

The British Gunpowder Industry and the Transatlantic Slave Trade

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During the eighteenth century, millions of firearms were shipped from Britain to Atlantic Africa where they were exchanged for enslaved people. Scholars have argued that this deadly trade was crucial for the development of Britain's arms industry. Atlantic Africa was a large export market for British gun makers, helping to considerably grow the output of the industry, especially in peacetime when the state purchased few weapons. The drive to meet African demand for low priced and low-quality firearms also spurred the expansion of the British firearms industry beyond its traditional heartland around London to the growing industrial center of Birmingham, where Britain's arms making would be concentrated throughout the nineteenth and twentieth centuries. The impetus given by the African trade also fostered a symbiotic relationship between Britain's emerging fiscal-military state and private manufacturing, because it helped to create an extensive private arsenal that the British military could be supplied from in wartime. Arms makers—whose growth was assisted by the slave trade before abolition—continued to grow after the ending of the trade by selling their deadly wares to both the state and growing export markets, Africa included. The synergistic relationship between the British arms industry and the transatlantic slave trade has been offered as clear evidence of Eric Williams' famous hypothesis that Atlantic markets—and especially enslavement—were essential to Britain's Industrial Revolution.²

Much less scholarly attention has been paid to gunpowder—the fuel for the gun-slave engine that was so important to the transatlantic slave trade's operation. While gunpowder comprised only a small proportion of the cargos exported to Africa to acquire slaves—approximately five percent by value—it is nonetheless an ideal case study of the relationship between British manufacturing and Atlantic slavery. Unlike textiles, metals, or beads, which were typically reexported to Africa, gunpowder was—like guns—principally manufactured in Britain through a complex and multi-staged industrial process. The records for gunpowder makers are also the most complete of any

¹ Thanks are due to the numerous workshops that led to this special issue; the members of the Black History Conversations Group (especially Marcia Dunkley); Amy Stanning; Warren Whatley; Georgia Whelan; Nuala Zahedieh; and the editor and anonymous readers of the *Business History Review* for their constructive feedback on this article. The researching underpinning this article was facilitated by a small grant from the Economic History Society.

² Eric Williams, *Capitalism & Slavery* (Chapel Hill, NC: 1944). W.A. Richards, "The Birmingham Gun Manufactory of Farmer and Galton and the Slave Trade in the Eighteenth Century" (Unpublished MA Thesis, University of Birmingham, 1972); Joseph Inikori, *Africans and the Industrial Revolution in England* (Cambridge, 2009), 457-467; Priya Satia, *Empire of Guns: The Violent Making of the Industrial Revolution* (Palo Alto, 2019).

branch of Britain's African manufacturers, guns included, because the archives of five firms that supplied the slave trade are extant.³ Historians have previously examined these archives individually to grasp how the businesses operated and gunpowder making's place within regional economies.⁴ While some of these scholars have identified the importance of enslavement to some of these individual firms' development, most studies have concluded that the slave trade was marginal to the overall growth of Britain's gunpowder industry, which was principally driven by domestic demand from the military and miners.⁵ Exploring the relationship between gunpowder making and the slave trade can therefore help to interrogate the relative importance of enslavement for the growth of British industry. Focusing on the business histories of the five powder making firms can simultaneously reveal the identities of the investors who supplied the slave trade; the profitability of making goods used to acquire slaves in Africa; and the fates of the manufactories that fed goods into the slave trade post abolition—important topics that have received scant attention from historians to date.

By examining the business histories of five gunpowder makers that supplied the slave trade, this article makes three claims. First, it demonstrates that the Atlantic slave trade did help to develop the British gunpowder industry prior to the slave trade's abolition. During the eighteenth-century British merchant capitalists—most of them slave traders—established the five new plants in the proximity of Bristol and Liverpool to meet the growing African demand for gunpowder. Like in gun

³ The major collections are for powder mills at Woolley (Somerset Heritage Centre, Taunton, DD/SH/27); Thelwall (Derbyshire Record Office, D157/MT); and Haverthwaite (Lancashire Archives, DDLO). The first two collections principally comprise financial accounts; the latter includes both accounts and several hundred letters exchanged between the firm's investors. Smaller sets of records are available for plants at Sedgwick (Kendal Archive Centre, WD/W) and Littleton (Jonathan Barry ed., *The Diary of William Dyer: Bristol in 1762* (Bristol, 2012)). Each firm examined here was named after some, or all, of its partners. Low Wood, for example, was named Fayerer, King & Co. However, because the partnership structures of the companies typically changed over time, I have used the names of the mill sites, rather than the names of the partnerships, throughout this article.

⁴ See, Brenda J. Buchanan, "Capital Investment in a Regional Economy: Some Aspects of the Sources and Employment of Capital in North Somerset, 1750-1830" (Unpublished PhD Thesis, University of London, 1992); B. J. Buchanan, "The Africa Trade and the Bristol Gunpowder Industry", *Transactions of the Bristol & Gloucester Archaeological Society* 118 (2000): 133-156; E. M. Patterson, *Black Powder Manufacture in Cumbria* (Faversham, 1995); Alice Palmer, *Low Wood Gunpowder Company its inception and early growth 1798-1808* (London, 1998), Robert Vickers, "The South Lakeland Gunpowder Manufacturing Industry, 1764-1936" (Unpublished PhD Thesis, Lancaster University, 2003).

⁵ Buchanan, Vickers, and Palmer all highlight the slave trade's centrality to the growth of individual powder works. For regional studies that emphasize the importance of domestic markets, or that ignore the slave trade, see, P.N. Wilson, "The Gunpowder Mills of Westmoreland & Furness," *Transactions of the Newcomen Society* 36:1 (1963): 47-65; E. M. Patterson, *Black Powder Manufacture in Cumbria* (Faversham, 1995); A.G. Crocker et al, *Gunpowder Mills: Documents of the Seventeenth and Eighteenth Centuries* (Woking, 2000); Ian Tyler, *The Gunpowder Mills of Cumbria: A History of Cumbria's Gunpowder Industry* (Keswick, 2002). No general study emphasizes the importance of Africa to the growth and spread of gunpowder technology or manufacturing. See, for example, J.R. Partington, *A History of Greek Fire and Gunpowder* (Cambridge, 1960); Brenda J Buchanan ed., *Gunpowder: The History of an International Technology* (Bath, 1996); G.I. Brown, *The Big Bang: A History of Explosives* (Stroud, 1998); Jack Kelly, *Gunpowder: A History of the Explosive That Changed the World* (London, 2004); Brenda J. Buchanan ed., *Gunpowder, Explosives and the State: A Technological History* (London, 2016).

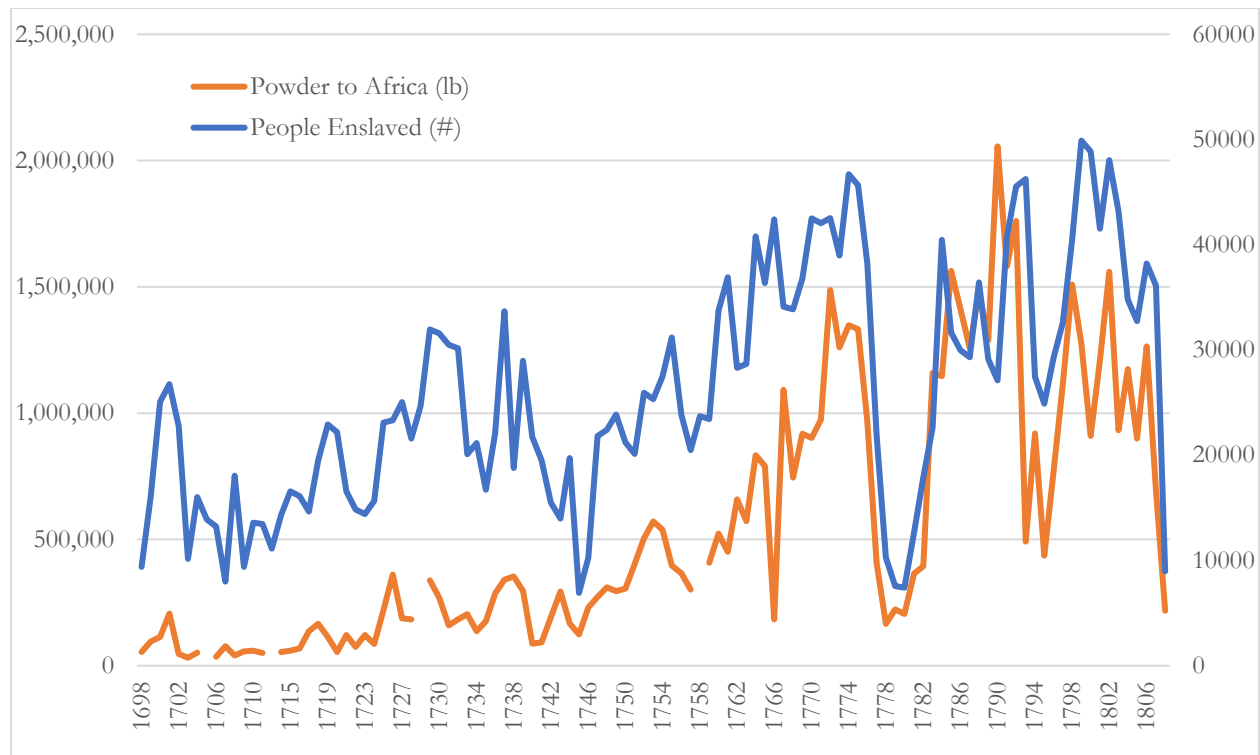
making, the slave trade therefore drove the geographic expansion of industry beyond the southeast and into the provinces. The slave trade was also by far the largest export market for British gunpowder makers, with twenty percent of all the powder produced prior to 1807 going to Africa. Second, this article reveals that supplying the slave trade was likely a lucrative and important pursuit for British manufacturers. The five plants explored here made powder that was designed specifically for the African market enabling their investors to earn consistently high profits that matched, and even exceeded, the returns to be made from slave trading. This article concludes, however, that the slave trade's long-term impacts on the British gunpowder industry were likely of limited importance. The stimulus given to powder making by the slave trade faded considerably as abolition neared, by which point the powder works surveyed here comprised a small and specialized sub-sector of a much larger industry. The example of gunpowder therefore indicates that British manufacturing was stimulated by the slave trade before abolition, but that stimulus was likely of minimal importance for driving Britain's industrial development during the nineteenth century.

