works of Stephen

[24] A. Musson and E. Robinson, *Science and Technology in the Industrial Revolution* (Manchester, 1969), pp. 69–96. See also: R. Schofield, *The Lunar Society of Birmingham* (Oxford, 1963).
[25] D. Landes, *The Unbound Prometheus* (Cambridge, 1969), esp. pp. 12–29, 126–33 and 211–230; P. Mathias, 'Who unbound Promotheus? Science and technical change, 1600–1800' in A. Musson (ed.), *Science, Technology and Economic Growth in the Eighteenth Century* (London, 1972), pp. 69–96; P. Mathias, 'Skill and the diffusion of innovations from Britain in the eighteenth century', *Transactions of the Royal Historical Society*, 25 (1975), pp. 93–113
[26] Mokyr, *Gifts*, chps. 1 and 7; Allen, *British*, pp. 238–72; J. Mokyr, 'Intellectual origins of modern economic growth' *JEH*, 65(2) (2005), pp. 285–351; J. Mokyr, *The Industrial Enlightenment* (London, 2009), chps. 3 and 5.
[27] For general discussions on the subject of knowledge dissemination and the relationship between science and industry, see: I. Inkster, 'Mental capital: transfers of knowledge and technique in eighteenth century Europe', *Journal of European Economic History*, 19 (1990), pp. 403–41; I. Inkster, *Science and Technology in History* (New Jersey, 1992); J. Harris, *Industrial Espionage and Technology Transfer* (Aldershot, 1998), chps. 13 and 22; D. Headrick, *When Information Came of Age* (Oxford, 2000).
[28] Mokyr, 'Intellectual origins', p. 301; Mokyr, *Culture*, p. 283.
[29] L. Stewart, *The Rise of Public Science: Rhetoric, and Natural Philosophy in Newtonian Britain, 1660–1750* (Cambridge, 1992), pp. 101–8; M. Jacob, *The First Knowledge Economy: Human Capital and the European Economy, 1750–1850* (Cambridge, 2014), p. 1

Epstein, Liliane Hilaire–Pérez, and Maxine Berg, have focussed on the role of a much larger middling–strata of artisans and technicians, whose technical literacy, practical skills and mobility were, they argue, vital to the diffusion of innovative ideas and technologies.[30]

The evidence explored in this chapter reveals a unique case of an experienced and skilled community of artisanal miners responding to the knowledge and skills deficit of a newly–industrialising region, over a distance of some 100 miles.[31] Within this context, the dispute between Hooson and Linden enables us to reflect on debates concerning the nature and character of the 'industrial enlightenment', and consider the importance of certain forms of social organisation, specifically that of the mining community introduced and examined in chapters 1 and 2, in processes of knowledge dissemination and industrialisation during the eighteenth century. In order to evaluate the impact of these different approaches on the development of the Flintshire and Derbyshire lead industries, the views of travelling savants and authors, writing later in the eighteenth century, shall also be consulted.[32] These sources present vivid accounts of the Flintshire and Derbyshire lead industries, and highlight important continuities, as well as changes, in their structure and organisation. Their voices, combined with the views presented in the Hooson–Linden debate, help to frame the discussion and provide important context to developments taking place in both regions over time. They reveal a complex picture of overlapping processes of continuity and change at the regional and local level, as different approaches and techniques were adopted to suit local needs and market conditions. What the printed works of Hooson and Linden, and the observations provided by travelling savants and writers, do agree on, however, is the importance of communal values of

[30] The literature arguing this point remains limited, but has grown substantially in recent years, see especially: S. Epstein, 'Craft guilds, apprenticeships, and technological change in pre–industrial Europe', *JEH*, 58 (1998), pp. 684–713; M. Berg, 'The genesis of 'useful knowledge'' *History of Science*, 45(2) (2007), pp. 123–33; L. Hilaire–Pérez, 'Technology as a public culture in the eighteenth century: the artisan's legacy', *History of Science*, 45(2) (2007), pp. 135–53; M. Berg, 'Skill, craft and histories of industrialisation in Europe and Asia', *Transactions of the RHS*¸ 24 (2014), pp. 127–48.

[31] For other works exploring the diffusion of knowledge and skill in the Derbyshire lead industry, see: R. Burt, 'The international diffusion of technology in the early modern period: the case of the British nonferrous mining industry', *EcHR*, 44(2) (1991), pp. 249–71. See also: Mathias, 'Skill'; Hilaire–Pérez, 'Technology'; Berg, 'Skill'.

[32] They present an invaluable archive of British knowledge and technology during the eighteenth century, see: Harris, *Industrial*, esp. chps. 10 and 17.

trust, honesty and credibility – which have already proven to be essential features of the Derbyshire mining community (see chapters 1 and 2) – in the acquisition and dissemination of trade–relevant knowledge, skills and technology, especially at the local level, during this period.[33]

No less significant, however, is the view that these printed works offer of the Derbyshire mining community during the eighteenth century. Contrary to the image presented by Andy Wood in his *The Politics of Social Conflict*¸ the evidence drawn from a close reading of Hooson's *Dictionary*, and of their activity in Flintshire and elsewhere, demonstrates their proactive engagement with processes of industrial and technological development at the local, regional and national level.[34] Far from being victims of industrialisation and capital intensification, as Wood claims, the miners of Derbyshire reveal themselves to be a 'Robust and enterprising people', who were engaged proactively in the promotion of capital investment and who were themselves shareholders in its proceeds (see chapter 2).[35] The depiction presented below will draw attention to the entrepreneurialism of the mining community, their eagerness to engage in joint projects with gentry capitalists of Derbyshire and Flintshire, and their aggressive self–promotion, which enabled them to place their skills and expertise at the forefront of any bids for contracts in mining ventures right across England and Wales. The pattern of behaviour exhibited by the Derbyshire lead miners, and their involvement in wider developments, suggests the need for a reassessment of the fundamental character of industrialisation, emphasising the importance of the local context and of the involvement of the entire population in a piecemeal and gradual process of developmental change. Here, the framework provided by Paul Slack's notion of an early modern 'culture of improvement' is particularly relevant, the implications of which shall be considered throughout this study.[36]

[33] For discussions of these social values, see chapter 1 above, and Muldrew, *Economy*, pp. 148–56; Finn, *Character*, pp. 1–22.
[34] See especially Wood's selective account of Hooson's text: Wood, *Politics*, pp. 8, 169.
[35] For more detailed examination of this quote, see section III below. For Wood's depiction of the miners as victims of industrialisation, see especially: Wood, 'Social', pp. 31–58.
[36] Slack, *Invention*, p. 1–14.

The chapter will commence, in section I, by exploring Hooson's decision to publish his *Dictionary*, its wider context, and the essential features of the knowledge it contains. Attention will focus, in particular, on what his work reveals about the importance of community, trust and reputation in disseminating the miners' technical knowledge amongst the local population, and his engagement with the gentlemen capitalists of Flintshire. Section II will then explore the motivations that provoked Linden's criticisms of Hooson's work, consider the solutions he presents, while situating them in the wider context of elite academic learning during the eighteenth century. Finally, section III will evaluate the impact that the artisanal knowledge and expertise of the Derbyshire mining community, and the more theoretical knowledge of elite intellectuals, such as Linden, had on the processes of industrialisation and technological development in the counties of Derbyshire and Flintshire, using a variety of sources including contemporary observations made by those learned savants and authors who traversed both counties later in the mid to late–eighteenth and early–nineteenth centuries.

I. *'A useful Book of Mineing'*

In putting pen to paper and disseminating the knowledge and technical vocabulary of the Derbyshire lead miners, Hooson was partaking in what had become an increasingly common practice by the turn of the eighteenth century.[37] Many hundreds of individuals, just like Hooson, of middling or lower stock, were electing to share their knowledge and expertise via the medium of print.[38] A range of 'Vade Mecums', 'pocket companions', and 'complete guides' proliferated throughout the late seventeenth and eighteenth centuries, works such as: *The Florist's Vade Mecum* (1682), *The Builder's Vade Mecum* (1735), *The Seaman's Vade Mecum* (1744), and *The Shipwright's Vade Mecum* (1805), appeared alongside others, including: *The Compleat Surveyor* (1653), *The Compleat Surgeon* (1701), *The Complete English Tradesman* (1726), and *The Compleat Brewer* (1760).[39] Like Hooson's *Dictionary*, these works aimed to provide 'Plain

[37] E. Einstein, *The Printing Revolution in Early Modern Europe* (Cambridge, 2005 ed.), pp. 3–12.
[38] A. Fox, 'Words, Words, Words: Education, Literacy and Print' in Wrightson, *Social*, pp. 138–47.
[39] For 'vade mecum' works, see: S. Phileremus, *The Florist's Vade Mecum* (London, 1702 ed.); B. Langley, *The Builder's Vade Mecum* (London, 1735); W. Mountaine, *The Seaman's Vade Mecum*

and Easy Directions' for those curious about the techniques and practices of trade, to explore the 'Etymology' of the terms used by tradespeople, to consider the 'Character', 'Skill' and 'Temperament' required to be successful, and to present 'lists', 'recipes', and 'instructions' that might be of use to those unfamiliar with the trade.[40] Hooson could also draw upon a number of similar works concerned with the clarification and definition of the laws and customs of free mining in Derbyshire.[41] In 1653, for example, the lawyer and Steward of the Barmote Court in Wirksworth, Edward Manlove, published a 'Rhymed Chronicle' outlining: *The Liberties and Customs of the Lead Mines within the Wapentake of Wirksworth* – a text Hooson references directly in his definition of 'The Barmote Court'.[42] Similarly, in 1681, writing from his 'Lodgings in Warwick–lane near the College of Physicians in London', Thomas Houghton, produced a work entitled: *Rara Avis in Terris: or The Compleat Miner*, which he intended to be 'a Vade Mecum, or *Pocket Companion*' for the 'Liberties, Laws and Customs of the Mines' in Derbyshire.[43] While in 1734, another lawyer, George Steer, published his *The Compleat Mineral Laws of Derbyshire*, aiming to collate and organise the 'scattered', 'scarce' and occasionally 'contradictory', laws and customs of the miners.[44]

Thus, Hooson was able to draw inspiration from an established and growing body of practical literature, which was in wide circulation by the turn of the eighteenth century. That said, his decision to publish a 'dictionary' of Derbyshire mining terms distinguishes his work from others of a similar kind. This particular genre, which comprises all kinds of glossaries, encyclopaedias and lexicons, is characterised by its precision and comprehensiveness, and by

(London, 1744); D. Steel, *The Shipwright's Vade Mecum* (London, 1805). For 'Complete guides', see: W. Leybourn, *The Compleat Surveyor* (London, 1653); C. Le Cec, *The Compleat Surgeon*, trans. (London, 1702 ed.); D. Defoe, *The Complete English Tradesman*, I (London, 1st ed. 1726); Anon., *The Compleat Brewer*, (London, 1760).

[40] Quotes taken from the title pages and prefaces of the various works referenced in footnote 39.

[41] For more on the free mining customs of Derbyshire see introduction to this thesis. See also: Wood, *Politics*, pp. 1–10.

[42] E. Manlove, *The Liberties and Customs of the Lead Mines within the Wapentake of Wirskworth*, repr. in W. Skeat (ed.), *Reprinted Glossaries* (London, 1873), pp. 9–20.

[43] T. Houghton, *Rara Avis in Terris: or The Compleat Miner*, (London, 1681), pp. i–ii.

[44] G. Steer, *The Compleat Mineral Laws of Derbyshire* (London, 1734), pp. vi–vii.

the strict rules governing its form and layout.[45] Writing in 1695, for example, the physician, William Salmon, stressed in his 600 page volume of *The Family Dictionary, or Household Companion*, the 'great deal of Trouble' he had expended in reading, excerpting and cataloguing information from 'a heap of other Books' in order 'to dispose them in the Method and Order they are now in.'[46] Likewise, Thomas Wilson, in his *An Archaeological Dictionary*, emphasised the advantage of 'an Alphabetical Arrangement of Classical Antiquities' and its 'advantage over any other form', but also stressed the effort required 'to bring everything into as small a space as possible, without omitting anything of consequence.'[47] While the great dictionary–writer, Samuel Johnson, in his *Plan of a Dictionary of the English Language*¸ drew attention to the methodological challenges he faced and the need to be rigorous and exact in the compilation of both words and definitions, stating: 'I shall therefore, since the rules of stile, like those of law, arise from precedents often repeated, collect the testimonies of both sides, and endeavor to discover and promulgate the decrees of custom', and identify 'who has so long possessed whether by right or by usurpation, the sovereignty of words.'[48]

Hooson's own efforts to compose a dictionary of mining terms largely falls short of these stringent rules governing style and layout.[49] His work was neither rigorous nor exact; rather it was, by design, a rough compilation of personal experiences and customary practices, intended to overcome the specific challenge of disseminating the knowledge and expertise of the Derbyshire lead miners to the local population of Flintshire.[50] Indeed, Linden criticises

[45] R. Yeo, 'Reading Encyclopaedias: Science and the organisation of knowledge in British dictionaries of arts and sciences, 1730–1850', *ISIS*, 82 (1991), pp. 24–49.
[46] This methodology was common in dictionary writing, with many claiming to be compilers of other men's work, see: A. Walters, 'Scientific and medical books, 1695–1780', in M. Suarez and M. Turner, *The Cambridge History of the Book in Britain* (Cambridge, 2009), pp. 824–5. For quote, see: W. Salmon, *The Family Dictionary, or Household Companion* (London, 1710 ed.), pp. x–xi.
[47] T. Wilson, *An Archaeological Dictionary* (London, 1783), pp. iii–iv.
[48] S. Johnson, *A Plan of a Dictionary of the English Language* (London, 1747), p. 25. For more on his struggles see also: A. Reddick, *The Making of Johnson's Dictionary* (Cambridge, 1990), pp. 1–10 and 25–55.
[49] Hooson offers no explanation for his choice of format. Though it appears to have helped him structure his ideas more clearly, see preface and appendix I to Hooson, *Dictionary*. For more discussions of the use of dictionaries and encyclopaedias to structure ideas, see: R. Yeo, *Encyclopaedic Visions* (Cambridge, 2001), pp. 110–5.
[50] He states that the contents of his work was founded upon experience and practice and were his few 'reflections' in the preface and dedication to his *Dictionary*.

Hooson's choice of genre directly, stating: 'a Dictionary–Writer lies under indispensable Obligations of observing certain Rules, which you have either neglected, or are not acquainted with, otherwise you would have inserted… a paragraph called Smelting'.[51] Although Hooson's choice of format may have been suboptimal, it was not entirely without merit. Throughout the eighteenth century, specialised lexicons in a variety of forms emerged in increasing volume, many of which claimed the dual purpose of definition and utility.[52] In his *Lexicon Technicum*, for example, John Harris claimed that his reader 'may not only find here an Explication of the *Technical* Words, or the Terms of Art… but also of those *Arts* themselves.'[53] Additionally, the proliferation of various pocket dictionaries, such as: *The Gardener's Pocket Dictionary*, *The Soldier's Pocket Dictionary*, and *The Historian's Pocket Dictionary*, attests to the growing popularity of abridged versions of specialised lexicographical works, especially toward the end of the eighteenth century.[54]

Despite the growing popularity of pocket dictionaries and practical treatises, the commercial success of Hooson's work appears to have been limited. It was not reprinted until the 1970s and its initial sales, whilst not inconsiderable, proved insufficient to propel its wider circulation, which thereby limited its long–term profitability for both author and publisher. Even if the second–hand market for published works is included, the commercial value of Hooson's *Dictionary* remained limited, as little of the revenue produced by the petty–chapmen, hawkers and pedlars examined by Margaret Spufford were passed onto the author.[55] Thus, it is

[51] Linden, *Letter*, p. 22.
[52] Yeo, 'Reading', pp. 39–43; Yeo, *Encyclopaedic*, pp. 1–32.
[53] See preface to: J. Harris, *Lexicon Technicum: or, An Universal English Dictionary of Arts and Sciences* (London, 1716 ed.).
[54] The shift in popularity of these pocket dictionaries appears to have been a market response to the completion of the major encyclopaedic projects of the early to mid–eighteenth century, especially in France and Italy. These works were out of reach for the majority of consumers, thus abridged versions began to appear in ever greater numbers. For insights into the changing function of dictionaries and encyclopaedias during the age of Enlightenment, see in particular: R. Collison, *Encyclopaedias: Their History Through the Ages* (New York, 1964); J. Lough, *The Encyclopaedia in Eighteenth–Century England* (Newcastle, 1970); R. Darnton, *The Business of Enlightenment* (Cambridge, 1979); Yeo, *Encyclopaedic*, pp. 35–48. For works referenced, see: J. Abercrombie, *The Gardener's Pocket Dictionary* (London, 1786); J. Willson, *The Soldier's Pocket Dictionary, or Friend in Need* (London, 1794); Anon., *The Historian's Pocket Dictionary* (London, 1790).
[55] For more on the second–hand and reprint trade, see in particular: Spufford, *Small*, pp. 111–29.

unlikely that Hooson judged the success or failure of his work on its sales revenue. As the works of James Raven, Michael Suarez, and others have shown, the conditions of the book trade in eighteenth–century England favoured the purveyors and publishers of books, often at the expense of authors and consumers.[56] This continued until the late–eighteenth and nineteenth centuries when reforms to copyright law were enacted, which introduced much needed competition into the industry.[57] Prior to these changes, the industry was controlled by established cartels of 'bookseller–publishers' centred in London, who continued to expand their market share of the book trade.[58] Their dominant position was maintained through a mixture of effective marketing strategies and the monopolisation of reprinting rights for popular works, which both inflated book prices and stagnated technological development.[59] Consequently, what motivated the majority of authors to publish at this time, was not the prospect of earning a living from book sales, but rather, the potential second–order effects, resulting from the dissemination of knowledge, their highlighting of particular issues, and the establishment of an author's reputation for competency and leadership in their field, which might then result in the receipt of patronage or investment in future projects.[60]

Within this context, Hooson's *Dictionary* may be best understood as a vehicle for promoting the knowledge and expertise of the Derbyshire lead miners amongst the local

[56] There are a range of works that explore this issue, but for recent overviews of the subject, see: T. Belanger, 'Publishers and writers in eighteenth–century England' in I. Rivers (ed.), *Books and their Readers in Eighteenth–Century England* (Leicester, 1982), pp. 5–25; R. Sher, 'Corporatism and consensus in the late eighteenth–century book trade: the Edinburgh booksellers' society in comparative perspective', *Book History*, 1 (1998), pp. 32–93; M. Suarez, 'The business of literature: the book trade in England from Milton to Blake', in D. Womersley (ed.), *A Companion to Literature from Milton to Blake* (Oxford, 2000), pp. 131–47; J. Raven, *The Business of Books* (London, 2007), pp. 193–220; M. Suarez, 'Introduction' in Suarez and Turner, *Cambridge*, pp. 1–35; J. Raven, *Publishing Business in Eighteenth–Century England*, (Woodbridge, 2014), pp. 17–32. For important precursor to the works of Raven and Suarez, see in particular the work of John Feather: *The Provincial Book Trade in Eighteenth–Century England* (Cambridge, 1985), pp. 12–32; J. Feather, *A History of British Publishing* (Beckenham, 1998), pp. 116–25.

[57] Raven, *Publishing*, pp. 1–17 and 86–94.

[58] J. Raven, 'The book as commodity' in Suarez and Turner, *Cambridge*, pp. 91–4 and 106–8. For broader comparisons of the London and provincial book trades, see in particular: Feather, *Provincial*, pp. 1–12; J. Fergus, *Provincial Readers in Eighteenth–Century England* (Oxford, 2006), pp. 15–21.

[59] J. Raven, 'British publishing and bookselling: constraints and developments' in J. Michon and J. Mollier (eds.), *Les Mutations du Livre et de l'Edition dans le Monde du XVIII Siècle à l'an 2000* (Quebec, 2001), pp. 19–30; Raven, 'The book', p. 108–15.

[60] P. Korshin, 'Types of eighteenth–century literary patronage', *Eighteenth Century Studies*, 7(4) (1974), pp. 453–73; D. Griffin, *Literary Patronage in England, 1650–1800* (Cambridge, 1996), chp. 2.

Flintshire population; yet in so doing, it illuminates not only the author's interpretation of reliable and useful knowledge, but also the importance of establishing this interpretation at the local level. Throughout his work, Hooson emphasises the importance of 'practice' and 'experience' in constructing a reliable knowledge of the mining trade.[61] For example, in the postscript, he states explicitly that the 'Arte of Mineing' was dependent upon 'Men who's Knowledge is built upon the Foundation of a Practical Experience', and uses phrases such as: 'this cannot be well known to anyone but by Experience', 'it requires an Experienced Miner to be the daily worker of it', and 'I presume so far that we have no certain Rule to know such things… but by Experience only.' According to Hooson, mastery of the trade is determined entirely by the miner's length of service and breadth of experience. Thus, in his discussion of 'Proping' or probing – a method used by miners to search for ore deposits – he describes how the 'Antient and wisest Miners' are 'doubtless… the most knowing and skilful', as they had 'acquired [their expertise] by long Practice and Experience'. This principle is extended to the training of novices, as he states, for example, that 'a Man by what I have written, may become a Miner that has not known much of it before, if he will but add Practice and Experience', and concludes that 'I do not know what can further be added for Instruction about Mines, nothing but Practice and Experience… may inform you further.'[62]

According to Housen, practice and experience, which are the basis for the miners' knowledge, could be gained in several ways. First, he emphasises the primacy of first–hand experience. Thus, in his discussion of the various types of ore found in veins, he states: 'I have made many Trials of these kinds of Ores, and so I know by Experience' their various properties. Similarly, when assessing the safety of a mine operation, Hooson suggests that if it has been surveyed by 'a Skilful Dialler and by a Dial that he is acquainted with… it is certain enough,

[61] This was a common feature in a number of works promoting 'craft knowledge', see: P. Smith, *The Body of the Artisan* (Chicago, 2004), pp. 6–8.
[62] This experience based approach to training the 'lads', or apprentices, of the mining trade was also revealed in the case study of Miners Engine mine, in chapter 2. For more on apprenticeship training, see in particular: Ben–Amos, *Adolescence*, chps. 3 and 5; Brooks, 'Apprenticeship' in Barry and Brooks, *Middling*, pp. 52–83; and for experiences of servants in husbandry, see: Kussmaul, *Servants*, pp. 31–48.

and may be depended on, as I have known by experience.'[63] As well as that, he highlighted second–hand or indirect experience, whereby an event or mining practice was related by another individual who experienced it first–hand. This source of knowledge could be enhanced by demonstrating his familiarity with the individual concerned, their reputation for 'honesty' and 'skill', and the degree of 'experience' they had of mining practices. Thus, when discussing a unique method of 'blasting', he confirms its efficacy by stating that 'A very good and Experienced miner assures me he has done it'; and while reflecting on a type of ore called 'Ghurr', which was said to be still in the process of 'growing' underground, he qualifies the evidence stating that it had been 'related by a good Miner and maintainer of mines'. Finally, Hooson occasionally highlights the reliability of his information by describing how it circulated communally via oral networks and customary practices.[64] When discussing the worst time of year for airflow in the mines, for example, he describes how 'the old miners were wont to say, that when Pease was in Blossom, then was the worst time for Wind in the Mines'. Similarly, when defining an illness or 'Distemper' caused by exposure to dust released from working hard rock surfaces, and termed 'Belland',[65] he recounts a traditional remedy long practiced within the mining community: 'it is found by Experience that to Eat a Mouthful of Bread dipped in sweet oil, when a man comes home from his work, and refrain from Drinking anything first (which is often the Miners Use)', then it 'is found to be good against it.'

While emphasising the reliability of his insights, Hooson also invoked notions of 'trust', 'reputation' and 'community', alongside 'practice' and 'experience'. His descriptions suggest that these qualities were important not only for him as an author, but for the mining community which he describes, where authentic knowledge of the Derbyshire lead–mining

[63] The skill of dialling was also examined at length in another contemporary work, see: Hardy, *Miners*, pp. 128–30.
[64] For more on the importance of oral networks in early modern society, see especially: D. Woolf, 'The "common voice": History, folklore and oral tradition in early modern England', *P&P*, 120 (1988), pp. 26–52; A. Fox, *Oral and Literate Culture in England 1500–1700* (Oxford, 2003 ed.), pp. 259–98.
[65] The term was also used to describe a very fine grade ore, see: Rieuwerts, *Glossary*, p. 19.

techniques was highly valued.[66] This connection is made explicit in Hooson's definition of 'An Honest Steward's Character', where he describes the steward:

> as a first Balance between his Master and his Miners; no Passions draw him awry; he Scorns Gifts and Bribery from any man, because he knows they are to open a way to pick his Master's Pockets; he takes care of his workmen, and pays them honestly; he is easy of access, delights to do justice, not conceited of his Abilities, but will advise with his workmen, and yields to Reason; his Place can never much inrich him, because he's honest, and knows what a Steward's Riches smell of…

Leadership at the Derbyshire lead mines, as it was in the mining household (see chapter 1), was equated with the steward's reputation and moral standing, his aversion to greed and profligacy, and his willingness to listen to the collective reasoning of those under his charge.[67] This is confirmed in Hooson's advice to 'such Gentlemen who have a mind to try their Fortunes in venturing', who ought 'to pick out an Honest Miner or two that are Substantial, and of good Credit.'[68] Again, Hooson conflates a miners' reputation for 'honesty', 'substance', and 'good credit', with his competency and knowledge of the mining trade, and in so doing, endeavours to present the Derbyshire mining community, and the artisan miner, as important moral and intellectual authorities on the mining trade, who ought to be consulted by investors prior to the commencement of a mining venture.

Hooson contrasts this image of the 'honest', 'reliable', and 'credible' miner, with that of 'certain talkative miners', those 'learned men' and 'Demonstrative miners', whose knowledge was founded not on practice, experience and the accreditation of the mining community, but upon their own 'ideas', 'notions', and 'opinions'.[69] Hooson makes clear that

[66] See also chapter 1 above and Muldrew, *Economy*, pp. 148–57.
[67] This resonates with the language observed by Alexandra Shepard in relation to the masculinity and leadership within the household, see: Shepard, *Meanings*, pp. 70–89.
[68] For more on notions of 'good' or 'bad' credit, see: Muldrew, *Economy*, pp. 1–11.
[69] Such references appear throughout Hooson's work, see in particular his definitions of 'Minery' and of 'Virgula Divinatoria'.

such individuals ought not to be trusted, he cautions 'all Adventurers to take care who they imploy in their Work, for there are many loose drunken Fellows, that have been the occasion of some Gentlemen spending their Money to no purpose, cheating both their Masters and the Country, and running away.' He also warns Gentlemen and investors against those 'Demonstrative miners, bred in *London* sent into the Country' who often failed in their endeavours due to their lack of local knowledge and experience in the mining trade. In general, Hooson is suspicious of anyone who claims to have knowledge of mining without a basis in practice and experience. In the case of 'Ghurr', for example, he states it 'is called by those Learned Men that pretend to understand the Nature of it, the Mother of Mettles, but for my own part I am not at all acquainted with it', and so look 'upon it rather as a Notion formed, than experimentally proved.' Similarly, when discussing the subject of 'Blasting', Hooson describes it as 'a very principle piece in mining, and any young fellow will pretend to it', but goes on to state that 'if more care and pains were taken about it, it would be much better than [any of] these youngsters think'.

Thus, a miners' credit and reputation within the local community is seen as vital not only for securing the essentials of everyday economic life, as demonstrated in chapter 1, or determining their standing within the mining workforce, as demonstrated in chapter 2, but also for assessing and corroborating their claims to knowledge and expertise in the mining trade.[70] Indeed, verifying knowledge claims must have been a perennial problem prior to the establishment of formal institutional mechanisms in the nineteenth and twentieth centuries, and may have been particularly exacerbated during the eighteenth century with the growth of national and international migration.[71] Hooson draws attention to this problem in his work, relating the case:

> of a couple of Fellows who came as Adventurers, Men well known to you, that came into *Wales*, and appeared very Substantial and Creditable, to all but those

[70] For more on the social context of truth and the importance of trust and reputation in supporting claims to knowledge, see in particular: S. Shapin, *A Social History of Truth*, (London, 1994), pp. 3–41.
[71] Allen, *British*, pp. 52–5; Mokyr, *Enlightened*, pp. 58–60.

> that knew them, their stay was not long in *Flintshire*, as being too well known to form any Design there, but Rode into *Cardiganshire*, where they hoped for less Acquaintance or rather none at all…

These men went on to defraud a Cardiganshire gentleman, claiming money for materials they never purchased and wages for labourers they never employed, and then vanished without a trace.[72] Hooson's use of this well–known local case was no doubt intended to emphasise the immediacy and significance of communal networks as a means of validating the merits of prospective contractors, and to remind his readers of the potential cost of venturing upon the claims of those whose reputations were unknown.

By emphasising the importance of reliability and longevity of practice, Hooson's text was thus proffering the Derbyshire lead miners as the most viable and trustworthy source of labour and leadership for future mining operations in Flintshire. This objective is made clear in the appendix to his *Dictionary*, where he presents advice to his genteel readership about the most appropriate methods of locating and unearthing mineral deposits in their land. Occurring in the final portion of his work, Hooson claims the intention of the appendix was to 'draw together', and 'further explain' a number of general queries, which were 'thought by some Persons already to be extremely difficult, if not impossible to be done.' He presents three 'Propositions', including: 'I. How a Gentleman may know whether He has Mines in his Land', 'II. How he may know the cheapest and best Way to come at them', and 'III. The method of carrying them on, in order to make them Profitable Works.' In each case, Hooson stresses the importance of employing an experienced and reliable workforce. When discussing how best to locate new ore deposits, for example, he admits 'That I do not at all pretend to see into the Bowels and Concaves of the Earth, any more than a Physician can see into the Body of Man', rather 'it is the proper and apparent Signs and Symptoms at the Day, that indicates to us Miners the Nature of Places,' and 'whether they may contain Metalline Veins or not'. Similarly, in his

[72] The lead industry in Cardiganshire was even less developed than Flintshire by the mid–eighteenth century, see: Lewis, *Lead*, chp. 8.

discussion of the most efficient and profitable approach to organising a mine, he states that 'this depends much upon… the chiefe Manager and Director of the Work', and observes how 'many times it happens that this Steward… is but a small Miner, having never cut one Yard of Ground in his Life'.

