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Zhenxiong Li, Hilary Ingham

The Department of Economics
Lancaster University Management School
Lancaster LA1 4YX
UK

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Financial Development, Economic Performance and Democracy: Methodological Issues and New Estimates

Zhenxiong Li[a,*], Hilary Ingham[b,**]

[a]*DongWu Business School, Soochow University, Suzhou City, Jiangsu Province, China.*
[b]*Department of Economics, Lancaster University, Lancaster, UK.*

Abstract

This paper investigates the long-term effect of financial development on economic growth using annual data for 67 countries over the period 1971 to 2007. Both autoregressive distributed lag (ARDL) and cross-sectionally augmented autoregressive distributed lag (CS-ARDL) models are applied to count for cross-country heterogeneity and error cross-country dependence. The results uphold a positive and significant effect of financial development on long-run per capita output. There is also some evidence of a non-linear relationship between financial development and growth. However, the analysis also reveals that the results derive primarily from non-democratic countries.

Keywords: Economic growth; Financial development; Democracy

JEL Classification: O16; O43; P16

1. Introduction

The relationship between financial development and economic performance is a controversial topic in growth economics. As far back as the start of the twentieth century, a burgeoning volume of literature emphasized the importance of the functions of financial sector as a driver of economic progress. (Schumpeter (1912); McKinnon (1973); Shaw (1973)). A well-developed financial sector

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**Corresponding author

Email addresses: zxli@suda.edu.cn. (Zhenxiong Li), h.ingham@lancaster.ac.uk. (Hilary Ingham)

is thought to promote long-term economic growth by facilitating transactions, mobilizing savings and diversifying risk (Beck et al. (2000)). However, as sometimes witnessed, excessive speculative activities and financial resource misallocation inevitably shed doubt on the expected growth-enhancing role of financial development.

A parallel, somewhat more recent, development in the growth literature is the effect of democracy on economic performance. Thus, for example, Acemoglu et al. (2014) revealed some evidence of a beneficial effect of democracy for socio-economic outcomes. Nevertheless, to date, empirics has largely ignored the moderating role of democracy on the relationship between finance and eco-nomic performance. This paper therefore aims to contribute to the literature by examining the degree to which democracy strengthens, or weakens, the impact of financial development on growth.

Furthermore, despite the increasing sophistication of the estimation methods, growth empirics are never free from criticism regarding methodology. In particular, as suggested by Durlauf et al. (2005), Eberhardt and Teal (2011) and Pesaran (2015), cross-country heterogeneity and cross-section dependence, which are largely ignored in the majority of existing growth literature, have challenged the standard cross-country and panel growth regression frameworks.

Using both error correction-based autoregressive distributed lag (ARDL) and cross-sectionally augmented autoregressive distributed lag (CS-ARDL) models, this paper aims to address these concerns by applying recent heterogeneous panel estimation methods to account for slope heterogeneity and error cross-country dependence. The results confirm that financial development is capable of stimulating output in the long term, although such a beneficial effect is largely driven by non-democratic countries. In addition, the results provide some, albiet limited, evidence of an inverse U-shaped relationship between financial development and economic performance, suggesting that over-development of the financial sector can be detrimental to growth.

The remainder of this paper is organized as follows. Section 2 provides a brief overview of the literature examining the relationship between both financial development and democracy on growth. Cross-country heterogeneity and dependence along with nonlinearity are addressed in Section 3. This Section also outlines the models employed in the analysis. Following a description of the data in Section 4, Section 5 presents the results. A summary discussion of the results and their implications conclude the paper.

2. Growth, Financial Development & Democracy

The relationship between economic performance and financial development has a long history dating back to Smith (1776) and Hamilton (1781). Since then, various scholars, such as Schumpeter (1912), McKinnon (1973) and Shaw (1973), have stressed the irreplaceable role of finance in the economy. In particular, at the theoretical level, a well-developed financial system would promote economic growth via its functions of information production, corporate governance, risk diversification, savings mobilization, and transaction facilitating (Beck et al. (2000)). Meanwhile, inspired by the seminal contribution of King and Levine (1993a,b), empirical investigation on this relationship has gradually emerged since the 1990s. The majority of empirical investigations in the next 20 years continued to support a strong relationship between financial development and economic growth. Among these are the studies of Levine et al. (2000), Beck et al.(2000) and Beck and Levine (2004).

