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Finance and the Sources of Growth at Various Stages of Economic Development

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Abstract

This paper studies the effects of financial development on the sources of growth in different groups of countries. Recent theoretical work shows that financial development may affect productivity and capital accumulation in different ways in industrial versus developing countries. This hypothesis is tested with panel data from 74 countries using GMM dynamic panel techniques. Results are consistent with the hypothesis: finance has a strong positive influence on productivity growth primarily in more developed economies. In less developed economies, the effect of finance on output growth occurs primarily through capital accumulation.

JEL Classification: O4, G1.
Key words: Financial development, economic growth, productivity, capital accumulation.

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Finance and the Sources of Growth at Various Stages of Economic Development

I. Introduction

The effects of financial development on economic growth have been widely discussed in the academic literature. The increased availability of financial instruments and institutions reduces transaction and information costs in an economy. Larger and more efficient financial markets help economic agents hedge, trade, and pool risk, raising investment and economic growth.[1] The hypothesis that finance increases growth has been tested in various ways mostly finding a significant positive effect.[2] However, there are two issues that have received less attention. First, whether finance affects growth in different ways in industrial versus developing countries. Second, how financial development affects the *sources* of growth.[3] While there have been some studies of these two issues separately, they have not been analyzed in a unified fashion as perhaps they should be given some recent theoretical work.

Specifically, Acemoglu, Aghion, and Zilibotti (2002) show that a developing country that is behind the technological frontier will typically pursue a capital accumulation growth strategy ("investment-based growth"). At this development stage, there is less incentive to be highly selective of firms and managers as this is costly. Hence, we observe long-term business relationships between financial market agents and firms, which result in funds flowing to those established firms for capital accumulation purposes. Conversely, industrial countries that are at the technological frontier have a strong incentive for innovation, so they are very selective of firms and managers that can attain this goal. Financial markets will then fund these innovation activities leading to larger productivity gains ("innovation-based growth").[4]

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[1] The theoretical literature goes back to Schumpeter (1912), Robinson (1952), Hicks (1969), McKinnon (1973), Goldsmith (1969), and Fry (1995).

[2] The empirical literature includes King and Levine (1993a, b, c), Roubini and Sala-i-Martin (1992), Pagano (1993), Levine (1997, 1998), Arestis and Demetriades (1997), Lindh (2000), Levine, Loayza, and Beck (2000). Some papers, like Demetriades and Hussein (1996) and Luintel and Khan (1999), fail to find a causal effect of finance on growth.

[3] Beck, Levine and Loayza (2000) have recently studied this issue. They find that finance affects economic growth primarily through productivity growth. Arestis, Demetriades, and Fattouh (2002) find different effects of certain financial policies on capital productivity in different countries.

[4] There have been studies in the growth accounting literature which suggest that the engines for growth may vary in different countries. For example, Young (1994) finds that much of the very rapid growth in

Further theoretical support is found in Lee (1996), who models a process of learning-by-doing in which lending decisions improve over time as lenders acquire project specific information by making investment decisions. Again, this points to more efficient allocation of funds, which go to the most productive firms, in developed economies.[5]

Hence, as financial markets are crucial to fund production-related activities, we may observe a differential effect of financial development--not only on *economic* growth--but on the *sources* of growth based on a country's relative position. We propose to empirically test the following propositions:

- Does financial development have a larger effect on capital accumulation in developing countries than in industrial countries?
- Does financial development have a larger effect on productivity growth in industrial countries than in developing countries?

We use a large panel data set of 74 countries that covers the 1961 to 1995 period. Further, we apply generalized method of moments (GMM) dynamic panel techniques in order to deal with the possible simultaneity of financial development and economic growth and to control for country-specific effects. Our results are consistent with previous empirical work that finds that the effects of finance on *economic* growth may vary in different types of countries.[6] Our results go further finding that finance has a strong positive influence on productivity growth primarily in more developed economies. Conversely, in less developed economies, the effect of finance on output growth occurs primarily through capital accumulation and not productivity.