Another feature of the Derbyshire lead miners' knowledge and expertise, which was again crucial to establishing their credentials as experts and leaders in the trade, was their approach to 'antient' and 'modern' mining techniques and practices.[73] Hooson frequently refers to the ways 'Antiently known', the experiences of 'old miners', approaches 'oft used in past times', and things known in 'former days'. These traditional techniques and practices formed an archive of reliable craft knowledge upon which generations of miners relied, for both pedagogical and practical direction.[74] Throughout his text, Hooson frequently submits to the superiority of 'Antient' miners in the performance of certain techniques and practices. In his definition of a 'Leap', for example, he notes that it 'is a Term well known in Mining, but the Antient Miners better understood the Nature of it, than now a Days they do in many Places.' Likewise, in his discussion of the practice of 'Proping', he describes it as 'an old and good way used by the Antient Miners, for discovering of Veins and formerly much used and practiced', but laments that 'at this Day it is not so much used, nor do I think that the late Miners have that skill and judgement therein, as the Old Miners had'. Hooson also notes the 'surety' offered by traditional techniques and practices. In his definition of 'Minery', Hooson suggests that in the safe 'Sinking of Shafts' one ought to consult 'the Practice of the old Miners which I take to be very good'. While in the case of 'Wind–Pipes' he describes the methods used by the 'old miners', which 'once put in Practice, may be more safely depended on' than many novel techniques. For Hooson, the longevity of many of these practices granted them inherent

[73] Discussions concerning the precedence of ancient or modern practices persisted throughout the seventeenth and eighteenth centuries despite the widespread acceptance of the notion of 'improvement', see: Slack, *Invention*, pp. 129–42. See also wider discussions within social and cultural spheres: D. Woolf, *The Social Circulation of the Past* (Oxford, 2003), pp. 66–70.
[74] For more on pedagogical practices of the miners see chapter 2 above.

legitimacy, as it presupposed their continued use and appraisal by members of the mining community.[75]

Although these traditional sources of knowledge were authoritative, they were not the impenetrable barriers to progress that some contemporaries and historians have claimed.[76] While it is true that artisans, such as the Derbyshire lead miners, relied upon tradition and custom in the conduct of their trade, their knowledge and skills were not static, rather they formed a conversant and dynamic repository that was relentlessly reassessed and improved in response to innovations in mining technology. When describing the term 'Buddle', for example, which was a large wooden container used by ore dressers to clean finer grades of ore, Hooson highlights a new method that was, in his view, 'the best way and now most in use', and 'if there be sufficient Water, is the readyest and best way of all.' Likewise, in the case of 'Blasting', Hooson stresses its benefits to the mining trade and its recent rise to dominance in the extension of underground mineral works. He describes how 'formerly the old miners used to cut it all with picks', but now in many places 'tis all done with Gunpowder'. He also describes a particular method of blasting that had 'lately come into use, and now called the New Way', which was widely considered 'very safe with small care'. In some cases, old methods were superseded by new methods. In the case of 'Wharr', for example, he describes it as 'A very ready and useful way of late invented, for carrying Corves or Kibles, especially in Straight and roomey Ways, by which a Labourer will do the Work with more ease, and twice as much as formerly without it'.[77] In other cases, old methods were deemed redundant and thus phased out of use. When defining the term 'Rooling or Rooling Corfes', for example, Hooson provides the briefest of descriptions, claiming 'I only thought fit to mention these, tho' now a Days they are worn out of Use in dressing of ore and it is as well done without them, so not worth speaking

[75] The importance of custom and tradition to the mining community of Derbyshire has been examined at length by Wood, see especially: *Politics*, pp. 163–8. For what remains the most comprehensive study of the role of custom in English social history, see: Thompson, *Custom*, esp. chp. 3.
[76] Debates concerning the merits of 'old' versus 'new' are considered by some historians to be characteristic features of the age, see: Clark, *English*, pp. 446–70; Smith, *Body*, pp. 6–8; Woolf, *Social*, pp. 50–5; Slack, *Invention*, pp. 129–42.
[77] 'Corves' and 'Kibles' refer to the baskets used by the Derbyshire lead miners to carry ore from the vein head to the drawing shaft.

any more of.'[78] Tradition thus offered a benchmark, against which new methods might be assessed, but if through experience and practice a new method proved superior to an old one, then it seems from Hooson's work that there was little resistance to its implementation. In the case of the 'Divination Rod', for example, Hooson admits that 'It would be a very valuable thing, if by a Hazel Rod one could Discover the Veins of Metal in the Earth' and would be much preferred over 'the industrious ways of Proping, Casting and the hazardous and expensive way of Sinking at all Adventures', but he remained adamant that 'until I see it proved, I shall give no credit at all to it.'

As Hooson's work explains, the miners' thus combined 'both Antient and Modern' approaches to mining in order to improve the safety and profitability of the mineral works under their charge. Hooson defines 'minery', or the studying of mining methods, as 'the right Understanding of Mines the best and most proper ways that are to be taken for carrying on the whole work, both for convenience and profit'. This, he claims, is important not only for ensuring the safety of the miners, but also for securing the best possible returns for capital investment. Hence, tradition and custom, practice and experience, and reputation and credit, were used not only as safeguards against fraud, but also as a means of comparing the merits of old and new technologies.[79] On the final pages of his work, Hooson provides a mixed assessment of the technological achievements in mining since the turn of the eighteenth century, he acknowledges that: 'what improvements [that have] been made in Mining within this fifty years, are mostly such as belong to Exhausting or Drawing up, whether it be Gear of all sorts or water, and Convenient enough', but decries the fact that 'no Discoveries' have been made to 'assist the Miner under Ground, but that safe and sure way of Blasting.' The Derbyshire lead miners thus shared in the common goal of improving mining practices and technology during

[78] Precisely what Hooson meant by a 'rooling corfe' is unknown, though it may refer to a small wheeled cart used to transport ore, see: Rieuwerts, *Glossary*, pp. 129–30.
[79] Epstein, 'Craft', pp. 688–93; L. Hilaire–Pérez, 'Dissemination of technical knowledge in the Middle Ages and the Early Modern era: New approaches and methodological issues', *Technology and Culture*, 47(3) (2006), pp. 536–65; Hilaire–Pérez, 'Technology', pp. 143–6; Berg, 'Skill', pp. 132–4.

the eighteenth century, and utilised their experience and practice to gauge the potential benefits of new methods and technologies.[80]

Hooson's *Dictionary* offers insights into the methods and practices of the Derbyshire mining community, the empirical foundations of their knowledge, and their approaches to 'Antient and Modern' techniques. It was a work intended for a genteel audience, aimed at acquiring patronage and investment for the Derbyshire lead miners in the burgeoning Flintshire lead industry, and to caution prospective investors against employing so called 'learned men' from outside the mining community. Central to his argument, was the importance of communal 'credit' and 'reputation' in verifying claims to knowledge and skill, and accordingly, much of his work was devoted to persuading the gentlemen of Flintshire that the Derbyshire lead miners were the most trustworthy and reliable custodians of the trade. This essential function of Hooson's work, as an advert for the miners' knowledge and expertise, highlights the active role played by artisans and skilled labourers in wider processes of industrialisation and technological change.[81] Not only were the Derbyshire lead miners alive to the opportunities presented by skills shortages in newly industrialising regions of Britain, but were ready to present their own 'brand' of technical expertise as a viable alternative for the improvement of mining techniques and practices. Clearly, this image does not resonate with that of the obstinate and reactionary miners presented in Woods interpretation of the Derbyshire mining community.[82] On the contrary, Hooson's work demonstrates a coalescence of interests between the Derbyshire lead miners and the gentry capitalists of Flintshire, made explicit in the dedication to his work, where he states that 'my Prayers, and the Prayers of all Honest Miners, will attend the Honest Fair Adventurers, and the Encouragers of all Honest Miners, that such may meet with Success in all their Undertakings.' Indeed, there appears to have been a common understanding within the mining community that the fortunes of both the miner and investor

[80] The gradual and cumulative character of 'improvement' is explored in: Slack, *Invention*, pp. 1–4 and 229–42.
[81] Berg, 'Genesis', pp. 127–31; Hilaire–Pérez, 'Technology', pp. 139–43; Mokry, *Enlightened*, pp. 106–13.
[82] Wood, *Politics*, pp. 218–48, 316–26.

were inextricably linked to the improvement of the mining trade, and that cooperation and engagement, not conflict and resistance, offered the most logical course for ensuring their continued prosperity.[83]

II. *'A greater Sketch of Learning'*

On the final pages of his *A Letter to William Hooson*, Linden attached another letter, addressed: '*to a Friend at Chester in Answer to his Advice given me not to publish anything against* Mr. Hooson's *Miner's Dictionary*'.[84] In it, Linden thanks his friend for 'your kind Enquiry after my Welfare', and more especially 'for your kind Advice not to publish', but begs pardon for having 'not followed it', as 'I have more Reason on my side than you imagine' for making the said 'publick'. His friend's objections centred largely on the issue of social status: 'you say that Mr. *Hooson* is but a practical Miner, not exceedingly well read, therefore not my Equal, and consequently not worth my Notice', but while acknowledging his friend's 'good Opinion' of him, Linden remained resolute in his conviction that it was 'necessary to make known his Errors in this Part of the World, where Mining is but in its Infancy'.[85]

Social etiquette and gentlemanly codes of conduct counselled against the repudiation of social inferiors in print, but it seems Linden, as a man of learning, felt vindicated by his concern for the 'Improvement' of the Flintshire lead industry, and the 'publick' welfare of the local inhabitants who were, in his view, being misled by Hooson's text.[86] From the beginning of the seventeenth century – as Paul Slack explains – 'improvement' was transformed from a *raison d'être* for the burgeoning yeomanry and 'middling sort', to an ideology that permeated eighteenth–century society. That 'gradual, piecemeal, but cumulative betterment' of society, the economy, and the individual thus appeared as a leading ideology attached to a variety of

[83] The crucial role played by the gentry, merchant and middling investors in the Derbyshire lead industry shall be explored at length in chapter 4.
[84] Linden, *Letter*, pp. 69–72.
[85] *Ibid*, p. 69.
[86] See: Goldgar, *Impolite*, pp. 183–8. For more on the concept of 'politeness' and social etiquette within local society during the seventeenth and eighteenth centuries, see in particular: L. Klein, 'Liberty, manners, and politeness in early eighteenth–century England', *HJ*, 32(3) (1989), pp. 583–605.

social, economic and cultural factors and made apparent in Hooson and Linden's works. As we have already seen, Hooson was motivated by the desire to 'improve' mining practices in Flintshire; however, his interpretation of what that entailed differed markedly from that of Linden, who accuses him of having 'over–acted the Part of one endeavouring to promote the Improvement of an Art by denying Matters of Fact'.[87] For Linden, improvement entailed the application of theoretical knowledge to the mining trade and the establishment of centralised educational facilities, where the sons of the English and Welsh gentry could be trained in the 'new sciences' of 'mineralogy', 'chymistry' and 'physick'.[88] Linden's response to Hooson's *Dictionary* thus represents an important defence of elite learning and highlights some of its more salient features, including: its transnational perspective, its emphasis upon the importance of the 'new sciences', the role of the 'enlightened' state, and the centralisation of commercial and industrial concerns under the direction of learned individuals.[89] However, as will be demonstrated below, the ideals of elite learning were not necessarily shared by everyone in society at this time, and Linden's idealism and forthright mannerisms brought him into conflict with local gentlemen, industrialists and miners, who were used to more traditional forms of behaviour.[90]

As an avowed man of letters, Linden participated in two interrelated, yet distinct, social spheres. One was fixed within a locality, region or nation, and the other transcended those boundaries via the so called 'Republic of Letters'.[91] As Anne Goldgar has shown, the academics

[87] Linden, *Letter*, pp. 69–72.
[88] See in particular: J. Golinski, *Science as Public Culture: Chemistry and Enlightenment in Britain, 1760–1820* (Cambridge, 1992), chps. 2 and 3; L. Stewart, *The Rise of Public Science* (Cambridge, 1992), p. 128; M. Lynn, 'Experimental physics in enlightenment Paris: The practice of popularisation in urban culture' in B. Bensaude–Vincent and C. Blondel (eds.) *Science and Spectacle in the European Enlightenment* (New York, 2016 ed.).
[89] For more on enlightened idealism, see: L. Daston, 'The ideal and Reality of the Republic of Letters in the Enlightenment', *Science in Context*, 4(2) (1991), pp. 367–86; M. Ultee, 'The Republic of Letters: Learned Correspondence, 1680–1720', *Seventeenth Century*, 2(1) (1987), pp. 95–112; Mokry, *Culture*, pp. 179–226.
[90] For the limitations of Enlightenment enthusiasm, see in particular, L. Klein, 'Sociability, Solitude and Enthusiasm', in L. Klein and A. La Vopa, *Enthusiasm and Enlightenment in Europe, 1650–1850* (California, 1998), pp. 153–178.
[91] For more on 'the Republic of Letters' as an intellectual project, see: R. Hahn, *The Anatomy of a Scientific Institution* (London, 1971), pp. 35–40; Daston, 'Ideal', pp. 367–86; Ultee, 'Republic', pp. 95–112; Mokry, *Culture*, pp. 179–226.

and intellectuals of eighteenth–century Europe strove to create a 'community of equals', which looked beyond the religious and political confines of secular society and pursued the egalitarian ideals of learning and improvement.[92] However, the ambivalences and tensions created by the coming together of these separate spheres, with their distinct rules of engagement and behaviour, were a perennial problem for Linden, as his *Letter to a Friend* demonstrated.[93] He complains, for example, how 'in this Part of the world you ridicule, mock, and laugh to Scorn everyone that comes amongst you' and notes how 'a foreigner no sooner appears upon your Coast, but, without entering into his Merit, you are making your satirical Remarks, and cast your conjectural reflections about him.'[94] He perceived this as a great detriment to the local economy, arguing that 'you are so far jealous that instead of expecting to reap the advantages from [a foreigner], you conclude that he is come to pick your Pockets.'[95] Even before publishing his *Letter*, Linden's outspoken manner had earned him a poor reputation within the local community: 'I doubt not but there are a great many, that will not scruple to pronounce me a *Braggadocio*¸ and call me a *Mountebank,* as they have already done, because I assert a Truth which they are ignorant of.'[96] Indeed, Lewis Morris Esq., perhaps one of the most prolific and well–known investors in Welsh mining, makes apparent this public view of Linden's character in his annotated copy of Linden's *Letter,* where he declares sarcastically: 'How dares a miner [such as Hooson] argue with such a Profound man as Mr. Linden? He wears a gold waistcoat and can borrow money of all the Roman Catholics about Holywell, and will repay them when he discovers his magnet, and his Gold mine.'[97] The accusations of 'arrogance', 'extravagance', 'popery' and 'untrustworthiness', implicit in Morris's comments were grave indeed, especially

[92] Goldgar, *Impolite,* pp. 1–11.
[93] For more on the social tensions created by the interaction between 'elite' and 'popular' culture during the age of the Enlightenment, see in particular: P. Burke, *Popular Culture in Early Modern Europe* (London, 1978), chps.1 and 4; P. Burke, *A Social History of Knowledge* (Cambridge, 2000), chps.4 and 6; T. Munck, *The Enlightenment* (London, 2000).
[94] Linden, *Letter,* p. 27.
[95] *Ibid,* p. 27–28.
[96] *Ibid,* p. 28.
[97] Quoted in: Rhodes, 'Dr. Linden', p. 261.

considering the contemporary political and religious climate following the Jacobite rising of 1745.[98]

Yet, despite local opinion, Linden remained steadfast in his defence of 'elite learning', and was particularly candid about his own abilities, stating: 'I don't pretend to be endued with any particular Abilities, or to have more than [an] ordinary Knowledge in this noble Art', yet 'I confidently believe, that I have as much in Manuscripts, as I have learn'd and acquir'd in other Parts of the World, as would be of singular Service both in Mining and Smelting in these Islands'.[99] Moreover, in contrast to Hooson's emphasis upon 'practical experience', Linden argues that 'the Art of Mining is founded upon a Chain of Experiments, grounded upon Reason, collected in several Ages, and preserv'd down to this Time'.[100] The implication being that only through the examination of this established body of knowledge, and through an engagement with other learned scholars, could a miner hope to acquire a theoretical understanding of his art. This is reiterated in his caricature of the ideal student of mining, where he states: ''tis not the idle Abettor of Ignorance, but the Curious, the Inquisitive: 'Tis not he that goes upon Hypotheses, but he that backs his Reason by a series of Experiments: 'Tis not he, that tir'd by the Unsuccessfulness of them, denies the thing to be possible', but rather it is 'he that frankly communicates to the World how far he has gone towards making the Discovery, and leaves, and humbly submits the rest to the Abilities of his Successors that is the Promoter of Sciences.'[101]

Linden also makes clear his pan–European frame of reference, and draws unfavourable comparisons between the situation in other European countries and that of the English and Welsh mining regions, though the extent to which such indulgences were useful for his reader is questionable.[102] He expresses an admiration for Holland, which he describes as: 'a Refuge to

[98] For a recent account of the Jacobite rebellion and its aftermath, see: G. Plank, *Rebellion and Savagery* (Philadelphia, 2006), pp. 1–28.
[99] Linden, *Letter*, p. v.
[100] *Ibid*, p. 12.
[101] Linden, *Letter*, pp. iv–v.
[102] This negative comparison was not uncommon, indeed it was widely stated by visiting savants that Britain lagged behind in mining technology, which perplexed many as it remained a remarkably

all Strangers' and 'so very far from being jealous of Strangers, that they make not the least scruple of Naturalizing; nay… of qualifying any Stranger, if in him there appears the least Merit'.[103] He also references the superior methods of Sweden, which 'outdoes at present all the World in the Art of Mining and Smelting', and applauds the states of 'Hungary' and 'Bohemia', which are 'abound in mines' and welcoming to foreign students.[104] However, Linden reserves particular reverence for the mining practices of his 'native country', 'Germany'.[105] He describes how 'we have Mines in *Germany*, that have been work'd these seven hundred years and upwards', the success of which was due largely, in Linden's view, to the industriousness of 'my Countrymen… in improving every new Discovery', whereas, in England and Wales, he had observed several mines that had been abandoned prematurely 'for want of a due Knowledge in Mining.'[106] He also points to the various academies and societies of learning and technology in Europe, which he claims were of great benefit to the art of mining: 'in my native Country there is a Chemical Society, that have established a Fund, out of which they pay Rewards for Discoveries made in that noble Science' and boasts of his own affiliation with 'the most deeply learned *Doctor Stahl*' who 'was President of the above–named Society'.[107]

Linden is particularly critical of the educational standards acquired by so–called 'practical miners' in England and Wales in comparison with their European counterparts.[108] In his typically abrasive style, Linden questions the validity of Hooson's claim, to have been a Practical Miner for 'more than forty years', stating that 'I find you know not what belongs to a Practical Miner, since you call him one, whose Business it is to work daily underground; but

profitable enterprise, see: T. Porter, 'The promotion of mining and the advancement of science: the chemical revolution of mineralogy', *AS*, 38 (1981), pp. 543–70; K. Brunland, 'Skills, learning and the international diffusion of technology: a perspective on Scandinavian industrialisation' in M. Berg and K. Brunland (eds.) *Technological Revolutions in Europe: Historical Perspectives* (Cheltenham, 1998), pp. 161–87; D. Brianta, 'Education and training in the mining industry, 1750–1860: European models and the Italian case', *AS*, 57 (2000), pp. 267–300.

[103] Linden, *Letter*, pp. 26–7.

[104] *Ibid*, pp. 56–7.

[105] Though the state of Germany did not exist at this time, it is curious that Linden repeatedly refers to it as such, perhaps for the benefit of his English and Welsh reader, see: Linden, *Letter*, pp. 3–5 and 53–57

[106] *Ibid*, pp. 3–5.

[107] Linden, *Letter*, p. 14.

[108] For a detailed discussion of the role of the mining official in Europe, see: U. Klein, 'Savant officials in the Prussian mining administration', *AS*, 69(3) (2012), pp. 349–74.

such, I would have you know, in my native Country, are called labourers'.[109] 'In *Germany*', Linden states, such individuals were 'educated in a regular methodical Manner, and act as Directors over Labourers. In short, Smelting and Mining there are taught like Physick and Divinity in your Universities'.[110] He also emphasises the importance of 'Chymistry' and the 'new sciences' to the mining trade: 'In Germany, an Assistant to the Art of Mining, we call in several Branches of Chymistry… and unless he is very well versed in these, we think he is far from being capable of making any great Proficiency therein'.[111] After completing their studies, the student of mining was expected to venture upon a tour of the most distinguished mining countries of Europe, including: Sweden, Saxony, Russia, Hungary, Bohemia and Italy.[112] Such tours presented the opportunity to study under the most renowned mining officials in Europe, to experience a range of geological and mineralogical phenomena, and to make use of the prestigious libraries and laboratories attached to various mining academies and universities across Europe. The purpose of which, Linden claims, was to 'advance' the student of mining 'in Learning as well as Reputation.'[113]

Cultivating a reputation amongst the intelligentsia of the Republic of Letters was thus vital to advancing the career of an aspiring savant, according to Linden, as it was for the artisanal miners within the local mining community. However, while the miner's reputation – as described by Hooson – was built upon the consistency and longevity of their practice in trade, and their honesty and reliability as members of local society, Linden emphasised the reputation of the 'Men of Letters' as a matter of intellectual prowess and reliant on their integration into a transnational networks of correspondence.[114] To expand this network it was necessary to achieve a measure of fame, whether through the publication of critical works, the acquisition of patronage, the recommendation of superiors, or through much travel and communication.[115]

[109] Linden, *Letter*, pp. 50–1.
[110] *Ibid*, p. 51.
[111] *Ibid*, pp. 53–4.
[112] Klein, 'Savant', pp. 352–6.
[113] Linden, *Letter*, p. 56.
[114] Goldgar, *Impolite*, pp. 143–7.
[115] *Ibid*, chp. 3.

Linden's *Letter* was critical and erudite, and its tone was clearly intended to attract attention, both among supporters and opponents. Additionally, the moral and behavioural structures that governed interactions within the intellectual community differed markedly from those of society at large, as Anne Goldgar has put it, 'On [the] one side… was behaviour as a man; on the other, behaviour as a scholar.'[116] This divide 'in the mind' of the aspiring savant is demonstrated throughout Linden's *Letter*. When discussing the skills and competencies he possesses, for example, Linden states that he will keep them for himself, being: 'in no way… under any Obligation to the Publick, but only indebted to some few worthy private Friends.' Similarly, while disclosing his familiarity with a particular method of smelting, he states that:

> 'I shall not take upon me the Trouble to teach you how, or in what manner it is to be perform'd; I have better Views in my Head; I design to serve myself and my worthy Friends with it first, and after that the Publick may expect to be used in the same manner as I am by them.'[117]

Linden was evidently on the margins of Flintshire society, and cared little about his reputation amongst the local population. Instead, he was concerned principally with the opinion of his 'private Friends' and learned correspondents, and focussed upon expanding his reputation as a respected writer and scholar within the wider intellectual community. This contrasts sharply with the approach adopted by Hooson and the Derbyshire lead miners, observed in section I. Their principal concerns appear to have been the establishment of communal ties with the local population, and the engagement of local gentlemen investors in the lead trade.[118] Such contrasting priorities are key to explaining the patterns of knowledge dissemination beyond a core of engaged experts to a wider uninformed periphery during the eighteenth century.[119]

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[116] *Ibid*, pp. 183–8.
[117] Linden, *Letter*, p. 15.
[118] This pattern of behaviour will be considered further in chapter 4, see also: Rhodes, 'Derbyshire', pp. 339–51.
[119] Hilaire–Pérez's thoughts on 'local public space' are particularly relevant here: Hilaire–Pérez, 'Technology', pp. 141–2. For more on the notion of 'public sphere' and its relevance to developments during the eighteenth century, see: T. Broman, 'The Habermasian public sphere and "Science in the Enlightenment"', *History of Science*, 36 (1998), pp. 123–49; R. Yeo, *Science in the Public Sphere*, (Aldershot, 2001), pp. 257–84.

Yet, despite his stated indifference to local opinion, it is clear that Linden saw his *Letter* as an opportunity to publicise his knowledge and skills to the Flintshire gentry, whilst also rebuking the claims made by Hooson in his *Dictionary*. In his *Letter to a Friend*, Linden mocks Hooson, describing him as 'a Novice in Mining', but laments that 'in this Part of the World' he is considered 'the Oracle.'[120] He complains that Hooson's 'Disciples have over–run the whole Country, and such as will not agree with them are laugh'd and sneer'd out of Reason if possible, in order that their Patrons may not be inform'd of the Truth, but still kept in Ignorance to their no small Advantage'.[121] To illustrate this trend, Linden recounts how he had: 'seen here two Miners in particular making no small Figure with Mr. Hooson's Instructions, amongst Gentlemen that were not in the least acquainted with the Art of Mining,' he describes how they 'gloried' in what 'they had learnt under [Hooson], and boasted they had been his Pupils' and 'by this Means they Insinuated themselves in Favour, gained great Credit, and attained considerable Employments.'[122] Evidently, the Derbyshire lead miners had already established themselves as credible mining experts in Flintshire by 1747, and Hooson, as a leading figure within the community, appears to have been considered a savant of some repute. This situation troubled Linden greatly and he warns his friends and readers, that: 'this I am afraid has, and will be more often the case, unless some more able Genius can be persuaded to apply to the Study of the Mineral World', and though he denies any 'Ambition or Interest, Envy or Malice' it is obvious that Linden considered himself to be a suitably qualified candidate to fulfil such a role.[123]

For Linden, the stewardship of mineral works was a task best suited to the sons of local gentry and merchant families, which may, he claims, assist greatly in the bringing to perfection' local mining practices.[124] First, he encouraged the sons of the English and Welsh gentry to educate themselves in the art of mining. He describes how 'In *Sweden* most of the Nobility

[120] Linden, *Letter*, p. 70.
[121] *Ibid*, p. 70–1.
[122] *Ibid*, p. 71–2.
[123] *Ibid*, p. 72.
[124] *Ibid*, p. iv.

apply themselves to the Art of Mining and Smelting' and recalls that during his time 'at *Fryberg* in *Saxony*… there were there… three young *Swedish* Counts of the First Rank, with whom I had the Honor to be a Fellow–Student.'[125] Indeed, he expresses astonishment 'that here in this Part of the World the above–mentioned Method in one Shape or other is not made use of for the Improvement of this profitable Art.'[126] Second, he recommends that a 'Mineral–School' be erected 'here in… your County, enrich'd with Mines, where Pupils may have Opportunities to go under–ground, and [visit] Smelting–Houses, to see the Practical Part', though advises against visiting those 'in this Neighbourhood', as 'they must be reform'd and amended'.[127] Instead, he suggests that such students ought to 'be sent Abroad' to experience the more advanced methods and practices adopted by other European nations.[128] And third, Linden recommends a more proactive role for central government. Again, he recounts the situation in his 'native country' where such 'Things of late Years' had been 'justly regarded and duly weighed by some of the most renowned Princes in *Germany*' who have 'appointed proper Persons in their Schools and Universities to give publick instructions and read regular Lectures in the Vulgar Tongue on this subject'.[129] He also stresses the role of governments in providing recommendation and encouragement to 'Mining Proficients' in their expeditions 'to Foreign courts' and in granting them 'the Liberty of seeing the Art of Mining and Smelting, in the same Perfection as they are both there practiced.' It was, Linden argues, 'by this, and no other Means' that mining and smelting practices may be 'improv'd' and 'reform'd', but should they be neglected by the state 'in one Generation more' then 'your Smelting Houses will go to Rack and Ruin, [and] your discover'd Mines will be worked–out'.[130]

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[125] *Ibid*, p. 57.
[126] *Ibid*, p. 57–8.
[127] *Ibid*, p. 58.
[128] For the role of the absolutist state in 'science and industry' in eighteenth century France, see especially: C. Gillispie, *Science and Polity in France at the End of the Old Regime* (Princeton, 1980), chp. 6. For more general outlines of the issue, see: O'Brien, 'Political', pp. 1–32; J. Robinson, 'The Enlightenment above national context: Political economy in eighteenth–century Scotland and Naples', *HJ*, 40(3) (1997), pp. 667–97; S. Engerman, 'Insitutional change and British supremacy, 1650–1850: some reflections', in de la Escosura, *Exceptionalism*, pp. 261–282; Mokyr, *Enlightened*, pp. 1–12 and 392–449.
[129] Linden, *Letter*, p. 54.
[130] *Ibid*, p. 58.

Hence, the objective of improving the Flintshire lead industry was at the centre of Linden's work, as it had been in Hooson's *Dictionary*. This was reiterated in a later work Linden published, entitled: *Three Letters on Mining and Smelting; in which a method is laid down whereby useful sciences may be greatly improved*.[131] In this work, Linden responds to a 'friend's' enquiries concerning the state of mining and smelting in North Wales, the first of which asks whether 'I had observed any Improvements of late Years', to which he responds emphatically that 'it may be easily demonstrated and illustrated beyond all Doubt, that Mining, in this Part of the Globe, is in such a perfect Decay, that it is greatly to be feared it will in a few years, become totally extinct.'[132] As in his earlier work, Linden promotes the application of 'useful sciences', such as 'Chymistry', 'Metallurgy' and 'Physick', to the mining trade, and underlines the superiority of continental practices.[133] The work is largely a restatement of the arguments presented in his *Letter*, though the rhetoric is less heated and his discussion of the issues of mining and smelting more elaborate. This more conciliatory tone appears to have enhanced Linden's rather poor reputation in Flintshire, as in December, 1752, he was employed by the Duke of Ancaster as a 'mining adviser' for the duchy estates in Flintshire and Caernarvonshire – at a salary of one guinea per month with generous expenses, including an expensive horse and payment for trips to London and elsewhere.[134] For the next ten years Linden had the opportunity to apply his extensive knowledge and expertise to a variety of mining and smelting enterprises, many of which he oversaw directly; and yet, it seems, for the most part, that his endeavours were unsuccessful.[135] Indeed, Linden appears to have spent much of the time avoiding his responsibilities: he travelled to London on the Dukes account in 1753, to the Llandrindod Wells for his health in 1754, and was absent from the estate accounts on a number of occasions between 1756 and 1764.[136] During this time a series of mine accounts indicate that he also accumulated a number of debts related to shares in an unprofitable mine in

[131] D. Linden, *Three Letters on Mining and Smelting* (London, 1750).
[132] *Ibid*, p. 2.
[133] *Ibid*, pp. 5–6.
[134] Rhodes, 'Dr. Linden', pp. 261–5.
[135] *Ibid*, pp. 263–5.
[136] *Ibid*, pp. 263–4.