However, sight was not lost though on the fact that certain studies have uncovered evidence of the detrimental effect of domestic financial development for long-term growth prospects. Indeed, the idea that there may be a threshold above which further financial development brings about negative returns can be traced back as far as Kindleberger (1978) and Minsky (1991). More recent research of Cecchetti and Kharroubi (2012), Law and Singh (2014), Beck et al. (2014), Arcand et al. (2015), and Cournède and Denk (2015), also suggested a high level of financial development could be a drag on economic growth due to talent misallocation and speculative bubbles. Moreover, it is indicated in recent literature that effect of growth of finance could depend on the specific institutional condition in a specific economy. For example, Menyah et al. (2014) observed that financial system development failed to promote domestic output growth in Cameroon, Central Africa Republic, Chad, Congo and Sudan. Interestingly, the countries mentioned above commonly lack democratic institutions, which is salient in view of the fact that authors such as Acemoglu et al. (2014), and Madsen et al. (2015), have highlighted democracy as a major driver of growth.

Theoretical debate on the role of a political system on economic growth has also been ongoing for decades and, as a result, three predominant opinions on the influence of the democratic system on growth have emerged. First, the compatibility school argues a democratic political system is best suited for countries pursuing sustainable growth via its inherent advantages in protecting the private sphere, ensuring socio-economic rights, and limiting state intervention (Przeworski and Limongi (1993), Acemoglu et al. (2014)). Subject to strong public checks, decision-making processes in democratic states essentially prevent attempts of monopolizing lucrative economic opportunities, thus benefiting long-term growth (Acemoglu et al. (2008); Acemoglu and Robinson (2013)). While the second perspective, the conflict school, suggests non-democratic states are capable of resisting immediate consumption demands and prohibiting dysfunctional consequences in the decision-making procedure through suppressing individual incomes and labor unions (Przeworski and Limongi (1993); Olson (2000)). Despite the cost of economic and political freedom, non-democratic rulers could outperform democratic ones in smoothing resource allocation, stimulating investment and, eventually, promoting long-term economic growth (Sirowy and Inkeles (1990); Przeworski and Limongi (1993)). A third view, the sceptical perspective, however, advocates the nonexistence of a systematic connection between democracy and growth (Sirowy and Inkeles (1990)). Typically, because countries with distinct political systems can choose the same economic policies, democracy is not viewed as the key to economic growth according to Barro (1997).

At the empirical level, a consensus of the effect of democracy on economic performance has not yet been reached. Previous cross-country analyses, such as Barro (1996), Tavares and Wacziarg (2001) and Persson and Tabellini (2008), did not reach agreement on the exact effect of democracy on economic performance. Likewise, panel data studies have also not succeeded in resolving the issue: Rock (2009) and Knutsen (2013) provided some evidence on the positive direct effect of democracy on economic performance in the context of Sub-Saharan African countries and Asian countries respectively. With a large panel of 175 nations over the period 1960 to 2010, Acemoglu et al. (2014) also revealed evidence of a significantly positive impact of democracy on growth. However, in con-trast, some others, including Murtin and Wacziarg (2014), and Jacob and Os-ang (2015), failed to observe any significant influence of democracy on economic performance.

It is also worth noting that democracy could be potentially capable of exerting a significant effect of long-term economic performance indirectly through diverse channels. The indirect channels that examined in the previous literature include property rights, income inequality, human capital, government size and trade openness (Przeworski and Limongi (1993); Helliwell (1994); Tavares and Wacziarg (2001); Baum and Lake (2003); Gerring et al. (2005)).

3. Methodology

Nothwithstanding the popularity of the panel ARDL model, such an approach fails to account for potential error cross-sectional dependence. Thus, in addition to the ARDL model, this study employs the cross-sectionally augmented autoregressive distributed lag (CS-ARDL) model (Chudik and Pesaran (2015); Cavalcanti et al. (2015)). In essence, the CS-ARDL model augments the ARDL model with a linear combination of the cross-sectional averages of both the dependent variables and of all the regressors, which aims to capture the cross-sectional correlation in the error term. Typically, as shown by Chudik and Pesaran (2015), both mean group (MG) and pooled mean group (PMG) estimators are used in the estimation of the CS-ARDL model. Of course, the time-dimension (T) needs to be large enough so that the model can be estimated for each cross-country unit. Also, a sufficient number of lagged cross-section averages should be included to ensure the validity of these estimators.

The mean group (MG) estimator initially requires estimating time series equations for each country separately. The coefficients across countries can then can be computed as the unweighted means of the estimated coefficients. Pesaran (2015) suggested that the MG estimator provides consistent estimates of the average of the parameters given a sufficiently large time-series dimension. At the same time, it is worth noting that the MG estimator does not impose any restrictions on the cross-sectional parameters and ignores the possibility that some parameters can be the same across countries. Given the fact that all intercepts and coefficients can differ freely, the technique affords the maximum degree of heterogeneity. However, the shortcomings of such an approach are quite apparent. Although consistent, the MG estimator is likely to be inefficient for a small cross-country dimension (N). Also, as noted by Arnold et al. (2011) and Samargandi et al. (2015), this estimator is sensitive to any country outliers which may affect the averages of the country coefficients severely.