South East Asia in the 1966-90 period is explained not by productivity, but by capital accumulation and labor force growth. Similarly for Latin America, Elias (1992) finds that productivity growth accounts for only about one quarter of output growth during 1940-1980. Agenor and Montiel (1999, p. 676) report that productivity growth accounted for only 4.4% of growth in African countries in the 1970s while capital accumulation accounted for 64.4%. Conversely for industrial countries, Christensen, Cummings, and Jorgenson (1980) find the contribution of productivity was more than 50% during 1947-1973.

[5] See also Acemoglu and Zilibotti (1997).

[6] For example, Xu (2000), Demetriades and Hussein (1996), De Gregorio and Guidotti (1995), and Odedokun (1996). These papers generally find a stronger effect of finance on economic growth in more developed economies, although the issue has not been systematically studied.

The remainder of paper is organized as follows. Section II discusses the measures and data; Section III describes the methodology. Section IV presents and discusses the results and Section V concludes.

II. Data

Following the empirical literature, we use three common financial development measures: Private Credit (PC), Commercial vs. Central Bank (CCB), and Liquid Liabilities (LL). Private Credit is the credit issued to the private sector as percent of GDP and is the preferred measure of Beck, Levine, and Loayza (2000). Commercial vs. Central Bank is defined as commercial bank assets divided by commercial bank plus central bank assets. This measures the relative importance of commercial banks vs. central banks in allocating savings. This variable is commonly used in the literature to measure financial development as presumably commercial banks are better at evaluating the potential returns and risks of various projects. Finally, Liquid Liabilities is defined as currency plus demand and interest-bearing liabilities of banks and non-bank financial intermediaries as percent of GDP. This variable, like Private Credit, is a size or "financial depth" measure that has been used in the literature by Goldsmith (1969) and King and Levine (1993b) among others.

There are three dependent variables of interest in this paper: economic growth defined as the rate of growth of real per capita GDP; capital growth defined as the rate of growth of per capita physical capital stock; and productivity growth defined as the rate of growth of the "residual" (after capital and labor growth are accounted for).

To compute capital growth, Beck, Levine, and Loayza (2000) start with an estimate of the initial level of capital stock for each country in 1950 assuming that the capital-output ratio was in steady state. Capital stock in later years is then computed using the real investment series from the Penn World Tables and the perpetual inventory method with a 7% annual depreciation rate.

The measure of productivity is derived starting with the neoclassical production function:

$$Y=AK^{\alpha}L^{1-\alpha}$$

where Y is output, K is physical capital, L is the labor input, and A is productivity. To solve for productivity growth, divide both sides of the production function by L, take logs, and differentiate with respect to time. Assuming a capital share α=0.3, this yields the following expression in per person terms:

$$\text{Productivity growth} = \text{Output Growth} - 0.3 * \text{Capital Growth}.$$

Next, we discuss briefly the data set and some useful statistics. The data set consists of a panel of observations for 74 countries for the period 1961-1995 and is the same data set used by Beck, Levine, and Loayza (2000). The data are averaged over five-year intervals: 1961-1965, 1966-1970, …, 1991-1995, so there are seven observations per country when available. Table 1 presents descriptive statistics for all the variables.

Countries are grouped into three groups: low-, medium- and high-income, depending on the relative ranking of their income per capita in the middle of the sample period.[7] We use three (rather than two or more than three) groups since much of the policy literature discusses country differences in terms of low-, middle-, and high-income countries. That makes the interpretation of our results more intuitive and useful. Separating countries into three roughly equal-size groups is fairly mechanical and may leave the positioning of some countries open to skepticism. However, it has the advantage of avoiding subjective judgments on how to group the countries.[8] With

[7] Countries with income per capita of less than $752 were classified as low-income; those with income per capita between $752 and $2490 were classified as middle-income; and those above $2490 were classified high-income.