Trefriw, alongside rents for a smelting mill that he and his associate, Dr. Thomas Cotham, acquired; but neither of which were ever repaid.[137]

Unsurprisingly, therefore, Linden disappeared from the Duke's accounts in 1764, and was replaced by an experienced lead miner of Derbyshire, called Samuel Nuttall, appointed as mineral surveyor of the Duke's lands, who received a generous salary of £30 per annum.[138] Hence, in the contest between foreign book learning and local expertise, the former seems to have lost in this case. Linden's experiences as an overseer of mineral operations confirmed many of Hooson's reservations about 'learned men' and 'Demonstrative Miners', and the issues of commencing mineral operations without a solid foundation in practical experience. Yet, it would be wrong to conclude on that basis that the knowledge and ideas Linden divulged in his *Letter*, and his contributions to the lead industry of North Wales, were inconsequential. Improvement was a complex process, which relied upon more than just rational argument and intellectual debate to be successful. As we have seen, trust, reputation and credit were also vital components in verifying new techniques and practices, and in disseminating knowledge and technology at the local level. Improvement was gradual, cumulative and localised, and demanded the engagement of everyone in society; it required a shared belief in the fruits of change, and conducive market conditions to make the application of new technology economically viable.[139] Linden, despite his failings, was part of that process and contributed to the consolidation and expansion of knowledge and skill in Flintshire during the eighteenth century.

III. *'A Robust and Enterprising People'*

During his tour of England's mountainous regions in 1776, the Swedish mineralogist, Johann Jacob Ferber, ventured to what he described in his *An Essay on the Oryctography of Derbyshire*,

[137] *Ibid*, p. 263.
[138] *Ibid*, p. 265.
[139] Slack, *Invention*, pp. 1–2 and 8–14.

as one of 'the most interesting counties of England'.[140] The essay was divided into two parts. The first, reviewed the 'natural geography' of the county, for which he relied heavily on his guides, the philosopher and geologist of Derby, John Whitehurst, and the cartographer and geographer of Essex, Peter Burdett, both of whom were recommended to him by Benjamin Franklin.[141] The second, focussed on the lead industry and was concerned with several subjects, including: a general description of the 'Lead and calamine Mines' found in the region, the 'Political and Economical Constitution of the Mines of Derbyshire' and the 'Working of the Mines of Derbyshire', which included an account of the 'Preparation of the Ore' and 'The Lead Foundries'.[142] In general, Ferber's opinion of the industry – its organisation and approaches to mining, ore preparation, and smelting – is decidedly negative, he describes how: 'the mountains of Derbyshire presents to the naturalist a great number of curious objects; but they are much less interesting to those who only regard the working of the mines, for, in general, this branch of industry is in a deplorable condition.' He describes the 'scanty condition' of the mine workings, noting that 'every overseer directs the labour of the mines according to his ability; and as economy is sought as much as possible, the timber of the mines is everywhere in so bad a condition, and the pits so ill constructed that it is impossible to form an idea of it.' Like Linden, Ferber also questions the management of the mines and claims that 'it is only the extreme richness of the mineral which can counterbalance the losses to the proprietors, arising from an unskilful administration.'[143] The solution he proposes, akin to that provided by Linden,

[140] J. Ferber 'An Essay on the Oryctography of Derbyshire' in J. Pinkerton, *A General Collection of the Best and Most Interesting Voyages and Travels in All Parts of the World* (London, 1808), p. 465.
[141] *Ibid*, pp. 465–6. John Whitehurst was a significant figure in local philosophical circles; he was likely recommended to help Ferber due to his mineralogical text, entitled: *An Inquiry into the Original State and Formation of the Earth &c.* (London, 1778). For a more general discussion of the philosophical community centred on the city of Derby during this period, see: P. Elliot, 'The birth of public science in the English provinces: natural philosophy in Derby, c.1690–1760', *AS*, 57 (2000), pp. 61–100. Peter Burdett, meanwhile, was heavily involved in the mapping of various regions, taking particular note of the geological features of various regions, see in particular: PRO, WO 78/5678: P. Burdett, 'Survey of Derbyshire' (1762-1767).
[142] Ferber, 'Essay', pp. 465–88.
[143] *Ibid*, p. 483.

was 'that this branch of industry will never arrive to a high degree of perfection, unless a supreme council be established over the mines, with unlimited power to reform all abuses.'[144]

Ferber, unlike his peripatetic counterpart, Linden, stood to gain little from engaging in an impassioned critique of the localities and peoples he visited during his mineralogical tours. His goal, like those of many travelling savants during this period, was not to change mining practices, but to observe them for educational and political purposes, and to prepare oneself for state office.[145] Ferber studied at the University of Uppsala, Sweden, under the notable likes of Axel Fredrik Constredt, Johann Gottschalk Wallerius and Torben Bergman.[146] But unlike Linden, Ferber had been successful in his pursuit of an academic career. His first position was as professor of natural history in Mittau University in 1774, a post he held for almost ten years. In 1783, he was invited to take up a post at the St Petersburg Academy under Elizabeth the Great, and was later offered the position of overseer of mineral operations in Siberia. He eventually declined the latter position, and instead accepted an invitation to become Commissioner of the Mines under the employ of the Prussian state in 1786. His training and research involved major state sponsored tours of important mining regions in Europe, and he is perhaps best known for his detailed surveys of Italy and Bohemia, published under the titles: *L'Histoire Naturelle De L'Italie* and *Mineral Geschichte von Bohemen*.[147] His tour of Derbyshire and England was part of his wider studies in preparation for state office, and his opinions similarly influenced by enlightened idealism regarding the conduct of mining under the absolutist state and the role of learned men.[148]

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[144] *Ibid*, p. 484.
[145] See in particular the work of John Harris on the preponderance of industrial espionage and its role in the dissemination of knowledge and technology: Harris, *Industrial*, esp. chp. 10.
[146] Some of their more prominent works include: J. Wallerio, *Systema Mineralogicum*, I & II (Stockholm, 1775); T. Bergman, *A Dissertion on Elective Attractions*, (London, 1775 ed.); A. Constredt, *An Essay Towards a System of Mineralogy*, trans. G. Von Engestrom, I & II (London, 1788).
[147] Both of which are collections of a series of letters, see: J. Ferber, *L'Histoire Naturelle De L'Italie* (Prague, 1773–6); J. Ferber, *Mineral Geschichte von Bohemen* (Berlin, 1774).
[148] For more on this idealism amongst the savants and mining officials of Europe, see in particular the special edition of the *AS* journal in 2012: 'Artisanal–scientific experts in eighteenth–century France and Germany', in particular: Klein, 'Savant', pp. 349–74; P. Konečný, 'The hybrid expert in the 'Bergstaat': Anton von Ruprecht as a professor of chemistry and mining, and as a mining official, 1779–1814', *AS*, 69(3) (2012), pp. 335–47; C. Lehman 'Pierre–Joseph Macquer an eighteenth–century artisanal–scientific expert', *AS*, 69(3) (2012), pp. 307–33.

Since a crucial part of Ferber's mission was to gather valuable information on behalf of the Prussian state, he strove throughout his *Essay* to comprehend the rationale behind the organisation of the Derbyshire lead industry, and to highlight its redeeming characteristics and competitive advantages. He emphasises in particular the skills and competencies of its practitioners, describing them as 'a robust and enterprising people' who were creative and proactive in their pursuit of lead ore, and who made the most of their humble circumstances. This observation is key, and was a reflection of what he perceived as their fierce independence and entrepreneurialism in venturing after lead ore on their own account. He also considers whether 'the number and richness of the veins' in Derbyshire were 'the cause of the want of that attention which is so much admired in the other enterprises of that enlightened nation', and concludes that it was perhaps 'the considerable revenues, which the proprietors constantly derive from these mines' that explains their apparent complacency.[149] Moreover, in contrast to Linden's negative opinion of English and Welsh smelting, Ferber offers a more balanced opinion of the practices used in Derbyshire, noting, in particular, the widespread use of 'the test kiln', which he claims 'is perhaps the best invention of this country'.[150] Other visitors from Europe made similar observations following tours of the region and reveal certain continuities in the industry's structure and organisation during the mid to late eighteenth century. In 1754, Reinhold Rücker Angerstein, another Swedish mineralogist educated at the University of Uppsala, commented on the abundance of 'mines and workings' in the vicinity of Winster, in Derbyshire, claiming 'it is impossible to count them all', and observed the 'innumerable shafts of lead mines' on Cromford Moor, some of which 'had been sunk to depths of more than 600 feet'.[151] He too highlighted the entrepreneurialism of the miners, who were 'generally paid according to the amount of ore produced', with 'wages and overheads for a load of lead ore [amounting] to 9, 19, 20 or 35 shillings at different times'.[152] While later, in 1781, the French

[149] Ferber, 'An Essay', pp. 483–5.
[150] *Ibid*, p. 485.
[151] T. Berg and P. Berg (eds.), *R. R. Angerstein's Illustrated Travel Diary, 1753–1755* (London, 2001), pp. 206–10.
[152] *Ibid*, p. 204.

chemist and metallurgist, Gabriel Jars of Lyon, produced a detailed account of the Derbyshire lead industry in his *Voyages Métallurgiques*.[153] He observed that 'it is usual to have these mines exploited by entrepreneurial or independent labourers, with whom the companies arrange for their wages, by providing them with all the necessary tools, with permission to dig and do all sorts of research whatsoever to their will within their locality.' He also argues that it was 'Due to the arrangement of the ore' that the organisation of 'the works are very irregular, the wells are only small – of three and a half feet square', and consequently, the mineshafts appear 'rather like fox holes than openings of mines', but notes that 'one cannot hold the workers responsible' as they 'must avoid all unnecessary expenses in their present enterprise'.[154]

These comments reveal a number of important continuities in the structure and organisation of the Derbyshire lead industry during the eighteenth century. Contrary to Andy Wood's assertion that: 'from the middle of the seventeenth century, the productive capacity of large, sophisticated, labour–intensive, highly capitalised mines marginalised free mining activity', the evidence examined above, and in chapters 1 and 2, have demonstrated the continued relevance of free mining to industrial and economic developments of the eighteenth century.[155] Output data for the period shows that mines of varying sizes operated in tandem without impeding one another's progress, with small to medium sized ventures constituting around two–thirds of total ventures and producing around nine–tenths of total output right up to the end of the eighteenth century.[156] Capital–intensive mines, such as Gregory, Odin, Yatestoop, and Magpie, for example, were worked in close proximity to smaller free–mining ventures, such as those wrought by John Naylor in chapter 1. Indeed, as Naylor's case revealed, these larger mines provided important sources of alternative income for independent miners during periods of financial hardship, helping to appease creditors and occupy his time more

[153] G. Jars, *Voyages Métallurgiques* (Paris, 1781). For more on Gabriel Jars, see: 'Industrial Spies: Gabriel Jars (1732–1769)', *ODNB* (accessed: 17/10/2017); Harris, *Industrial*, pp. 222–37.
[154] Jars, *Voyages*, p. 73.
[155] Wood, *Politics*, p. 117.
[156] See in particular: Willies, 'Technical', p. 282; Burt, 'International', p. 249–71.

productively between ventures.[157] Similarly, the case of Miners Engine showed that even when employed at large capital–intensive mines, the Derbyshire lead miners continued to occupy important positions of authority and independence, thanks to the Cope Bargain System.[158] So, far from 'marginalising free mining activity', the processes of industrialisation and technological development during the late seventeenth and eighteenth centuries appear to have profited both miner and investor alike, and incentivised a cooperative, rather than combative, relationship.

This collaborative approach adopted by the Derbyshire lead miners is reflected in their activities later in the eighteenth century, and indicates that Hooson's efforts in the 1740s were part of a broader process of knowledge dissemination and integration repeated in a number of newly–industrialising regions across Britain. References made by travel writers in Flintshire and elsewhere indicate that the Derbyshire lead miners continued to integrate into various localities by appealing to the same communal values that Hooson referenced in his *Dictionary*. Writing in 1778, the Flintshire gentleman and travel–writer, Thomas Pennant, observed the long–term impact that skilled migration had on the county of his birth, stating:

> It is extremely populous; and in the mineral parts composed of a mixed people, whose fathers and grandfathers had resorted here for the sake of employ out of the *English* mine counties; many of whose children, born of *Welsh* mothers have quite lost the language of their fathers.[159]

Parish and mine records also attest to an increase in the number of individuals with common Derbyshire surnames moving to Flintshire throughout the eighteenth century.[160] Names, such as: Middleton, Nuttall, Needham, Yates, and Ingleby, increased in frequency between 1690 and 1750, but thereafter reduced, as migration levels slowed and the first generation of migrants to Flintshire assimilated into local society and successfully imparted their knowledge and skill.[161]

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[157] Derbyshire Record Office (DRO), D7812/1: Lead miner's diary.
[158] See chapter 2 above. Also: Wood, *Politics*, pp. 85–6 and 104–5.
[159] T. Pennant, *A Tour Through Wales*, I (1778), p. 3.
[160] Rhodes, 'Derbyshire', p. 348.
[161] *Ibid*, pp. 348–9.

This pattern was repeated elsewhere. In David Robertson's *A Tour Through the Isle of Man*, for example, he recalls his visit to the lead mines of Foxdale, in the sheading of Glenfaba, 'which are wrought, under the government of a company in London, [and] a few miners from Derbyshire.'[162] In the North Pennines, an estimated thirteen mining families from Derbyshire were invited to work at Langdon Beck mine in 1758, with the majority settling permanently in the region.[163] While in Sussex, the Earl of Ashburnham invited several parties of Derbyshire lead miners and their families to work at his extensive limestone mines at Orchard Wood, in East–Sussex, during the late eighteenth century.[164] Derbyshire miners were sought after by the Earl due to their experience working with hard carboniferous rock and their familiarity with advanced drainage technology. These skills were so valuable that the Earl even introduced a system that mirrored the Cope Bargain System to entice more miners to migrate.[165] But once again, the initial surge of migrants to Sussex was followed by a subsequent drop in numbers, as the first generation of arrivals began to integrate into local society and disseminate their knowledge and expertise amongst the local population.[166]

This trans–regional migration pattern was not solely the result of the Derbyshire lead miners' entrepreneurial endeavours, it was also linked to concurrent flows of Derbyshire capital. From around 1660, Flintshire gentlemen sought to attract Derbyshire investors to the region in order to unlock the mineral deposits on their land and to take advantage of their experience in directing mineral operations.[167] This process reached a peak in the early eighteenth century, when the London Lead Company began acquiring shares at the Flintshire lead mines and expanded their smelting operations in the region.[168] Though the Company had largely failed to infiltrate the Derbyshire lead industry their linkages with several of its most prominent investors resulted in a variety of combined schemes in which Derbyshire miners

[162] D. Robertson, *A Tour Through the Isle of Man* (London, 1794), p. 83.
[163] Hunt, *Lead*, p. 193.
[164] A. Pearce, 'Derbyshire Miners in Sussex', *BPDMHS* 11(2) (1990), pp. 72–6.
[165] *Ibid*, pp. 72–6.
[166] *Ibid*, p. 73.
[167] Rhodes, 'Derbyshire', p. 341.
[168] *Ibid*, p. 342.

were often employed to oversee mineral operations.[169] At the Company mine of Trelegan, near Holywell, for example, their 'under–steward' was 'an old Derbyshire miner' called George Norman, and later in 1765, they employed the services of an engineer from Derbyshire called Joseph Thompson.[170] Henry Thornhill and Nicholas Twigg, both gentlemen capitalists of Derbyshire, also cooperated with the Company in a number of joint ventures in Flintshire and Derbyshire.[171] While in the 1730s, a group of Derbyshire lead proprietors called 'the Pentre Partnership' invested in an array of mines in North Wales, many of which employed Derbyshire lead miners in key supervisory positions.[172] The Partnership comprised the notable likes of John Thornhill of Stanton, Nicholas Twigg of Holme near Bakewell, Richard Calton of Chesterfield, Samuel Heathcote of Derby, Francis Allwood of Youlgreave, and Thomas Grimer and Philip Smith, both miners of Stanton.[173] Indeed, it is believed that Hooson acquired his first mining post in Flintshire following the recommendation of John Thornhill, an important local figure in the financing of the Derbyshire lead industry who shall be revisited in the next chapter.[174]

The Derbyshire lead miners thus benefitted directly from their association with the gentry and merchant capitalists of Derbyshire. By fostering a cooperative and pragmatic relationship, the miners were able to participate in processes of industrialisation at both the local and national level. Indeed, the cases discussed above and the debate between Hooson and Linden, have revealed the importance of established communal ties in facilitating the dissemination and verification of knowledge, and in the self–promotion of skilled labourers during an era of precocious change. As was shown, the success or failure of Linden's efforts to improve the Flintshire lead industry rested not upon the veracity of his arguments or the merits of his elite education, but rather his ability to acculturate his ideas and to integrate into local society. In contrast, Hooson and the Derbyshire lead miners appealed directly to communal

[169] For a general account of the London Lead Company's industrial concerns in Derbyshire and elsewhere, see: Raistrick, *Two*, map 1 and pp. 9–16; Raistrick and Jennings, *History*, pp. 247–67.
[170] Rhodes, 'Derbyshire', pp. 342–5.
[171] *Ibid*, p. 342.
[172] *Ibid*, pp. 344–5; Rieuwerts, *Adventurers*, p. 12.
[173] Rhodes, 'Derbyshire', p. 343.
[174] Rieuwerts, *Adventurers*, p. 12.

values, such as trust, reputation and credibility, to promote their knowledge and skills and to influence the direction of industrial and technological change in a variety of regions across England and Wales.[175] The centrality of these communal values is illustrated further in Arthur Aikin's account of the mining settlement of Almwch on the north coast of the Isle of Anglesey, in his *Journal of a Tour Through North Wales* (1797).[176] Like many towns and villages in North Wales at this time, Almwch witnessed an early–eighteenth century population boom, triggered by the rapid growth of mining in the region. He describes how: 'the town of Almwch, which had about 30 years ago had no more than half a dozen houses in the whole parish, now supports a population of four or five thousand inhabitants'.[177] On the day of his visit the town was 'thronged with miners, and country people', yet Aikin was amazed to find not 'a single instance… of drunkenness, not one quarrel have I witnessed during two very crowded market days, and one of them a day of unusual indulgence', nor could he find any evidence of 'a gaol, or bridewell, or house of confinement… in the town or neighbourhood.'[178] This burgeoning community of migrant miners appears idyllic, and indeed Aikin's impression may have been idealised; however, the image he presents once again stresses the importance of communal integrity and social order, which was achieved despite rapid population growth and high levels of inward migration over the course of the preceding three decades.[179] Clearly, the communal values of reputation, trust and credibility were vital to processes of change, and were central to the assimilation of migrant labour into newly industrialising regions.[180]

[175] For more on the successful transference of human capital during the eighteenth century, see especially: Mathias, 'Skills', pp. 100–3; Berg, 'Genesis', pp. 129–31; Hilaire–Pérez, 'Technology', pp. 143–6; Mokry, *Enlightened*, pp. 58–9.
[176] A. Aikin, *Journal of a Tour Through North Wales* (London, 1797).
[177] *Ibid*, p. 142.
[178] *Ibid*, p. 148–9.
[179] This contrasts sharply with the image presented by Peter Mathias of the skilled artisan as: 'leaving their own countries for dubious motives and succumbing to the delights of drink and other distractions in their new–found prosperity', see: Mathias, 'Skills', p. 108.
[180] Berg, 'Genesis', pp. 129–31; Berg, 'Skill', pp. 134–5.

Conclusion

In a letter, written to his brother in December 1757, the gentleman and lead proprietor, Lewis Morris, described Flintshire as 'one immense reservoir of metallic treasure, awaiting only the spirit of enterprise, and the hand of industry to bring it into use.'[181] In light of his rather scathing opinion of Linden's character, and the pattern of industrialisation witnessed in subsequent decades, it seems apparent that the 'enterprise' and 'industriousness' Morris sought was not to be found among the travelling savants and enlightened academics of Europe, but rather, among the experienced, technically literate and entrepreneurial miners and capitalist investors of Derbyshire. The business acumen and practical experience required to successfully organise and expand a local industry without recourse to state sponsorship – which was generally the case in Sweden, Prussia, France and Russia – inherently favoured the pragmatic approach adopted by miners and capital investors, whose principal concern was to maximise profits and minimise costs, while, for the learned savant, the main goal was to achieve a 'high degree of perfection' in the organisation and structure of mining founded on the principles of elite learning and experimental science.[182] Yet, one should not overstate the supposed 'exceptionalism' of Britain in this regard.[183] After all, Britain was deeply involved in pan–European processes of change, which were bringing European states closer together in economic, social and cultural terms.[184]

In particular, this chapter has revealed the ubiquity of 'improvement' as a driving force for change in eighteenth century society. For, despite their differing approaches to the art of mining, both Hooson and Linden employed the same language of improvement to support their views. On the one hand, Hooson stressed the importance of improving established techniques and technologies in a gradual and cumulative manner, which both encouraged change and

[181] S. Meyrick, *The History and Antiquities of the County of Cardiganshire* (London, 1808), p. ccxxxiv.
[182] Linden, *Letter*¸ pp. iv, 1 and 58; Ferber, 'Essay', p. 484. For more on the notion of 'perfection', see: Slack, *Invention*, pp. 231, 248.
[183] C. MacLeod, 'The European origins of British technological predominance', in Escosura, *Exceptionalism*, pp. 111–126; Mokyr, *Enlightened*, pp. 30–39.
[184] MacLeod, 'European', p. 111.

provided a means of preserving certain traditional practices.[185] While Linden, on the other hand, recommended a more radical programme of improvements, with fundamental changes in the practice, organisation and oversight of mining in England and Wales, including increased state involvement and the appointment of learned savants to key managerial posts.[186] Both authors also couched their visions of improvement in moral terms and highlighted reasons for doubting the moral integrity of their competitors. Hooson, for example, contrasted the miners' honesty, reliability and credibility in mining affairs with the perceived dishonesty and untrustworthiness of 'learned men' and 'demonstrative miners', whose merits and origins were often unknown. Meanwhile, Linden noted the moral imperatives he faced, as a man of learning, to correct the 'Mistakes' and 'Errors' he observed in Hooson's work, which were, in his view, intentionally misleading the general public.[187] As the Hooson–Linden debate clearly shows, while it is true that belief in the notion of improvement was pervasive in eighteenth–century society, its meaning was disputed. What constituted 'improvement' for one might not reflect the view of others.

The Hooson–Linden debate also demonstrates the important role played by community in processes of knowledge dissemination and technological development during the eighteenth century. In this regard, Hooson was particularly successful. For, despite his inferior education and social status, he was able to frame his ideas in terms agreeable to the local community of Flintshire. As was demonstrated in section I, Hooson expressed deference and respect for local gentlemen investors, appealed to their patronage and generosity, and emphasised the miners' practical skills and knowledge, which he hoped might convince his reader 'that there is some skill as well as Slavery in mining'.[188] However, far from representing 'a refusal to accept the illegitimate exercise of elite authority', as Andy Wood has argued, the use of deferential language by Hooson demonstrates a pragmatic approach to local power structures and an

[185] Hooson, *Miners*. See also: Epstein, 'Craft', pp. 688–93; Smith, *Body*, pp. 6–8.
[186] For more on these common practices, see: Klein, 'Savant', pp. 349–74; Mokyr, *Enlightened*, pp. 392–448.
[187] Linden, *Letter*¸ pp. iii–vii.
[188] This interpretation contrasts sharply with Wood's reading of the same passages, see: Wood, *Politics*, p. 8.

engagement with discourses of paternalism and deference, both of which were crucial to accessing communal resources and assimilating into local society.[189] As revealed in section II, Hooson's conciliatory tone contrasted sharply with the more combative style adopted by Linden in his *Letter*. Throughout, Linden endeavoured to distance himself from Flintshire society, to emphasise the backwardness of local mining practices, the superiority of foreign practices and was forthright in his criticisms of well–known individuals in the region, both above and below him in social status.[190] While it was noted that this apparent disregard for social etiquette was rooted in the mannerisms of the 'Republic of Letters', it is also clear that Linden's hostile tone limited the impact his work had in the region and alienated many potential investors. The Hooson–Linden debate thus shows that how ideas and new technologies were framed and communicated within local communities was as important as their contents and potential benefits for industry and the economy in determining their pattern of dissemination.

These findings have important implications for wider debates concerning the role of artisans and elite intellectuals during the Industrial Revolution. As noted in the introduction to this chapter, discussions have been largely dominated by an either/or dichotomy: either the Industrial Revolution was determined by the application of elite intellectual knowledge to the challenges posed by industry and technology, or it was a result of the wider dissemination of the technical skills and practical knowledge of artisans.[191] The case examined here has provided a clear example of how both types of knowledge interacted at the local level and offers insights into the factors that determined their uptake in response to particular industrial, economic and social conditions. It is curious to note that both foreign and native sources of knowledge converged within the narrow confines of the locality, suggesting that the mobility of human capital during this period was more pervasive than has often been assumed.[192] The movement of skills and knowledge was not limited solely to rural–urban migration, they were also drawn

[189] *Ibid*, pp. 168–9.
[190] Linden, *Letter*.
[191] Mokyr, *Gifts*, pp. 1–2; Berg, 'Genesis', pp. 123–33; Hilaire–Pérez, 'Technology, pp. 135–53.
[192] Mathias, 'Skills', pp. 93–100; Inkster, 'Mental', pp. 417–35.

to the expanding rural industries of Europe, with experts such as Hooson and Linden offering their services wherever there was a demanded. Overall, therefore, the evidence examined above suggests that the intellectual developments of the age, what Mokyr termed the 'Industrial Enlightenment', and the dissemination of the practical knowledge and expertise of the artisan, ought not to be treated as divergent or competing processes, but rather as concurrent trends in a wider process of 'improvement' taking place across Western Europe at this time and involving the whole of society, not just designated 'elite' groups.[193] In his more recent work, Mokyr has granted a more prominent role to the artisans and technicians of Europe, describing them as 'the unsung foot soldiers of the Industrial Revolution', and while it represents a welcome amendment to his overall conclusions, it still represents a rather arbitrary valuation of the contributions made by different groups to processes of industrialisation, one that is yet to be merited by the evidence available.[194] Certainly, in the case of the Flintshire lead industry, the artisanal mining community of Derbyshire were not subordinate foot–soldiers in wider processes of industrialisation; on the contrary, their methods and expertise proved to be influential and played a vital role in governing the pattern and pace of industrialisation at the local level for much of the eighteenth century.

[193] Mokyr, *Culture*, pp. 267-86; Slack, *Invention*, pp.257–64.
[194] Mokyr, *Enlightened*, p. 110.

Chapter 4
The Local Origins of Capital: Capital, Credit and the Local Economy

In his *A General view of the Agriculture and Minerals of Derbyshire*, produced on behalf of the Board of Agriculture between 1807 and 1811, John Farey described Derbyshire as a 'Manufacturing county', which ought, by his estimation, 'to rank higher than has generally been supposed, it being probable that Lancashire, Staffordshire and Warwickshire, only, of the English counties, excel it, in the extent and variety of their manufactured goods'.[1] Chief amongst the industries he observed were the cotton and lead industries, which together comprised a large proportion of the county's abundant commercial ventures, including: lead mines, smelting furnaces, cotton factories, mills, cottages and workshops of varying sizes.[2] According to Farey, Derbyshire was marked by its self–sufficiency and productivity, which presented a 'flattering picture of the varied and great manufacturing industry of the county… shewing it to contribute, far beyond most other counties, towards *the supply of all its wants*, and contributing in no small degree towards *the supply and general Trade of the Kingdom* at large'.[3] The richness of the county's industry and commerce were matched only by that of its communications network, which, according to Farey, provided: 'a connected view of the great exertions of the Inhabitants, for opening facilities of communication amongst themselves and with the kingdom at large', which 'besides serving to mark the progress of these grand Improvements of the condition of the County, may perhaps stimulate some other British districts to similar exertions.'[4]

[1] The surveys upon which Farey based his subsequent work were carried out in the years 1807 to 1809, while his publications appeared in 1811, 1813 and 1817, see: J. Farey, *A General View of the Agriculture and Minerals of Derbyshire*, III, (London, 1817), p. 476.
[2] *Ibid*, pp. 478–96.
[3] *Ibid*, pp. 496–7.
[4] *Ibid*, pp. 206–7.