An alternative method is the pooled mean group (PMG) estimator proposed by Pesaran et al. (1999). In particular, this PMG approach has been applied widely in recent empirical growth studies; such as, Loayza and Ranciere (2006), Arnold et al. (2011),Samargandi et al. (2015), and Cavalcanti et al. (2015), largely due to it being an intermediate routine between the averaging and pooling methods of estimation. Specifically, a two-step procedure is applied. First, the long-term slope coefficients are estimated jointly across countries via a concentrated maximum likelihood procedure. Second, given the estimates of the long-term slope coefficients, intercepts, short-term coefficients, the speed of adjustment, and error variances are estimated through maximum likelihood on a county-by-country basis. Such an approach essentially restricts the long-term slope coefficients to be homogeneous over the cross-sections, but otherwise allows for heterogeneity. Given a large cross- country dimension, this PMG approach also provides consistent estimates of the mean of the short-term coefficients across countries by averaging individual country coefficients (Loayza and Ranciere (2006); Samargandi et al. (2015)).

It is worth noting here that several conditions are required to ensure the validity of the PMG estimator (Samargandi et al. (2015); Cavalcanti et al. (2015)). Firstly, there must exist a long-term relationship among the variables of interest. This is checked via a negative and significant coefficient on the error correction term. Secondly, the dynamic specification of the model should be sufficiently augmented so that the regressors can be treated as weakly exogenous. Thirdly, the resulting residuals from the error correction model must be serially uncorrelated.

Obviously, the selection between MG and PMG approaches rests on whether homogeneous slopes can be imposed for the estimated long-term parameters. Hence, it essentially involves a trade-off between consistency and efficiency. If the long-term coefficients are, in fact, not equal across countries, the MG estimates of the mean of long-term coefficients are consistent while the PMG estimates are inconsistent. However, if the homogeneity restrictions are valid, estimators that impose cross-country constraints dominate the heterogeneous ones in terms of efficiency. So, when the long-run coefficients are the same for individual countries, both MG and PMG estimates are consistent, but only the latter are efficient (Arnold et al. (2011); Loayza and Ranciere (2006); Samargandi et al. (2015)).

In practice, the PMG approach often is regarded as best available compromise for consistency and efficiency (Samargandi et al. (2015); Cavalcanti et al. (2015)). In terms of the finance-growth nexus, previous studies, including Loayza and Ranciere (2006),Arnold et al. (2011), andSamargandi et al. (2015), have implied that there is a homogeneous long-term relationship across countries. Short-term adjustment, on the other hand, could be affected by country-specific monetary policies, laws and regulations, as well as macroeconomic fundamentals and hence is expected to be subject to a substantial degree of heterogeneity (Samargandi et al. (2015); Cavalcanti et al. (2015)).

The empirical models used for this study are based on the ARDL and CS-ARDL model specifications. We initially employ the error correction form of the ARDL model:

$$\Delta y_{it} = \omega_i + \alpha_i(y_{i,t-1} - \theta_i^{'} x_{i,t-1}) + \sum_{j=1}^{p-1} \phi_{ij} \Delta y_{i,t-j} + \sum_{j=0}^{q-1} \delta_{ij}^{'} \Delta x_{i,t-j} + \varepsilon_{it} \quad (1)$$

where y_{it} is the real per capita output (GDP) for country i at time t. x_{it} is a 4×1 vector of explanatory variables; domestic investment to output ($INVEST$), the secondary school enrollment rate (SSE) from the Cross-National Time-Series Data Archive, the corrected population growth rate (POP) private credit by financial institutions to output ($FINDEV$) and its square ($FINDEV^2$). All variables are natural logs. Both long-run and short-run behaviour can be established from (1). θ_i represents the long-term equilibrium relationship between x_{it} and y_{it} while ϕ_{ij} and δ_{ij} capture the short-term dynamics between variables. α_i reflects the speed of convergence of the economy to long-term equilibrium. Meanwhile, terms in parentheses represent the cointegrating relationship between between x_{it} and y_{it}.

The traditional panel ARDL approach accounts for slope heterogeneity along with different orders of integration in the variables, and can be applied regardless of whether the regressors are exogenous or not. However, Phillips and Sul (2003) highlighted potential problems if the cross-section correlation in the errors is ignored. To overcome this, the panel CS-ARDL model is employed, which involves augmenting the right-hand side variable set with the cross-sectional averages of the independent variables, the dependent variables, and a series of their lag values (Pesaran (2006); Chudik et al. (2013); Eberhardt and Presbitero (2015)). These additional terms serve to account for the cross-sectional correlation in the error term. The resulting model is:

$$\Delta y_{it} = \mu_i + \alpha_i(y_{i,t-1} - \theta_i^{'} x_{i,t-1} + \alpha_i^{-1}\eta_i \overline{y}_t + \alpha_i^{-1}\zeta_i^{'}\overline{x}_t) + \sum_{j=1}^{p-1}\phi_{ij}\Delta y_{i,t-j} + \sum_{j=0}^{q-1}\delta_{ij}^{'}\Delta x_{i,t-j}$$
$$+ \sum_{j=0}^{p-1}\nu_{ik}\Delta\overline{y}_{t-j} + \sum_{j=0}^{q-1}\varsigma_{ik}^{'}\Delta\overline{x}_{t-j} + \varepsilon_{it} \quad (2)$$

where $\overline{y}_t$ and $\overline{x}_t$ are the cross-section averages of y_{it} and x_{it}. Noticeably, we distinguish the short-term and long-term behaviors of the cross-sectional correlation in equation (2). Following Eberhardt and Presbitero (2015), only the level parts of cross-sectional averages are included in the long-term equilibrium relationship in parentheses. Meanwhile, the long-run coefficients relating y_{it} and x_{it}; i.e. θ_i, and the speed of adjustment towards long-run equilibrium, α_i, are the key coefficients of interest. The short-run coefficients, ϕ_{ij} and δ_{ij} are also reported for completeness.

4. Data

For the empirical work it is necessary to employ data with sufficiently large time and cross-section dimensions to allow for cross-sectional slope heterogeneity and residual cross-sectional dependence (Samargandi et al. (2015); Cavalcanti et al. (2015)). Here we select 1971 to 2007 with the choice of the end date being governed by avoiding excessive noise in the data caused by the Global Financial Crisis.

Given such conditions, we only include countries for which there are 37 consecutive observations and, as a result, we end up with a balanced dataset, covering 67 countries over the period 1971 to 2007. The list of countries included can be found in the Appendix.

In addition to the right-hand side variables outlined in the previous section, we also use the dichotomous democracy indices of Cheibub et al. (2010) and Acemoglu et al. (2014). We define a country as a democracy if both two measures have a value of 1 for at least 19 out of 37 years over the sample period. Otherwise, the country is identified as a non-democractic state. On this definition, 38 nations are classified as democracies and 29 as non-democractic.

Table 1 below displays the summary statistics of variables for the whole sample and the sub-samples. From Table 1, the average annual growth rate of real per capita output is 1.6% for all 67 nations. The 38 democratic nations have enjoyed a relatively high average output growth rate whereas the non-democratic countries recorded an average annual growth rate of only 0.9%. In terms of the level of per capita output, the democratic sub-sample largely out-performed the nondemocratic subsample. It is worth noting that the variation of the per capita output over the period under investigation is comparable for all countries. In terms of investment and schooling, the democratic nations have experienced higher rates than their non-democratic counterparts. The average population growth rate of 29 non-democratic economies is higher than that of 38 democracies. In addition, despite the fact that the levels of financial development vary dramatically within the 38 democratic nations, the average private credit indicator is twice as large as that of non-democractic countries.

Table 1: Summary Statistics

Panel A: Whole Sample					
Variable	Obs	Mean	Std. Dev.	Min	Max
$GROWTH$	2,412	0.016	0.046	-0.298	0.314
GDP	2,479	11679.220	12742.030	518.180	94431.080
$INVEST$	2,479	0.198	0.093	0.006	0.546
SSE	2,479	0.056	0.031	0.001	0.166
POP	2,479	0.069	0.011	0.041	0.115
$FINDEV$	2,479	0.373	0.353	0.011	1.981
Panel B: Democracy Sub-sample					
Variable	Obs	Mean	Std. Dev.	Min	Max
$GROWTH$	1,368	0.022	0.036	-0.161	0.198
GDP	1,406	16152.180	12180.800	1148.387	58643.040
$INVEST$	1,406	0.229	0.080	0.049	0.516
SSE	1,406	0.068	0.027	0.007	0.166
POP	1,406	0.064	0.009	0.047	0.087
$FINDEV$	1,406	0.501	0.391	0.033	1.981
Panel C: Non-democracy Sub-sample					
Variable	Obs	Mean	Std. Dev.	Min	Max
$GROWTH$	1,044	0.009	0.056	-0.298	0.314
GDP	1,073	5818.103	10964.380	518.180	94431.080
$INVEST$	1,073	0.157	0.094	0.006	0.546
SSE	1,073	0.040	0.028	0.001	0.126
POP	1,073	0.076	0.009	0.041	0.115
$FINDEV$	1,073	0.205	0.194	0.011	1.552

Notes: Summary statistics for original annual variables before log transformations.