[8] For robustness checks, we also grouped countries according to income levels earlier and later in the sample period. We also conducted all estimations with a separation into two groups: high and low income. The estimates are similar and are available on request.

few exceptions, the relative position of countries in terms of income has not changed during the sample period.[9]

For further motivation, Table 2 reports output, capital, and productivity growth for the three sub-samples of countries, which we later use in the econometric analysis. Table 2 shows that output growth was substantially slower in low-income countries: 0.9% on an annual basis compared to 2% in middle income and 2.3% in high-income countries. The relative contributions of productivity and capital are also very different. Using α=0.3, capital growth accounts for 66.3% of per capita output growth in the low-income group, which is similar to the evidence from previous research reported earlier. In middle and high-income countries, productivity accounts for 60% of per capita output growth, substantially more than in low-income countries (33.3%). These differences prompt us to examine whether finance has different channels for influencing economic growth at various levels of development.

Finally, Table 3 reports the average values of the three financial development variables in the three income groups. Higher income is clearly associated with more developed financial markets across all three measures. This apparent correlation however does not imply any causality since finance and growth may be jointly determined as most of the theoretical literature suggests. Our objective is to go a step further and test for any effect of the exogenous component of finance on growth. Financial sector reform is an important part of development policies in many countries and accurate estimates of the effect of such reforms are important. That makes it necessary to employ the recently developed dynamic panel data techniques discussed in the next section.

[9] In addition, we should point out that in Acemoglu, Aghion, and Zilibotti's (2002) theoretical piece, the differences in growth strategies also depend on the *relative* income position of a country, i.e. on

III. Methodology

Following Beck, Levine, and Loayza (2000), we use recently developed dynamic panel generalized-method-of-moments (GMM) techniques to address potential endogeneity in the data.[10] Let y_{it} be the logarithm of real per capita GDP in country i at time t. We are interested in the following equation:

$$(1) \qquad y_{i,t} - y_{i,t-1} = (\alpha - 1) y_{i,t-1} + \beta' X_{i,t} + \eta_i + \varepsilon_{i,t}$$

where $y_{i,t}$ - $y_{i,t-1}$ is the growth rate of real per capita GDP, $X_{i,t}$ is a set of explanatory variables, including our measures for financial development, η_i captures unobserved country-specific effects, and ε_{it} is an error term. Rewrite equation (1) as:

$$(2) \qquad y_{i,t} = \alpha y_{i,t-1} + \beta' X_{i,t} + \eta_i + \varepsilon_{i,t},$$

Notice in (2) that the lagged dependent variable, which enter as an independent explanatory variable is correlated with the country-specific component of the error term. To resolve this problem, as a first step, the GMM procedure involves taking first differences to eliminate the country-specific effect:

$$(3) \qquad y_{i,t} - y_{i,t-1} = \alpha\left(y_{i,t-1} - y_{i,t-2}\right) + \beta'\left(X_{i,t} - X_{i,t-1}\right) + \left(\varepsilon_{i,t} - \varepsilon_{i,t-1}\right).$$

By construction, in equation (3), however, the lagged difference in per capita GDP is correlated with the error term, which along with the potential endogeneity of the explanatory variables X, requires the use of instruments. The GMM *difference* estimator uses the lagged levels of the explanatory variables as instruments under the conditions that the error term is not serially correlated and that the lagged levels of the explanatory variables are weakly exogenous (i.e., they are uncorrelated with future

how far it is from the technological frontier.

[10] This method is fully described in Arellano and Bond (1991), Arellano and Bover (1995), and Blundell and Bond (1998).

error terms). Then the following moment conditions are used to calculate the difference estimator:

(4) $E\left[y_{i,t-s}\left(\varepsilon_{i,t}-\varepsilon_{i,t-1}\right)\right]=0 \quad for \quad s\geq 2; t=3,....,T,$

(5) $E\left[X_{i,t-s}\left(\varepsilon_{i,t}-\varepsilon_{i,t-1}\right)\right]=0 \quad for \quad s\geq 2; t=3,....,T.$

Since persistence in the explanatory variables may adversely affect the small-sample and asymptotic properties of the difference estimator (Blundell and Bond, 1998), the difference estimator is further combined with an estimator in levels to produce a *system* estimator. The inclusion of a levels equation also allows us to use information on cross-country differences, which is not possible with the *difference* estimator alone.