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Although Africans encountered gunpowder from the moment of European contact the explosive remained little used until the introduction of reliable flintlock muskets in the seventeenth century. African consumers eagerly embraced these new weapons for warfare, but also in hunting, as status symbols, and as articles of trade: by abolition, Britons brought approximately two hundred thousand weapons a year to Africa. Africans imported immense quantities of gunpowder to fire this arsenal. Over the course of the eighteenth century, the volume of powder imports increased exponentially: in 1698, the English brought just 54,000 pounds of powder to Africa; by 1750, annual imports from Britain had increased fivefold to 272,402 pounds. Captives were acquired with proportionately more powder from the second quarter of the eighteenth century onwards, presumably to fire the accumulating number of weapons in Africa, providing a further boost to demand; in the thirty years before abolition, Africans acquired a million pounds of gunpowder per annum from Britons, on average—enough ammunition to fire a musket twice every second throughout that entire period (Figure 1).⁶

⁶ For the firearms trade to West Africa, see, Gavin White, "Firearms in Africa: An Introduction," *The Journal of African History* 12:2 (1971): 173-184; R.A. Kea, "Firearms and Warfare on the Gold and Slave Coasts from the Sixteenth to the Nineteenth Centuries," *The Journal of African History* 12:2 (1971): 185-213; J.E. Inikori, "The Import of Firearms into West Africa 1750-1807: A Quantitative Analysis," *The Journal of African History* 18:3 (1977): 339-368; W.A. Richards, "The Import of Firearms into West Africa in the Eighteenth Century," *The Journal of African History* 21:1 (1980): 43-59. For the

Powder exported to Africa (lb.) vs People enslaved (#), 1698-1808



Sources: CUST3/1-82, CUST17/1-30, TNAUK; www.slavevoyages.org

African consumers demanded a specific type of powder that suited tropical conditions and indigenous uses for weapons. Gunpowder is comprised of saltpeter, charcoal and sulfur that is ground together in varying proportions (usually 70:15:15) before being graded according to the fineness of the grain. The best quality powder is of a small grain, producing a strong and sustained charge that was ideal for military and hunting weapons. Europeans discovered by the late seventeenth century that Africans disliked small-grained powder because it absorbed moisture easily, reducing its effectiveness in the tropics; the explosive power of fine powder also threatened to burst the barrels of the low-quality “trade guns” that were commonly exported to Africa. Europeans therefore devised a specialist product known as “Africa,” “Guinea,” or “Trade” powder for African markets. While Africa powder lacked “quickness or strength,” one powdermaker noted, it was “large grained, hard dried & of a quality that will keep a long time” making it durable and reliable in the

non-violent uses of firearms in West Africa, see Saheed Aderinto, *Guns and Society: Firearms, Culture, and Public Order* (Bloomington, 2018).

tropics. Trade powder's low quality also made it cheap; it sold for around half the price of the highest-quality powder used by English sportsmen and the military.⁷

Manufacturers in south-east England—the historic center of powder making—met the growing African demand for trade powder in the late seventeenth century. Gunpowder mills had been established around the Thames estuary throughout the Tudor and Stuart period to supply England's army and navy. London's links to the Indian Ocean trade via the East India Company were particularly important because India was, after 1650, the principal source of global-saltpeter production. Londoners could also obtain sulfur via the growing trade with the volcanic islands of southern Italy. By 1700, approximately twenty works surrounded London, which furnished powder to the state, merchants, miners, sportsmen, and wholesalers. The London-based Royal African Company—England's largest slaving company before 1700—ordered its powder from these works, especially those operated by manufacturers with ties to the East India Company.⁸ The London merchants that elbowed the RAC aside at the turn of the eighteenth century continued to obtain powder from nearby mills while also purchasing the explosive from Holland—itsself a major exporter of gunpowder. There is no evidence that London mills were founded specifically to supply the slave trade, however; African demand was met by manufactories that instead supplied a variety of buyers, especially the military.⁹

Provincial merchants, who supplanted Londoners as the largest British slave traders in the second quarter of the eighteenth century, instead established new plants specifically focused on producing African powder. Bristol's slave trade had grown steadily from 1698 through 1721 but the town's African merchants were forced to laboriously import their gunpowder from London. To open a more direct supply, a consortium of four Bristol merchants erected, in 1722, a new

⁷ Christopher Wilson to Daye Barker, Kendal, Dec 28, 1799, Box 2, Bundle 9, DDLO, LA. For the early history of Africa powder, see Kea, "Firearms and Warfare," 204-5.

⁸ For India saltpeter production, see, David Cressy, *Saltpeter: The Mother of Gunpowder* (Oxford, 2013), 121-135; Susil Chaudhuri, "Saltpetre Trade and Industry in Bengal Subah, 1650-1720," *Proceedings of the Indian History Congress* 34:1 (1973): 263-270; James W. Frey, "The Indian Saltpeter Trade, the Military Revolution, and the Rise of Britain as a Global Superpower," *The Historian* 71-3 (Fall 2009): 507-554. For sulfur production, see Daniel Cunha, "The Frontier of Hell: Sicily, Sulfur, and the Rise of the British Chemical Industry, 1750-1840," *Critical Historical Studies* 6:2 (2019): 279-302. For powdermaking around London, see Jenny West, *Gunpowder, Government and War in the Mid-Eighteenth Century* (London, 1991); A.G. Crocker et al, *Gunpowder Mills: Documents of the Seventeenth and Eighteenth Centuries* (Woking, 2000).

⁹ For powder exports by the RAC's acquisition of powder, see the Committee of Goods' minute books in T70/126, 128, and 131. The RAC's powder exports aboard it ships are within the invoice books outwards (T70/910-935, TNAUK). Humphry Morice, the largest private London slave trader in the early eighteenth century, ordered his gunpowder from Holland and London mills. See the accountbooks for his ships *Henry*, *Portugal*, and *Sarah* (Morice Papers, Bank of England). The London mills that supplied the slave trade also had contracts with the state. See, West, *Gunpowder, Government*, 197-211. For a London mill that focused almost entirely on supplying domestic demand, see, Crocker et al, *Gunpowder Mills*, 107-172.

gunpowder works at Woolley, a hamlet ten miles from Bristol (Figure 2). In 1749, another group of Bristol merchants established a new plant at Littleton, a secluded valley six miles to the southwest of Bristol.¹⁰ When Liverpool merchants sought to seriously enter the slave trade in the 1730s, they also lacked local powderworks that could supply their ships; they instead sourced powder from Bristol, London, or Holland. These various sources combined apparently sufficed to supply Liverpool's slave trade, which enjoyed a period of explosive growth at mid century; in 1749, Liverpool vaulted ahead of Bristol and London. Limitations on the movement of powder imposed by the Board of Ordnance during the Seven Years War—including a complete halt in the supply of powder from Bristol to Liverpool in 1762—apparently spurred the local production of powder; in 1757, four Liverpool merchant built a new powderworks at Thelwall, a village twenty miles up the River Mersey from Liverpool.¹¹ The new mill apparently was unable to meet Liverpool's voracious demand for powder because, in 1764, a group of Cumbrian businessmen founded another new powder works at Sedgwick, four miles south of Kendal, that was linked to Liverpool via ports at the mouth of the Kent River.¹² Liverpool's slaving merchants began sourcing their powder from the new sites at Thelwall and Sedgwick, but also continued to purchase powder from London, Bristol, and Holland.¹³