5. Estimation Results

As discussed above, the panel ARDL approach is valid irrespective of whether the underlying variables are $I(0)$ or $I(1)$, or a mixture of the two. Hence, it is important to examine the time series properties of the these. Two panel unit root tests, i.e. Im et al. (2003) (IPS) and Pesaran (2007) cross-sectionally augmented IPS (CIPS) tests, are conducted here. The IPS test generally allows for heterogeneous autoregressive parameters for each panel. All panels have a unit root under the null hypothesis of the IPS test. A rejection of the null is an indication that a non-zero fraction of panels is stationary. However, as stated by Cavalcanti et al. (2015) and Eberhardt and Presbitero (2015), the presence of cross sectional dependence threatens the validity of standard panel unit root tests. Hence, we also apply the CIPS test proposed by Pesaran (2007). In particular, this test allows for heterogeneous unit root processes via an augmented the ADF regressions for each country with cross section averages. Tables 2 and 3 report the results of IPS and CIPS tests for GDP, $INVEST$, HC, POP, $FINDEV$, and $FINDEV^2$ for the whole sample. For lags between 1 and 3 two test scenarios are presented, one which includes both an intercept and a linear time trend and another including only the intercept.

From both tables, GDP can be identified as $I(1)$ series while SSE is generally $I(0)$. Overall, mixed results are observed on the time series in levels. However, a panel unit root process is rejected after using first-differences in both the IPS and CIPS tests. As a result, the validity of panel ARDL approach is guaranteed as our estimation model does not contain $I(2)$ series. This also holds for both the democratic and non-democratic sub-samples.

Table 2: Im-Pesaran-Shin (2003) IPS Test: Full Sample

With an intercept and a linear trend				
Variables	Lag 1	Lag 2	Lag 3	Integration Order
GDP	-1.362*	0.067	-1.379	1
$INVESTMENT$	-3.548***	-1.247	-1.107	1
SSE	-3.482***	-5.182***	-6.182***	0
POP	-35.700***	4.182	-5.111***	1
$FINDEV$	-3.022**	-0.688	-2.515***	1
$FINDEV^2$	-4.293***	-2.911***	-4.320***	0
With an intercept				
Variables	Lag 1	Lag 2	Lag 3	Integration Order
GDP	6.341	7.963	6.848	1
$INVESTMENT$	-4.940***	-2.752***	-2.459***	0
SSE	-4.206***	-4.091***	-4.831***	0
POP	-19.769***	7.369	-0.744	1
$FINDEV$	-0.979	0.200	-0.574	1
$FINDEV^2$	-4.755***	-4.276***	-4.791***	0
ΔGDP	-21.765***	-13.442***	-12.520***	0
$\Delta INVESTMENT$	-29.767***	-20.164***	-15.902***	0
ΔSSE	-11.120***	-8.575***	-10.410***	0
ΔPOP	-35.849***	-6.943***	-6.183***	0
$\Delta FINDEV$	-20.458***	-13.319***	-11.105***	0
$\Delta(FINDEV^2)$	-21.358***	-14.794***	-12.541***	0

Notes: The null hypothesis is that all panels contain unit roots. *** significant at 1%; ** significant at 5%; * significant at 10%.

Table 3: Pesaran (2007) CIPS Test: Full Sample

With an intercept and a linear trend				
Variables	Lag 1	Lag 2	Lag 3	Integration Order
GDP	-3.759*	0.504	-0.162	1
$INVESTMENT$	-5.619***	-2.542***	-1.572*	0
SSE	-1.657**	-1.430*	-1.348*	0
POP	-24.485***	5.310	-0.970***	1
$FINDEV$	-2.585***	0.364	-0.500	1
$FINDEV^2$	-3.224***	-0.522	0.161	1
With an intercept				
Variables	Lag 1	Lag 2	Lag 3	Integration Order
GDP	-1.435*	1.193	0.550	1
$INVESTMENT$	-3.789***	-0.701	0.064	1
SSE	-4.290***	-5.184***	-4.074***	0
POP	-26.334***	1.485	-5.311***	1
$FINDEV$	-3.513***	-1.154	-1.885**	1
$(FINDEV^2)$	-2.830***	-0.924	-0.143	1
ΔGDP	-19.408***	-11.069***	-9.154***	0
$\Delta INVESTMENT$	-25.407***	-17.238***	-13.103***	0
ΔSSE	-10.285***	-7.182***	-7.301***	0
ΔPOP	-24.659***	-4.337***	-3.127***	0
$\Delta FINDEV$	-15.268***	-9.775***	-7.489***	0
$\Delta(FINDEV^2)$	-16.242***	-11.433***	-8.751***	0

Notes: The null hypothesis is that the series is a unit root. Cross-section dependence is assumed to be in form of a single unobserved common factor. *** significant at 1%; ** significant at 5%; * significant at 10%.