The equation in levels uses the lagged differences of the explanatory variables as instruments under two conditions. First, the error term is not serially correlated. Second, although there may be correlation between the levels of the explanatory variables and the country-specific error term, there is no correlation between the difference in the explanatory variables and the error term. This yields the following stationarity properties:

(6) $E\left[y_{i,t+p}\eta_i\right]=E\left[y_{i,t+q}\eta_i\right] \quad and \quad E\left[X_{i,t+p}\eta_i\right]=E\left[X_{i,t+q}\eta_i\right]$ for all p and q.

The additional moment conditions for the regression in levels are:

(7) $E\left[\left(y_{i,t-s}-y_{i,t-s-1}\right)\left(\eta_i+\varepsilon_{i,t}\right)\right]=0 \quad for \quad s=1$

(8) $E\left[\left(X_{i,t-s}-X_{i,t-s-1}\right)\left(\eta_i+\varepsilon_{i,t}\right)\right]=0 \quad for \quad s=1.$

In summary, the GMM *system* estimator is obtained using the moment conditions in equations (4), (5), (7), and (8). Following Blundell and Bond (1998), we use two specifications tests: the Sargan test which tests the validity of the instruments, and a test that the error term is not second-order serially correlated.

In addition to economic growth, we apply the methodology described above to estimate the effect of financial development on productivity and capital growth. In order to capture differences in effects across income groups, we create dummy variables based on the low- and middle-income groups (the high-income group is the omitted group) described in the previous section. The dummy variables are then interacted with the financial development variable and included in equation (1). The estimated effects for the three groups are reported in the Results section below. We report the overall effect for each group, i.e. the sum of the coefficient of financial development and the interaction term for a particular income group. Thus, the reported coefficients can be directly interpreted as the effect of financial development on growth in the various income groups.

IV. Results

Financial Development and Economic Growth

The effects of the Private Credit measure of financial development on economic growth are described in Table 4. First, regression (1) is estimated without breaking countries into groups for comparison. In this case, we obtain the standard result of a positive, significant effect.[11] Regression (2) estimates the potentially different effects in three groups of countries: low-, middle- and high-income. We find that the estimated coefficients for all three groups are statistically significant at the 5% (for low-income) and 0.1% (for middle- and high-income) levels. Notice that the higher the income level, the larger the effect of Private Credit on growth. The estimates are 0.007, 0.015, and 0.020 for low-, middle, and high-income respectively. Further, the three coefficients are statistically different from one another.[12] The

[11] We use the same set of control variables as Beck, Levine, and Loayza (2000). The rationale for each variable's inclusion is as follows. First, the initial level of real per capita GDP controls for the convergence effect implied in the standard Solow-Swan growth theory. Second, average years of secondary schooling is a measure of educational attainment which controls for the level of human capital in the country. Third, government size (% of GDP), the inflation rate, and openness to trade ((exports + imports)/GDP) are all controls for policy in the country. Large government sectors and high inflation are presumed to affect growth adversely, while more openness to trade is presumed to affect growth positively. These regressions also included time dummies, but those coefficients are not reported for brevity.

[12] A t-test for the difference in coefficients is used but not reported here and throughout the paper. These results are available on request.

economic interpretation of these coefficients is that a 10% increase in financial development would lead to a 0.20 percentage point higher growth rate in a high-income country, while only to a 0.07 percentage point larger growth rate in a low-income country. The results are intuitively and theoretically supported by Acemoglu and Zilibotti (1997) and Lee (1996). For instance, in Acemoglu and Zilibotti (1997) projects with higher rates of return are indivisible and have minimum size requirements. In that environment, the financial sector has to develop a certain minimum size before sufficient funds can be pooled together to finance such larger projects. Hence, the effects of finance on growth may be larger in more advanced economies. Our results are also consistent with the previous empirical findings in Xu (2000), Demetriades and Hussein (1996), and De Gregorio and Guidotti (1995).