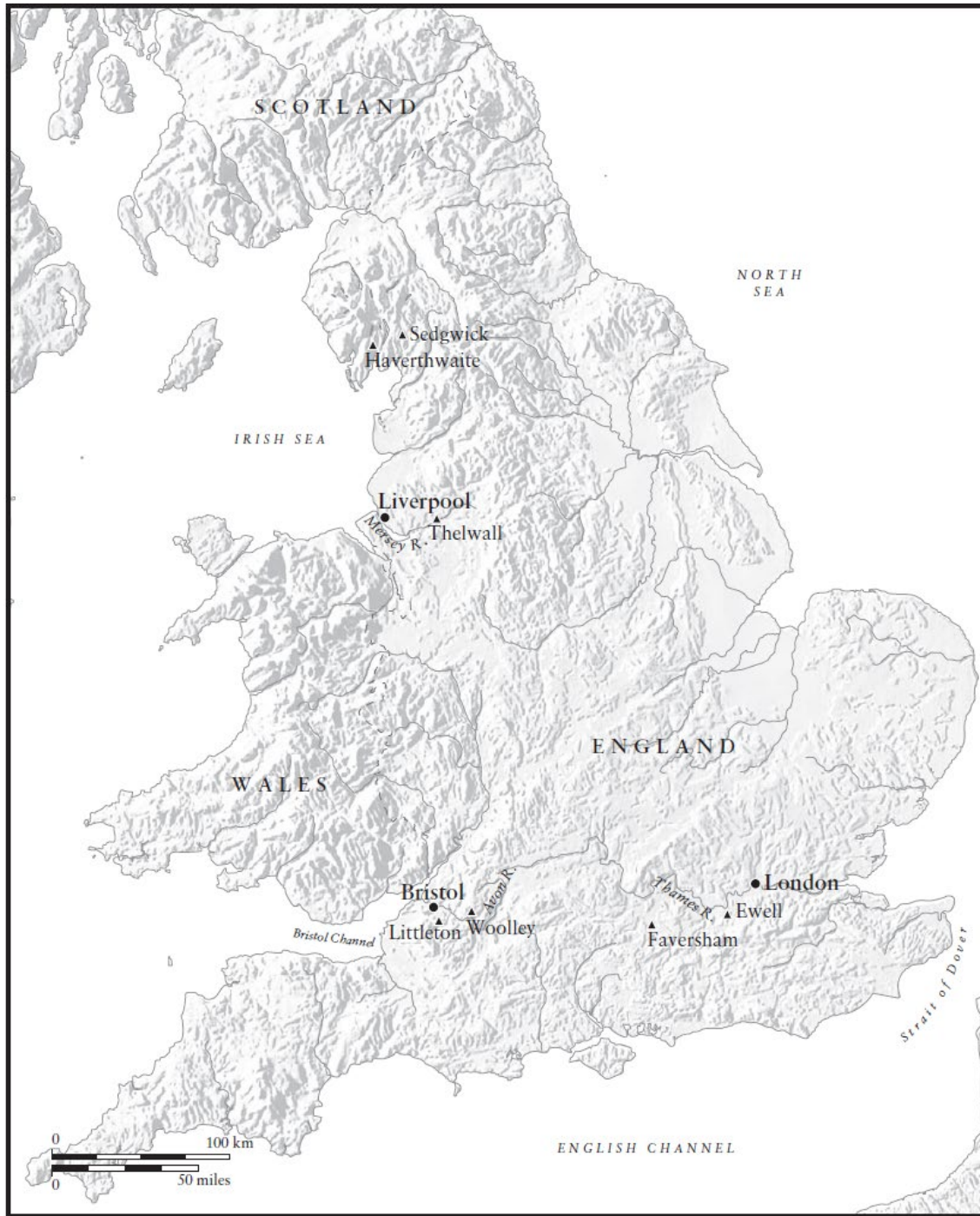
¹⁰ For the founding of Woolley and Littleton, see Brenda J. Buchanan, "Bath's Forgotten Gunpowder History: The Powder Mills at Woolley in the Eighteenth Century," *Bath History Journal* X (2005): 72–96; Buchanan, "Africa Trade;" Barry ed., *The Diary of William Dyer*, 7-30.

¹¹ For the transport of powder from Bristol to Liverpool, see, West, *Gunpowder, Government*, 125. For London mills selling powder in Liverpool via agents, see Frances Wilkins, *The Hassels of Dalemain: A Cumberland Family, 1736-1794* (Kidderminster, 2003), 44-48. The Dutch powder was typically shipped to the Isle of Man, where it was then collected by Liverpool slave ships departing for Africa; between 1718 and 1764, at least 4,650 barrels of powder were shipped via the Isle of Man into the Liverpool slave trade. See, Frances Wilkins, *Manx Slave Traders: A Social History of the Isle of Man's Role in the Atlantic Slave Trade* (Douglas, 1999), 5. For the Ordnance Board's restrictions during the Seven Years' War, see West, *Gunpowder, Government*, 119-129. For the difficulties caused by the embargo on the Bristol firms, see, Barry ed., *The Diary of William Dyer*, 76-168; "1761-1762 Attempts to Produce Gunpowder for Govt Service and to Obtain Export License," DD/SH/27, SHC.

¹² For the establishment of the Thelwall works, see "Gunpowder works at Thelwall: Proprietors meetings, accounts and resolutions, 1759-78, with inventory and valuation of stock 1797," D157M/T3554, DRO. For the founding of Sedgwick, see Vickers, "South Lakeland," 35-41; Tyler, *Gunpowder Mills*, 27-37. Although there is no direct documentary evidence that Sedgwick was founded specifically to supply the slave trade, I agree with Vickers that the firm's subsequent role supplying the Liverpool slave trade, coupled with an absence of viable local markets for large quantities of powder, strongly implies that slave trade provided the impetus for its establishment.

¹³ For Woolley supplying powder to Liverpool, see "Gun Powder Annual Accounts," c.1751-1758, DD/SH/27. William Davenport, one of Liverpool's largest slave traders c.1750-1788, principally sourced gunpowder from a mill at Ewell, near London; he also acted as an agent for Chauncy & Vigne, who produced powder at works in Faversham and Oare, near Lonodn. Baker & Dawson, the largest British slaving company c.1783-1793, likewise sourced their powder, which amounted to 2-3,000 barrels a year in 1788, from Faversham. See, *The Papers of William Davenport and Co., 1745-1797* (Wakefield: Microform Academic Publishers, 1998); "The Humble Petition of Miles Peter Andrew on behalf of himself and of Frederick Pigou the Elder and Frederick Pigou the younger his partner," 1788, in *American Papers in the House of Lords Record Office* (Wakefield: Microform Ltd., 1983), 2.23.

Figure 2: Principal gunpowder works supplying Britain's slave trade, c.1722-1808



The continued growth of Britain's slave trade—especially at Liverpool—encouraged the further expansion of powder output. In the early 1730s, Woolley constructed a “new powder mills” near to the original site, doubling capacity. Littleton likewise expanded its production in the 1760s by

constructing two new works at nearby Chew Stoke and Chew Magna. Given that Bristol's slave trade was in decline after 1740, this increased capacity was almost certainly opened to supply Liverpool's rapidly expanding slave trade. The northern mills were also substantially expanded to feed Liverpool: four expansions were made to Thelwall's output between 1764 and 1774. In 1790—the peak year for British powder exports to Africa—production at Sedgwick was also substantially increased by the construction of a new set of works. The growing success of the northern mills encouraged another group of northern businessmen to establish, in 1798, a new powder works at Haverthwaite, ten miles to the west of Sedgwick, specifically to supply Liverpool's slave trade. The new manufactory initially had two mills producing powder; in 1803, another mill was added to meet the surging demand from Liverpool merchants. Britain's slave trade was thus supplied with gunpowder through the erection and then expansion of five new manufactories (two near Bristol, three near Liverpool), and the continued sourcing of powder from London and Holland.¹⁴

The creation of these highly specialized new works required substantial capital inputs. Gunpowder making required expensive equipment housed within its own building; Sedgwick had “about twenty different buildings” including mills, magazines, a blacksmith, cooperage, and a sawmill. Weirs, races, and “cuts” also had to be expensively constructed to channel waterpower. Constructing a new powderworks hence required teams of hired tradespeople to work for at least a year—a period when the investors received no income. Large sums also had to be spent on powder's three ingredients, especially saltpeter; at least two firms took out bridging loans, principally from Atlantic merchants, to purchase precursors.¹⁵ Once a company produced powder, sales were made on credits that typically stretched to a year, further prolonging the wait for revenue. The sums invested in setting up powder works were consequently large: Woolley's owners had sunk £9,000 into the business by 1746, and Thelwall cost £9,577, of which £3,700 was invested in plant; £2,203

¹⁴ For the expansion of Woolley, see [Woolley mill partnership agreement], 1733, DD/SH/27, SHC. “Memd relating to Gunpowder works,” DD/SH/27, SHC; Littleton, see Buchanan, “Africa Trade,” 142; Thelwall, see “Gunpowder works at Thelwall: Proprietors meetings, accounts and resolutions, 1759-78, with inventory and valuation of stock 1797,” D157M/T3554, DRO; Sedgwick, see Tyler, *Gunpowder Mills*, 28, 33. For the slave trade as the motivation for the establishment of the Haverthwaite mill, see the letters between Christopher Wilson Junior and his partners in Box 2, Bundle 9, DDLO, LA.

¹⁵ For the extensiveness of Sedgwick, see Tyler, *Gunpowder Mills*, 27, 33. For hydraulics at powderworks, see Buchanan, “Bath's Forgotten Gunpowder History,” 82-88. For the extensive work required to establish a powderworks, see the correspondence for 1798/9 detailing the creation of the Haverthwaite works in Box 2, Bundle 9, DDLO, LA. The land for the Thelwall site was purchased in September 1757, but the site was not in full operation until 1760, implying that it took several years to construct the plant. See, “Gunpowder works at Thelwall: Proprietors meetings, accounts and resolutions, 1759-78, with inventory and valuation of stock 1797,” D157M/T3554. Haverthwaite took loans of £5,699 by December 1800 (Vickers, “South Lakeland,” 43). Woolley's annual accounts show total loans of £10,100 between 1751 and 1774. See, “Gun Powder Annual Accounts,” c.1751-1774, DD/SH/27.

in inventory, and the remainder—plus the firm’s profits—circulated as credit sales. Sedgwick and Haverthwaite were equally as costly at £10,000 and £13,800 respectively. Establishing a network of provincial powder mills to supply the slave trade thus required approximately £50,000 in startup capital.¹⁶

Powder works were particularly capital intensive when compared to alternative investments in the Atlantic World. In 1745, for example, nine Bristol merchants fitted out the slave ship *Jason Galley* to drag 450 people from the Gold Coast. The vessel and its equipment cost £1,939 and the cargo added a further £2,676—£4,615 in total, or roughly half the cost of Woolly. Establishing a powder works was more comparable to founding a Caribbean plantation, which were capital intensive partially because they also involved the semi-industrial processing of raw materials; by 1774, a typical Jamaican sugar estate with a hundred enslaved people cost £10,000. While equivalent to investments in the Atlantic slave economy, the establishment of powder works was expensive when compared to other provincial investments. In Bristol’s surrounds, for example, establishing a mine or paper mill in the late eighteenth century involved approximately £2,000 of fixed capital. The powder mills were likewise some of the most capital-intensive establishments in the northwest; only coke-fired iron works and textile mills exceeded Sedgwick and Haverthwaite in value. The founder of Haverthwaite was correct when he described powderworks as “great manufactor[ies].”¹⁷

The capital required to establish new powder works was obtained from two principal sources: Atlantic traders, especially slaving merchants, and local merchant-capitalists. Each of the five companies was founded by a partnership that ranged in size from three to five individuals, with each partner usually providing an equal share of capital; twenty investors initially founded the firms. Most of those people—eleven of the twenty—invested in slave ships prior to establishing the powder works and then continued to invest in the slave trade once the mills were in operation. The Cunliffe brothers Ellis (1717-1767) and Robert (1719-1778), for example, fitted out ships that enslaved eight thousand people before founding Thelwall. Joseph Fayrer (1743-1801), a co-founder of Haverthwaite, raised his capital as a slave ship captain, having helmed ships that carried over four

¹⁶ For the capital invested in Woolly, see “Gun Powder Annual Accounts from the Year 1746,” DD/SH/27, SA; for Sedgwick, see Vickers, “South Lakeland,” 36; for Haverthwaite, see Vickers, “South Lakeland,” 42-43; for Thelwall, see Gunpowder works at Thelwall: Proprietors meetings, accounts and resolutions, 1759-78, with inventory and valuation of stock 1797,” D157M/T3554, DRO. The expansions to each of the sites detailed above appears to have been financed through the reinvestment of profits rather than the addition of capital.