Table 4 presents results derived from the ECM specification for the full sample. Following Samargandi et al. (2015), a quadratic term of the financial development indicator is included to capture the potential non-linear association between financial development and economic performance. As stated earlier, it is likely that the MG estimator is sensitive to country outliers and inefficient in a panel with a small cross-country dimension. In comparison, the PMG estimator is viewed as offering an attractive trade-off between consistency and efficiency. As a result, the long-run coefficients on economic performance is derived from the PMG estimator in the following discussion.

The first column in the table shows the long-run estimates based on the ARDL model. As mentioned by Loayza and Ranciere (2006), the determination of the lag order of the ARDL model generally involves a trade-off between sufficient length and over-extension, given a limited time-series dimension. It is worth noting that various authors have applied different approaches for this lag selection and, indeed, a number of studies have imposed a common lag structure for all countries; e.g. Chudik et al. (2013). Other studies (Arnold et al. (2011); Cavalcanti et al. (2015)) have suggested that the lag order of the ARDL be selected via information criterion. Here, the lag order is selected via the BIC, subject to a maximum lag of 2 on each of the explanatory variables in the ARDL model. This resulted in an ARDL model incorporating a single period lag on each of the variables, as depicted in the first column of the table.

From Column 1, the coefficient on the error correction term is statistically significant at the 1% level with a negative sign. This finding suggests that the system reverts to the long-run values following a shock, indicating cointegration among the variables. Also, per capita output is positively and significantly related to domestic investment and human capital, and negatively related to the corrected rate of population growth. Such findings are generally consistent with the theoretical expectations of the augmented Solow model of Mankiw et al. (1992). Meanwhile, the estimated coefficients of both the financial development indicator and of its quadratic term turn out to be significantly negative. This implies that any increase in the private credit ratio would lead to a decrease in

Table 4: PMG Estimates of the Long-Run Effects on Economic Performance: Full Sample

	ARDL	CS-ARDL	CS-ARDL
No. of lagged CA		2	3
Long Run Equation			
$INVEST$	0.756***	0.304***	0.527***
	(0.054)	(0.015)	(0.025)
SSE	0.348***	0.160***	0.134***
	(0.042)	(0.022)	(0.030)
POP	-3.662***	-0.129**	-1.574***
	(0.324)	(0.057)	(0.139)
$FINDEV$	-0.158**	0.031***	0.071**
	(0.064)	(0.011)	(0.029)
$FINDEV^2$	-0.054***	-0.039***	-0.017***
	(0.008)	(0.005)	(0.005)
Short Run Equation			
ECT	-0.038***	-0.127***	-0.074***
	(0.007)	(0.025)	(0.022)
$\Delta INVEST$	0.083***	0.069***	0.057***
	(0.013)	(0.014)	(0.016)
ΔSSE	0.030	0.030	-0.007
	(0.029)	(0.034)	(0.044)
ΔPOP	0.331	0.539	0.979**
	(0.210)	(0.402)	(0.437)
$\Delta FINDEV$	-0.067*	-0.147***	-0.103
	(0.037)	(0.053)	(0.065)
$\Delta(FINDEV^2)$	-0.014	0.000	0.023
	(0.015)	(0.022)	(0.031)
Constant	0.058***	0.555***	0.607***
	(0.008)	(0.107)	(0.173)
Obs	2412	2345	2278
Pesaran CD	15.610	-0.455	-1.561
P-Value	[0.000]	[0.650]	[0.119]

Notes: Estimates based on the error correction model. Standard errors are in parentheses. *** significant at 1%; ** significant at 5%; * significant at 10%.

long-run real average output.

The validity of the PMG estimates in Column 1 is contingent on the assumption that the errors are cross-sectionally independent. In order to test this, the cross-section dependence (CD) test was conducted. Specifically, this test uses the correlation-coefficients between the time-series for each panel member. Under the null hypothesis of cross-section independence, the CD statistic is standard normally distributed. Here, the null is rejected at the conventional significance levels. This then implies that failing to account for error cross-country dependence renders the accuracy of PMG estimates questionable.

To overcome this, the CS-ARDL methodology is employed, which involves including additional lagged cross-sectional averages of both the dependent variables and of all regressors in the estimation. A crucial step in the usage of the CS-ARDL model is the selection of the lag order for the cross-sectional averages. It is widely accepted that the number of lagged cross-section averages should be sufficient to overcome the concerns on cross-sectional dependence of the residual. Guidance from previous studies, such as, Chudik and Pesaran (2015) and Eberhardt and Presbitero (2015), would suggest a lag length of 2 in this application, whereas others, Chudik and Pesaran (2015) for instance, the lag length should not exceed 3. Both scenarios are presented in our results.

Columns 2 and 3 in the table show the PMG estimates of these two CS-ARDL model specifications. Here, the null hypothesis of cross-section independence in the Pesaran CD test is not rejected, suggesting that any cross-sectional dependence caused by common factors have been controlled for when the regression is augmented with the lagged cross-sectional averages. As a result, the PMG estimates under the CS-ARDL model are preferred.