Although Farey's survey was conducted at the turn of the nineteenth century, the Derbyshire he observed very much belonged to the eighteenth. The development of the lead industry, for example, had already peaked and entered into decline by the 1790s, turnpike and canal improvements were firmly established by 1800, and the precipitous growth of the cotton industry overlapped with the long decline of the lead industry in the decades after the construction of Richard Arkwright's mill in 1771. Yet, despite the abundant evidence for a marked change in the character and pace of industrial and commercial development in a number of localities during the eighteenth century, aggregate studies exploring the role of capital accumulation have tended to downplay the role played by capital, and in particular fixed capital, at the national economic level. Estimates produced by Phyllis Deane suggest that as little as six or seven per cent of gross national income (GNI) was absorbed by capital investment prior to 1800, and while more recent estimates have put the figure slightly higher, at between nine and ten per cent of GNI, the overall consensus remains that capital, and its accumulation, played a comparatively minor role in the process of industrialisation and economic growth prior to the mid–nineteenth century.[5]

The representativeness of these national estimates are doubtful, however, as they rest on the assumption that the financial demands posed by capital accumulation were evenly distributed across the entire population and economy of Great Britain during the eighteenth and nineteenth centuries.[6] Yet, as has been demonstrated by a range of important studies, the processes of industrialisation and capital–intensification, especially during their early phases, were characteristically local: drawing on local resources and restricted to a number of specific localities dispersed across the nation.[7] M. M. Postan, in a classic article on the subject, noted the localism of eighteenth century capital markets, observing that 'on the whole the

[5] C. Feinstein, 'Capital Formation in Great Britain' in P. Mathias and M. Postan (eds.), *Cambridge Economic History of Europe*, VII, part 1 (Cambridge, 1978), pp. 73–94.
[6] This assumption is inherent in the methodology and sources used to construct the estimates, see: *Ibid*, pp. 39–65.
[7] See especially: Langton, 'Industrial', pp. 145–67; Hudson, 'Regional', pp. 5–38; Hudson, 'Industrial' in Floud and Johnson, *Cambridge*, pp. 28–54. On the subject of capital formation, see in particular collection of essays in: Crouzet, *Capital*. Also: Hudson, *Genesis*, pp. 3–24.

insufficiency of capital' during the early phases of industrialisation 'was local rather than general, and social rather than material', leading him to conclude that while 'the reservoirs of savings were full enough, conduits to connect them with the wheels of industry were few and meagre.'[8] This view was shared some years later by Herbert Heaton, who described how financial resources had to be 'scraped together' from the personal stock and reserves of factory owners and industrialists during the eighteenth century, noting the 'zeal' with which these families were forced to plough their meagre profits back into their ventures.[9] Later in the 1940s and 50s, T. S. Ashton observed how the industrialists and manufacturers of the eighteenth century were forced to patiently amass capital from their family's savings, and once 'this rigid economy' had been thoroughly 'wringed', industrialists had few alternative sources from which they might draw additional funds.[10] This situation only changed, according to Postan, Heaton, Ashton and others, with the liberalisation of the British financial sector following the repeal of the Usury and Bubble Acts in the mid nineteenth century.[11] Thereafter, capital became more 'impersonal' and 'mobile', it could be drawn from a much larger pool of savers, and could be transferred seamlessly across borders, sectors and industries.[12] No longer was the creditor 'forced', as Ashton put it, to 'guess… as to the credit–worthiness of the borrower', instead 'capital was becoming impersonal – 'blind', as some say – and highly mobile.'[13]

While the above referenced historians correctly identified the challenges associated with capital accumulation as localised, their prescribed remedy – the introduction of modern banking – is an anachronism that offers little insight into the processes at play during the eighteenth century. For, as will be demonstrated in this chapter, despite the institutional

[8] The three components to this statement have been used as section headings for this chapter: M. Postan, 'Recent trends in the accumulation of capital', *EcHR*, 6(1), (1935), pp. 1–12.
[9] H. Heaton, 'Financing the Industrial Revolution', *BBHS*, 11(1), (1937), pp. 1–10.
[10] Ashton, *Industrial*, pp. 78–89.
[11] Postan, 'Recent', pp. 6–7; Heaton, 'Financing', pp. 6–10; Ashton, *Industrial*, p. 83–6. For more recent scholarship on the importance of financial reform, see especially: R. Cameron et al., *Banking in the Early Stages of Industrialisation* (Oxford, 1967); J. Williamson, 'Why was British growth so slow during the Industrial Revolution?', *JEH*, 44(3), (1984), pp. 687–712; P. Temin and H. J. Voth, *Prometheus Shackled* (Oxford, 2013), pp. 23–38.
[12] Postan, 'Recent', pp. 6–7.
[13] Ashton, *Industrial*, p. 87.

shortcomings and the very personal character of capital and credit, the eighteenth century still witnessed major industrial and economic developments, which demanded sustained levels of capital investment concentrated in those localities and regions that experienced the most rapid change.[14] In that regard, the work of Patricia Hudson has been representative of a more contextualised and locally sensitive approach to the question of capital formation.[15] Using the case study of the West Riding woollen textiles industry during the eighteenth and nineteenth centuries, Hudson revealed the importance of local networks in the financing of capital projects, and concluded that industrialisation became a self–sustaining process, as proceeds and capital were ploughed back into different stages of the supply chain and contributed to further growth and development in later periods.[16] But while Hudson's study remains a seminal work in the field, her analysis is limited to the circulation of capital and credit within a single industry. What follows is an attempt to look more broadly at the flows of capital and credit between different industries and sectors of the local economy, and consider the role played by local networks of family, kin, friends and affiliates in the supply of circulating and fixed capital during this period.[17]

The Derbyshire evoked by Farey thus offers an ideal setting in which to explore these processes in detail. The chapter will focus on three overlapping case studies: the Derbyshire lead industry, the Derbyshire turnpike and canal networks, and the Derbyshire cotton–textiles industry. All three are linked not only by locality and chronology, but also form interconnected sectors of the local economy – including primary (mining), secondary (cotton textiles), and tertiary (turnpikes and canals). The chapter is divided into three sections. The first examines

[14] Langton, 'Industrial', pp. 145–67; Hudson, *Regions.* For a helpful overview of the regional debate, see: S. King and G. Timmins, *Making Sense of the Industrial Revolution* (Manchester, 2001), pp. 33–61.
[15] Hudson, *Genesis*, chp. 1.
[16] *Ibid*, pp. 259–70.
[17] For more on business networks, see especially: Davidoff and Hall, *Family*; M. Rose, *Firms, Networks and Business Values: The British and American Cotton Industries since 1750* (Cambridge, 2000), chps.1 and 3; R. Pearson and D. Richardson, 'Business networking in the industrial revolution', *EcHR*, 54(4) (2001), pp. 657–79. See also collection of essays in J. Wilson and A. Popp (eds.), *Industrial Clusters and Regional Business Networks in England, 1750–1970* (London, 2003); J. Taylor, *Creating Capitalism* (Woodbridge, 2006), pp. 23–32; idem., 'Privacy, publicity, and reputation: How the press regulated the market in nineteenth-century England' Business History, 87(4) (2013), pp. 679–701.

the capital requirements posed by the various studies in question; the second, assesses the social and economic origins of capital; and the third, explores the local familial, kinship and business networks that enmeshed the various groups observed and provided conduits for the supply of capital and credit to local industrial and commercial ventures. In sections I and II, each case study will be examined sequentially, to reflect their chronological order and to enable a closer examination of the nature of capital formation, and its social and economic origins. While in section III, the case studies will be explored concurrently to highlight and explore the relationships that intertwined different industries and sectors of North Derbyshire. Overall, it will be argued that aggregate studies of the process of capital formation understate the capital requirements posed by industrialisation by incorrectly assuming that those demands were answered at the level of the national economy. As will be shown, the resources used to finance industrialisation and capital formation during the eighteenth and early–nineteenth centuries were overwhelmingly supplied by the local population via the operation of the local credit economy, and by a socially and economic diverse cast of people, including, in particular, a large cast of middling tradespeople and yeomanry farmers, drawn from a series of overlapping familial, kinship and affiliate networks. Without the assurances and trust invested in these tightly–bound financial relationships, it shall be argued that the processes of industrialisation and economic growth during this period would not have been possible.

I. *'The wheels of industry'*

The capital requirements posed by the Derbyshire lead industry during the eighteenth and early nineteenth century has been a matter of some debate among local historians, with contributors drawing on a range of arguments relating to the pace and character of change at the local level. Evidence has revealed that from at least the middle of the sixteenth century, the introduction of new lead smelting and drainage technology in Derbyshire, facilitated the early rise of a number of increasingly significant capital–intensive operations, which began to occupy an increasing

share of overall output from the early seventeenth century onwards.[18] According to Andy Wood, David Kiernan, and several others, this expansion in the number and significance of capital–intensive operations triggered the 'marginalisation' of smaller, less productive, ventures, operated and financed by independent artisan miners and their families.[19] Yet, evidence drawn from the eighteenth and nineteenth centuries suggests that there was also continuity, as well as change, in the form and structure of lead mining during the eighteenth and nineteenth centuries.[20] In a survey of lott and cope accounts for the period 1740 to 1850, Lyn Willies found that 89 per cent of mining ventures conducted in the parish of Winster were 'small' (producing fewer than 100 loads of ore per year), 10 per cent were 'medium' (producing between 100 and 1000 loads per year), and just 1 per cent were 'large' (producing over 1000 loads per year). While in the parish of Ashford, near Bakewell, the proportions were 97, 3, and less than 1 per cent respectively for the same period.[21] At the same time, Willies' data also indicates that this continuity in the number and distribution of mining ventures occurred in conjunction with a rise in the output of large–scale capital–intensive ventures. In the parish of Winster, for example, over 50 percent of total output for the eighteenth and nineteenth centuries was produced by two ventures, Portaway and Yatestoop mines, while in the parish of Ashford a similar proportion was produced by a single venture, Magpie mine, near Sheldon.[22]

Although this depiction may be more representative of the evidence for the eighteenth century, it makes approaching the problem of capital formation no less challenging. Establishing a coherent account of the many thousands of different mining ventures in operation during the eighteenth century is a difficult task, made worse still by the absence of standardised accounting procedures for capital expenditure.[23] The Reckoning Book System (RBS) – a

[18] Kiernan, *Derbyshire*, chps.5–6.
[19] *Ibid*; Wood, *Politics*, pp. 117–8.
[20] See especially: Raistrick and Jennings, *History*, chp. 7; Kirkham, *Derbyshire*, pp. 113–8; Burt, *British*, pp. 1–9; Burt, 'International', pp. 249–71.
[21] Willies, 'Prosperity', p. 254.
[22] *Ibid*, pp. 254–60.
[23] A problem faced by many industries and firms during this period, see especially: S. Pollard, *The Genesis of Modern Management: A Study of the Industrial Revolution in Great Britain* (London, 1965), chp. 6; Mokyr, 'Accounting', pp. 4–14.

single–entry charge and discharge accounting system used to monitor income, costs and profits at the Derbyshire lead mines – offers a useful starting–point for exploring the running costs and profitability of large capital–intensive mines. As a source of evidence for capital accumulation, however, it is limited both by the lack of differentiation given to different categories of expenditure of capital stock (whether on fixed or circulating, for example,) and by the general lack of attention given to the amount of capital accumulated at different times at the Derbyshire lead mines. What is more, the survival rate of reckoning books creates a bias toward larger mining ventures and to the late–eighteenth century. As for small and medium ventures, surviving accounts are so rare and references in the archives so infrequent that quantification becomes extremely difficult.[24] Thus, what follows constitutes an attempt to establish the groundwork for further examination. For now, a more selective approach to the available evidence has been taken to produce an overall impression of the capital demands posed by the Derbyshire lead mines.

'Small' ventures, or those producing 100 loads of ore or less per year, were the simplest and most numerous type of mining venture in Derbyshire during the eighteenth century.[25] Thanks to the continued observance of free mining customs in the Derbyshire peaks, miners could begin digging for ore without purchasing the land under which veins were located, and as such, very little capital was required to commence operations and so could be financed independently by artisan miners and their families.[26] As observed in the case of John Naylor in Chapter 1, these small–scale family–run operations continued to provide mining households with a viable, and potentially lucrative, source of income throughout the eighteenth century, which was often combined with small–holding and wage–labour to form a varied and resilient household economy.[27] It was estimated that Naylor's expenditure on his mine was in the region of £20–£30 per year, which included the cost of maintaining his tools and work clothes,

[24] See section II below.
[25] The categories 'small', 'medium', and 'large', are based on those outlined by Willies, see: 'Prosperity', pp. 254–6.
[26] *Ibid*, p. 254.
[27] DRO: D7812/1: Lead miner's diary.

purchasing wood for propping, gunpowder for blasting, candles for lighting, stone for constructing surface structures, and labour to assist at the mine.[28] Of these, the cost of labour was by far the largest, and it was for that reason Naylor often turned to members of his household for assistance.[29] The capital requirements of these small ventures were thus largely absorbed by the household economy and from the proceeds of the mine itself, though as was demonstrated in Chapter 1, credit sourced from within the local community was also significant. Credit was often used to cover the costs of everyday household essentials, including food, fuel, and rent, and in the purchase of materials and goods used in mining.[30] These debts were repaid upon receipt of income from the mine, which usually occurred on a quarterly basis at an event called a reckoning, though income could be unpredictable and it was easy for a mining household to periodically fall into indebtedness. Thus, while the demand for fixed capital investment in basic machinery, and surface structures, was comparatively low for small ventures, the demand for circulating capital, to pay for wages, materials, and tools, alongside household amenities, was comparatively high. For that reason, the availability of credit, often extended informally and without interest by members of the local community, was crucial to the survival of small family ventures.[31]

Medium sized ventures, or those producing between 100 and 1000 loads of ore per year, are perhaps the most difficult to define in terms of capital structure.[32] Some at the lower end of the scale consisted of little more than an enhanced family venture, directed by partnerships of 4 or 5 miners and their families, and were dependent on a similar system of finance to their smaller counterparts.[33] Those at the upper end of the scale, however, were more akin to large capital–intensive mines, drawing on the resources of small partnerships of local investors, and employing anywhere between 5 and 20 miners, their families, and additional

[28] *Ibid*. See also Chapter 1.
[29] For more on the maintenance of a productive household during the early modern period, see: Muldrew, *Food*, esp. chps.4 and 5.
[30] D7812/1. See chapter 1 for breakdown of expenditure.
[31] As demonstrated in Chapter 1. For more on community credit, see: Muldrew, *Economy*, pp. 157–72; Muldrew, 'Hard', pp. 78–120; Shepard, *Accounting*, pp. 1–32.
[32] Willies, 'Prosperity', pp. 254–5.
[33] For comparison, see: Hudson, *Genesis*, pp. 57–84.

wage labourers. These ventures commonly required the installation of horse gins, waterwheels, and other manual or horse–powered machinery to assist with drainage and haulage, but total expenditure on capital remained marginal. Additional costs associated with such ventures included renting horses, payment of handlers' wages, the purchase of larger quantities of materials and tools, payment of craftsmen services in the construction and maintenance of machinery and mine workings, and the sinking of additional shafts and adits to provide access and drainage to deeper operations. These, alongside the essential costs of mining, drawing, and washing ore, could vary from £50 to £2000 per year, depending on the size and the depth of operations. Such mines were important local employers, as they were more numerous than their larger counterparts and continued to utilise labour–intensive procedures. Such ventures also tended to be more enduring and financially sustainable than their smaller and larger counterparts, expanding and contracting in response to variable market conditions over the course of several decades.[34] In the parish of Ashover, for example, alongside the capital–intensive works at Gregory Mine, a variety of more modest ventures were in continuous operation for much of the seventeenth and eighteenth centuries. They included: Cockwell, Overton, Westedge, Porto Bello, and Ravenstor mines, each of which preceded and outlasted Gregory Mine, owing mainly to their less intensive exploitation.[35] The comparatively low capital demands of such mining ventures thus presented the local investor of modest and substantial means alike, with the opportunity to earn a steady income from shareholding, whilst also ploughing capital and credit back into the local economy, providing employment for local miners and craftsmen, and facilitating their other business interests.

Large–scale capital–intensive mine operations, or those producing 1000 loads of ore or more per year, represented major financial and organisational challenges. They drew on the resources of large partnerships of investors and shareholders, who in turn sub–contracted the extractive process to small partnerships of miners, called copes, via the Cope Bargain System

[34] See: Willies, 'Prosperity', pp. 255–61.
[35] G. Hopkinson, 'Lead mining in 18th century Ashover' *DAJ*, 72 (1952), pp. 1–3.

(CBS).[36] As noted in chapter 2, this system enabled the mine investors at larger ventures to apportion some of the financial risks to the mining workforce, and at the same time enabled the miners to maintain their independence.[37] The amount of fixed capital investment required from proprietors varied depending on the depth of mine operations, the character and stratigraphy of the ground through which the vein passed, and the demands associated with drainage, ventilation and haulage. At their most basic, they required the construction of an assortment of surface structures, including wooden shelters and workstations for surface workers, coes to store mine equipment and extracted ore, stone or wooden structures to house machinery, pumps and drawing equipment, and thoroughfares to connect the mine with the county's road network. These were combined with underground structures, including sprawling networks of tunnels and shafts, underground storage for extracted materials and equipment, the installation of underground railroads, pumping equipment and ventilation pipes, and the maintenance of large galleries to provide better access to the extractable ore. As with their small and medium–sized counterparts, large ventures were not required to purchase or rent land in the Derbyshire lead–field, which constituted a major financial saving, especially considering the number of surface structures required in larger operations, yet running costs remained high and could vary from £2,000 to £15,000 per annum.

Table 5.1: *Cost of sough construction in Derbyshire, c.1670–1880*

Sough Name	Period of Construction	Cost	Length (miles)
Cromford	1673–1750	£30,000	2
Millclough	1681–1687	£2,000	1/2
Stoke	1724–1734	£35,000	2
Magclough	1723–1736	£6,447	1
Wheal	1723–1736	£8,581	1
Yatestoop	1743–1764	£30,000	2 1/4
Hillcarr	1766–1787	£20,500	2 1/2
Meerbrook	1771–1800	£45,000	2
Magpie	1873–1881	£18,000	1 1/4

Sources: Farey, *General*, pp. 328–31; Willies, 'Prosperity', p. 263; N. Kirkham, 'Wheal Sough and Hubberdale Mine', BPDMHS, 2(4), (1964), pp. 206–29; N. Kirkham, 'Eyam Edge Mines and Soughs. Part II', BPDMHS, 3(1), (1965), pp. 43–57.

[36] See chapter 2.
[37] *Ibid*, pp. 224–7.

Of the various sources of capital expenditure at large ventures, alleviating the mine of water was perhaps the most costly and obstructive. One option involved the construction of drainage tunnels, or 'soughs', to carry water away from an afflicted mine to a nearby valley or underground watercourse, often two or three miles away.[38] Soughs had the advantage of being financed and organised by separate investment partnerships established with the specific purpose of draining networks of interconnected mines simultaneously, and once constructed required very little additional expenditure to maintain.[39] Yet, these advantages were counterbalanced by lengthy construction periods and associated costs (see table 5.1). Stoke Sough, in the parish of Eyam, for example, commenced in 1724, was over 2 miles long, took 10 years to complete at cost of £35,000. Likewise, Yatestoop Sough, in the parish of Winster, commenced in 1743, was 2 ¼ miles long, took 21 years to complete and cost £30,000. While perhaps the most expensive sough in the history of the Derbyshire lead industry, Hillcarr Sough, commenced in 1766, was 3 miles long, took 21 years to complete and cost £50,000.[40] Other soughs, such as Odin, Magclough and Wheal, cost less – at between £5,000 and £10,000; yet, average costs of construction remained remarkably high, representing some of the most costly capital ventures in the pre–canal era.[41]

Another option lay in the installation of steam engines to pump water out of the vein, either by drawing it to the surface, or more commonly, drawing it to the level of a pre–existing sough or natural watercourse. One of the earliest references to steam engines at the Derbyshire lead mines is found in the diary of the non–conformist preacher and physician, Dr. James Clegg, of Chapel–en–le–Frith, who described seeing 'three curious engines at work' at Yatestoop Mine near the village of Winster, in September 1730, which 'by ye force of fire heating water to vapour, a prodigious weight of water was raised from a very great depth, and a vast quantity of

[38] There are a number of important works exploring sough construction during this period, see especially: Kirkham, *Derbyshire*, pp. 77–93; Honeyman, *Origins*, pp. 20–34.
[39] *Ibid*, pp. 34–57.
[40] This total included subsidiary branches to other mines in the locality, which formed a web of interconnected tunnels beneath Stanton Moor, see: Farey, *General*, p. 330; Hopkinson, 'Eyam', pp. 85–8; N. Kirkham, 'Eyam Edge mines and soughs parts 1 – 4', *BPDMHS*, 2–3 (1960–5); Willies, 'Prosperity', p. 263.
[41] Kirkham, *Derbyshire*, pp. 77–93; Honeyman, *Origins*, p. 23.

lead ore laid dry.'[42] The first of these engines was installed in 1720, the second and third in 1724 and 1728, others were then erected at Mill Close, Oxclose and Watergrove mines in the 1730s and 40s, and at Portaway, Gregory, and Placket mines in the 1750s and 60s.[43] As has been noted by other historians, the initial cost of acquiring a steam engine was comparatively low during this period.[44] Farey estimated that a new Wimsey Engine, used to draw lead ore to the mine surface, 'may be about £500 each', while 'large Steam–Engines', used in drainage, might 'cost £2000 or more'.[45] In practice, however, the majority were purchased for even less, thanks to a thriving market for second–hand steam engines during the eighteenth and nineteenth centuries (see table 5.2).[46] The partners of Placket mine in the parish of Winster, for example, sold their four year–old Newcomen engine for £1,460 in 1767, those of Calver Mill Sough near Bosal sold theirs for £486 in 1774, while at Magpie Mine a second–hand atmospheric steam engine was acquired for around £800 in 1824.[47] Once purchased, the engine had to be installed, fuelled and maintained, and it was often here that costs began to spiral. At Gregory Mine, for example, a Whimsey engine put to work in March 1796, was purchased for just £272, but cost a further £282 for a local engineer to assemble it, and an additional £5,000 for sinking a shaft to grant it access to the vein.[48] Similarly, at Watergrove mine it was estimated that the installation of a steam engine would cost £6,400 in total, of which just £2,400 or 37.5 per cent was spent acquiring and installing it.[49] Fuel constituted an even greater proportion of overall expenditure on steam engines, though reliable data is difficult to acquire.[50] At Gregory Mine,

[42] H. Kirk, 'Dr. Clegg, minister and physician in the 17th and 18th centuries' *DAJ*, 35, (1913), p. 28.
[43] See: F. Nixon, 'The Early Steam–Engine in Derbyshire', *TNS*, 31 (1957), pp. 1–28; Kirkham, 'Steam', pp. 69–88. See also: Farey, *General*, pp. 337–8.
[44] The cost of capital relative to the price of labour decreased throughout the eighteenth century and it was this price mechanism that has been used to explain why the industrial revolution occurred in Britain and not elsewhere: G. von Tunzelmann, *Steam Power and British Industrialisation to 1860* (Oxford, 1978), pp. 45–59; Allen, *British*, pp. 140–4.
[45] Farey, *General*, p. 338.
[46] Allen, *British*, pp. 164–76.
[47] Kirkham, 'Steam' pp. 70–9.
[48] Brand, 'Steam', pp. 286–7.
[49] Kirkham, 'Steam', pp. 71–2.
[50] Tunzelmann, *Steam*, pp. 62–7; J. Tann, 'Fixed Capital Formation in Steam Power, 1775–1825', in C. Feinstein and S. Pollard, *Studies in Capital Formation in the United Kingdom, 1750–1920* (Oxford, 1988), pp. 172–8. For more on importance of coal, see: J. Nef, *The Rise of the British Coal Industry* (London, 1932), pp. 165–89; M. Flinn, *History of the British Coal Industry*, II: *1700–1830: The*

Table 5.2: *Selection of steam engines installed at Derbyshire Lead Mines, c.1729–1825*

Location	Date installed	Estimated cost of steam engine (excluding installation costs)
Yatestoop (Winster) 1st	1720	NA
Yatestoop (Winster) 2nd	1724	NA
Yatestoop (Winster) 3rd	1730	NA
Portaway (Winster)	1740	£3,000 (including installation)
Mill Close Mine (Darley Bridge) 1st	1748	£2,000
Oxclose Mine (Snitterton)	1748	£503 15s. 3d.
Watergrove Mine (Foolow) 1st	1748	NA
Stoneylee (Youlgreave)	1750	£4,000 (including installation)
Cowclose Mine (Elton)	1755	NA
Placket Mine (Winster)	1767	£1,460
Gregory Mine (Ashover) 1st	1768	£246 4s. 2d.
Calver Mill Sough	1774	£486
Dalefield Mine (Snitterton)	1776	NA
Yatestoop (Winster) 4th	1777	NA
Gregory Mine (Ashover) 2nd	1781	£2,180*
Yatestoop (Winster) 5th	1782	NA
Watergrove Mine (Foolow) 2nd	1794	NA
Westedge Mine (Ashover)	1794	NA
Gregory Mine (Ashover) 3rd	1796	£272
Magpie Mine (Sheldon)	1824	£800
Watergrove Mine (Foolow) 3rd	1830	£2,400

*The estimate for this engine was based on the average price of a new Boulton & Watt engine at 50hp, see: Tann, 'Fixed', p. 175; combined with additional expenses for new equipment, mentioned in the D1101/L/4.
Sources: Farey, *General*, pp. 337–8; Nixon, 'Early', pp. 17–22; Kirkham, 'Steam', pp. 69–88.

one of the few mines for which data is available, a total of £26,647 was spent fuelling its three steam engines between 1782 and 1803, comprising an average of 19 per cent of total expenditure during the same period, and rising incrementally from 15 per cent in 1782 to 30 per cent by 1802 (see figure 5.1).

As may be gathered from the above, circulating capital remained the largest financial hurdle for proprietors of large capital–intensive mines throughout the eighteenth century. At Gregory Mine, of the £138,066 spent between 1782 and 1803, 75 per cent was spent hiring and contracting labour in both mine construction and ore extraction. This included not only miners, but also a variety of local tradespeople, surveyors, overseers and clerks, responsible for administration and upkeep. [51] The same can be said for Miners Engine mine in the parish of Eyam, where labour costs were in the region of 70 to 75 per cent of total expenditure, and

Industrial Revolution (Oxford, 1984), pp. 442–57; Wrigley, *Continuity*, pp. 68–98; Allen, *British*, chp. 4.
[51] D1101/L/4–5: Gregory Mine Reckoning Book.

amounted to an average of £750 per annum. Sough construction was no less labour–intensive, with expenditure on materials and fixed capital constituting a comparatively small proportion of the overall bill, while labour costs could range from anywhere between £5 and £10 per yard depending upon rock–type and the depth of operations.[52] In the case of steam engines, the cost of installing the machine was usually far in excess of its asking price, and simultaneously created a demand for additional skills and competencies in mechanical engineering, which, in the case of the Derbyshire lead industry, appears to have been met predominantly by the local mining community.[53] The shift towards more capital–intensive mining ventures did not, therefore, represent a 'marginalisation' of the skilled artisan miner during the eighteenth century; on the contrary, the ability to delve ever deeper and unlock new ore deposits appears to have increased the overall demand for skilled labour without negatively impacting more traditional forms of industrial organisation.[54] It is clear, therefore, that any future research into the rate of capital formation at the Derbyshire lead mines must take account of the fact that at small, medium, and large mining ventures alike, investment in circulating capital, such as labour, fuel and work materials, continued to absorb a substantial share of total capital investment, and that the burden of fixed capital, on machinery, structures, and mine workings, remained marginal until well into the nineteenth century. For present purposes, however, this distinction between fixed and circulating capital is immaterial, what is of particular importance is the large quantity of local capital resources demanded by the Derbyshire lead industry during this period, to say nothing for capital investment in smelting furnaces and in the mercantile elements of the industry.[55]

[52] Kirkham, *Derbyshire*, pp. 86–7; *Ibid*, pp. 263–4; Honeyman, *Origins*, pp. 23–4 and 30.
[53] Evidence suggests that the new generation of skilled engineers and tradespeople were sourced from within the established mining community, see especially the examples of Francis Thompson and Thomas Southern in Nixon, 'Early', pp. 6–17.
[54] Wood, *Politics*, pp. 116–8. For more on this discussion see chapters two and three above.
[55] For useful studies of smelting see in particular: Kiernan, *Derbyshire*, pp. 164–91; L. Willies, 'Derbyshire lead smelting in the eighteenth and nineteenth centuries' *BPDMHS*, 11(1), pp. 1–19.

Estimating the rate of capital formation in Derbyshire's transportation network from the middle to the late eighteenth century poses a series of different challenges to those observed above in the case of the lead industry. Farey's largely positive view of the county's 'connectedness' at the turn of the nineteenth century has already been noted; yet, like many commentators and surveyors of this period, his aim was not to confirm the status quo, but to challenge it under the banner of improvement.[56] In the conclusion to his *General View*, Farey makes eighteen recommendations for the improvement of the county's road network, including: changes to turnpike regulation to make the formation of trusts less costly, the planning of 'new lines of Road' to avoid 'Hills &c.', the appointment of a 'Board of Roads and Bridges' to audit accounts of turnpike trusts, new methods for the construction of carriages and carts to help reduce damage caused to road surfaces, and an overhaul of the methods and materials used in road construction.[57] As for canals, he gives just eight recommendations centred on increasing connectivity between canal and rail infrastructure and simplifying the bye–laws governing trade and building work along its route.[58] Based on these and other criticisms levelled by county

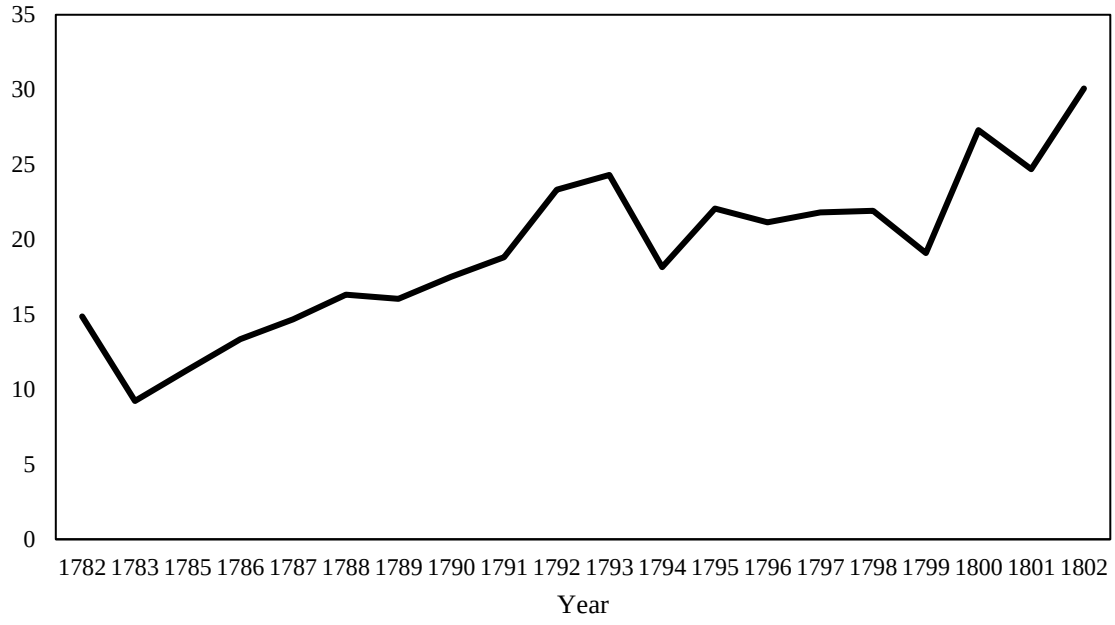

Figure 5.1: *Graph showing Coal as a percentage of total expenditure at Gregory Mine, 1782–1803*. Source: DRO D1101/L/4–5: Gregory Mine Reckoning Book.