¹⁷ Accountbook of the *Jason Galley*, Bristol Record Office. For the price of a Jamaican plantation see, Edward Long, *History of Jamaica* (London, 1774), I, 459-60. For capital costs around Bristol, see Buchanan, “Capital Investment,” 206-322. For capital costs in southern Cumbria, see Vickers, “South Lakeland, 33-34. Christopher Wilson Jr. to Daye Barker, Kendal, July 28, 1802, Box 3, Bundle 1, DDLO, LA.

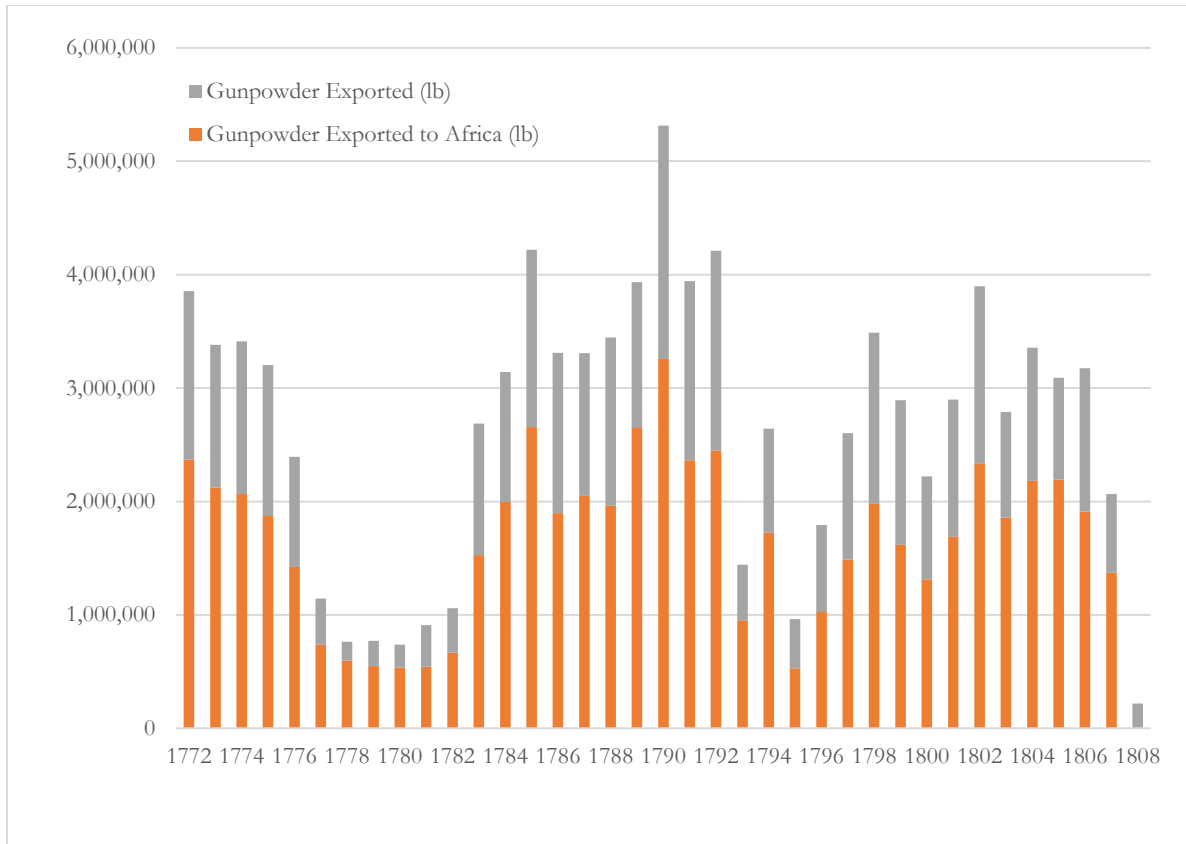
thousand people into captivity. Four of the other twenty founders were connected to the Atlantic slave economy via the bilateral colonial trade; one of the Woolly partners was previously an attorney for Caribbean plantations. The remaining five investors, all of them partners in Sedgwick or Haverthwaite, were local textile manufacturers, bankers, iron mongers, landowners, or lawyers, who apparently aimed to profit from Atlantic slavery without directly enslaving people. John Wakefield (1738-1811), for example, was engaged in brewing, textile making and the bilateral trade with the West Indies but never invested directly in the slave trade, perhaps because of his Quakerism. He nonetheless profited from enslavement by establishing, and eventually fully owning, Sedgwick. Wakefield's fellow Kendal businessman Christopher Wilson Jr. (1765-1845) likewise never invested in slave ships or plantations, but enthusiastically plunged his capital into supplying the slave trade at Haverthwaite. At least two women—the widows of deceased partners—also held shares in Woolley between 1753 and 1764. The capital that financed the powderworks thus emerged principally from the Atlantic slave economy, especially the slave trade itself, but also encompassed individuals who held themselves aloof from the bloody business.¹⁸

The collective result of these investors' actions was an expansion in the geographic distribution of the British explosives industry. Prior to 1722, gunpowder manufacturing remained entirely concentrated around London; no licensed provisional mill was in permanent operation. By century's end, the erection of five new works to meet the slave trade's demand had spread powder making into south- and north-west England. By the late eighteenth century, provincial merchants' dominance of the slave trade was mirrored by provincial powdermakers dominance of African markets. For example, in 1767—a peace year when Britain's slave trade was buoyant—just eighteen percent of the gunpowder exported from London headed to Africa, versus ninety-two percent of powder from the outports. Londoners instead shipped most of their powder to the Americas (forty-seven percent of exports) Europe (nineteen percent), and India (seventeen percent). Outport merchants sent no powder to India, next to none to Europe (less than one percent), and negligible amounts to the Americas (seven percent). The geographic expansion of the slave trade from the

¹⁸ For the investors in Woolly and Littleton, see, Buchanan, "Africa Trade," 148-150. For the Cunliffes' slaving investments, see <https://www.slavevoyages.org/voyages/UfEII321>. For Ellis Cunliffe, see, "CUNLIFFE, Ellis (1717-67), of Saighton Grange, nr. Chester" in *The History of Parliament* (<https://www.historyofparliamentonline.org/volume/1754-1790/member/cunliffe-ellis-1717-67>). For Fayrer's career as a slave ship captain, see: <https://slavevoyages.org/voyages/hXrhhWXj/>. For his investments as a slaving merchant, see: <https://slavevoyages.org/voyages/NwmPFt8x>. Fayrer also made substantial sums as a privateer, for which see, Gomer Williams, *History of the Liverpool Privateers...* (London, 1897), 229, 286. For the financiers of Sedgwick and Haverthwaite, see, Vickers, "South Lakeland," 35-45. For Christopher Wilson, see Olive Wilson, *Christopher Wilson of Kendal: An Eighteenth Century Hosier and Banker* (Kendal, 1988).

metropolis to the provinces was therefore mirrored by a simultaneous expansion of manufacturing to supply that trade.¹⁹

Figure 3: Total gunpowder exported (lb) vs gunpowder exported to Africa (lb), 1772-1808



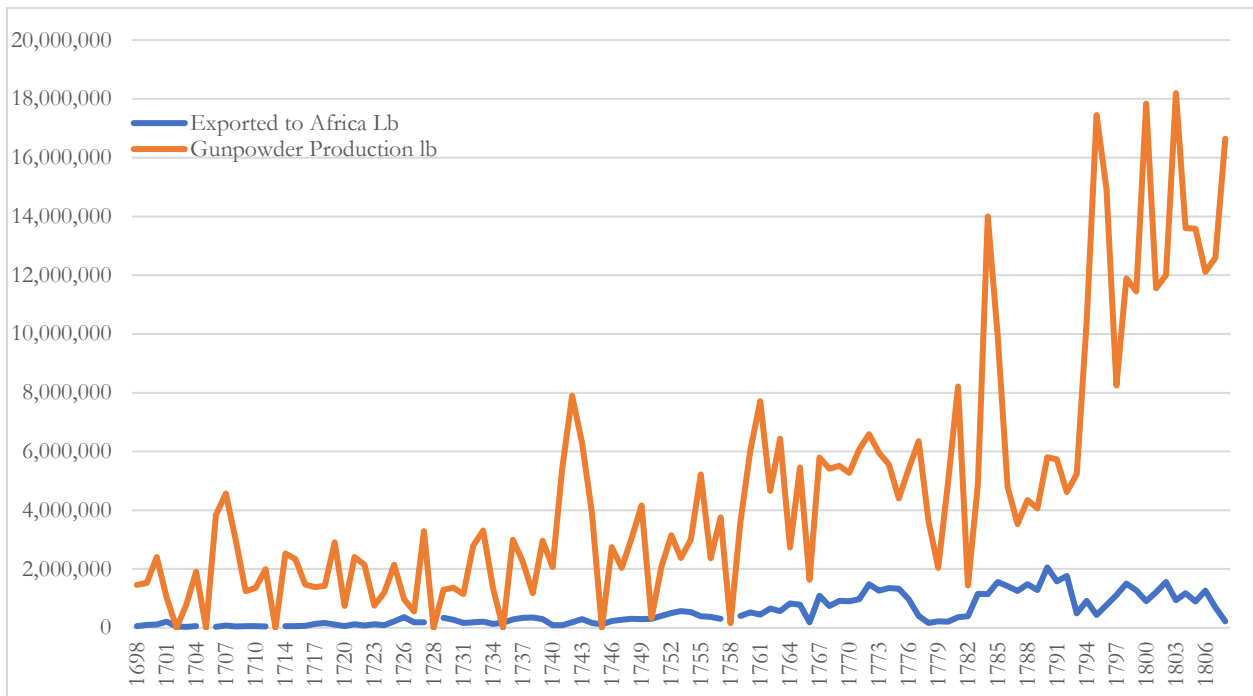
Source: CUST17/1-30, TNAUK. The customs records prior to 1772 take a different format that makes it difficult to calculate the export markets for powder with the same level of precision.