In both Columns 2 and 3, the estimated coefficient for the error correction term is, again, negative and significant at the 1% level. Under both specifications, the estimated coefficients of $INVEST$, SSE, and POP are significant with the expected signs. The results show that a one percent increase in the proportion of domestic investment over output is associated with an average increase in steady-state per capita GDP of over 0.3 percent. Meanwhile, a one percent increase in the rate of secondary school enrollment is associated with an average increase in steady-state level of real per capita output by more than 0.1 percent. A positive and significant effect of the level of financial development on the level of output performance is observed in both Columns 2 and 3. Meanwhile, the estimated coefficient on the quadratic term of financial development indicator is negative and significant at the 1% level. Such a finding supports pervious empirics, including Shen and Lee (2006) and Arcand et al. (2015).

After controlling for cross-country heterogeneity and error cross-country dependence, the relationship between financial development and economic performance is found to be bell-shaped for the 69 countries examined here. Such a finding suggests that more private credit raises output performance, but only at low levels of credit and that high levels of private credit could exert a detrimental effect on long-run economic performance. The 'turning point' of the effect is estimated to occur at around 150% of GDP. Within the sample used here there are several examples where financial development exceeds this figure. Thus, for example, the ratio of private credit to GDP of both Malaysia and Thailand reached 150% during the Asian financial crisis of 1997 to 1998. Meanwhile, taking the examples of Canada, Denmark, Switzerland, the United Kingdom, and the United States, private credit grew steadily from the early 2000s and exceeded 150% in 2007, the year before the global financial crisis. Another interesting example is Japan. During the period of its economic crisis from late 1980s to 2007, Japan's private credit ratio never dropped below 150%. Noticeably, all of these countries, with the exception of Malaysia, are democracies.

Turning to the democratic and non-democratic sub-samples, the results for these two groups of countries are presented in Tables 5 and 6, where the first columns of both tables give the PMG estimates derived on the basis of a single lag for all variables. Columns 2 and 3 of these tables give the CS-ARDL results incorporating 2 or 3 lags of the cross-section averages of dependent and explanatory variables. As before, the coefficient on the error correction term is always negative and statistically significant and, as expected, the estimated coefficient on $INVEST$ turns out to be significantly positive in the long run, while that of POP is negative using both ARDL and CS-ARDL approaches.

The PMG estimates in Table 5 show mixed results, especially with regard to financial development. From first two columns, the estimated coefficient for $FINDEV$ is positive and statistically significant. However, it is worth noting that the null hypothesis of cross-sectional independence under the Pesaran CD test is strictly rejected. Column 3, reveals another another rejection of the null for the CD test, although error cross-section dependence is reduced as the statistic drops dramatically to around -2. Thus, these appear to provide the most accurate estimates and show that the coefficient estimate on $FINDEV$ is negative, albeit statistically insignificant. Also, the coefficient on the square of the financial development is positive, although this estimate fails to achieve statistical significance.

Table 6 presents the estimates for the non-democratic countries. Here, the results in the first column reveal some evidence of a positive, but insignificant, effect of financial system development on long-term economic performance. However, these results fail to account for error cross-section dependence. The results for the CS-ARDL model presented in Columns 2 and 3 suggest that the use of cross-section averages largely reduces residual cross-section dependence. In particular, as the Pesaran CD test statistics drop to around -0.5, no evidence of error cross-section dependence is uncovered in these two columns. Therefore, concerns over the influence of macroeconomic linkages and common shocks are eliminated. From last two columns, the estimated effects on per capita output of physical capital investment and human capital are all statistically significant with the expected signs. Also, the estimated coefficient on $FINDEV$ is positive, and significant. In this specification, the square of the financial development term is also revealed to be positive and significant.

Table 5: PMG Estimates of the Long-Run Effects on Economic Performance: Democratic Sub-sample

	ARDL	CS-ARDL	CS-ARDL
No. of lagged CA		2	3
Long Run Equation			
$INVEST$	0.552***	0.922***	0.709***
	(0.053)	(0.134)	(0.050)
SSE	0.219***	-0.446***	-0.632***
	(0.042)	(0.106)	(0.074)
POP	-1.225***	-6.414***	-1.877***
	(0.234)	(0.801)	(0.198)
$FINDEV$	0.965**	1.914***	-0.031
	(0.095)	(0.260)	(0.045)
$FINDEV^2$	0.333***	0.737***	0.018
	(0.032)	(0.106)	(0.019)
Short Run Equation			
ECT	-0.048***	-0.015*	-0.051***
	(0.014)	(0.009)	(0.020)
$\Delta INVEST$	0.118***	0.116***	0.091***
	(0.018)	(0.018)	(0.019)
ΔSSE	0.009	-0.025	0.016
	(0.034)	(0.042)	(0.049)
ΔPOP	0.098	0.069	0.621
	(0.307)	(0.386)	(0.564)
$\Delta FINDEV$	-0.023	-0.059	0.032
	(0.046)	(0.064)	(0.074)
$\Delta(FINDEV^2)$	-0.017	0.038	0.069
	(0.023)	(0.037)	(0.042)
$Constant$	0.403***	0.555***	2.194***
	(0.109)	(0.107)	(0.853)
Obs	1368	1330	1292
Pesaran CD	16.721	8.395	-2.482
P-Value	[0.000]	[0.000]	[0.013]