[56] A. Briggs, *The Age of Improvement, 1783–1867* (London, 1959), pp. 36–50; Slack, *Invention*, esp. chps. 6 and 7.
[57] Farey, *General*, pp. 677–9.
[58] *Ibid*, pp. 679–80.

surveyors and reformers of the nineteenth century, generations of historians, including W. T. Jackman, Sidney and Beatrice Webb, Phyllis Deane and W. A. Cole, have subscribed to the view that eighteenth century road and canal improvements were largely defective and inadequate prior to the commencement of the 'Railway Age' and the great reforms of the nineteenth century.[59] More recently, William Albert, Eric Pawson, John Ginarlis, and Dan Bogart in the case of turnpikes, and Michael Freeman, Gerard Turnbull, Phillip Bagwell, Peter Lyth and many others in the case of canals and river navigations, have helped redress these imbalances in the historiography of transport, and contributed to a revision of the roles played by different modes of transportation in the so called 'transport revolution' of the eighteenth and nineteenth centuries.[60] It is now widely agreed that improvement in road and water navigation played a significant role in boosting economic and industrial growth during this period, and far from representing chaotic, disorganised and even corrupt institutions, as Jackman and the Webbs claimed, turnpike and canal improvements, together with coastal, and river transport, formed a coherent, well–orchestrated and efficient transportation network by the turn of the nineteenth century.[61]

[59] S. Webb and B. Webb, *English Local Government: The Story of the King's Highway* (London, 1913), pp. 125–6; W. Jackman, *The Development of Transportation in Modern England* (London, 1962 ed.), pp. 250–8 and 415–35; T. Ashton, *Economic History of England* (Cambridge, 1955), pp. 70–8; Deane and Cole, *British*, pp. 238–9.

[60] Turnpikes, see: W. Albert, *The Turnpike Road System in England, 1663–1840* (Cambridge, 1972); E. Pawson, *Transport and Economy* (London, 1977); J. Ginarlis and S. Pollard, 'Roads and Waterways, 1750–1850', in Feinstein and Pollard, *Studies*, pp. 182–224; D. Bogart, 'Did turnpikes trusts increase transportation investment in eighteenth–century England', *JEH*, 65(2) (2005), pp. 439–68; D. Bogart, 'Turnpike trusts and the transportation revolution in 18th–century England', *EEH*, 42(4) (2005), pp. 479–508. Canals, see: M. Freeman, 'Transporting methods in the British cotton industry during the industrial revolution', *Transport History*, 1(1), (1980), pp. 59–74; G. Turnbull, 'Canals, coal and regional growth during the industrial revolution', *EcHR*, 40(4) (1987), pp. 537–560; P. Bagwell and P. Lyth, *Transport in Britain: From Canal Lock to Gridlock* (London, 2002).

[61] Bagwell and Lyth, *Transport*, pp. 19–20 and 41–42.

The growing importance of turnpike and canal improvements during this period is revealed by the substantial amount of capital they absorbed at the national level. Figure 5.2 depicts Ginarlis's estimates for gross expenditure on roads and canals between 1750 and 1850. It reveals that overall expenditure levels were similar in both cases, for much of the period in question, with peaks in the 1790s and 1820s and slumps during the 1780s and 1810s.[62] But, while the trend in gross expenditure was similar for both, the capital requirements of individual turnpikes and canals were markedly different. According to parliamentary surveys there were between 20,000 and 30,000 miles of turnpike road by 1823, and 3,000 miles of canal, and if, as Bogart and Ward state, total investment in turnpikes and canals had reached £10 million and £17 million respectively by the 1820s, then it suggests gross investment per mile of £300 for turnpikes and £5,500 for canals.[63] Aggregate data also shows that both forms of infrastructural

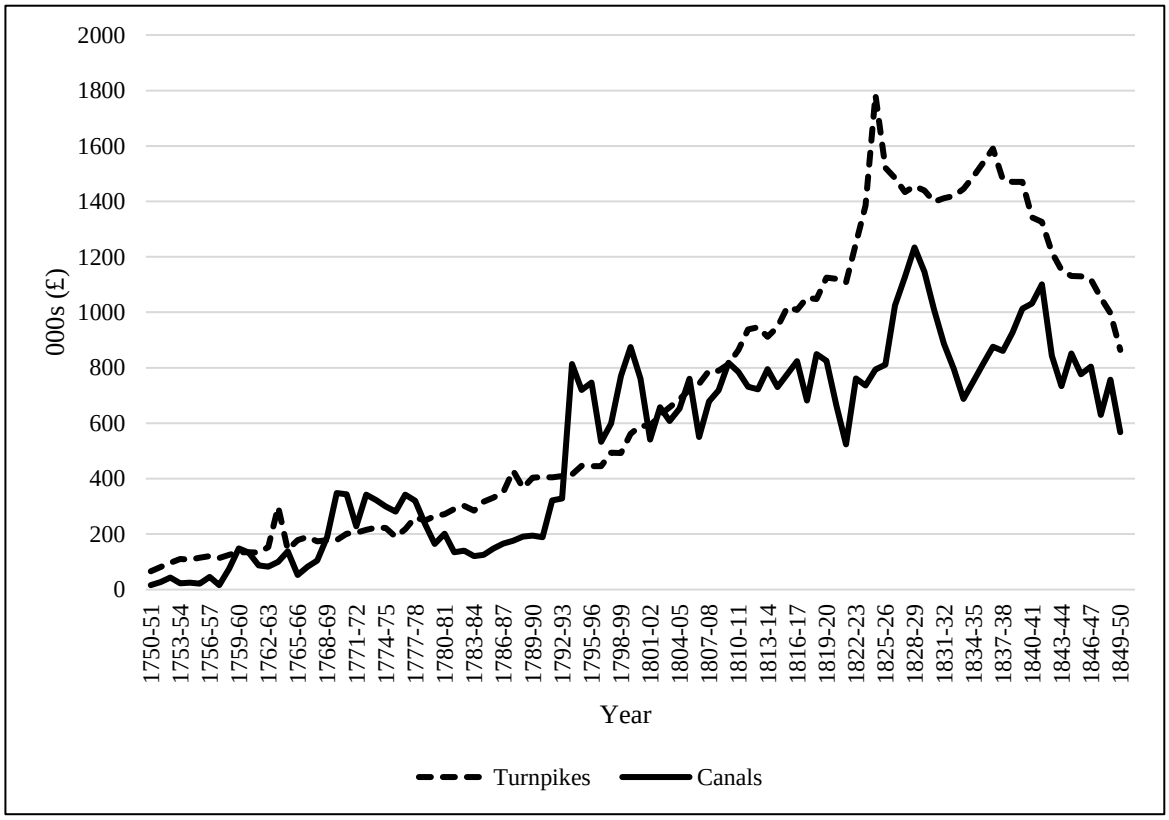

Figure 5.2: *Annual 'Quasi–net' investment in turnpike and canal improvements, Great Britain 1750–1850*. Source: J. Ginarlis and S. Pollard, 'Road and Waterways, 1750–1850' in Feinstein and Pollard, *Studies*, Table 8.8.

[62] Ginarlis and Pollard, 'Roads', pp. 216–24.
[63] Ward, *Finance*, p. 73; D. Bogart, 'The transportation revolution in industrialising Britain: A survey', *IDEAS*, (2013), p. 13.

improvement had important impacts on the national economy. Bogart, for example, has argued that turnpike improvements triggered a fourfold increase in capital expenditure on roads, a 40 per cent reduction in freight charges and a 60 per cent reduction in travel times during the late eighteenth and early–nineteenth centuries.[64] While Turnbull, in his examination of the regional impact of canals measured a marked fall in the price and a threefold increase in the production of coal in Lancashire as a result of the construction of the Leeds and Liverpool Canal in 1773.[65]

In the case of Derbyshire, evidence for turnpike expenditure during the eighteenth century is limited by the low survival rate of trust accounts for the period 1750 to 1800. What evidence that has survived indicates similar patterns to those observed at the national level. Using data collected from parliamentary returns by Ginarlis, it has been possible to produce an estimate for gross investment in turnpike improvements in Derbyshire between 1740 and 1840.[66] By calculating the average amount spent per mile by 22 turnpike trusts between 1822

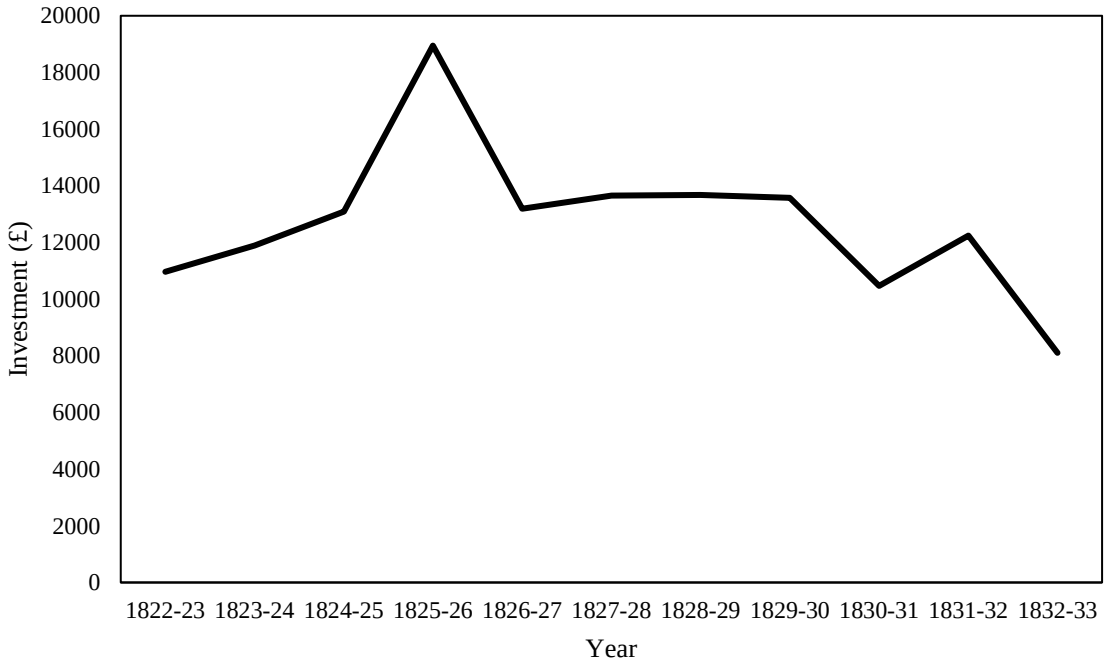

Figure 5.3: *Annual expenditure for 22 turnpikes in Derbyshire, c.1822–1833.* Source: J. Ginarlis, 'Road and Waterway Investment in Britain, 1750–1850', unpublished PhD thesis, (Sheffield, 1970), pp. 301–4

[64] D. Bogart, 'Turnpike trusts and the transportation revolution of 18th–century England', *EEH*, 42 (2005), pp. 479–508.
[65] Turnbull, 'Canals', pp. 537–60.
[66] Ginarlis, 'Road', pp. 301–4.

and 1833, and factoring in those trusts not covered by Ginarlis's sample, it has been estimated that around £1,489,348 was spent by 40 trusts on constructing and maintaining over 607 miles of turnpike road between 1740 and 1840.[67] While this estimate is far from perfect, it offers a plausible figure for 100 years of turnpike expenditure, and reflects the particular attention given to the road network by Derbyshire's investment community during the eighteenth and early nineteenth centuries.[68]

Estimating capital investment in Derbyshire's canal network is in some ways simpler and in other ways more challenging than in the examples discussed above. The process is aided by the novelty of the canal system, which in contrast to turnpikes, had no pre–existing infrastructure upon which to build, thus, differentiating between investment in the formation of new capital and the adoption or expansion of existing assets is made simpler. There are also an abundance of contemporary sources, including canal minute books, newspapers, correspondence, and the parliamentary acts for the creation of a canal company, which help to retrace the construction process and provide insights into the way canals were financed.[69] The totals presented in table 5.3 were constructed using these and other sources, including surviving account books and contemporary printed works.[70] They reveal discernible peaks in capital formation during the 1770s and 90s, and dips during the 1780s and 1810s. These trends mirror

[67] The total for the 22 trusts covered by Ginarlis's sample was £876,087, for those 18 not included it was £613,261. The estimate also took into account the much higher levels of expenditure in the turnpikes first two years of activity, and the subsequent drop to a stable average thereafter, see: Pawelski, 'Turnpikes', pp. 65–9.

[68] Farey, *General*, III, p. 476.

[69] See in particular: C. Richardson, *Minutes of the Chesterfield Canal Company* (Chesterfield, 1996); H. Potter and P. Riden (eds.), *Minutes of Meetings of the Cromford Canal Company, 1789–1799* (Chesterfield, 2015). For other sources for Derbyshire and East Midlands canals, see especially: C. Hadfield, *The Canals of the East Midlands (including part of London)*, (London, 1966), pp. 30–46; J. Ward, *The Finance of Canal Building in Eighteenth-Century England* (Oxford, 1974), pp. 18–78; C. Richardson, *The Waterways Revolution from the Peaks to the Trent, 1768–1778* (Worcestershire, 1992). For more on the use of canal acts see: Ginarlis and Pollard, 'Roads', pp. 219–20.

[70] For useful contemporary works see especially: J. Philips, *A General History of Inland Navigation* (London, 1792); Farey, *General*, III, pp. 290–456; J. Priestley, *Historical Account of the Navigable Rivers, Canals and Railways, of Great Britain* (London 1831). Existent canal records are predominantly kept at the National Archives under the Rail Company collections that later took over the management and upkeep of Britain's canal network, see especially: TNA, RAIL 817: Chesterfield Canal Company, 1769–1780; TNA RAIL 803: Ashby–de–la–Zouch Canal Company, 1781–1845; DRO M689: Microfilm copy of committee minutes and cash book, 1789–1852; TNA RAIL 828: Erewash Canal Company, 1777–1932; TNA RAIL 854: Nottingham Canal Company, 1791–1802.

those revealed at the macroeconomic level in figure 5.2, and support the hypothesis presented by Ginarlis and others, that canal investment was particularly susceptible to economic fluctuations during periods of war.[71] This compliance with national trends creates confidence in the data, while the gross figure of £1,113,236 for fixed capital investment in canals between 1766 and 1805, sits neatly with aggregate trends.

There are also limitations to this data, however. First, it is important to note that the totals expressed in table 5.3 offer very little insight into how much was spent by canal companies on different aspects of the construction process, whether on labour, materials, building work, maintenance or repairs. Second, the assumption that canal construction had a clearly defined beginning and end point is at odds with the evidence drawn from canal minute books. The majority were opened in stages, with tolls used to help finance subsequent work and to contribute to ongoing repairs and maintenance.[72] This complicates the picture, as it suggests that parliamentary sources, which include an estimate for total expenditure prior to the commencement of work, inherently understate total capital investment in canal construction.[73] Finally, as in the case of lead mines and turnpikes, there is the more general problem of accounting for the contributions made by labour in the process of capital formation. Most of the capital sunk into canal construction was spent employing labourers to dig channels, build warehouses and install locks, while the actual value of fixed capital assets, or the so–called 'bricks and mortar' of the project, constituted a comparatively small proportion of overall expenditure.[74] As has been noted by Feinstein, Pollard and several others, this creates problems when differentiating fixed from circulating capital investment, as it was common for proprietors of the eighteenth century to utilise short term credit contracts in the payment of labourers' fees, and thus to draw upon circulating, rather than fixed, capital resources.[75] This is significant as it

[71] Ginarlis and Pollard, 'Roads', p. 222. See also: Ashton, *Economic*, pp. 63–91.
[72] Cromford Canal was partially opened in the year 1792 and collected £1,054 in toll receipts, in 1793 that figure rose to £3,137, and the year after the canal was opened in its entirety, see: Potter and Riden, *Minutes,* pp. xvii–xix.
[73] See especially: Pollard, 'Capital', pp. 75–91; Ginarlis and Pollard, 'Roads', p. 222.
[74] For a detailed description of the construction process, see: C, pp. 50–68.
[75] Pollard, 'Fixed', pp. 305, 310–1; 'Discussion 4' in J. Higgins and S. Pollard, *Aspects of Capital Investment in Great Britain, 1750–1850* (London, 1977), pp. 149–57; Feinstein, 'Capital', pp. 59–63.

again alludes to the importance of local credit networks in the financing of capital ventures and their embeddedness in local society during the eighteenth and early nineteenth centuries.[76]

Table 5.3: *Cost of canal construction in Derbyshire, 1750–1800*

Canal	Period of Construction	Length (Miles)	Estimated Cost
Trent and Mersey	1766–1777	93 1/2	£334,250
Chesterfield	1771–1777	46	£160,000
Erewash	1777–1779	12	£21,000
Cromford	1789–1794	14 1/2	£80,000
Nottingham	1792–1796	26	£45,185
Nutbrook	1793–1796	½	£22,801
Derby	1793–1796	22	£90,000
Ashby–de–la–Zouch	1794–1804	31	£180,000
Peak Forest	1794–1805	20	£180,000
Total	1766–1805	265 1/2	£1,113,236

Sources: Farey, *General*, III, pp. 290–456; Hadfield, *Canals*, pp. 30–46

Finally, the process of capital formation in the early cotton industry has benefited from detailed and wide–ranging research by generations of historians, keen to observe processes of change in what is widely considered the most technologically and organisationally advanced industry of the period.[77] Yet, the majority of works in capital formation have downplayed its revolutionary character. Stanley Chapman, for instance, concluded that 'the longer one looks at the early cotton industry under the microscope, the less revolutionary the early phases of its life–cycle appear to be.'[78] Similarly, Michael Edwards observed 'that the traditional theories about the industry's development' have tended to 'put too much stress on the technological changes and their effects on the structure and organisation of the trade.'[79] This well-established consensus has since been challenged by Philip Richardson and others, who have scrutinised the methodologies, terminologies and sources used in the calculation of 'fixed capital ratios'.[80] Yet, despite these valid considerations, the balance of evidence suggests that the demand for fixed capital, especially in the initial phases of the cotton industry's development were low relative

[76] For local aspects of capital investment in the case of turnpike and canal improvements, see: Hadfield, *Canal*, pp. 42–50; Albert, *Turnpike*, pp. 100–8; Ward, *Finance*, pp. 97–125.
[77] For a useful overview of the literature, see: Daunton, *Progress*, pp. 173–205.
[78] S. Chapman, 'Fixed capital formation in the British cotton industry, 1770–1851', p. 253.
[79] M. Edwards, *The Growth of the British Cotton Trade, 1780–1815* (Manchester, 1967), p. 215.
[80] P. Richardson, 'The structure of capital during the industrial revolution revisited: Two case studies from the cotton textile industry', *EcHR*, 42(4) (1989), pp. 485–8.

to the demand for circulating capital and in comparison with other industries and sectors.[81] Central to this orthodoxy are a set of widely held views concerning the industry's capital structure during the early stages of growth. In an influential article, Pollard stressed the relatively low levels of initial capital resources required to commence operations in the cotton industry, which he argued 'allowed the smaller firm, in particular, to enter the production circle with only a small fraction of the capital it ultimately used'.[82] As in the case of the lead industry, this gave rise to a complex and multi–layered network of small and medium sized ventures, organised and financed at the level of the household economy, alongside large capital–intensive firms financed by partnerships of investors.[83] In case of the Derbyshire cotton industry, Farey notes 'the rapidity' with which 'the different manufacturing Establishments were accumulated', which in his words appeared to 'spring forth' from nowhere. In the parish of Glossop, for example, he relates how at the beginning of the 1780s 'only one Mill existed, appropriated to the making of Oatmeal for its few Agricultural inhabitants; yet at the time of collecting my notes (1809), out of the 112 cotton mills of the county… half of these were found in this Parish.' Thus, the growth observed by Farey was varied, with large, purpose–built, and capital–intensive, mills and factories, appearing alongside a host of smaller, family–run ventures, housed in converted corn mills, cottages and family workshops.[84]

Table 5.4: *Capital investment in Derbyshire's cotton mills organised by type, c.1770–1810*

Type	Amount invested	No. of Mills
A	£17,350	12
B	£96,800	26
C	£62,550	5
Total	£176,700	43

Source: Chapman, 'Fixed', pp. 264–5

[81] For a useful summation of the literature on evolution in the development of the factory system, see: D. Farnie, 'Cotton, 1789–1914' in D. Jenkins (ed.), *The Cambridge History of Western Textiles*, II (Cambridge, 2003), pp. 721–61.
[82] Pollard, 'Fixed', p. 309.
[83] Chapman, *Early*, pp. 15–33.
[84] Farey, *General*, III, pp. 498–9.

Accurately accounting for the capital requirements posed by the full range of cotton manufactories thus represents a major challenge to historians, and as in the case of the lead industry, the required evidence to support such valuations are scarce.[85] The most detailed study of the Derbyshire cotton industry for the eighteenth century remains that produced by Chapman using data drawn from insurance registers housed in the Sun Fire Office and Royal Exchange archives.[86] He identifies three basic types of cotton manufactory: types 'A, B and C'.[87] Type A comprised the smallest ventures, powered predominantly by horse and man, and centred on the workshops, warehouses and cottages of tradespeople and successful artisan producers, with valuations for premises of up to £2,000. Type B represent those mills powered by water on the Arkwright principal, valued between £2,000 and £6,000. While type C mills comprised the largest cotton ventures, were powered almost entirely by steam engines, and were particularly common in the mill towns and cities of Lancashire and Scotland, with valuations in the region of £10,000 to £15,000.[88] Table 5.4 shows the amount of capital invested in Derbyshire's mills on the basis of their 'type'. As may be gathered, the data significantly understates the volume of smaller manufactories – comprising just 26 per cent of the sample – while the total number of factories sampled (46) is around a third of that mentioned by Farey (112) during his tour of the region at the turn of the nineteenth century.[89] Nevertheless, the sample is sufficiently large to illustrate the comparatively limited fixed capital requirements of the early cotton industry with just £176,700 invested in fixed capital across the largest 46 ventures in the county between 1770 to 1810 (see table 5.5). Finally, as table 5.6 demonstrates, there were clear links between the location of the burgeoning cotton industry in Derbyshire, and that of the gradually declining

[85] For issues related to availability of evidence, see: Richardson, 'Structure', pp. 486–7.
[86] For assessment of insurance valuations as sources for exploring capital formation, see: Chapman, 'Fixed, pp. 253–6; S. Pollard, 'The insurance policies', in Feinstein and Pollard, *Studies*, pp. 225–56
[87] Chapman, 'Fixed, pp. 238–41.
[88] *Ibid*, pp. 242–8.
[89] It is likely that the majority not covered by Chapman's data were smaller and less capital–intensive mills, see his explanation of coverage: *Ibid*, pp. 253–6. For list of Derbyshire mills and their location, see: Farey, *General*, III, p. 485.

lead industry, with 74 per cent of the mills constructed between 1770 and 1810 located in settlements with direct links to the historic lead trade.[90]

Table 5.5: *Capital Investment in Derbyshire's cotton mills organised by decade, 1770–1800*

Decade	Amount invested	No. of Mills
1770	£20,100	6
1780	£63,350	16
1790	£44,500	10
1800	£18,000	2
Total	£145,950	

Source: Chapman, 'Fixed', pp. 264–5

Circulating capital also played a major role in the organisation and financing of the early cotton industry, with saleable stock, credit for payment of wages and bills for the purchase of raw materials, and fuel, constituting a large proportion of total capital outlay.[91] The cotton manufacturing firm: Oldknow, Cowpe & Co. of Nottinghamshire, for example, commencement operations in 1786 with a fixed capital ratio of around 90 per cent, which subsequently fell to lows of between 30 and 40 per cent from the mid–1790s onwards (see figure 5.4).[92] While at McConnel & Kennedy's of Manchester, the fixed capital ratio fluctuated between 70 and 60 per cent in the first 10 years of operations, and then fell to between 50 and 25 per cent from the 1810s.[93] The balance of fixed to circulating capital in both of these well documented cases suggests that while fixed capital outlay may have been higher than previously supposed, the short– and long–term demands posed by circulating capital remained significant. Indeed, in the Derbyshire context, it is likely that circulating capital constituted an even greater proportion of total capital outlay than in the examples discussed above, for, as Chapman has noted, the

[90] Chapman, *Early*, pp. 94–5, 125–44.
[91] R. Fitton and A. Wadsworth, *The Strutts and Arkwrights, 1750–1830: A Study of the Early Factory System* (Manchester, 1968), pp. 240–53, 261–71; Chapman, *Early*, pp. 156–74; Edwards, *Growth*, pp. 216–34.
[92] Chapman, *Early*, p. 126.
[93] Richardson, 'Structure', p. 493.

majority of the county's early cotton mills were constructed using the less capital–intensive 'Arkwright principle'.[94] Thus, the main barrier to entry for Derbyshire's early cotton masters was not amassing the comparatively meagre sums required to finance mill construction and machinery, but rather that of embedding themselves in local mercantile and business networks, which were crucial to gaining access to local reserves of short- and long-term credit, which was so vital to the everyday business of purchasing raw materials and selling goods to customers.[95]

Table 5.6: *Location of Derbyshire cotton mills, c.1770–1800*

Location	Amount invested	No. Mills
Ashover	£3,000	1
Bakewell	£3,000	1
Bamford	£1,000	1
Belper	£23,600	3
Brough	£1,500	1
Chesterfield	£4,800	2
Crich	£3,000	1
Cromford	£7,000	2
Darley Abbey	£6,000	1
Darley Dale	£8,000	2
Derby	£32,000	5
Edale	£3,000	1
Great Longstone	£950	1
Lea	£3,000	1
Matlock	£15,200	3
Tideswell	£5,950	3
Winster	£2,000	1
Wirksworth	£7,200	2
Other	£46,500	11
Total	£176,700	43

Source: Chapman, 'Fixed', pp. 264–5

It is clear, therefore, that the capital requirements posed by Derbyshire's industrial and economic development during the eighteenth and early nineteenth centuries were substantial and varied. The clustered development of industry and infrastructure in the north–west of the county, highlights important trends in the process of capital formation that are difficult to account for in aggregate studies. As has been demonstrated, the demand for capital, and the burden for financing it, were far from evenly distributed within regions and nations during this

[94] Chapman, 'Fixed', pp. 242–3.
[95] Pollard, 'Fixed', pp. 305–7.

period. Localities in north–west Derbyshire, south Lancashire and the West Riding of Yorkshire, witnessed the most rapid change during this period, and it was these localities and regions that consequently bore the brunt of the financial demands posed by rapid industrialisation.[96] Understanding how these localities met their enhanced capital requirements shall be considered in sections II and III.

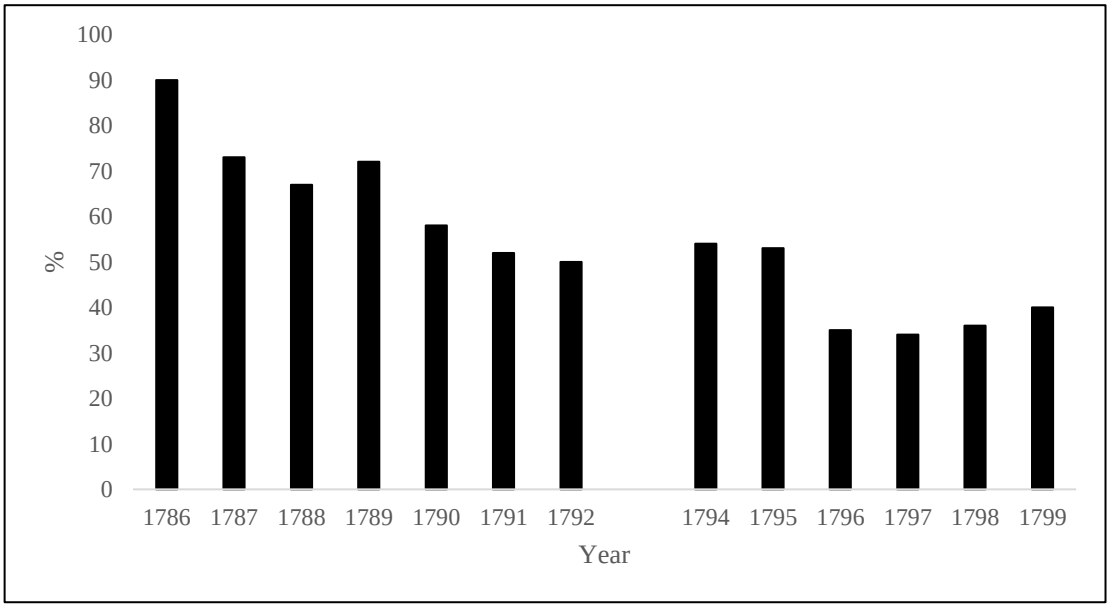

Figure 5.4: *Graph showing fixed capital as a percentage of net capital at Oldknow, Cowpe & Co., Pleasley Mills in Mansfield, Nottinghamshire, c.1786–1799.* Source: Chapman, *Early*, p. 126.

II. *'The reservoirs of savings'*

In the year 1771, a group of 73 investors and proprietors came together and formed the 'Society for the Encouragement of Mining in the Wapentake of Wirksworth' (SEMWW) in Derbyshire (see table 5.7).[97] It comprised a variety of individuals: there were gentlemen, such as Philip Gell of Hopton Hall near Wirksworth, Sir Cecil Wray of Retford in Lincolnshire, and George Goodwin, and his son, of Monyash; notable merchants, bankers and industrialists, including Peter Nightingale of Lea, George Evans of Bonsall, Francis Hurt of Alderwasley, and John Toplis of Wirksworth; alongside an assortment of tradesmen and artisans, including the butcher,

[96] Hudson, 'Regional', pp. 5–38.
[97] For a full list of the subscribers, and an account of this society, see: R. Gould, 'Capital formation in the Wirksworth lead mining industry, 1700–1800', *BPDMHS,* 6(5) (1977), pp. 233–40.