The overall output of Britain’s gunpowder industry was likewise boosted by the slave trade, something that can be determined with precision by comparing the volume of gunpowder produced and exports to Africa (Figure 4). Between 1698, when customs records commence, and abolition in 1808, Africa absorbed fifty-eight million pounds of British powder—thirteen percent of total production. Across that period, Africa was by far the largest export market for powder. Britons exported gunpowder to Europe (especially Flanders, Holland, Italy, and Portugal), the Americas (principally the populous thirteen colonies and Canada), and India. But, taken together, these exports markets were dwarfed by Africa: between 1772 and 1808, sixty-two percent of exported

¹⁹ CUST3/71, TNAUK.

powder went to Atlantic Africa—almost three times the quantity that was shipped to the Americas, the next largest export market. Africa’s importance as a market rose over the eighteenth century before declining considerably at century end: in 1700, the slave trade absorbed just five percent of British powder production; by midcentury Africa imported three times as much of Britain’s increased output; and in 1787—the peak of the slave trade’s importance—Africa consumed thirty-six percent of powder output. Africa was an especially significant peacetime market: three times as much powder was shipped there in peace compared to war years, on average. The slave trade’s significance to the powder industry reduced considerably after the 1793 outbreak of the French Revolutionary War, though, as output was increased by London mills to supply the army and navy; by abolition, Africa once again absorbed just six percent of powder production. The slave trade was thus important for growing the overall size and extent of the British gunpowder industry—especially its provincialization and orientation towards African export markets—but it was by no means the primary driver of that industry’s growth.

Figure 4: Total production of gunpowder (lb) vs gunpowder exported to Africa (lb), 1698-1808



Sources: CUST3/1-82, CUST17/1-30, TNAUK.

Method: The total production of gunpowder has been determined by multiplying the volume of saltpeter imported from India (less any re-exports) by 1.43: the ratio of gunpowder to its saltpeter content, by weight.

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British merchant-capitalists established new works because they hoped to profit by satisfying the slave trade's voracious demand for gunpowder. Earning those profits was not straight forward, however. Powder makers needed to convert their working capital into a product that had to meet the exacting standards of African consumers; sell it into a slave trade that fluctuated in volume year on year; and extend their capital, via credit sales, into a notoriously precarious business. Manufacturers who successfully navigated these myriad challenges stood to make large sums, though, offering an alternative way to profit by Atlantic slavery that bypassed the considerable risks and moral opprobrium of owning slave ships or enslaving people.

Powdermakers began the process of converting their capital into profits by sourcing saltpeter, charcoal, and sulfur—the three ingredients of gunpowder. They typically set production targets based on coming African demand and ordered in varying quantities of precursors accordingly. Charcoal was usually obtained locally; Haverthwaite, for example, were supplied by charcoal coppiced from nearby forests that also fueled nearby iron furnaces. The other two ingredients came from Britain's expanding empire: sulfur was principally acquired from Sicily where forced laborers—many of them children—mined the volcanic element, which was then forwarded to the powderworks via London or Liverpool; and saltpeter, which comprised seventy percent of gunpowder by weight, was sourced from India via London, where the East India Company held a twice annual auction of the substance.²⁰

A small team of mill workers converted the ingredients into gunpowder. "Rough" saltpeter and sulfur were refined in specialized buildings to remove impurities and then tumbled together with charcoal into a "green charge." The charge moved into the "incorporating" mill—the heart of the complex—where large water-powered "edge-runners" ground the precursors together. The resulting "mill cake" was transferred to a "corning house" where a worker broke it into chunks that were passed through a series of hair sieves of increasing fineness. The largest grains were graded as African powder, leaving the remainder to be categorized according to increase levels of fineness

²⁰ For the increasing of ingredient stockpiles, see for example Christopher Wilson Jr. to Daye Barker, Kendal, Nov 5, 1800, Box 2, Bundle 9, DDLO. Mill owners laid off workers or, in extremis, halted production entirely when demand from the slave trade collapsed. See, for example, Barry ed., "Diary of William Dyer," 81; Christopher Wilson Jr. to Daye Barker, Kendal, Mar 21, 1800, Box 2, Bundle 9, DDLO. For the supply of charcoal, see Christopher Wilson Jr. to Daye Barker, Kendal, 24 and 28 Dec 1799, Box 2, Bundle 9, DDLO. African powder was made with either oak or alder, which was cheaper than the "savin coal" that went into higher quality powders. For sulfur extraction, see Cunha, "Frontier of Hell." For the shipping of sulfur from Liverpool, see Christopher Wilson Jr. to Daye Barker, Kendal, Aug 31, 1799, Box 2, Bundle 9, DDLO. For the shipping of sulfur from London, see, Barry ed., "Diary of William Dyer," 12, 82.

indicated by a series of Fs: with F the lowest, followed by FF, FFF and so on. Graded powder was “glazed” by tumbling it in barrels and then dried for at least two days; African powder was dried for a long period to ensure its durability. The finished powder was loaded into one-hundred-pound barrels which were stored some distance from the works awaiting shipment. Ensuring this finished powder met the stringent demands of African consumers required experimentation and constant tweaks to the manufacturing process: makers visited other mills to examine their production methods; produced prototypes that they compared against competitor’s wares; and used feedback from Africans, via returning slave ship captains, to further refine the manufacturing process.²¹

The multi-staged nature of gunpowder making meant that each works produced a steady stream of output; large quantities of powder could not be made at once. Incorporation was the key bottleneck on production, as the charge needed to be ground for at least six hours. All the plants consequently had numerous runners grinding simultaneously: Woolley had four runners—all powered by a double overshot water wheel—that could collectively grind a hundred pound barrel of gunpowder in just two hours; by 1800, Thelwall, Sedgwick, and Haverthwaite each had eight runners grinding concurrently that could produce twice as much output. Production was further maximized, especially when demand from the slave trade rose, by having the runners in operation “night & day without intermission.” Even so, output remained limited by the capacity of the runners; Woolley could only produce twelve barrels of powder per day. Each mill therefore stored large quantities of precursors on site; partially made gunpowder within the works; and finished gunpowder both on site and in slaving ports. In 1797, for example, Thelwall had sufficient ingredients to make three hundred barrels of powder on site; fifty-nine barrels in production; forty barrels of finished powder onsite; and 226 barrels in Liverpool. Gunpowder was a “perishable article” and so manufacturers aimed to produce only enough to meet anticipated African demand.²²

²¹ Each mill only employed small numbers of staff. Woolley had twelve men in 1747, for example. See, “Memd relating to Gunpowder works,” [1747], DD/SH/27, SAC. For the process of gunpowder making, see, Crocker et. al., “Gunpowder Mills,” 5-20. For the importance of drying African powder, see the long run of letters from Christopher Wilson Jr. between March and April 1800 in Box 2, Bundle 9, DDLO. For experimentation to ensure powder met African demand, see the correspondence between Joseph Fayrer and Christopher Wilson Jr. in Box 2, Bundle 5, DDLO, LA.

²² For Woolley’s output, see “Memd relating to Gunpowder works,” [1747], DD/SH/27. For Thelwall’s, see William Sherratt to Christopher Wilson Jr., Salford, Sep. 21, 1798, Box 2, Bundle 9, DDLO, LA. For Sedgwick’s and Haverthwaite’s production, see Christopher Wilson Jr. to Daye Barker, Kendal, Dec 4, 1800, Box 2, Bundle 9, DDLO, LA. For night work at Haverthwaite, see, Christopher Wilson Jr. to Daye Barker, Kendal, Apr 15, 1800, Box 2, Bundle 9, DDLO, LA. For Thelwall’s stock, see “Inventory of Stock taken at Thelwall Mills and Liverpool 31 December 1797,” D157/MT, DRO. For gunpowder’s perishability, see Christopher Wilson Jr. to Daye Barker, Kendal, Mar 21, 1800, Box 2, Bundle 9, DDLO, LA.