Notes: Estimates based on the error correction model. Standard errors are in parentheses. *** significant at 1%; ** significant at 5%; * significant at 10%.

Table 6: PMG Estimates of the Long-Run Effects on Economic Performance: Non-democratic Sub-sample

	ARDL	CS-ARDL	CS-ARDL
No. of lagged CA		2	3
Long Run Equation			
$INVEST$	0.494***	0.247***	0.192***
	(0.041)	(0.023)	(0.013)
SSE	0.190***	0.366***	0.047*
	(0.022)	(0.048)	(0.026)
POP	-0.952***	-0.833***	1.024***
	(0.169)	(0.172)	(0.083)
$FINDEV$	0.126	0.584***	0.482***
	(0.083)	(0.065)	(0.058)
$FINDEV^2$	-0.019	0.103***	0.126***
	(0.013)	(0.013)	(0.016)
Short Run Equation			
ECT	-0.070***	-0.114***	-0.174***
	(0.021)	(0.035)	(0.067)
$\Delta INVEST$	0.032*	0.043*	0.009
	(0.019)	(0.024)	(0.026)
ΔSSE	0.064	0.084	0.125
	(0.048)	(0.053)	(0.101)
ΔPOP	0.361	0.792	0.518
	(0.276)	(0.581)	(1.199)
$\Delta FINDEV$	-0.169***	-0.275***	-0.070
	(0.055)	(0.097)	(0.160)
$\Delta(FINDEV^2)$	-0.034***	-0.053**	-0.002
	(0.014)	(0.026)	(0.047)
$Constant$	0.519***	0.744***	-1.641***
	(0.148)	(0.229)	(0.590)
Obs	1044	1015	986
Pesaran CD	2.110	-0.573	-0.426
P-Value	[0.035]	[0.567]	[0.670]

Notes: Estimates based on the error correction model. Standard errors are in parentheses. *** significant at 1%; ** significant at 5%; * significant at 10%.

6. Concluding Remarks

In sum, the PMG results presented here for the full sample support the positive effect of financial development on economic performance and also uphold the non-linearity of this effect, with the results suggesting a turning point in the bell shaped function at around 150% of GDP. However, partitioning the sample of countries into democratic and non-democratic nations reveals noticeable differences between the two groups.

For the democratic nations, although the CS-ARDL model with 2 lags did result in a large positive coefficient estimate on $FINDEV$, when an additional 3-period lag was introduced, in the most robust of our estimated specifications, the statistical significance of the coefficient disappeared. Furthermore, although the coefficient on the square of this variable was significant in the CS-ARDL 2 model, it was positive suggesting an ever-increasing rate of the effect of financial development on growth, contrary to expectations. This coefficient was not significant in the CS-ARDL 3 model.

Turning to the non-democratic sub-sample, $FINDEV$ was both positive and statistically significant in both CS-ARDL models. The square of this variable was also significant in both models but was, once again, positive in both specifications. Taken together these results imply that, for non-democratic states, financial development has a positive effect on economic performance and that the strength of this effect increases along with the level of financial development. Thus, for these countries, the evidence presented here does not uphold the often noted bell shaped relationship between finance and growth.

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Appendix

Table A1: List of Countries

Democracies		Non-democracies	
Argentina	Italy	Cameroon	Panama
Australia	Jamaica	Cote D'Ivoire	Peru
Barbados	Japan	Egypt	Saudi Arabia
Bolivia	Korea, Republic of	Ethiopia	Senegal
Brazil	Malta	Fiji	Sierra Leone
Canada	Mauritius	Gabon	Sudan
Chile	New Zealand	Gambia, The	Swaziland
Costa Rica	Paraguay	Ghana	Tanzania
Denmark	Philippines	Haiti	Togo
Dominican Republic	Portugal	Kenya	Uganda
Ecuador	Sri Lanka	Malawi	
El Salvador	Sweden	Malaysia	
Finland	Switzerland	Mali	
Greece	Thailand	Mexico	
Guatemala	Trinidad & Tobago	Morocco	
Honduras	Turkey	Nepal	
India	United Kingdom	Niger	
Ireland	United States	Nigeria	
Israel	Venezuela	Pakistan	