Thomas Hawkes of Dudley, the grocer, Isaac Potter of Wirksworth, the chandler, John Smith of Manchester, the tailor, Thomas Walker of Ashbourne, the rope maker, John Bannister of Wirksworth, the tobacconist, Edward Anderton of Sheffield, and the lead miners, Richard Buxton and John Wright of Middleton and Crich.[98] Of the society's membership 33 per cent lived within 3 miles of the town of Wirksworth, 36 per cent came from other parts of Derbyshire, and the remaining 32 per cent came from outside the county, principally the cities of Manchester, Sheffield, Nottingham, and London. SEMWW's main goal was to encourage capital investment in the lead mines near to the settlement of Wirksworth, and its members agreed to spend 'yearly and every year for ten years £500, to be employed in purchasing mines, or making new trials for the discovery of lead mines within the Soke and Wapentake of Wirksworth.'[99] It was, therefore, a society intent on the expansion of the lead industry, and its members, many of whom were established partners and shareholders of varying degrees in the local lead industry, stood to gain directly from any increases in the flow of capital investment into the locality.

Whether its members fulfilled their obligations, and invested a total of £365,000 over 10 years, is unclear; nevertheless, SEMWW offers a useful starting point from which to view the social and economic origins of capital during the eighteenth century. Immediately, the list presents no clear trend in occupational background, with spinsters and widows, appearing alongside surgeons, butchers and jewellers. There is also no dominant sector of the economy represented, with farmers and miners, appearing alongside ironmongers and merchants. It does, however, comprise a number of serial investors, whose range of interests included the various industries and sectors explored in this present study. Sir Cecil Wray, for example, had interests not only in the lead industry, but also in turnpikes and canals in Derbyshire, Nottinghamshire and his home county of Lincolnshire.[100] The Gell family of Hopton Hall had historic links with the early development of the Derbyshire lead industry, but also played a major role in the

[98] Gould, 'Capital', p. 239.
[99] *Ibid*, p. 240.
[100] Richardson, *Minutes*, p. xxiii.

Table 5.7: *Members of the Society for the Encouragement of Mining in the Wapentake of Wirksworth, 1771*

Name	Location	Name	Location
Sir Cecil Wray	Lincolnshire	Richard Ince	Hindley, Staffordshire
Rev. Olithorne Wray	Darley	Richard Alton	Tipton, Staffordshire
Philip Gell	Hopton, Wirksworth	Joseph Wainwright	Dudley
Francis Hurt	Alderwasley	Joseph Aston	Dudley
William Milnes	Cromford	Thomas Philips	Dudley
Peter Nightingale	Lea	Thomas Hawkes	Dudley
Dr. Philip Gell	Wirksworth	Thomas Ince	Wirksworth
Pearce Galliard	Edmonton	David Woodhouse	Crich
Roger Sedgewick	Manchester	John Saxton	Crich
Immanuel Halton	South Wingfield	Joseph Outram	Alfreton
John Gell	Hopton, Wirksworth	John Sims	Nottingham
John Turner	Birmingham	Richard Buxton	Middleton
John Balguy	Alfreton	Isaac Potter	Wirksworth
John Oldenshaw	Tamworth	Ralph Toplis	Wirksworth
John Barker	Stainsby	Thomas Smedley	Wirksworth
John Wall the younger	Wensley	George Smith	Tansley
Francis Arthington	-	Stephen Gamble	Chesterfield
Francis Bolton (widow)	Darley	Henry Richardson	Derby
Isabella Gell (spinster)	Hopton, Wirksworth	George Richardson	Derby
Temperance Gell (spinster)	Hopton, Wirksworth	Edward Anderton	Sheffield
Mary Evans (spinster)	Cromford	John Smith	Manchester
Sarah Turner	Birmingham	John Wright	Crich
Ann Goodwin	Monyash	Robert Mason	Matlock Bath
Thomas Evans	Derby	Stephen Hall	Middleton
George Evans	Cromford	John Bannister	Wirksworth
Richard Leigh	Manchester	John Salt	Wirksworth
Daniel Whittaker	Manchester	Will Loxley	Bonsall
Lawrence Garden	Manchester	Samuel Simpson	Derby
John Toplis	Wirksworth	George Hodgekinson	Ashover
William Toplis	Mansfield	Samuel Taylor	Wirksworth
Philip Tomlinson	Hopton, Wirksworth	Julius Caesar Robiglo	Ashbourne
George Goodwin	Monyash	Thomas Walker	Ashbourne
George Goodwin	Monyash	Daniel Glossop	Derby
John Reynolds	Crich	George Brearby	Derby
John Jacob	London	John Webster	Belper
Joseph Holebrook	London	John Hodan	Dudley

Source: Gould, 'Capital', table 4. Also: BL Woolley MSS. 6680 120/121.

county's turnpike and canal improvements.[101] Peter Nightingale combined a portfolio of shares in mining ventures, ran smelting and rolling operations from his estate, invested in turnpikes, and also financed the construction and operation of his own cotton mill at Lea in 1784.[102] While George Evans, alongside his brothers Thomas and Edmund, combined a range of interests in mining, smelting, banking, transport and cotton manufacturing.[103] In many respects, therefore, SEMWW offers a microcosm of the wider investment community of not only the lead industry, but of Derbyshire more generally. It was diverse, both socially and economically, it combined a range of occupational backgrounds, there were leading figures amongst a broader mass of smaller – though no less important – middling contributors, and its membership was

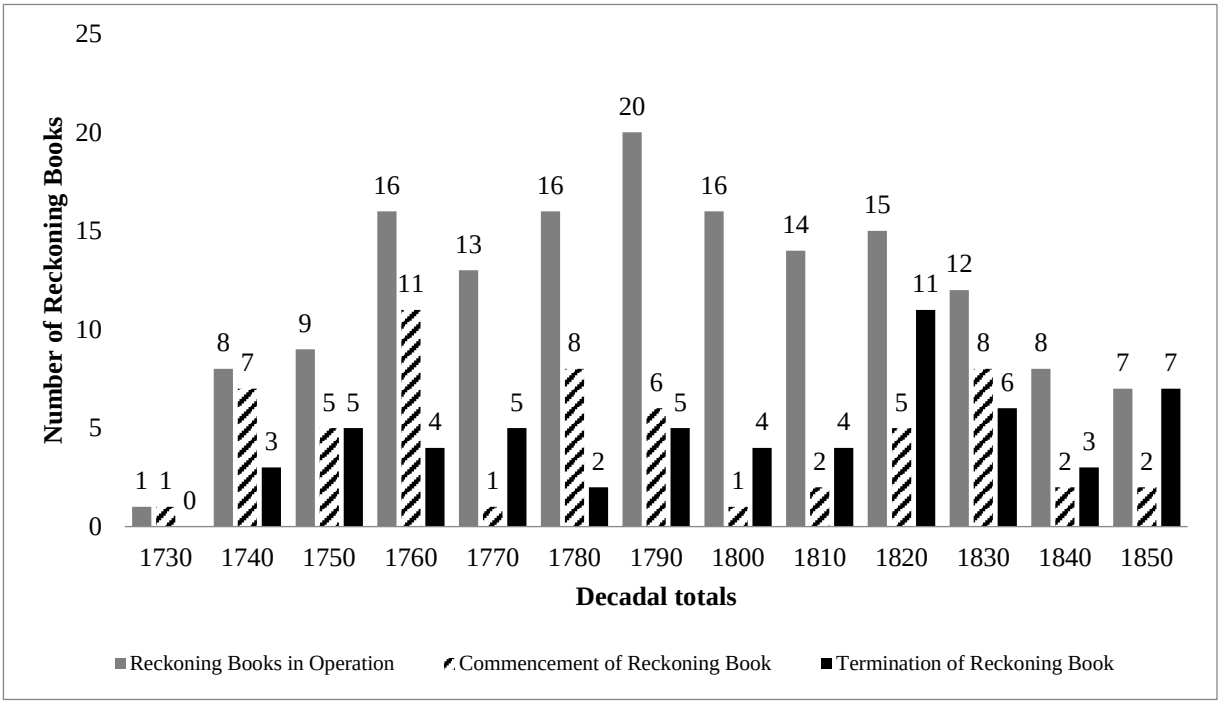

Figure 5.5: *Graph showing the distribution of reckoning books sampled between, 1730 and 1850.* Source: See collection of reckoning books found in DRO D1101: Papers of the Bourne family of Ashover, 1645–1804; D1154/G/L: Lead mining records of the British Speleological Association; D3305: Lead mining records for Bradwell liberty; D5430: Wright of Eyam Hall: family and estate papers; D7676: Bagshawe Collection, amongst others.

[101] R. Slack, 'The later Gells and the decline of the lead trade', *BPDMHS*, 14(2) (1999), pp. 9–14.
[102] See especially family archives: D1575; D3585. See also: S. Chapman, 'Peter Nightingale, Richard Arkwright, and the Derwent Valley Cotton Mills, 1771–1818', *DAJ*, 133 (2013), pp. 166–88.
[103] For discussion of Evan's family lead and cotton interests, see: J. Lordsay, 'An early industrial community: the Evans cotton mill at Darley Abbey, 1783–1810', *Business History Review*, 34 (1960), pp. 277–301. For their role in financing early cotton ventures as bankers, see for example: Fitton and Wadsworth, *Strutts*, pp. 240–4; Chapman, *Early*, pp. 94–5; Edwards, *Growth*, p. 231. For their involvement in canals, see: Chapman, *Early*, p. 151; Potter and Riden, *Minutes*, p. xxx.

predominantly local, with auxiliary investors drawn mostly from neighbouring counties and regions with long established trade links to the mining region. In this section, the representativeness of this core of notable investors and proprietors shall be tested, first, against evidence compiled for the lead industry, and then for turnpikes, canals and the cotton industry. It is hoped that in so doing broader trends in the social and economic origins of capital during the eighteenth and nineteenth centuries may be revealed.

Beginning with the lead industry, table 5.8 presents the social and occupational origins of 273 shareholders at 59 lead mines in Derbyshire between 1730 and 1850. The data was compiled from surviving reckoning books, which included comprehensive lists of shareholders, alongside income, expenditure and profit accounts. The principal aim of the reckoning book was to monitor the amounts owed by and to the shareholders of lead mines, and as such, they provide a useful source for exploring the social origins of capital at the Derbyshire lead mines. As noted above, survival rates are comparatively low, and there is a clear bias toward large capital–intensive operations, which were more likely to employ agents and clerks to produce regular and detailed accounts. Yet, despite these limitations, figure 5.5 shows that the coverage of the sample resembles the pattern of growth and decline in the industry more generally during the eighteenth and nineteenth centuries – with a gradual rise from the 1730s to a peak in the 1780s and 90s, followed by decline to the 1850s.[104] The shareholders were identified using detailed searches of published work by historians and contemporaries, lists of families, pedigrees and occupations in trade directories and gazetteers, parish records (including marriages, inventories and wills), as well as circumstantial evidence gleaned from accounts and correspondence.[105] The process was far from straightforward, there were, for example,

[104] G. Hopkinson, 'Five generations of Derbyshire lead mining and smelting, 1729–1858' *DAJ*, 78 (1958), pp. 9–10; Kirkham, *Derbyshire*, pp. 113–8; Willies, 'Prosperity', pp. 274–9; Burt, *British*, pp. 95–107.

[105] Sheffield and Manchester trade directories are freely available at Manchester and Sheffield City Libraries, and may also be accessed via www.archive.org.uk. Derbyshire directories, especially for the eighteenth century are uncommon, though a number of pedigrees and nineteenth century directories proved helpful, and can be accessed at the Derbyshire County Library. For helpful guide to Derbyshire directories, see: P. Riden (ed.), *Derbyshire Directories 1781–1824* (Chesterfield, 2006). For select printed works with helpful references, see especially: Pilkington, *View*; Farey, *General*, I–III; S. Glover, *The Directory of the County of Derby*, II (Derby, 1829); T. Noble (ed.), *The History and Gazetteer of the*

discrepancies in the use of titles such as 'yeoman' or 'husbandman', which were often ascribed in wills and inventories to individuals who had spent the majority of their working lives in a trade.[106] The process of identifying shareholders from outside the county was also problematic, and often required a detailed examination of the social networks of known Derbyshire shareholders to detect likely candidates. Owing to these difficulties, the geographic origins of shareholders have been excluded from table 5.8 and shall be dealt with separately below.

Table 5.8: *Social origins of mine shareholders at 59 lead mines in Derbyshire, c.1730–1850*

Title	Aristocracy	Gentry	Merchants	Yeomen/ Husbandmen	Tradesmen/ Miners	Women
Class	I	II	III	IV	V	VI
Number	9	50	66	85	34	19
Percentage	3	21	23	31	12	7

Source: Sample of 59 reckoning books, see source for figure 5.4.

An important feature of the evidence presented in table 5.8 is the significant role played by the 'middling sort'. Together the categories of 'Yeomen/Husbandmen' and 'Tradesmen/Miners' comprised 119, or 43 per cent, of the 273 shareholders examined, which remained consistent throughout the eighteenth century, and only began to drop from 1810 onwards.[107] Of this sample, less than a dozen were identified as 'miners', while the majority were farmers, shopkeepers, and tradesmen in other industries. It seems many who had the resources to invest in shares also had the resources to invest in land, and so often claimed the status of yeoman or husbandman, despite coming from a mining background. George Heyward, for example, commenced his career as a miner in the parish of Bakewell, acquired the position of mine agent at several ventures during the 1730s, used his earnings from these endeavours to purchase land and livestock, and by the commencement of his estate accounts in 1752, was

County of Derby, I–II (1831–1833); C. Glover and P. Riden (eds.), *William Woolley's History of Derbyshire* (1981). Parish records were also widely used, and are housed at the DRO, while probate inventories and wills for Derbyshire are located at the DRO and SRO. www.Ancestry.co.uk proved helpful in scouring these sources.

[106] For more on the problematic nature of these sources, see the collection of essays in: T. Arkell, N. Evans and N. Goose (eds.), *When death do us part. Understanding and interpreting the probate records of early–modern England* (Oxford, 2000). See also: Stobart, 'Economic', pp. 143–4.

[107] This contradicts the views presented by Wood, see: *Politics*, pp. 57–65 and 316–25.

earning more from the sale of sheep and cattle than from his exploits in lead.[108] Heyward's experiences testify to the fluidity of social and economic status within the broad category of the middling sort, and the challenges associated with identifying practitioners who often combined farming, trade and retail as part of a diversified middling–household.[109] It is also telling that the contributions made by individuals in these groups tended to be smaller and more locally defined than their wealthier counterparts. The majority owned shares in one or two mining ventures in their local parish, with shares rarely exceeding 1/24th or 1/48th. Overall, the evidence suggests that the character of middling investment was largely defined by the strength and scope of their social networks, and the character of the local economy.[110] The decision to invest shares in a mining venture, as in any financial transaction during this period, relied on trust in the claims made by those seeking capital and credit.[111]

As for the 'Gentry' and 'Merchant' classes, the wider reach of their social networks and their superior financial resources, granted them access to a wider area of potential investment activity. Their combined number was roughly the same as that of the middling sort, totalling 126 or 46 per cent of the shareholders examined, though their individual contributions were far greater, with typical shares ranging between 1/12th and 1/16th, while shares of a 1/4 or 1/2 were not uncommon. Individuals in these categories were also more likely to invest in shares at multiple ventures, and were frequently involved in the organisation and management of large capital ventures. The 'Aristocracy' meanwhile played a comparatively minor role. They comprised just 3 per cent of the shareholders listed, though their individual contributions were on a par with those of their 'Gentry' and 'Merchant' counterparts. Their comparatively limited involvement in the process of capital formation at the Derbyshire lead mines is striking, and indicative of their wider retreat from local economic affairs during the eighteenth and

[108] DRO D7676/467: George Heyward cash book.
[109] See especially: Holderness, 'Rural', pp. 77–81.
[110] Davidoff and Hall, *Family*, chps.5 and 6; Hunt, *Middling*, pp. 22–46; Lemire, *Business*, pp. 16–47; Stobart, 'Economic', pp. 153–8.
[111] Hunt, *Middling*, pp. 22–9.

nineteenth centuries.[112] In contrast, the participation of 'Women' was more substantial than might be expected, comprising 7 per cent of the shareholders listed.[113] The majority came from gentry and merchant families, though several also came from middling backgrounds. Evidence suggests that their patterns of shareholding mirrored those of their male equivalents, with some, such as Mrs Middleton, wife of the lead merchant Robert Middleton, owning shares in several mines along Eyam Edge ranging from 1/8th to 1/24th.[114] Many acquired their shares through inheritance following the death of family members, though a sizeable proportion were actively engaged in the acquisition of shares on their own account, making use of their savings and social connections to speculate on the mineral market.[115]

The majority of shareholders studied, regardless of social status, were not only residents of Derbyshire, but also of the parishes in which the mines were located. At Gregory Mine (see table 5.9), 80 per cent of its shareholders were residents of the parish of Ashover, with local gentry, merchants and middling sort, appearing alongside the parish vicar, widows, miners and tradespeople.[116] Beyond the locality, mines also drew upon the resources of regional investors who operated vast networks of shares and investments in a range of industrial and commercial activities. At the Eyam Edge Mines, the role of regional investors was of particular importance, with large numbers drawn by the promise of windfall profits.[117] At Haycliffe Mine,

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[112] Their role in the early development of the lead industry was, in contrast, substantial, see: Kiernan, *Derbyshire*; Wood, *Politics*, esp. chp. 10. For wide discussion of the role of the aristocracy, see especially: B. Holderness, 'Landlord's capital formation in East Anglia, 1750–1870', *EcHR*, 25(3) (1972), pp. 434–47.

[113] For more on the role of women, see also: Slack, 'Women', pp. 46–8. For more on female shareholders, see: Davidoff and Hill, *Family*, pp. 279–89; M. Freeman, R. Pearson and J. Taylor, "A doe in the city': Women shareholders in eighteenth– and early–nineteenth–century Britain', *Accounting, Business & Financial History*, 16(2) (2006), pp. 265–91.

[114] See reckoning book for Eyam Edge Veins located in the Bagshawe collection, especially: D7676/587.

[115] For similar behaviour in other contexts, see: Erickson, *Women*; M. Finn, 'Women, consumption and coverture in England, c.1760–1860', *HJ*, 39(3), (1996), pp. 703–722; D. Green and A. Owens 'Gentlewomanly capitalism? Spinsters, widows and wealth holding in England and Wales, c.1800–1860', *EcHR*, 56(3), (2003), pp. 510–536; Freeman, Pearson and Taylor, 'Doe', pp. 268–280. For more on female speculative investment in the context of the slave trade, see also: C. Walker, 'Pursuing Her Profits: Women in Jamaica, Atlantic slavery, and a globalising market', 1700–60', *Gender & History*, 26(3), (2014), pp. 478–501. For credit contracts and the Atlantic Economy, see: P. Mathias, 'Risk, credit and kinship in early modern enterprise', in McCusker and Morgan, *Early*, pp.15–35; N. Radburn, 'Keeping 'the wheel in motion': Trans-Atlantic credit terms, slave prices and the geography of Slavery in the British Americas, 1755–1807', *JEH*, 75(3) (2015), pp. 660–89.

[116] DRO D1101/L/4. See also: Hopkinson, 'Ashover', pp. 1–4.

[117] Hopkinson, 'Eyam', pp. 81–2.

for example, John Twigge and William Milnes, both investors at Gregory Mine and residents of the parish of Ashover (see table 5.9), were accompanied by 'Messers Barker and Wilkinson', John Bagshawe of Castleton, Francis Hurt of Alderwasley, and Joseph Clay of Sheffield, all merchants and serial investors in the lead industry.[118] The dense social networks from which these local and regional investors were drawn were vital to the sourcing of capital investment at the Derbyshire lead mines. In view of the patterns of capital flow among miners and local tradesmen, elucidated above, it appears that many must have harnessed their reputations for honesty, credibility and success to attract resources from a mass of eager investors from outside the lead trade, who had no first–hand knowledge of lead mining and whose investment decisions, therefore, must have depended on the reputations of those operating a mine and the assurances received from family, friends and kin closer to the trade.[119] Those investors who came from outside the county meanwhile, were less tightly bound to local credit networks, but

Table 5.9: *Shareholders in Gregory Mine, 1782*

Name	44th shares	88th shares
Sir Joseph Banks (Gentleman)	8	
Robert Banks Hodgekinson (Gentleman)	4	
Messers Barker and Wilkinson (Merchant/Bankers)	9	
Reverend Francis Gisborne (Gentleman/Clergyman)	4	
Messers Milnes & Co. (Merchants)	3	
Reverend John Bourne (Gentleman/Clergyman)	3	
Mr Kirk (Merchant)	2	
Mr Samuel Haslam (Yeoman)	2	
Mr John Haslam (Yeoman)	1	
Mr Thornhill (Gentleman)	1	
Mr John Gratton (Timber Merchant)	1	
Mr John Twigge (Merchant)	1	
Mr Royle (Gentleman)		1
Messers Brassly, Bullock & Cooper (Trades)		1
Mrs Chism (Trades)		1
Mr John Boucher (Trades)		1
Mrs Mary Allen (Miner)*		1
Late Wm Wilmot's Children (Miners)*		1
Late Richard Roberts Children (Miners)*		1
Late William Allen's Children (Miners)*		1

Source: DRO D1101/2 *Label for household not individual.

[118] DRO D7676/387; DRO D1101/L/9.

[119] Speculative investments were common, see for example references to the lead trade in the correspondence of J. Flamsteed: E. Forbes, L. Murdin and F. Wilmoth (eds.), *The Correspondence of John Flamsteed, the First Astronomer Royal*, I–III (Bristol, 1995).

were also less socially diverse. Most acquired information about investment opportunities via business or landed interests in the area, while others might hear of opportunities via advertisements in newspapers or through the operation of agents in London, Edinburgh, and other major cities.[120] Several of the aristocrats observed in table 5.8 fell into this category: Lord John Murray and Sir Archibald Grant, for example, were both eminent Scottish peers who relied upon Derbyshire agents to handle their mineral interests, while others, such as the ironmongers, merchants and industrialists of Sheffield: John Nodder, John Fell, John Watts, and John Simpson, utilised direct links with prominent lead merchants to remain informed of investment opportunities.[121]

The majority of shareholders sampled were also residents of rural communities. Of those living in Derbyshire, roughly 80 per cent were from rural settlements located in the north–west of the county, with very few examples of shareholders from the east or south. The overriding factors determining their pattern of investment appears to have been the reach of their social and financial networks and the proximity of rural industry, with little evidence to suggest that access to urban areas or markets influenced the availability of capital investment.[122] Of the minority residing outside Derbyshire, around 95 per cent came from urban areas mainly located along important trading routes east to Nottingham and Hull along the River Trent, and north to Sheffield toward the River Don. Shareholders from Manchester and London also featured, though again their involvement appears to reflect the social and economic ties between rural suppliers and merchants with their urban customers, rather than the urban core spreading their economic influence on rural peripheries. In summary, the investment community revealed by these sources was socially and economically diverse, but geographically concentrated. Those

[120] For more on the role of agents in the Derbyshire lead industry, see section III below, and especially: L. Willies, 'The Barker family and Wyatt lead mining business, 1730–1875', *BPDMHS*, 8(6) (1983), pp. 333–9.
[121] For more on the Scottish link, and use of agents in Derbyshire, see: L. Willies, 'Sir Archibald Grant of Monymusk Bart: a "Carping Maintainer" and his Derbyshire Agents', *BPDMHS* 12(4) (1994), pp. 23–7. For links between Sheffield ironmongers and the Derbyshire lead industry, see: Hopkinson, 'Eyam', pp. 80–97.
[122] Wrigley, 'Urban', pp. 696–705; Estabrook, *Urbane*, chps. 2 and 3; Stobart, 'Economic', pp. 146–9.

individuals who elected to invest in the lead mines generally did so on the basis of their social and financial ties via the local credit economy, and thus, tended to live in communities near to the mining ventures.[123]

Analysis of shareholders who invested in turnpike and canal improvements reveal similar findings to those observed in the case of the lead industry. In his examination of turnpike finance, William Albert emphasised the 'local nature' of trust investment, and noted that 'although trusts drew loans from a fairly limited area, the investors came from the extremes of position and wealth'.[124] Likewise, in the case of canal finance, John Ward stressed the social diversity of canal investors, and their proportionate contributions to the financing of canal construction. As for their geographical origins, Ward was clear: 'canals were generally financed by persons resident in the localities they served', with additional investors drawn from 'the personal or commercial connections of local men.'[125]

Table 5.10: *The social origins of trustees in the Derby, Duffield, Chesterfield and Sheffield Turnpike, c.1756*

Title	Aristocracy	Gentry	Merchant	Yeoman/ Husbandman	Trades	Women	Unknown
Class marker	I	II	III	V	VI	VII	–
Number	25	146	48	37	44	0	105
Percentage	6	36	12	9	11	0	26

Source: Act of Parliament: 31st May 1754 (London, 1756), pp. 987–1011.

These observations are supported by evidence for the Derbyshire turnpike and canal networks. Table 5.10 reveals the social origins of 402 trustees who subscribed to the Derby, Duffield, Chesterfield and Sheffield Turnpike Trust in 1756.[126] As can be seen, the 'Gentry' comprised the largest single group, totalling 36 per cent of trustees, while the remainder were evenly distributed amongst the other groups. The Aristocracy were noticeably more engaged in

[123] Stobart, 'Economic', p. 155.
[124] Albert, *Turnpikes*, pp. 93–119.
[125] Ward, *Finance*, p. 79.
[126] The sources used to identify these individuals was the same as those used in the construction of table 5.8, see footnote 105.

the financing of turnpikes than in the lead industry, while yeomen and tradesmen appear less prominent. The number of merchants referenced in is also noticeably lower than might be expected, given the benefit such individuals could expect to obtain from the improvement of road transport. Merchants were comparatively easy to identify using directories, correspondence and archives, thus it is unlikely that a significant number were missed in the collation of table 5.10. Instead, evidence from trust accounts and minute books indicates that merchants were more targeted in their allocation of resources, investing heavily in those routes that benefited their interests the most.[127] Francis Hurt and Peter Nightingale, for example, loaned a combined total of over £1,000 to the Wirksworth and Duffield trust in 1757, while the grocer and merchant Richard Milnes of Chesterfield, loaned a similar amount to the Chesterfield and Worksop trust in 1740.[128] Minute and order books also show that merchants, manufacturers and bankers were the most likely to adopt the roles of clerk, treasurer, and surveyor.[129] In the case of the Wirksworth and Duffield trust, for example, the merchant–banker John Toplis of Wirksworth adopted the position of treasurer in 1756, while in the case of the Chesterfield, Matlock, Darley and Rowsley Bridge trust the same role was performed first by John Milnes of Ashover, and later by the merchant–bankers Crompton, Evans & Co. of Derby.[130] Thus, while representing a comparatively small number of trustees, it is clear that merchants exercised a tremendous amount of financial and social influence over trust affairs.[131] This contrasts sharply with the position of 'women', who were not listed amongst the Derby, Duffield, Chesterfield and Sheffield trustees, and are rarely found at other trusts elsewhere in Derbyshire. Their apparent lack of involvement in turnpike investment is significant given their prominent role at the Derbyshire lead mines, though this may reflect wider reservations

[127] Pawelski, 'Turnpikes', pp. 63–9.
[128] *Ibid*, pp. 65–6.
[129] Albert, *Turnpike*, chp. 4.
[130] DRO D6/1/1: Wirksworth Turnpike Order Books, May 1756 – Oct 1811; J. Lindsay, 'An early industrial community: the Evans cotton mill at Darley Abbey, Derbyshire, 1783–1810' *Business History Review*, 34 (1960), pp. 278–80.
[131] Albert, *Turnpike*, pp. 108–13.

surrounding female involvement in public versus private ventures, and the heightened public responsibilities that came with trusteeship. [132]

Table 5.11: *Social origins of investors and shareholders in a selection of Derbyshire canals*

	Social Class								
	Peers	Gentry	Yeomen	Capitalists	Manufacturers	Trades	Professions	Clergy	Women
Canal	I	II	III	IV	V	VI	VII	VIII	IX
Trent and Mersey	44	252	–	101	61	58	47	26	61
%	**7**	**39**	**–**	**16**	**9**	**9**	**7**	**4**	**9**
Erewash	5	53	–	–	–	31	32	7	16
%	**3**	**37**	**–**	**–**	**–**	**22**	**22**	**5**	**11**
Cromford	10	133	40	47	48	46	42	45	49
%	**2**	**30**	**9**	**20**	**10**	**10**	**9**	**10**	**10**
Nottingham	30	126	–	24	90	148	30	22	27
%	**6**	**25**	**–**	**5**	**18**	**30**	**6**	**4**	**5**
Derby	20	141	79	66	54	126	69	23	22
%	**3**	**24**	**13**	**11**	**9**	**21**	**12**	**4**	**4**
Ashby–de–la–Zouch	114	395	106	147	70	307	153	85	123
%	**8**	**26**	**7**	**10**	**5**	**20**	**10**	**6**	**8**
Peak Forest	–	115	37	31	391	49	43	16	21
%	**–**	**16**	**5**	**4**	**56**	**7**	**6**	**3**	**–**

Source: Ward, *Finance*, pp. 18–78.

Analysis of shareholders and investors in Derbyshire's canal network reveals broadly similar trends. The categories used in table 5.11 were adapted from those used by Ward, and though far from ideal are, nevertheless, illustrative of the social and economic diversity of the investment community of Derbyshire during this period. Aside from the Peak Forest Canal, contributions were evenly distributed among the various social groups explored. The role of the Aristocracy was similar to that revealed in the case of turnpikes, while the role of women was more substantial, which seems to mirror their contribution as shareholders in mining ventures. Canal minute books also show that while the financing of canals was democratic, their management and organisation of operations fell principally to the merchant and gentry classes.[133] In the case of the Chesterfield Canal, leadership came chiefly from local lead industrialists, including the aforementioned Barker and Wilkinson consortium, alongside the

[132] Freeman, Pearson, and Taylor, 'Women', pp. 280–87. See also discussion of men, women and trusteeship in Davidoff and Hall, *Family*, p. 211.
[133] Ward, *Finance*, chp. 4.