Powdermakers found customers for their finished product via agents in Liverpool and Bristol. These agents needed to have a “general knowledge of the merchants” in the slaving ports and so they tended to be individuals enmeshed within the merchant community, either partners within the powdermaking firm or outsiders hired on commission. The two Bristol firms initially competed for local customers via their respective owners, most of whom were slaving merchants; Woolley also obtained custom in Liverpool via two agents, both slavers. In 1758, Woolley and Littleton combined their competing sales arms to form a single concern that had a permanent marketing office in the Bristol Exchange; the manufacturing arms remained distinct.²³ The new firm continued to employ its Liverpool agents, who competed for business with representatives of the London mills and the northern mills. In addition to making sales, agents also fed back intelligence from the ports on the anticipated demand, as well as feedback from Africa on the quality of the powder—all of which could be used to set future production targets and adjust manufacturing methods. Agents were thus crucial links in a chain that tied British manufacturers to African consumers, via slaving merchants; one agent observed that he could not sell “a single barrel” of powder if he was not “on the spot” in Liverpool.²⁴

The presence of agents for numerous gunpowder mills in the major slaving ports made for a competitive market. Woolley and Littleton apparently enjoyed a monopoly on gunpowder sales to the Bristol slave trade; northern and London mills did not station agents in the town. But competition was much higher at Liverpool, with eleven different companies selling powder there by century end. Unlike the London mills, which formed a trust to fix their prices, the provincial powder makers ruthlessly cut prices to gain business. Slaving merchants understood this well and they drove

²³ Thomas Parke to Christopher Wilson Senior, Liverpool, Oct 15, 1798, Box 2, Bundle 9, DDLO, LA (“general”). The two Bristol companies were tied into the town’s compact network of slave traders via their principal partners, most of whom invested directly in the ships or were related to slave traders. Abraham Hooke and Edmund Baugh—two of Woolley’s founders—were both slave traders, as was Baugh’s relative Stephen. Later investors in Woolley were likewise some of Bristol’s largest slave traders. Littleton was founded by Jeremiah Ames, William Miller, and Isaac Elton, all of whom were slave traders; numbers members of Elton’s family were slavers too. Woolley’s Liverpool agents were Benjamin and Arthur Heywood. For the Heywood’s extensive investments in the Liverpool slave trade, see: <https://slavevoyages.org/voyages/NwmPFt8x>. For the union of the Bristol mills, see Buchanan, “Africa Trade,” 150.

²⁴ Thelwall stationed Charles Craven, one of its partners, as an agent in a warehouse in the Liverpool’s center; Sedgwick likewise employed a full-time agent in Liverpool who was later admitted to be the “Best” powder salesman in the town. See “Annual valuation and memoranda,” 1759-1778, D157/MI, DRO; Joseph Fayrer to Daye Barker, Liverpool, Mar 12, 1800, Box 2, Bundle 5, DDLO, LA. Haverthwaite used former-slave-ship-captain Joseph Fayrer’s links to his “brothers” in the trade to drum up business; he spent his working days traipsing between the counting houses of Liverpool’s merchants. After Fayrer’s death in Africa in 1801, the firm employed five different salesmen simultaneously, a strategy that backfired when they began to undercut each other on price. They then successfully switched to employing two Liverpool merchants, William & John Harding, as their sole agents. See Vickers, “South Lakeland,” 45-72. For changes to production in light of intelligence received from Liverpool, see the long series of letters from Joseph Fayrer to Christopher Wilson Jr. from Liverpool in Box 2, Bundle 5 and Box 21, Bundle 4, DDLO, LA. Joseph Fayrer to Daye Barker, Liverpool, Feb 6, 1800, Box 21, Bundle 4, DDLO, LA (“a single,” “on the”).

hard bargains by playing agents off against each other. In 1801, a three-year price war erupted between the northern mills which drove most of the Bristol and London makers out of the Liverpool market. Their competitors gone, the three northern mills sold between eighty and eighty-seven percent of all the powder vended in the town between 1801 and 1807. While supplying the slave trade was a cutthroat business, specialized firms that could produce a low-priced product that met stringent African demand could thrive.²⁵

Once an agent for a powder maker secured an order, they usually sold their powder on credits that typically stretched to long periods. With a sale closed, the captain collected the powder in the one-hundred-pound barrels as the slave ship departed for Africa. Crewmen then laded the explosive into small kegs holding anywhere between a pound and twenty pounds of powder, which were included in the bundle of goods used to purchase enslaved people. Once the powder had been exchanged for captives, the ship proceeded to the Americas, where the slaves were sold, usually for bills of exchange drawn on a British banker. After the lapsation of the allowed credit period, the ship owner typically paid for their powder with a new bill of exchange with three months to run. Powdermakers were, however, also obliged to take bills of exchange returned from colonial slave sales that extended to two and sometimes three years, making manufacturers key links in the “chain of credit” that powered Britain’s slave trade. With the powder paid for a year or more after it had been made, the manufacturer finally booked their profit.²⁶

Although lengthy, the completion of this cycle of production, sales, and collection of debts was typically highly lucrative. Viewed in the aggregate profits at all the powder companies were high: Woolley returned, on average, sixteen percent per annum between 1746 and 1807 (Figure 5). Profits at the other mills were equally as impressive. Thelwall averaged a twenty-one percent annual return in its first eight years of operation, c.1761-1767; within four years of founding the company, the

²⁵ Extant accountbooks for Bristol slave ships that identify the suppliers of gunpowder all sourced their powder from either Woolley or Littleton. See, Accounts of the Molly Snow, SMV/7/2/1/25, Bristol Archives; Voyage accounts for the Swift (1759-60)..., 39654(2), Bristol Archives; Account Book of the slave ship Hector (1756) for three voyages, AML/Y/1, National Maritime Museum; Account book of the Snow Africa, 1774-1776, G2404, Bristol Archives. The diary of Littleton’s accounts also details sales being made within Bristol (Barry ed., “Diary of William Dyer”). For competition at Liverpool and the difficulties London mills faced there, see Wilkins, *Hasells of Dalemain*, 44-48 and the Liverpool correspondence from Joseph Fayrer to Christopher Wilson Jr. in Box 2, Bundle 5 and Box 21, Bundle 4, DDLO, LA details these difficulties. For the market share of the different powdermakers at Liverpool, c.1800-1807, see Vickers, “South Lakeland,” 53.

²⁶ For the lengths of credits and the receipts used to settle debts, see “Bill Book,” 1799-1821, DDLO, LA. The Liverpool slaver *Earl of Liverpool* carried 155 barrels of powder, which was transferred into 10,075 powder kegs, on its 1797 voyage to Bonny (MS.10.50, Liverpool University Library). Each keg therefore held just over 1.5lb of powder. For the “chain of credit,” see, Robin Pearson and David Richardson, “Social Capital, Institutional Innovation and Atlantic Trade before 1800,” *Business History* 50: 6 (November 2008): 769.

partners had doubled their money. The accounts changed after 1768 making it difficult to track annual profits. Even so, the partners paid themselves a £900 dividend in 1774 and resolved to pay themselves further dividends annually, implying that the business continued to make sizeable profits. After drawing out dividends, the company was still, by 1797, worth £23,959—a healthy return on the £9,577 initially subscribed by the partners. Accounts for Sedgwick show even more rapid growth: between 1788 and 1809, the company’s capital value quadrupled. Haverthwaite also thrived: by abolition—just eight years after the company was founded—the firm had cleared its loans and paid the partners substantial dividends. By 1814, the partners’ capital was fully repaid via dividends, and the company was worth £34,102—almost three times the initial investment of £12,000.²⁷

While profitable in the aggregate, annual returns at all the works fluctuated considerably. The price of producing gunpowder largely remained static, with the important exception of saltpeter prices which swung wildly according to powdermakers’ demand and the volume of Indian supply. Finished gunpowder’s value was much more variable because it was determined by shifting demand from trade and the state; the total supply of powder by the nation’s mills; and the competitive bidding of merchant buyers. Powder prices were particularly volatile in the war-torn eighteenth century, with prices often soaring in wartime but crashing at peace. Profits in peace years were hence typically low; Woolley’s investors received significantly lower profits in peace years, including just 0.4% on their capital in the years 1750 and 1751. War, by contrast, often proved a boon to powdermakers’ bottom line. Unlike gunmakers, who shifted from the selling to the slave trade into selling to the state in wartime, provincial makers could not meet the ordnance board’s exacting standards for military-grade powder; Woolley and Thelwall attempted to produce military-grade powder during the Seven Years War, for example, but the ordnance board rejected their numerous samples; the other mills did not vend powder to the state.²⁸ Warfare nonetheless bid up the price of their now-much-sought-after product and, with it, the powdermakers’ profits: Woolley’s profits soared during the Seven Year’s War, and again during the French Revolutionary Wars; the investor’s made a 34.3% return in 1795 alone. The quadrupling in the capital value of Sedgwick occurred during the same conflict. While there was thus no direct connection between the provincial

²⁷ For Thelwall’s profits, see “Gunpowder works at Thelwall: Proprietors meetings, accounts and resolutions, 1759-78, with inventory and valuation of stock 1797,” D157M/T3554, DRO. For Sedgwick’s and Haverthwaite’s values, see Vickers, “South Lakeland,” 40, 45.

²⁸ For the Bristol makers inability to secure government contracts, see, “1761-1762 Attempts to produce gunpowder for Govt Service and to obtain Export License,” DD/SH/27, SA. See also, West, *Gunpowder, Government*, 18.

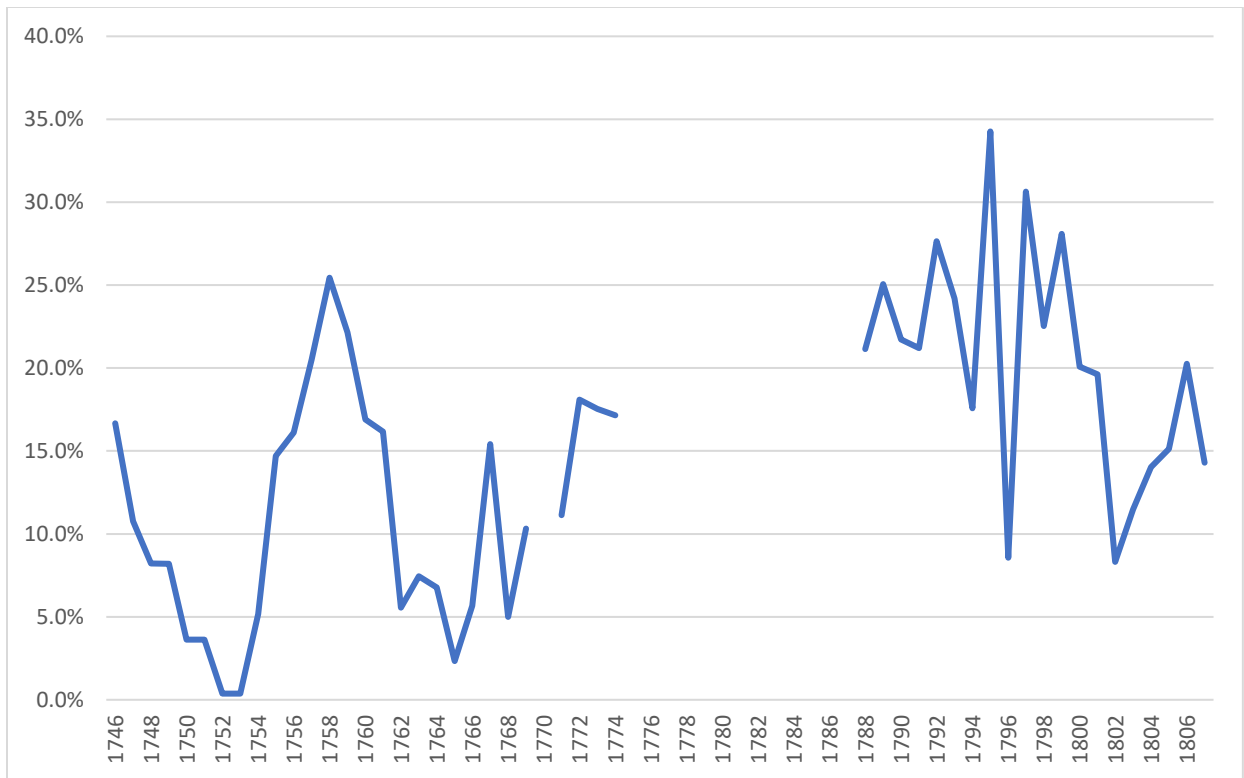
powderworks and the British state's voracious wartime demand for powder, they nonetheless benefited indirectly.²⁹

Although usually beneficial, war was not a guarantee of success in the competitive gunpowder making industry. War bid up the price of powder but it sometimes depressed the slave trade and, with it, the merchant demand for the product. From 1797 until abolition—a period of conflict—Woolley's profits were squeezed by a combination of the collapse of Bristol's slave trade and the loss of market share at Liverpool in the face of fierce competition (Figure 5). Constant shifts to Woolley's partnership structure throughout the firm's life provide further evidence that it did not produce consistently healthy returns. Thelwall's profits also flattened considerably during the American War; in 1779—a nadir for Liverpool's slave trade—the firm suffered a deep loss. Haverthwaite likewise made little after its initial founding during the depths of the French Revolutionary War; in 1799 and 1800, loans were taken out and the partners subscribed additional capital. Joseph Fayrer, the company's Liverpool-based partner and agent, feared in early 1800 that the new firm would still not “yeald a profit or Incom sufficient for me to rely upon” and so he returned to captaining slaving voyages; he died in Africa. Although every powder company produced healthy returns for their investors in the long term, each firm's fortunes hence fluctuated, indicating that supplying the fickle slave trade was a volatile business.³⁰

Figure 5: Annual Profits of the Woolley gunpowder works, c.1746-1807

²⁹ For powder prices, see “Gun Powder Annual Accounts from the Year 1746,” DD/SH/27, SA; Sales and Stock Accounts, c.1801-1808, Box 5, Bundle 13, DDLO.

³⁰ The price of saltpeter ranged from as little as 40 shillings per hundredweight in 1790, to as much as 90 shillings per hundredweight in 1761. Charcoal prices remained static at thirteen shillings a bushel between 1746 and 1774; sulfur likewise ranged narrowly between 13 and 15 pounds per ton c.1750 and 1793. See, “Gun Powder Annual Accounts from the Year 1746,” DD/SH/27, SA. For Thelwall's profits, “Gunpowder works at Thelwall: Proprietors meetings, accounts and resolutions, 1759-78, with inventory and valuation of stock 1797,” D157M/T3554, DRO. Joseph Fayrer to Christopher Wilson Jr., Liverpool July 2, 1800, Box 21, Bundle 4, DDLO, LA (“yeald”).



Source: “Gun Powder Annual Accounts from the Year 1746,” DD/SH/27, SA; letters from George Dyer to Henry Strachey Jr, 1795-1801, DD/SH/27

Despite their volatility, overall profits in manufacturing gunpowder likely exceeded those to be made via direct investment in the slave trade. Annual profits from slave ships averaged ten percent—a third less than the average returns reaped by Woolley’s investors. Profits in the slave trade were, however, even more unpredictable than the gunpowder industry: returns ranged from bonanzas of one hundred percent or more through catastrophic losses that could bankrupt merchants. Powder making was certainly not without risk: the African export market was highly unpredictable and the business was uniquely vulnerable to accidental explosions destroying the investors’ capital. Even so, manufacturing still made consistent returns by comparison to the slave trade; Woolley’s partners, for example, never made a loss in the forty-four years for which accounts are extant. For the merchants who financed the powder works, supplying the slave trade must have thus been an important hedge against that trade’s notorious volatility. Powder making may have also

been one of the most lucrative uses for provincial merchant capital: Woolley was, for example, one of the most profitable enterprises in Bristol's surrounds.³¹

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Historians have argued that a “crisis of adaptation” occurred in Africa after abolition in 1807, as commercial networks focused on enslavement suddenly had to be pivoted towards the “legitimate” in tropical commodities. Gunpowder makers confronted a similar crisis, as their lucrative business model selling a specialized trade good for purchasing people was threatened with extinction. The loss of the African market would be a particularly hard blow to the provincial mills because domestic markets were highly competitive and absorbed only small quantities of powder. Haverthwaite, for example, sold sporting and blasting powder to a network of over a hundred local customers prior to abolition while simultaneously producing powder for the slave trade. But this web of customers generated only a tenth of the sales as the Liverpool slave trade. Alternative export markets were also difficult to break into because myriad London mills largely controlled those sectors. The state did consume vast quantities of gunpowder, especially during wartime, but the military was so exacting that they would not accept the low-quality powder made by the provincial mills.³²

The looming threat of abolition nonetheless initially proved a boon for the powdermakers because it inflated the slave trade and boosted the demand for powder. Each of the mills therefore enjoyed buoyant sales for their powder on the eve of abolition; Haverthwaite was established precisely because its investors anticipated increased demand from abolition. The company's sales increased exponentially: from zero in 1799, to 2,800 barrels in 1800, and then over four thousand

³¹ For the slave trade's profitability, see David Richardson, “Profits in the Liverpool Slave Trade: The Accounts of William Davenport, 1757–1784,” in *Liverpool, the African Slave Trade, and Abolition*, ed. Roger Anstey and P. E. H. Hair (Liverpool, 1976), 60–90. For the risks of explosion, see for example, Christopher Wilson Jr. to Daye Barker, Kendal, Aug 25, 1802, Box 3, Bundle 1, DDLO, LA. Although none of the mills exploded during the pre-abolition era, Sedgwick did suffer a catastrophic flood in 1802 that temporarily halted production. Powder companies could not insure their works and so a catastrophic accident could potentially ruin the business. For Woolley's comparative profits, see Buchanan, “Capital Investment,” 315.

³² For the “crisis of adaptation,” see Paul E. Lovejoy and David Richardson, “The initial ‘crisis of adaptation’: the impact of British abolition on the Atlantic slave trade in West Africa, 1808–1820,” in Robin Law ed., *From Slave Trade to ‘Legitimate’ Commerce: The commercial transition in nineteenth-century West Africa* (Cambridge, 1995), 32–56. For domestic sales, see the account ledger in Box 23, Bundle 3, DDLO, LA; Vickers, “South Lakeland,” 49. The sporting powder market was especially difficult to break into because hunters demanded the highest quality powder sold in carefully designed canisters. There is no evidence that the other works vended significant quantities of powder to domestic buyers before abolition. In 1777, for example, eight-nine percent of Thelwall's inventory in Liverpool was African powder, and the remainder was principally powder for the defense of slave ships and privateers. See, Gunpowder works at Thelwall: Proprietors meetings, accounts and resolutions, 1759–78, with inventory and valuation of stock 1797,” D157M/T3554, DRO. Between eighty and ninety percent of Woolley's inventory was likewise African powder. See, “Gun Powder Annual Accounts from the Year 1746,” DD/SH/27, SA.

barrels in 1806, the year before abolition. Merchants eager to get their ships to Africa before abolition, coupled with wartime demand, also bid up the price of powder, boosting profits: in 1801-1803, a barrel of powder sold for just 70-75 shillings; by abolition, prices reached 100-120 shillings. Abolition halted this boom. Haverthwaite's sales at Liverpool collapsed from 4,459 barrels in 1807 to just 750 barrels in 1808 and then down to a nadir of 99 barrels in 1817. The Bristol makers also struggled. Having been squeezed out of the Liverpool market and with their town's slave trade much reduced, Woolley and Littleton merged in 1803, with the former moth-balled. Production at Littleton was drawn down to a maximum of 1,500 barrels—just over a third of Woolley's maximum output fifty years earlier.³³

Mining proved a lifeline for the provincial powdermakers. British miners had embraced blasting powder—a slightly higher graded product to African powder—to open shafts and gallies in the early-eighteenth century. By midcentury, mines had begun to absorb large quantities of gunpowder: between 1756 and 1763, at least 14,232 barrels of powder were shipped to mines—just over a third of the powder exported to Africa in the same period. By the turn of the nineteenth century, the demand for coal was growing exponentially to fuel Britain's industrial development and, with it, the demand for blasting powder. Although London mills dominated the mining sector, provincial powder mills all sought out the mines as a potentially lucrative secondary market before abolition. Sedgwick had, for example, sold blasting powder to nearby coal, lead and copper mines by drawing on its investors' connections to Quaker miners. The Bristol mills sought similar opportunities in Cornwall's tin mines and Somerset limestone quarries; by 1802, these customers annually consumed between 1,200 and 1,500 barrels of powder, a fraction of the 6-8,000 barrels previously channeled into the slave trade but a sufficient market to profitably sustain Littleton's operations once abolition came. The powdermakers shifted more decisively towards the growing mining sector after abolition. A year after the slave trade ended, Sedgwick was, according to one historian, "working 24 hours a day, 6 days a week" making blasting powder for the mines. Haverthwaite likewise pivoted into the north-west's mining sector: after 1815, the company began muscling out London mills from the north-east England's coal fields; by the 1820s, the firm was selling powder to a network of mines and quarries throughout northern England and had begun to make inroads in Scotland. While mining could not entirely make up the disruption to the immense

³³ For Haverthwaite's sales and powder prices, see the six-monthly accounts within Box 5, Bundle 13, DDLO, LA. For the merger of the Bristol works, see the series of letters for 1803 within DD/SH/27, SAC.