Cavendish family of Chatsworth Hall, who acted as figureheads for the lead industry. They were joined by merchants and professionals from the towns of Chesterfield, Worksop and Retford, including amongst others: the solicitor Godfrey Heathcote, the merchants John Frith, Samuel Jebb and Richard Milnes, the apothecary, surgeon and former JP of Derbyshire, Adam Slater, and the Chief Magistrate of Chesterfield, Samuel Towndrow.[134]

Identifying the geographical origins of shareholders and investors in turnpikes and canals is complicated by their trans–regional nature. The Derby, Duffield, Chesterfield and Sheffield turnpike, for example, intersected dozens of parishes and urban communities, and serviced a range of industries and sectors. Detailed analysis of its shareholders, however, suggests that the majority were residents of the localities through which it passed: around 60 per cent came from the settlements of Derby, Chesterfield and Sheffield, 35 per cent from other nearby towns and villages, and just 5 per cent from counties and settlements not serviced directly by the turnpike. A similar pattern is revealed in the case of canals.[135] The shareholders of the Chesterfield Canal, for example, comprised 'a mixed circle of North Derbyshire and Nottinghamshire landowners, merchants, and professional men', while its committee was 'carefully balanced to reflect the interests of Chesterfield, Worksop and Retford'.[136] As for the Cromford Canal, around 80 per cent of its investors came from Derbyshire and Nottinghamshire, while the majority of its additional capital requirements were met by local creditors.[137] The localism of infrastructural improvement is further illustrated by the conflicts that arose between different trusts and companies. The creation of the Chesterfield Canal, for example, was resisted by the proprietors of the Don Navigation Company and the business community of Bawtry, while the Cromford Canal was resisted fiercely by the Cromford to Langley Mill turnpike trust, the Erewash Canal Company and Derwent Navigation Company.[138] Thus, despite traversing an array of localities, counties and regions, the social and economic

[134] Richardson, *Waterways*, pp. 27–32.
[135] Hadfield, *Canals*, pp. 30–46.
[136] For detailed study of the Chesterfield Canal, see: Richardson, *Waterways*. For quote, see: Riden, 'Introduction' in Richardson, *Minutes*, p. x.
[137] Ward, *Finance*, p. 39; Potter and Riden, *Minutes*, pp. xii–xiii.
[138] Hadfied, *Canals*, chps.2 and 3; Richardson, *Waterways*, chps. 3 and 4.

scope of turnpike and canal improvements remained parochial in outlook, both in the sourcing of capital and designation of routes.

Table 5.12: *Occupational background of Derbyshire's factory owners in 1787*

Title	Large Landowner/ Gentry/ Large Businessmen	Independent Craftsmen/ Retail Traders/ Yeomen	Non–Independent Craftsmen/ Very Small Landholders	Semi–Skilled/ Unskilled Workers/ Agricultural Labourers
Class	I	II	III	IV
Number	8	12	1	0
Percentage	38	57	5	0

Source: Honeyman: *Origins*, table 5.3, p. 64.

As for the cotton industry, its capital structure differed markedly from the examples discussed above, which impacted the social and economic composition of its capital investors. Relatively low capital requirements and the more reliable flows of income, especially during the late eighteenth century, meant that partnerships in the cotton industry tended to be smaller, shares in ventures larger, and partners more closely aligned to one another and to the running of their enterprises.[139] As a result, the pool of investors from which the cotton industry drew was more circumscribed, with fewer opportunities for speculative investment when compared with the lead industry, turnpikes and canals. Evidence compiled by Katrina Honeyman in her work *The Origins of Enterprise*, shows the occupational origins of the early cotton manufacturers of Derbyshire in 1787. As can be seen in table 5.12, the categories used to disaggregate the investors are far from ideal, with distinct social groups, such as 'Large Landowners, Gentry and Large Businessmen', and 'Independent Craftsmen, Retail Traders and Yeomen', lumped together despite their widely differing social and economic statuses.[140] Thus, while at first sight categories I and II appear to dominate the provision of capital and credit to the burgeoning cotton industry, comprising 38 and 57 per cent of investors respectively, once broken down into constituent groups a more socially and economically diverse picture emerges.[141] Whereas in other counties, such as Lancashire, Yorkshire and Nottinghamshire,

[139] Pollard, 'Fixed', pp. 308–13; Chapman, *Early*, chp. 5; P. Cottrell, *Industrial Finance 1830-1914* (London, 1980), pp. 19–28.
[140] Honeyman, *Origins*, pp. 14–5.
[141] *Ibid*, p. 64.

cotton investors were mostly drawn from other branches of the textiles industry, in the case of Derbyshire investors came from a variety of occupational backgrounds.[142] Of the former, hosiery manufacturers were particularly prevalent, while of the latter, proprietors with links to the Derbyshire lead industry were common.[143] Assuming the data to be correct, then the role of the middling sort in the burgeoning cotton industry appears significant, while that of the gentry and merchant classes more modest than might be expected. As for the Aristocracy, the categories used make it impossible to distinguish their contributions from those of the gentry, while women are entirely absent from the accounts. In this instance, the exclusion of women appears to have been a result of the cotton industry's more rigid capital structure, which limited the opportunities available for women to make one–off speculative investments.[144] Yet, despite the much smaller pool of investors from which the cotton industry drew, the evidence explored clearly shows that this group remained socially and economically diverse.

As in each of the cases discussed above, the reservoirs of capital from which the cotton industry drew were predominantly local. In the Derbyshire case, investment in cotton manufactories was sourced from a range of local occupational groups, with no clear dominance achieved by any single group. The hosiery, drapery, bleaching, lead, and iron industries all featured prominently, with individuals such as Peter Nightingale, Thomas Evans, and William Toplis playing vital roles across a range of industries and sectors.[145] The same applied to those investors from outside the county. Richard Arkwright, for example, borrowed substantially from Samuel Need, Jedediah Strutt, Peter Nightingale, and the Wrights of Nottingham, in the establishment and subsequent operation of his Cromford mill, and his son later went into partnership with the latter to form the investment bank Arkwright, Toplis & Co.[146] Industry and

[142] *Ibid*, pp. 60–9.
[143] *Ibid*, p. 64. See also, Chapman, *Early*, pp. 77–100.
[144] Evidence shows that women played a more significant role in the domestic production of textiles both as wage–works and entrepreneurs, see especially: C. Muldrew, '"Th' ancient Distaff" and "Whirling Spindle": measuring the contribution of spinning to household earnings and the national economy in England, 1550–1770', *EcHR*, 65 (2012), pp. 498–526.
[145] Honeyman, *Origins*, p. 64.
[146] Fitton and Wadsworth, *Strutts*, pp. 60–8, 86, 164 and 224. See also recent debate: Chapman, 'Peter', pp. 166–88; D. Buxton, C. Charlton, and D. Hool, 'Peter Nightingale, Richard Arkwright and the Derwent Valley Cotton Mills, 1771 – 1818: A Rejoinder', *DAJ*, 135 (2014), pp. 99–113; S. Chapman,

commerce were not the only sources of capital for the early cotton masters, however, local landowners and farmers also played an important role. In total, six of the proprietors referenced in table 5.14 were from farming backgrounds, though the proportion may have been even higher in the case of small family–run workshops and manufactories.[147] William Radcliffe, a farmer and cotton spinner of Mellor in Derbyshire, for example, observed in his semi–autobiographical work *Origin of the New System of Manufacture*, that it was common for farmers 'in all parts of the hill country of Derbyshire' to combine agriculture with textile production to insulate from economic fluctuations and generate additional income.[148] Thus, whether in the form of industry, commerce or agriculture, the burgeoning cotton industry was reliant upon local capital resources, sourced from a range of economic and social groups.

The evidence examined above has confirmed that the social and economic origins of the SEMWW community were representative of more general patterns, and highlighted a number of recurrent themes in the sourcing of capital investment. First, it has been seen that while investors were drawn from diverse backgrounds – socially, economically, and occupationally – their places of origin were geographically concentrated. This does not chime with the views of Postan, Heaton, and Ashton, referenced above, who claim that prior to the introduction of modern banking and financial institutions, capital markets were isolated, and that capital demands were met predominantly through reinvestment of proceeds within industries and sectors. Clearly, this was not the case in Derbyshire, as investors came from a range of occupational backgrounds, and invested in a variety of apparently unrelated industries and sectors within their locality. Second, it is important to note that while the financing of capital ventures was socially and economically diverse, their management and organisation was concentrated in the hands of the gentry and merchant classes. Some might argue that this implied a centralisation of power in the hands of a capitalist elite; however, the evidence

'Peter Nightingale, Richard Arkwright and The Derwent Valley Cotton Mills, 1771-1818: A Reply', *DAJ*, 135 (2014), pp.114–6.

[147] Chapman, *Early*, pp. 53–60.

[148] W. Radcliffe, *Origin of the New System of Manufacture* (Stockport, 1828), p. 41.

examined here suggests that by the turn of the nineteenth century, the proceeds of capital continued to be shared across a range of social and economic groups, with no single group achieving complete dominance, even in the burgeoning cotton industry.[149] Finally, it has been shown that the most influential factors determining an individual's investment decisions was the social and geographic proximity of the investor to the proposed capital venture, rather than their occupation as has been suggested elsewhere. This indicates that while entrepreneurs certainly 'ploughed back' profits into their ventures to help finance subsequent development, they were also reliant on expansive local networks of individuals engaged in a plethora of economic activities. In short, it was local communities that furnished industry with capital and credit during this period, and so it is to local networks that we must now turn to explain how the capital demands posed by industrialisation and economic growth were met.

III. *'The conduits that connect them'*

Despite their social and economic diversity, the SEMWW community were united by more than just the bonds of locality and common interest.[150] Analysis of their personal and familial backgrounds shows that members were entangled in webs of interpersonal relationships of family, kinship, and friendship (see table 5.7). Familial bonds were particularly prevalent, implicating a range of individuals who might otherwise have been distanced from industrial and commercial affairs.[151] They include four siblings belonging to the Gell family: Thomas, Philip, Temperance and Isabella; George Goodwin and his children George and Ann; the Toplis brothers, John and William; and the Evans brothers, Thomas and George, and George's daughter, Mary. Kinship relations were also widespread among the society's members. Peter Nightingale and George Evans were brothers–in–law through George's marriage to Peter's

[149] For this argument in relation to the Derbyshire lead industry, see: Wood, *Politics*, pp. 98–102. More generally, see: Thompson, *Making*, pp. 207-32; A. Randall, 'Industrial conflict and economic change: the regional context of the Industrial Revolution' *Southern History* 14 (1992), pp. 74–92; J. Rule, 'Employment and authority: Masters and men in eighteenth-century manufacturing', in Griffiths, Fox, and Hindle, *Experience,* pp. 286–317.
[150] Gould, 'Capital', p. 240.
[151] Davidoff and Hall, *Family*, pp. 279–89.

sister, Anne, which in turn made Mary Evans his niece. Likewise, the Hurt family of Alderwasley had historic ties with the Gell family, including the marriage of Francis Hurt to Mary Gell in 1754, which in turn made Thomas, Philip, Temperance and Isabella his nieces and nephews. These ties also drew in a number of other important families: in 1774, Philip Gell married William Milnes' daughter, Dolly, in 1780 Francis Hurt's son, Charles, married Richard Arkwright's daughter, Susannah, and in 1785 Thomas Evans' son, William, married Jedediah Strutt's daughter, Elizabeth.[152]

Members were also bound by an array of affiliate ties either as friends, business partners, creditors and debtors, or as co–habitants of local communities. It is likely that the merchants Richard Leigh, Daniel Whittaker and Lawrence Garden of Manchester, for example, came to hear of SEMWW through ties with Derbyshire merchants, manufacturers, attorneys and agents, actively engaged in the Manchester cotton trade. It is also likely that the landowner and MP for East Retford, Sir Cecil Wray, became aware of the venture through his local ties with the mining community of North Derbyshire and his involvement in the promotion of the Chesterfield canal.[153] The clustering of middling tradespeople in certain settlements (see table 5.7) is also indicative of the importance of local credit networks in drawing together a diverse cast of individuals.[154] In Wirksworth, the grocers Isaac Potter and Ralph Toplis, the worsted manufacturer, Thomas Smedley, and the mercer, Samuel Taylor, were all prominent figures in local society, and undoubtedly shared a variety of social, economic and financial ties. While in the case of Crich, a similar situation likely pertained between the tanner, David Woodhouse, wood merchant, John Saxton, and miner, John Wright. These affiliate relationships could also ascend and descend the social hierarchy. Peter Nightingale, for example, shared social ties with Thomas Smedly, whose son, John Smedly, later leased the Lea Cotton Mill from the Nightingales in 1818. The innkeeper, John Salt also shared connections with Peter Nightingale, Francis Hurt, Philip Gell and others, through their joint involvement in the construction of

[152] For relevant family trees, see especially: Fitton and Wadsworth, *Strutts*, pp. 325–6.
[153] Richardson, *Waterways*, pp. 49–52.
[154] Muldrew, *Economy*, pp. 148–57; Shepard, *Accounting*, chp. 1.

Cromford Sough, and Salt's role as the local tithe–collector for Wirksworth parish during the 1770s.[155] Whether these dense familial, kinship and affiliate networks were able to meet the capital demands observed in sections I and II shall now be considered, alongside other forms of financial organisation and intermediation, such as banks, solicitors and agents.

It is now well established that family, in all its forms and structures, remained at the very heart of business enterprise throughout the eighteenth and early nineteenth centuries.[156] According to Davidoff and Hall, it provided both the 'rationale' and 'setting' for business enterprise, with few entrepreneurs declaring 'profit' as their chief motivator.[157] Instead, success and failure in business was often measured in relation to the family's perceived moral character, and couched in terms of prudence, independence and creditworthiness.[158] Indeed, the lack of an effective system of limited liability and the paucity of information concerning capital projects, made the prominence of family in business affairs not only a symbolic device to guide moral behaviour, but also a practical necessity in a turbulent economic environment. The eighteenth century was pitted with crises, triggered by a combination of financial instability, trade fluctuations and war, and it was often businesses, and by extension families, that bore the brunt of those uncertainties.[159] This applied not only to wealthy merchant capitalists such as the Evans family, who rode recurrent crises in the lead and cotton industries during the 1770s, 80s and 90s, but also to middling households such as the Naylor's, whose more limited exploits in mining were vulnerable to all manner of fluctuations at the local, regional and national level.[160] Faced with such intense instability, the tightly bound and carefully prescribed bonds of family and household offered a modicum of stability upon which a business enterprise could be built.

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[155] Gould, 'Capital', p. 240.
[156] See especially: Davidoff and Hall, *Family*; Rose, *Firms*; Daunton, *Progress*, pp. 258–60; Taylor, *Creating*, pp. 23–25, 67–71; Hudson, 'Industrial', pp. 47–55. For more on the concept of family during the eighteenth century, see: Tadmor, 'Concept', pp. 111–40; Tadmor, *Family*, chps.1 and 2.
[157] Davidoff and Hall, *Family*, pp. 198–200.
[158] *Ibid*, pp. 200–5. For more on links between, masculinity, business and credit, see especially: Shepard, 'Manhood, pp. 75–106.
[159] See especially: Hoppit, *Risk*, chp. 3; Hoppit, 'Attitudes, pp. 305–22.
[160] See chapter 1 for more on the Naylor household. For importance of family and risk–aversion, see: M. Mascuch, 'Social mobility and middling self–identity: ethos of British autobiographers, 1600–1750', *SH*, 2 (1995), pp. 45–61; Wrightson, *Earthly*, pp. 51–6,289–306.

The Evans cotton manufactory in Darley Abbey, for example, employed all of Thomas Evans's children, their husbands and wives, and rested on the family's collective resources acquired through a mixture of marriage, inheritance, rent and the proceeds of other business interests.[161] Similarly, the Thornhill family of Stanton Hall near Bakewell in Derbyshire, operated a vast portfolio of mine shares and smelting operations right across North Derbyshire, the North Pennines and North Wales, all managed and financed from their family estate and by members of their immediate family, in particular John Thornhill (1668–1730) and his sons Bache (1747–1830) and Henry (1708–1790).[162] It was not, however, mandatory for families to specialise in a certain occupation, some chose to spread their interests across a range of interconnected activities. William Toplis the cotton manufacturer, for example, worked closely with his brother John Toplis, a banker and lead merchant. Likewise, Peter Nightingale endeavoured to create a diverse portfolio of interests in lead mining, manufacturing and trading alongside cotton manufacturing and private lending on interest. This could also apply to middling households: George Heyward's career in the lead industry, for example, was supported and enhanced by his father's extensive farming interests.[163] Evidently, a plethora of strategies were available to enterprising families, though the onus remained on flexibility and adaptability in the face of intense economic instability and the pervasive threat of ruination.[164]

The early modern 'household–family' granted a stability of form and structure not immediately apparent in other relationships, and was thus crucial to the operation of the local credit economy.[165] In Chapter 1, it was shown how the Naylor household's access to communal credit, from vendors, traders, and labourers, was influenced not only by John Naylor's social dexterity, interconnectedness and earnings, but also the household's collective worth, measured in terms of moveable assets, personnel and productivity. This has also been demonstrated in

[161] Lindsay, 'Early', pp. 278–80.
[162] Rieuwerts, *Adventurers*, pp. 9–10.
[163] See also examples explored by: Davidoff and Hall, *Family*, chps.5 and 7; Hunt, *Middling*, pp. 22–45; Lemire, *Business*, 18–36.
[164] Hoppit, *Risk*, pp. 56–74; Wrightson, *Earthly*, pp. 51–7.
[165] Tadmor, 'Concept', pp. 111–40; Tadmor, *Family*. See also: Muldrew, *Economy*, pp. 157–72; Shepard, *Accounting*, pp. 214–31.

Alexandra Shepard's analysis of character assessments in church court depositions for the period 1550 to 1728, which showed that three–fifths of deponents were found to have responded with positive cash estimates of their 'net worth' based on their family's collective assets, moveable goods and occupation.[166] This applied to both men and women, though in the case of married women, answers were usually dictated by the laws of coverture, and thus posited in terms of their husband's 'worth'.[167] Yet, despite these differences, the pool of assets to which both husband and wife referred, were often the same, and as Amy Erickson and others have shown, their contributions to the family's wealth and reputation was substantial and often crucial to business success.[168] Evidence from the Derbyshire context reveals the importance of marriage as a vehicle for transferring capital between interconnected family groups engaged across industrial and sectoral divides, which could then be utilised in capital projects or in the expansion of their estate. When Susannah Arkwright married Charles Hurt in 1780, for example, she carried a dowry of £15,000, which was used to support both the expansion of the family estate, and their business interests, which for the Hurts was focussed in the lead industry.[169] Similarly, Barbara Evan's marriage to William Strutt in 1793, included a substantial dowry of £20,000, which was swiftly employed in the acquisition of the Kingston–on–Soar estate in Nottinghamshire.[170] Inheritance was another important vehicle for the transfer of assets within and between family groups.[171] Richard Arkwright, for example, left in his will a total of £100,000 in India Stocks to Susannah and her children, while further down the social order, lead miners commonly passed on shares in mining ventures to their wives and children.[172]

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[166] *Ibid*, p. 39.
[167] *Ibid*, pp. 52–63; Erickson, 'Coverture', pp. 1–16.
[168] A. Erickson, 'Common Law versus Common Practice: The use of Marriage Settlements in Early Modern England', *EcHR*, 43 (1990), pp. 21–39; C. Churches, 'Women and property in early modern England: A case study', *SH*, 23 (1998), pp. 165–80; J. Bailey, 'Favoured or oppressed? Married women, property and "Coverture" in England, 1660–1800', *C&C*, 17 (2002), pp. 351–72; A. Erickson, 'Possession – and the other one–tenth of the law: Assessing women's ownership and economic roles in early modern England', *WHR*, 16 (2007), pp. 369–85.
[169] R. Fitton, *The Arkwrights: Spinners of Fortune* (Manchester, 1989), p. 182.
[170] Lindsay, 'Early', p. 280.
[171] There is now a vast literature on Women and inheritance in early modern England, see especially: S. Staves, *Married Women's Separate Property in England, 1660–1833* (Cambridge, 1999); Erickson, *Women*; M. Berg, 'Women's property and the Industrial Revolution' *Journal of Interdisciplinary History*, 24(2) (1993), pp. 233–50.
[172] Fitton and Wadsworth, *Strutts*, p. 97; Slack, 'Women', pp. 46–8. See also Chapter 2 above.

Assets transferred in wills thus helped dampen the impact of death, but also provided the legal framework for the intergenerational transfer of capital. This was important not only to the survival of the family unit, but also to the interests of creditors, who could expect to be repaid in full upon the death of their debtors, or, at the very least, secure continuity in their credit relations with subsequent generations.[173]

Recent research has also demonstrated the importance of kinship networks in the financing of industrial and commercial ventures during this period. While the extent and character of their role have been debated by generations of historians, there is now broad agreement that kinship played an integral role in processes of industrialisation and capital formation at the local, regional and national level.[174] Wrightson and Muscuch, for example, have shown how kinship networks helped insulate families from risk and financial crisis.[175] Muldrew has demonstrated their role in the operation of the early modern credit economy, in underpinning relationships of trust and credit, and in providing financial aid for struggling relatives.[176] Richard Grassby has explored the bonds of family and kinship in the context of overseas trade and merchant networks, while Margaret Hunt and Beverly Lemire have highlighted their contribution to the raising of capital and credit in the urban context.[177] These 'enmeshed patterns of kinship and connectedness', as Tadmor has described them, were also widely utilised by the investment community of North Derbyshire during this period. When the Evans family commenced their cotton business at Darley Abbey in 1783, for example, they drew upon the advice, networks and financial support of the Strutt, Nightingale, Milnes and Toplis families, with whom they shared a variety of direct and indirect familial and kinship

[173] Davidoff and Hall, *Family*, pp. 275–9; Erickson, *Women*, pp. 34–5; Berg, 'Women's', pp. 233–50; Shepard, *Accounting*, pp. 198–204. For women and credit, see especially: Shepard, 'Crediting', pp. 1–24

[174] Tadmor, 'Early', pp. 15–48. See also: D. Cressy, 'Kinship and kin interaction in early modern England', *P&P*, 113 (1986), 38–69; Mitson, 'Significance'pp. 24–76; L. Davidoff, M. Doolittle, J. Fink, and K. Holden (eds.), *The Family Story* (London, 1998).

[175] Mascuch, 'Social', 45–61; Wrightson, *Earthly*, pp. 82–6.

[176] Muldrew, *Economy*, esp. chps.4, 5 and 6.

[177] R. Grassby, *The Business Community of Seventeenth–Century* England (Cambridge, 1995); Hunt, *Middling*, pp. 22–45; Lemire, *Business*, chp. 2. See also: Davidoff and Hall, *Family*, pp. 207–11.

ties.[178] In a similar way, the Milnes, Twigge and Kirk families, all lead merchants of Ashover, shared links via locality, occupation and marriage, and also worked together on a number of joint mining and smelting ventures.[179] At Gregory Mine in the parish of Ashover, for example, the shareholder list for 1782 (see table 5.11), includes the brothers William and John Milnes, whose mother Dorothy, was the sister of 'Mr Twigge', while Samuel Kirk was William Milnes' father in law, through the latter's marriage to Mary Milnes.[180] Kinship bonds were also prevalent amongst middling families. In the case of Miners Engine Mine in the parish of Eyam (see chapter 2), for example, mining households were shown to have married strategically in order to advance their local mining interests, improve their reputation, acquire employment opportunities, and secure access to capital and credit for the maintenance of the household economy.[181] Kinship ties thus pervaded the industrial community of Derbyshire during the eighteenth and early–nineteenth centuries, intersecting different industries and sectors, and providing essential conduits along which capital and credit could flow between interconnected family groups.

While the bonds of blood and marriage were crucial to establishing a secure capital base for business and industrial enterprise, resources could also be drawn from more expansive networks of non–kin.[182] Such connections could vary in their degree of formality and intimacy, from close formal partnerships between friends, neighbours, business associates and co-religionists, to more distanced and fleeting affiliations forged in the bustle of everyday economic life.[183] But regardless of their character, all such relationships were necessarily governed by notions of trust and obligation in economic affairs.[184] The partnership between the

[178] Lindsay, 'Early', p. 278.
[179] The Milnes of Ashover are not to be confused with the Milnes of Tapton Hall, Aldercar, Dunston and Cromford (mentioned in relation to SEMWW and the Gells of Hopton Hall). For the former, see: Noble, *History*, p. 57. For the latter, see: D. Lysons, *Magna Britannia*, V (London, 1817), p. xci.
[180] Hopkinson, 'Ashover', p. 4; Glover, *Directory*, p. 56.
[181] See chapter 2.
[182] For 'friendship' in the early modern period, see: Tadmor, *Family*, esp. chp. 5. For concept of 'neighbourliness', see: K. Wrightson, *English Society, 1580–1680* (London, 2003), chp. 2. See also Davidoff and Hall, *Family*, pp. 215–9.
[183] See, for example, case study of Thomas Turner in Tadmor, *Family*, chp. 5. Also: A. Prior and M. Kirby, 'The society of friends and the family firm, 1700–1830', *Business History* 35 (1993), pp. 66–85
[184] Muldrew, *Economy*, esp. chps. 5 and 6.

Barker and Wilkinson families of Derbyshire is an important case in point. The Barkers came from an ancient mining family who had served as stewards to the Duchies of Devonshire and Rutland for several generations, owning shares in mines and operating smelting ventures from a comparatively early date.[185] During the early to mid–eighteenth century, the family's interests were centred on the villages of Flagg and Monyash in Derbyshire, where they shared in a number of joint ventures with other local families, including the Buxton's, Thorpe's and Scholler's.[186] As the family's portfolio expanded they began to forge important commercial ties with the Milnes and Wilkinson families – merchants of Chesterfield – who purchased the majority of the Barkers' processed ore, worth in excess of £11,000 a year by 1754.[187] Thus when in 1759, the Barker and Wilkinson families entered into a formal partnership and began investing large sums in a catalogue of mining and smelting ventures, trust and reciprocity were already well–established.[188] More loosely defined affiliate networks were also vital to the financing of large capital ventures, such as turnpikes and canals. Included in the Derby, Duffield, Chesterfield and Sheffield turnpike trust, for example, were the bankers Samuel Crompton, Thomas Evans, and John Toplis, the lead merchants Anthony Tissington, William Milnes, Richard Milnes, Nicholas Twigge, and Francis Hurt, local gentlemen such as the Thornhill's, Gell's, and Milnes's (of Dunston and Cromford), aristocrats including the Cavendish's and Wilmots, and a variety of local tradesmen, miners and artisans. Thus, whilst lacking the formal structure of familial and kinship networks, the bonds of friendship and affiliation were no less crucial to the provision of capital and credit during this period.[189] Far from representing an 'inherent' source of 'instability' as some have argued, these relationships granted a modicum of stability in an otherwise turbulent and perilously under–regulated market economy.[190]

[185] Hopkinson, 'Five', p. 10.
[186] *Ibid*, pp. 9–11.
[187] *Ibid*, pp. 12–3.
[188] Hopkinson, 'Five', pp. 13–4. See also: Gould, 'Capital', p. 237.
[189] Tadmor, *Family*, chp. 5; Pearson and Richardson, 'Business', pp. 657–79.
[190] For the quote, see: B. Anderson, 'Money', p. 100. For alternative view, see: Muldrew, *Economy*, pp. 173–85; Finn, *Character*, pp. 1–24; Hudson, 'Industrial', pp. 53–6.

Alongside these dense networks of family, kin and affiliates were a growing number of financial intermediaries, including banks, solicitors and agents, whose services proved increasingly valuable as local demand for capital and credit continued to grow throughout the eighteenth century.[191] Of particular concern was the serious lack of currency in circulation, which threatened recurrent liquidity crises, most notably in the 1690s, 1770s and early 1800s.[192] Failure to tackle the problem of circulation was not peculiar to England, however; most European states grappled with similar problems, due in part to a continued reliance on silver as the standard for currency, and in part, to inadequacies in minting and government policy.[193] Within this context local intermediaries helped to grease the wheels of industry by facilitating the use of currency alternatives, such as bills of exchange and bank notes, and by providing conduits between suppliers and consumers of capital and credit.[194] Yet, by the late seventeenth century, only London had what might be considered an integrated financial system, with a range of services provided to merchants, traders and manufacturers, as well as public debt facilities via the Bank of England and other institutions.[195] In the provinces, the development of financial services was more sporadic.[196] According to Pressnell, country banking expanded steadily from the 1750s onwards, adapting their portfolio of services to meet the demands posed by local industry and economy.[197] In Cornwall and Devon, for example, Brunt compared the activities of country banks to 'venture capital firms', as they frequently acted as conduits for speculative investments in risky mining ventures.[198] While in London, Temin and Voth found that banks tended to be more risk–overt, providing stable deposit services, and more secure investments

[191] For country banks, see: Pressnell, *Country*, pp. 1–3; Cameron, *Banking*; Temin and Voth, *Prometheus*, pp. 23–38. For attorneys and agents, see: Anderson, 'Attorney', pp. 223–55; Miles, 'Money', pp. 127–46. For agents, see especially: Chapman, *Merchant*, 107–9*;* Rose, *Firms*, chp. 3. For a useful analysis of all three in operation, see: Hudson, *Genesis*, pp. 211–6.
[192] A. Feavearyear, *The Pound Sterling* (Oxford, 1963 ed.), pp. 145–6; Pressnell, *Country*, pp. 14–5; Hoppit, *Risk*, pp. 140–60.
[193] Anderson, 'Money', pp. 86–7.
[194] Ashton, 'Bill', pp. 25–35; Pressnell, *Country*, esp. chps. 3 and 10; Anderson, 'Attorney', pp. 229–44
[195] Chapman, *Merchant*, pp. 40–3; Temin and Voth, *Prometheus*, pp. 7–22.
[196] Pressnell, *Country*, pp. 14–35. For a useful portrayal of local industries during this period, see also: Hudson, 'Industrial', pp. 29–34 and 53–5.
[197] Pressnell, *Country*, pp. 4–11. In the case of Cornwall and Devon, Brunt has shown that this role
[198] L. Brunt, 'Rediscovering risk: country banks as venture capital firms in the first Industrial Revolution', *JEH*, 66(1) (2006), pp. 74–102.

in government bonds and national debt.[199] In the case of attorneys, Anderson and Miles demonstrated their growing importance as intermediaries between different sectors of the local economy. Their services commonly included the handling of bills of exchange and bank notes, the sourcing of capital and credit for mortgages and industrial enterprises, and the provision of private lending facilities.[200] As for agents, they became increasingly significant as the interests of families and businesses expanded beyond their immediate localities. Their role revolved around the representation of business interests in distant markets where they mediated with customers and suppliers to ensure quality of goods and services, provided information about distant markets and clientele, negotiated terms and contracts with customers and suppliers, and in turn, acted as guarantors of a business's reputation and credibility to their client base.[201]

Yet, despite their growing significance, the services offered by financial intermediaries during the eighteenth century demonstrates the expansion, rather than, as some have argued, the contraction, of more traditional forms of financial organisation. Family, kinship and affiliate networks remained crucial to the work of intermediaries, while the values of trust, obligation and reciprocity continued to inform their activities. Pressnell, for example, described the rise of country banks during this period as: 'less [of] an innovation than a specialisation in existing financial techniques', while Miles claimed that the role of an attorney or money scrivener could be performed 'by anybody who found [themselves] at the nexus of several sources of incoming capital; and had the necessary degree of personal credit' to operate as a middleman in financial transactions. In the case of Derbyshire, several individuals and families met these general criteria. As we have seen, John Toplis, Thomas Evans, and Samuel Crompton were all well connected merchants and industrialists with a range of active business interests that complemented and enhanced their banking enterprises.[202] Similarly, Bernard Lucas and Andrew Macbeth of Chesterfield and Wirksworth, both worked as grocers and merchants prior

[199] Temin and Voth, *Prometheus*, esp. chps. 3 and 4.
[200] Anderson, 'Attorney', 223–55; Miles, 'Money', pp. 128–35; Hudson, *Genesis*, pp. 211–7.
[201] Chapman, *Merchant*, pp. 107–9; Rose, *Firms*, chp. 3.
[202] See especially: 'Arkwright, Toplis & Co. records of bank operations, 1789–1924' Lloyds Ltd. archives; 'Thomas Evans & Sons of Derby records, 1771–1887' RBS archives; 'Crompton, Newton & Co. banking records, 1685–1877' RBS archives.

to becoming attorneys.[203] Agents also played a valuable role in linking rural industries with their urban markets. William Hodgekinson of Ashover, for example, served as an agent in Stockholm for his family's merchant business during the 1680s, trading in imported iron, tar, flax, timber, hemp, and other products from Sweden, in exchange for Derbyshire lead.[204] Likewise, the Strutt's employed Matthew Roberston of Gutter Lane in London, and James Shuttleworth of Manchester to keep the family abreast of news concerning their clientele, as well as the price of raw materials and finished products in domestic and foreign markets.[205] Agents working in Derbyshire on behalf of clients based in London and elsewhere were also a common feature of the financial landscape. The Barker and Wilkinson families, for example, acted as agents in Derbyshire on behalf of a variety of clients, investing in shares and providing them with information on local market conditions for much of the late eighteenth and early nineteenth centuries.[206] While Robert Banks Hodgekinson, heir to William Hodgekinson's estate, employed Isaac Bonne to manage his mining and estate business whilst he was away in London on parliamentary duty.[207]

The investment community of North Derbyshire was thus enmeshed in dense networks of overlapping familial, kinship and affiliate relations, which encased the full range of industrial and commercial activities, and incorporated individuals and families from a variety of social and economic backgrounds. Along this complex network of streams and inlets linking individuals and families, capital and credit flowed, sustained by notions of trust, obligation and reciprocity, and invigorated by the opportunities that lay before those enterprising enough to take advantage of local resources and favourable market conditions. The interpersonal and social character of the credit economy during this period has been considered by some, to be an impediment to growth, limiting the supply of capital and credit to business and industry, and

[203] DRO D24: Bernard Lucas, attorney of Chesterfield, business papers, 1760–1846; DRO D6696: Andrew Macbeth, Cash & Co. of Wirksworth, Attorneys 18th–20th centuries.
[204] P. Riden, 'An English factor at Stockholm in the 1680s', *Scandinavian Economic History Review*, 35(2), (1987), pp. 191–207.
[205] Fitton and Wadsworth, *Strutts*, pp. 47–50, 186.
[206] Willies, 'Barker', pp. 333–6.
[207] Hopkinson, 'Ashover', pp. 1–21.

stifling the process of industrialisation.[208] Yet, the evidence explored in this section has demonstrated quite the reverse. In the face of institutional frailty, poor supplies of currency and widespread economic uncertainty, credit advanced on an interpersonal basis helped grease the wheels of industry, and offered the certainty and accountability required to maintain the supply of capital and credit during a period of rapid industrial and economic change.

Conclusion

Thus, Postan's assertion that 'the conduits' connecting 'the reservoirs of savings' to 'the wheels of industry' were 'few and meagre' during the period of the Industrial Revolution, is not supported by the evidence examined in this chapter. Much depends, it seems, on the perspective taken. The established view that capital requirements were comparatively small as a proportion of GNI, and that dysfunctional capital markets hindered growth during this period, predominantly rest on the assumption that the eighteenth century ought to be judged on the criteria set by modern economies and banking systems.[209] Yet, as demonstrated in section I, the processes of industrialisation and capital intensification were distinctly local in character during this period, occurring in clusters alongside a plethora of different sized industrial and commercial ventures, the majority of which do not feature in aggregate studies of the rate of capital formation.[210] Within these local confines, the demands for both fixed and circulating capital were substantial, and as section II revealed, those demands were met almost entirely by local residents. Suppliers came from a variety of social and economic backgrounds, from aristocrats, gentry and merchant capitalists, to yeomen, husbandmen and local tradesmen, women were also a feature of the investment community and though their roles varied between industries and sectors, their presence is indicative of what Davidoff and Hall termed 'the hidden investment' of female entrepreneurs.[211] Interweaving this socially diverse, but locally

[208] See: Postan, 'Recent', pp. 6–7; Heaton, 'Financing', pp. 6–10; Ashton, *Industrial*, p. 83–6.
[209] For rate of capital formation, see: Feinstein, 'Capital', pp. 73–94. See also collection of essays in Higgins and Pollard, *Aspects*; Feinstein and Pollard, *Studies*.
[210] See especially: Berg and Hudson, 'Rehabilitating', pp. 24–50.
[211] Davidoff and Hall, *Family*, pp. 272–5, 279–89.

concentrated, investment community were overlapping relationships of family, kinship and affiliation, which provided the glue that bound the entire system together, and provided the security and trust necessary to enable capital and credit to flow between individuals, families and sectors of the local economy. This reliance on interpersonal relationships and the ubiquity of credit as a medium in transactions, created both opportunities and challenges for the entrepreneurial household, with indebtedness, bankruptcy and destitution a commonly referenced plight of the eighteenth century business community, and yet, despite its obvious shortcomings, the system contributed substantially to the industrial and economic growth of the period.[212]

The tendency for historians to apply modern answers to historical problems has thus often obscured the more subtle and historically embedded patterns of development and change that came about as a result of the expansion and improvement of traditional forms of financial and industrial organisation. Indeed, the early modern credit economy, and its reliance on relationships of trust and obligation, was not as chaotic or subjective as some have assumed.[213] On the contrary, it was a carefully organised, self–governing, and rigorous system, whereby the behaviour and moral character of each individual, their family and affiliates, were meticulously scrutinised to produce a communal sense of 'creditworthiness', which in turn, governed an individual's ability to access capital and credit via local networks.[214] In an environment characterised by institutional frailty, poor currency supply, and comparatively few financial intermediaries (especially in provincial England), this system offered a secure basis for financial transactions, without which industrialisation and economic growth during the mid to late eighteenth century could not have been achieved.[215] Thus, in many ways, the early modern credit economy became a victim of its own success, as the capital structures of industry and

[212] Hoppit, *Risk*; Hoppit, 'Attitudes', pp. 308–16; J. Hoppit, *A Land of Liberty? England, 1689–1727* (Oxford, 2000), chp. 10.
[213] Postan, 'Recent', pp. 6–7; Heaton, 'Financing', pp. 1–10; Ashton, *Industrial*, p. 87; Anderson, 'Money', pp. 86–7.
[214] See especially: Muldrew, 'Interpreting', pp. 163–83; Hunt, *Midding*, esp. pp. 22–9; Muldrew, *Economy*; Wrightson, *Earthly*, pp. 300–3; Lemire, *Business*, pp. 16–47; Finn, *Character*, pp. 1–25; Shepard, *Accounting*, chps.1 and 2.
[215] Hudson, *Genesis*; Hudson, 'Industrial', pp. 53–5.

commerce expanded beyond the locality, into regional, national and increasingly international markets by the mid to late nineteenth centuries.[216] Within this context, responsibility for upholding trust and credibility in the economy shifted from the individual and household, to large financial institutions, such as banks, government departments, treasuries and stock exchanges, giving rise to the capitalist structures that have dominated for much of the modern era.

[216] Muldrew, *Economy*, pp. 315–33.

Conclusion

Historians of the Industrial Revolution have studied various aspects of the process of industrialisation: its national and regional development, the role of technology and innovation, and the pace and character of economic growth. Yet, the Derbyshire lead industry – a significant regional industry with a history of activity and innovation dating back to at least the early-medieval period – hardly features in these accounts.[1] This is perhaps unsurprising, given the predominant account of the Derbyshire mining community, that by Andy Wood in *The Politics of Social Conflict: The Peak Country, 1520–1770*, foregrounds a process of decline in the mining community, beginning in the late seventeenth century, and links it to the gradual weakening and fragmentation of community structures and customary practices brought about by the process of industrialisation and capital intensification.[2] This thesis has set out to investigate the Derbyshire lead industry from several complementary angles, using closely studied archival sources to re-evaluate the part it played in eighteenth- and nineteenth-century processes of industrial and economic change. The results not only shed light on the history of the Derbyshire lead industry and its community of independent artisanal tradesmen during a period of great uncertainty and change, but they also provide insights into the pervasive role played by early modern social systems and economic structures in forging development and delivering growth in the eighteenth and nineteenth centuries.

A key finding presented in the first two chapters relates to the nature and texture of the mining community, and, as is typical of the period, the centrality of the household unit.[3] As was demonstrated, the patriarchal structures of the household economy, and its gendered hierarchies, were mirrored at the industrial workplace through occupational structures, the

[1] For other examples, see: Blanchard, 'Economic'; Blanchard, 'Derbyshire', pp.119–39; Honeyman, *Origins*, pp. 20–34; Thirsk, *Rural*, pp.178–9; Burt, *British; Berg, Age*, pp. 100–6.
[2] Wood, 'Custom', pp. 249–85; idem, 'Social', pp. 39–40; idem, *Politics*, pp. 316–25.
[3] See especially: Spufford, *Contrasting*, pp. 114–5; Wrightson, *English*, pp. 47–73; Wrightson, *Earthly*, pp. 75–8; Withington and Shepard, 'Introduction', pp. 1–17; Tadmor, *Family*, chp. 5; Tadmor, 'Where', pp. 89–112; Gaskill, 'Little', pp. 84–104.

division of labour and gendered pay-scales. This was as relevant to small independent mining ventures, operated by the likes of John Naylor, whose diary was examined in Chapter 1, as it was for large capital mines, such as Miners Engine, studied in Chapter 2. In both cases, it was the independent artisan miner – the master of his trade – who controlled access to labour, determined mining practices, and monopolised trade knowledge. This patriarchal structure was manifested most vividly in the life-cycle developments experienced by the 'lads', and in the prevalence of nepotism at the Derbyshire lead mines. Such new evidence has required this thesis to offer a revised interpretation of the Derbyshire mining community, and its role in industrialisation during the eighteenth century. Far from representing a class of down-trodden, disenfranchised proletariats, at the mercy of a coalition of merchants and gentlemen, as Wood suggests, the miners, and their families retained tremendous influence over mining practices in Derbyshire, continued to operate independently on their own account, worked as independent contractors and overseers at large capital mines, and were highly valued by investors for their skill and knowledge of the mining trade.[4] Rather than undermining and weakening community structures, as argued most notably by E. P. Thompson and Wood, industrialisation during these early phases was reliant on resilient and stable households and communities, and drew on their ability to finance and organise industrial ventures during a period largely devoid of institutional frameworks.[5] It was through community networks – and via community relations – that capital was sourced, knowledge was transmitted, and credibility and reputation were nurtured, while, in turn, all these factors were also crucial for propelling the process of industrialisation.

The discovery of John Naylor's diary, examined in close detail in Chapter 1, has provided a unique window into the organisation and structure of a Derbyshire mining household, confirmed in Chapter 2, where those detailed observations were seen to tally with more general records kept at Miners Engine Mine. As was demonstrated, the structure of the mining workforce mirrored that of the household economy, helping to maintain the independent

[4] This characterisation is that provided by Wood, see especially: Wood, 'Social', pp. 31–58.
[5] Thompson, *Making*, pp. 411–6, 441–56; Wood, *Politics*, pp. 316–25 Wood, *Riot*, pp. 17–23; A. Wood, *The Memory of the People* (Cambridge, 2013), pp. 43–93. See also collection of essays in: Griffiths, Fox and Hindle, *Experience*; T. Harris (ed.), *The Politics of the Excluded, c.1500–1850* (Palgrave, 2001).

status of the male household head, boost the household's collective earnings, improve its status in local society and also retain the knowledge and skills essential to the mining trade within a relatively closed network of interrelated mining households. Though historians of the industrial revolution have recently turned their attention to the household, with works by Jane Humphries and Jan De Vries offering a wealth of new insights, there remains a tendency to perceive the household in rather outmoded and structurally rigid terms.[6] This thesis offers a more detailed, and socially embedded account of the household economy during the eighteenth century, which draws on the latest research in the field of early modern social history.[7] As we have seen, households comprised structurally complex productive units, which remained flexible and enterprising right up to the end of the eighteenth century, with men, women and children fulfilling a plethora of roles, and contributing in a variety of ways to their collective wellbeing. While it may be true that the nineteenth century witnessed a gradual transition toward 'the male breadwinner family', as Humphries and Horrell have argued, the household of the eighteenth century was very much characterised by its diversified income streams, entrepreneurial outlook, and independent status.[8] It was this productive unit which predominated during the early phases of industrialisation, and supplied its financial- and human-capital demands.

This thesis has also shone light on the importance of credit, which, as we have seen, was highly important in household, community, and industrial relations alike, and operated at the interface of all three. Drawing on the works of Muldrew, Finn, and Shepard, this thesis has explored the role played by credit in household financial management, its effects on consumption habits and on patterns of work, as well as its role in accessing employment opportunities, disseminating knowledge and skill, and sourcing capital for industrial and

[6] Humphries and De Vries make almost no reference to revisionist work in the field of the early modern household, see: De Vries, *Industrious*, pp. 186–9; Humphries, *Childhood*, pp. 49–53.
[7] For overviews of this literature, see: Hindle, Shepard, and Walter, 'Making', pp. 1–41; L. Pollock, 'Little Commonwealth I: The household and family relationships', in Wrightson, *Social*, pp. 60–84. See particularly: Wrightson, 'Family, pp. 1–22; Tadmor, *Family*.
[8] Horrell and Humphries, 'Old', pp. 849–90; Horrell and Humphries, 'Origins', pp. 25–64; Humphries, *Childhood*, pp. 49–53.

infrastructural ventures.[9] Until now, accounts of the role played by credit in the process of industrialisation, as in the case of the household economy, have relied on a separate historiographical tradition rooted in the works of economic historians such as Anderson, Mathias, Hoppit and Hudson, and focus more on the modern than the early modern period.[10] With the exception of Hudson, such historians have also tended to stress the shortcomings of the credit economy; as Anderson put it: 'credit, depending in the end upon one man's measure of another's worth, was inherently unstable'.[11] But, as demonstrated here, the structure and stability of this system were rooted in early modern social and cultural norms, where credit featured not merely as an economic stimuli, but was part of a broader nexus of notions, including reputation, industriousness, honesty and frugality, placing the burden of credibility and financial stability not only on the individual, but also on the collective, be it the household or local community. Responsibility for policing this system was communal, reliant not solely on 'one man's measure of another's worth', but on the entire local community's surveillance of its members.[12] This was crucial to creating confidence in the system, and while the volume of litigation in the sixteenth and seventeenth centuries attests to potential teething problems, the fall in rates by the eighteenth century suggests that the system was becoming increasingly efficient and reliable.[13]

These findings also have wider implications for the role of the 'middling sort' in the processes of economic and industrial change during the period. Whereas much of the established literature emphasises the contributions made by those who might be termed the 'upper-middling' – namely merchants, large businessowners and the lesser gentry, and their

[9] For a sample, see: Muldrew, *Economy*; Shepard, 'Manhood', pp. 75–106; Shepard, *Meanings*, pp. 188–95; Finn, *Character*; Shepard, *Accounting*.
[10] Anderson, 'Money', pp. 85–101; Mathias, *Transformation*, pp. 88–115; Hoppit, 'Use', in McKendrick and Outhwaite, *Business*, pp. 64–78; Hudson, *Genesis*; Hoppit, *Risk*, pp. 18–28; Hoppit, 'Attitudes', pp. 305–22; Hudson, 'Industrial', pp. 49–56. For overview, see: Daunton, *Progress*, pp. 247–52.
[11] Anderson, 'Money', pp. 86–7.
[12] For more on these systems of surveillance see Chapter 1. A variety of systems were used from monitoring behaviour and consumption habits, to personal judgements of character, and conduct in business transactions, see: Muldrew, 'Culture', pp. 915–42. For a helpful discussion in the Victorian context, see: Taylor, *Creating*, pp. 23–32.
[13] Muldrew, 'Credit', pp. 23–38; Muldrew, *Economy*, pp. 216–41; Muldrew, 'Mutual', pp. 47–71.

rise to dominance during the eighteenth and nineteenth centuries – this thesis has highlighted the contributions made by a broad spectrum of middling people, from retailers, tradespeople, and practitioners, to engineers, managers, overseers and agents. As we have seen, industrialisation demanded more than just financial capital: it required skills, knowledge and technical expertise, as well as entrepreneurialism and risk-taking, all of which have been identified by historians as characteristic features of this middling group in early modern society.[14] The changes witnessed during this period were of such magnitude, and occurred over such a prelonged period of time, that they could not, as Mokyr says, have been 'a minority affair', whereby 'in the long run the few drag along the many.'[15] They required popular support, or at least compliance, a broad willingness to invest household resources in industrial and commercial ventures, a belief in the possibilities of improvement, and an entrepreneurial spirit that helped drive innovation and the pursuit of profits.[16] As we have see, these characterisitics were deeply engrained in the Derbyshire mining community, who, after all, had by 1700 been venturing their capital and credit in pursuit of ore for centuries, and had witnessed – and adapted to – technological and organisational change throughout the sixteenth and seventeenth centuries.[17] Ultimately, what brought about the decline in freemining in Derbyshire was not the ongoing technological and structural changes of the period, but rather the industry's general decline triggered by the exhaustion of accessible ore deposits, spiralling extraction costs, and stiff competition from other mining regions and localities. The industry's decline was at its worst during the Napoleonic War years, from which it was never to recover, with the exception of a few isolated mineral ventures during the 1840s, 50s and 60s.[18]

[14] See especially: Earle, *Making*, pp. 3–16; Barry, 'Introduction', pp. 1–27; Davidoff and Hall, *Family*, pp. 13-35; Hunt, *Middling*, pp. 1–21; French, 'Social', pp. 66–99; French, *Middle*, pp. 1–29; Muldrew, 'Middling', pp. 290–309.
[15] Mokyr, *Culture*, p. 283.
[16] For more on entrepreneurialism and improvement, see especially: Davidoff and Hall, *Family*, pp. 416–49; De Vries, *Industrious*, pp. 1–39; Mokyr, *Enlightened*, esp. chps. 2 and 12; Slack, *Invention*, pp. 102–15, 215–28.
[17] Kiernan, *Derbyshire*; Wood, *Politics*, pp. 41–56, 57–65.
[18] See especially: Willies, 'Prosperity', pp. 251–82; Willies, 'Derbyshire', pp. 1–19.

This 'master-led' entrepreneurial industry of Derbyshire was in some ways unique, but it was also typical of its time, as a great deal of emphasis was generally placed on the knowledge and skills of entrepreneurial craftspeople, and their contributions to industry.[19] The Derbyshire lead miners may thus be considered alongside other tradespeople and professionals involved in the process of industrialisation: the Cornish and North Pennine miners, the Birmingham button and toy makers, Sheffield metalworkers, Staffordshire potters, Tyne valley keelmen and coal miners, Midland iron smelters, Lancashire and Yorkshire textile manufacturers, Cheshire retailers, and Manchester cotton agents, as well as the shipwrights, millwrights, cartwrights, builders, carpenters, engineers, joiners, cabinet and furniture makers, tailors, shoemakers, weavers, frame knitters, embroiderers, clerks, accountants, solicitors, and attorneys, who populated the British countryside and urban centres, who were engaged in processes of change, and who profited at different times from economic and industrial development. Importantly, this thesis also demonstrates the national contexts of the knowledge economy of the Derbyshire lead miners, and their influence on other industrialising regions. As seen in chapter 3, the skills of the Derbyshire mining community were highly respected, had been explained and advertised in print, and touted by local craftspeople. As a result, they were widely sought by businessmen and landowners to oversee underground works across Britain and overseas: whether in mining, quarrying or tunnelling. From Sussex to the Isle of Man, North Wales to New England, Derbyshire lead miners were invited to take up positions of leadership, and thus played an important role in disseminating craft knowledge and techniques. Once more, credit played an important role. The same trust that enabled a miner such as Naylor to acquire work at local mines, to purchase goods, and acquire credit from local vendors and tradespeople, also enabled others such as William Hooson to peddle their expertise in Flintshire and further afield, and compete even against highly trained professionals from abroad. Clearly, the 'Industrial

[19] For broader discussion of the role of craftspeople in the process of knowledge dissemination, see: Hilaire–Pérez, 'Technology', pp. 135–53; Berg, 'Skill', pp. 127–48; Hilaire–Pérez, 'Dissemination', pp. 536–65. See also: Mokyr, *Culture*, pp. 22–33.

Enlightenment' benefited from a broader range of advocates and disseminators than Mokyr recognised, particularly in the early iterations of his thesis.[20]

Finally, the thesis turned to the question of capital formation, and here too, household, community and credit were shown to be crucial. Four interrelated case studies, examined in chapter 4, have shown how capital requirements for a range of industrial and infrastructural ventures were sourced from a socially and economically diverse yet locally defined community of investors, who drew on the same communal credit networks as, for example, did the Naylor household when purchasing goods and services from local vendors, or by labourers seeking employment at Miners Engine. Even those investors who came from further afield, such as the merchants, Richard Leigh, Daniel Whittaker and Lawrence Garden of Manchester, the Landowner and MP, Sir Cecil Wray, and the banker and cotton manufacturer, William Toplis, shared close personal ties with local residents, or were involved at different stages of the supply chains of local industries. This degree of familiarity was crucial to generating trust in capital ventures, especially given the absence of effective systems of financial intermediation.[21] It was also inherently subjective – a feature widely derided by economic historians.[22] Yet, as seen in Chapter 4, the system proved more than capable of meeting the varied capital demands posed by industrialisation at the local level, enabling a diverse cast of investors, including middling tradesmen, farmers, women, clergy, aristocrats, merchants and gentry, to share in the proceeds of industrialisation. This evidence points to the localism of capital markets, which in turn, highlights the need to reconsider the way that the process of capital formation has been treated by economic historians.[23] Clearly, the capital demands posed during the early phases of

[20] The question of credit and its relation to knowledge dissemination discussed by Mokyr under the term 'reputation effect', however, it is largely limited to elite circles, see: Mokyr, *Enlightened*, pp. 261–7, 382–3; idem, *Culture*, pp. 179–226.
[21] For importance of credit between partners, see especially: Taylor, Creating, pp. 23 – 32. For limits of the banking system, see: Pressnell, *Country*, pp. 501–10; Cameron, *Banking*, pp.1–14; Hudson, *Genesis*, pp. 218–23; Daunton, *Progress*, pp. 263–60; Temin and Voth, *Prometheus*, pp. 73–94, 148–75.
[22] For criticisms of credit economy, see especially: Postan, 'Recent', pp. 6–7; Heaton, 'Financing', pp. 6–10; Ashton, *Industrial*, p. 87; Cameron, *Banking*; Temin and Voth, *Prometheus*, pp. 23–38. See for money markets and role of intermediaries, see also: Pressnell, *Country*, pp. 1–3; Anderson, 'Money', pp. 86–7; Anderson, 'Attorney', pp. 223–55; Miles, 'Money', pp. 127–46.
[23] See collection of essays in: Higgins and Pollard, *Aspects*; Feinstein and Pollard, *Studies*. See in particular: Feinstein, 'Capital', pp. 73–94.

industrialisation were met not at the regional or national level, but at the local level, by a comparatively small proportion of the overall population, focussed in the immediate locality of the enterprise. This no doubt changed over the course of the nineteenth century, as banks and financial institutions expanded to meet the challenges posed by heavy industry and rail. However, for much of the eighteenth century the financial demands posed by industrialisation were shouldered predominantly by local populations.[24]

The process of industrialisation, charted here, was thus rooted in – and propelled by – a host of social structures and relationships familiar to the historian of early modern England: household and community ties, structured and complementing hierarchies of gender and age, local networks of credit and trust, local leadership by the 'middling sort', and their knowledge and skill in entrepreneurial endeavours. The approach adopted here also builds on the regional approach adopted most prominently by Hudson and Berg, but differs from them in a number of important ways. For the most part, their work explored the process of industrialisation through the prism of novel systems and structures, such as banks, factories, canals and railways. They stress the role played by leading industries and sectors, consider the region as the principal arena of change, and highlight the 'revolutionary' features of industrialisation.[25] While noting many areas of agreement, this thesis has focussed primarily on the personal, social and cultural contexts of industrialisation, while locating its basis in long-standing social and economic structures, typical of the eighteenth century and the early modern era, and in its inherently local character, yet while placing it within a broader regional and national context.

So, what are the implications of the system noted here for our understanding of the character and pace of industrialisation more generally? First, the evidence examined suggests that the character of industrialisation varied widely at the local level. This was seen most notably in Chapter 4, where the geographic reach of capital ventures was shown to be limited,

[24] See especially Pollard's well-known article: 'Capital', pp. 75–91.
[25] See especially: Hudson, *Genesis*, esp. pp. 265–8; Hudson, 'Regional', pp. 14–8; Berg and Hudson, 'Rehabilitating', pp. 24-50; Hudson, *Industrial*, chp. 4; Berg, *Age*, pp. 246-49. Also: Gregory, *Regional*; Langton, 'Industrial', pp. 145–67; Massey, *Spatial*; Stobart and Raven, *Towns*.

and the extent of industrial activity restricted to particular localities, while in chapter 1 it was noted how consumption habits and living standards were as much determined by the strength and integritiy of the local credit economy, as by aggregate trends in wages and commodity prices. Thus, according to the evidence examined throughout this thesis, industrialisation appears varied, pitted and locally defined, with change appearing dramatic, disruptive and sudden in some localities, and more gradual, evolutionary, even stagnant, in others. This leads to the second conclusion, namely that while the character of change could vary at the local level, there is no clear reason to question the overall assessment that the aggregate pace of economic and industrial growth during the eighteenth and early nineteenth centuries was gradual or 'slow', as the established literature suggests.[26] Though Hudson and Berg have used a similar approach to defend their view of the industrial revolution, as a period of 'revolutionary' change, this thesis has highlighted the continuities and regularities that accompanied the period, such as the continued reliance on locally sourced credit, and on traditional household and community structures.[27] At the same time, however, it also argues that in order to develop a more detailed and nuanced understanding of the mechanisms and causes of industrialisation, it is crucial to adopt a local perspective. It was at the local level that the majority of transactions and interactions were negotiated between households; where credit was sourced, capital financed, and labour employed, and where industrialisation, and its effects, were most keenly felt. If we rely solely on an aggregate-level perspective – as argued by Griffin, and also suggested by this thesis – and consider economic indicators at the expense of social, cultural and qualitative factors, we stand the risk of misreading and miscalculating the experiences of diverse localities and social groups.[28]

Third, and lastly, the varied and complex picture revealed by the present local-level analysis confirms the point raised by Martin Daunton and Patricia Hudson, namely that no

[26] Harley, 'British', pp. 283-5; Crafts, *British*, pp. 112-3; Crafts and Harley, 'Output', pp. 714-21; Clark, 'Farm', pp. 477–505; Antràs and Voth, 'Effort', pp. 52–77. See also: Wrigley, *Continuity*. For overviews, see: Daunton, *Progress*, pp. 1–24; Mokyr, 'Accounting', pp. 1–27.
[27] Hudson, 'Regional', pp. 5–38; Berg and Hudson, 'Rehabilitating', pp. 24–50.
[28] For a similar assessment, see especially: Griffin, *Liberty's*, pp. 241-7; Griffin, 'Diets', pp. 108-11.

single timeline can sufficiently encapsulate the process of industrialisation.[29] Clearly, the pace and character of change appear fundamentally different depending on the industry or society explored, and these differing timelines can be considered simultaneously in a contextualised history of the period. Industrialising processes naturally appear most rapid in those localities where industrialisation and the adoption of new technology was most intense. A history of the Derwent Valley, South Lancashire or parts of the West Riding of Yorkshire, therefore, will demonstrate a remarkable degree of change, which warrants the label 'revolutionary', while, in contrast, localities such as rural Lincolnshire, the Cotswolds, or London, reveal more gradual change, even stagnation, and different patterns of growth. At the same time, the more these different economic processes are studied together, the more the aggregate trends are likely to appear gradual and evolutionary. As figures continue to be refined in the light of studies of localities hitherto neglected, the overall assessment of the rate of economic growth is likely to continue to fall. To gain a better understanding of the mechanisms that brought about industrial and economic change, it is, therefore, imperative to study change at the local level, for it is at this level that industrialisation was at its most revolutionary. By exposing localities such as those examined here to close analysis, the role played by credit, household and community are revealed. The evidence presented in this thesis encourages us to see industrialisation as a deep-rooted local process, which then spread throughout Western Europe during the eighteenth and nineteenth centuries, with similar processes occurring globally. Yet, at its core, the process of channelling financial and human resources into industrial and commercial ventures, as this thesis suggests, was characteristically local in its origins.

[29] Hudson, *Industrial*, pp. 101–11, 32; Daunton, *Progress*, pp. 125–45.

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