African market for powder, it did generate sufficient demand to sustain the mills through the initial post-abolition period.³⁴

Liverpool's resurgent Africa trade provided a second prop to the provincial powder industry. Small quantities of palm oil had been imported from West Africa—especially from the Bight of Biafra—before abolition, but demand for the product soared once the slave trade ended as Britons found increasing uses for the oil in soap, candles, and as an industrial lubricant. Liverpool's merchants hence seized on the product as an alternative to slave trading after abolition;³⁵ imports of palm oil to Britain, most of which entered Liverpool, rose exponentially: from 2,233 hundredweight in 1807, to 75,049 hundredweight in 1819. Trade powder was, by value, one of the most important goods used to acquire palm oil in Africa: at the key oil markets of Bonny, for example, purchasing a hundred tons of palm oil in 1822 required an assortment worth 17,500 bars (the Bonny currency) that included a hundred barrels of gunpowder valued at 10,500 bars—by far the most valuable trade good in the bundle. Ivory and die woods were likewise acquired with gunpowder. The growth of this “legitimate” African trade enabled the northern mills to eventually rebuild their export market: Haverthwaite's Liverpool sales rebounded rapidly in the 1820s and, by 1830, the company was selling more powder in Liverpool than it had pre-abolition.³⁶

Selling to both African and domestic markets enabled several of the works to continue operating profitably well beyond abolition. A snapshot of Thelwall's finances in 1810 demonstrates this well. Like the other firms surveyed here, Thelwall approximately ninety percent of the powder it produced before abolition went to Africa. Just three years after abolition, the company had radically changed its business model. Liverpool's merchants still accounted for most (491.5 barrels) sales, but sales to local miners now represented an equally important (440.5 barrels) market. This new approach generated an annual profit of twenty-eight percent—equivalent to the sums made before

³⁴ For the use of powder by miners, see Ignacio Gonzalez Tascon, Juan Carlos Barrientos, Dolores Romero Munoz and Amaya Saenz Sanz, “Black powder in mining- its introduction, early use, and diffusion over Europe,” in Buchanan ed., *Gunpowder*, 205-218. For powder shipped to mines and Africa, c.1756-1763, see West, *Gunpowder, Government*, 224-5. For the Sedgwick mill's mining custom, see Vickers, “South Lakeland,” 62. For the Bristol mills seeking mining clients, see George Dyer to Henry Strachey Jr, Bristol, Aug 17, 1802, DD/SH/27, SAC. Tyler, *Gunpowder Mills of Cumbria*, 32 (“working”). For the growth of Haverthwaite's mining market, see Vickers, “South Lakeland,” 59-67.

³⁵ For the growth in the African palm oil trade, see Jonathan E. Robins, *Oil Palm: A Global History* (Chapel Hill, 2021); Martin Lynn, “The West African palm oil trade in the nineteenth century and the ‘crisis of adaptation,’” in Law ed., *From Slave Trade*; B.K. Drake, “Liverpool's African commerce before and after the abolition of the slave trade” (Unpublished MA Thesis: University of Liverpool, 1974), 57-77.

³⁶ For the annual volume of palm oil imports to Britain, see Vickers, “South Lakeland,” 58. For the importance of gunpowder in acquiring commodities in West Africa, see John Adams, *Sketches Taken During Ten Voyages to Africa...* (Liverpool, 1822), 116. For Haverthwaite's sales c.1802-1837, see the two accountbooks for the Liverpool magazine in Box 10, Bundles 17 and 27.

abolition. Haverthwaite likewise survived and thrived through a similar strategy: even with its Liverpool sales were in the doldrums, Haverthwaite's investors still made a five percent profit in 1810/11. The Bristol mills fared less well, perhaps because their town's African trade never recovered post abolition: the works were absorbed by a larger London competitor and, in the 1820s, shut down; Littleton has been converted to private residences and Woolley is now a farm. With both mills gone soon after abolition, the slave trade's long-term impacts on the explosive industry in the south-west were hence negligible.³⁷

The northern mills, by contrast, successfully integrated into Britain's nineteenth century industrial economy and helped to establish a thriving powder making industry. Thelwall continued to successfully operate until 1855, when a massive explosion flattened the site. Prior to the explosion, the adjacent village had been transformed by wealth flowing from the powderworks. Sedgwick and Haverthwaite survived longer and grew considerably; by the mid-nineteenth century, they were two of the principal manufactories in the region. The profits flowing out of the two mills were channeled into textile making, brewing, and banking, providing a considerable spur to the industrial development of Cumbria. The owners of the two sites also erected substantial country residences, helping to beautify the landscape of a region that is now famous for its attractive countryside. Production of high explosives, cartridges, and fireworks continued at both sites until the 1930s, when the works were closed and, in the case of Sedgwick, demolished. Prior to their closure, the two mills' success had encouraged other local businessmen to establish three new powder works in Cumbria, all of which grew to become major employers in the area. The Cumbrian gunpowder industry's roots in supplying the slave trade have been largely forgotten, however; Haverthwaite and Sedgwick are still remembered as having been founded principally to supply the region's miners. What remains of Haverthwaite is now a co-working space, an apt exemplar of Britain's transition from a manufacturing to a service economy during the twentieth century. A historic clock remains atop the site as a mute testament to the British gunpowder industry's long history supplying the slave trade.³⁸

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³⁷ For the smallness of sales from Thelwall to local buyers, see "Memorandum book of John Stanton," [1779-1784], D157M/T3373, DRO. For Thelwall's sales and profits in 1810, see "Valuation and costs of Thelwall Gunpowder Mills..." [1810-1811], D157M/T3553, DRO. For Haverthwaite's profits in 1810/11, see Box 23, Bundle 6, DDLO, LA. For the closing of the Bristol works, see Buchanan, "Africa Trade," 152.

³⁸ For the destruction of Thelwall, see Vickers, "South Lakeland," 96. For the importance of Christopher Wilson Jr. and John Wakefield to the Cumbrian economy, especially in banking, see Wilson, *Christopher Wilson*. For Sedgwick and Haverthwaite in the nineteenth and twentieth centuries and their role in growing the Cumbrian explosives industry, see Tyler, *Gunpowder Mills*, 38-82, 106-154.

Britain's gunpowder industry received a clear and direct impetus from the transatlantic slave trade. The growing African demand for gunpowder spurred the establishment of at least five new powder works, and these works collectively moved powder making away from London, laying the foundations for a provincial powder making industry. Moreover, the slave trade constituted the key export market for gunpowder makers throughout the eighteenth century, especially during peace times. Those works also generated healthy profits for their owners—most of them slaving merchants—indicating that supplying the slave trade was perhaps more lucrative than the trade itself. While the slave trade certainly clearly played a role in driving the growth of Britain's powder making industry, Atlantic slavery was, however, certainly not the main driver of that sector's expansion. Africa absorbed a fifth of British gunpowder production prior to abolition, making the slave trade an important but by no means essential market for powder makers. Africa's significance as a market also fell considerably at the turn of the nineteenth century, indicating that the slave trade was, as recent scholarship has argued, likely a more important market before Britain's Industrial Revolution.³⁹ And the impacts of African demand on the growth of industry were also limited geographically, with only two of the powder mills that were founded to supply the slave trade surviving beyond the mid-nineteenth century. Most of the mills that produced the powder that blasted the mines, railways and canals that would form the backbone of Britain's industrial economy were hence unconnected to the slave trade. Finally, there was, unlike in the case of guns, little connection between the African demand for powder and the growth of Britain's fiscal military state; none of the powder makers surveyed here supplied the state, either before or after abolition because they made a specialized, but low quality, product specifically for the slave trade. Atlantic slavery spurred the growth of British manufacturing but not its Industrial Revolution. This exploration of gunpowder manufacturing nonetheless opens many opportunities for further research. Gunpowder comprised a small fraction of the myriad goods that were produced in Britain, or obtained from its trading empire, and then shipped to Africa to be exchanged for slaves. If the example of gunpowder manufacturing is indicative, each of these sectors may have also made substantial returns to their investors and also been important for the development of new manufactories, particularly in the provinces. An extensive field is therefore open to explore the business histories of the British merchants and manufacturers who supplied the immense quantities of goods that were used to buy

³⁹ Trevor Burnard and Giorgio Riello, "Slavery and the new history of capitalism," *Journal of Global History* 15:2 (2020): 225-244.

enslaved people in Africa. Such work is essential if Britain is to fully reckon with the modern legacies of its slave trading past.