The results using the other two financial development measures are similar; they are presented in Table 5. Using the Commercial vs. Central Bank (CCB) measure, the estimated coefficients are 0.022, 0.029, and 0.038 for the low-, middle-, and high-income groups respectively. All three are statistically significant at the 0.1% level and are different from one another. When using Liquid Liabilities, the estimated coefficients are significant for the middle- and high-income groups only: 0.015 and 0.024. In addition, the Sargan tests are consistent with the instruments being correlated with the residuals. The Serial Correlation tests show no evidence of second order serial correlation. In summary, the pattern across all three measures is fairly consistent: the effects of financial development on *economic* growth seem to be higher the higher the income group of a country.

Financial Development and Productivity Growth

We now turn to analyze the effects on the sources of growth. Table 6 shows the effects of Private Credit on productivity growth. As in the previous section, regression (1) is estimated without breaking countries into groups. Private Credit has a positive, statistically significant effect on productivity growth, which agrees with Beck, Levine and Loayza (2000).[13]

[13] As Beck, Levine, and Loayza (2000), we keep the same set of control variables across all regressions in order to be consistent.

Regression (2) in Table 6 separates countries into three groups. We find that the coefficient estimates in the middle- and high-income groups are statistically significant, but the estimate for the low-income group is not. Hence, finance appears to not have an effect on productivity growth in the low-income countries. In addition, the estimated effect of Private Credit on productivity is larger in the high-income group (0.008) than in the middle-income countries (0.005). However, these two coefficients are not statistically different from each other.

Estimates using the CCB and Liquid Liabilities measures are presented in Table 7. Using CCB, the effect for all three groups is statistically significant and different from one another at the 0.1% level: 0.025, 0.027, and 0.039 for low-, middle-, and high-income countries. Again, the effects on productivity are larger in the richer countries. For instance, a 10% increase in CCB would lead to a 0.39 percentage point increase in productivity growth in the high-income group. Conversely, in the low- and middle-income group, a 10% increase in CCB would lead to a 0.25 and 0.27 percentage point increase. In summary, the richer the country the higher the effect of financial development on productivity growth, which agrees with the theoretical results derived by Acemoglu, Aghion, and Zilibotti (2002).[14]

Financial Development and Capital Growth

The effects of Private Credit on the growth of capital stock per person are depicted in Table 8. Of the three groups in regression (2), only the coefficient for the low-income group (0.009) is statistically significant. A 10% increase in Private Credit in the low-income group would lead to a 0.09 percentage point increase in the capital growth rate.. This would seem to imply that financial development affects capital accumulation in low-income countries only.[15]

It is then useful to examine the results using the other measures of financial development, which are reported in Table 9. Using the CCB measure, the coefficient estimates are statistically significant at the 0.1% level in all three income groups. The

[14] Results using the Liquid Liabilities measure are also consistent with this conclusion as the high-income countries have a larger coefficient than the middle-income countries (0.024 vs. 0.014). The low-income group has a coefficient that is not statistically significant.

[15] The lag value of capital growth is included as a regressor to deal with the serial correlation in this equation. This approach is suggested by Beck, Levine, and Loayza (2000), who also find serial correlation in their capital growth equation.

effect in low-income countries (0.034) is larger than that in middle-income countries (0.033) and high-income countries (0.028). A 10% raise in CCB would lead to a 0.34 percentage point increase in the growth of capital stock in the low-income group and only to a 0.28 percentage point increase in high-income countries. Using Liquid Liabilities, only middle-income countries show a statistically significant effect with a coefficient of 0.011.

Summarizing, although the results are not as definitive as those for productivity, financial development appears to have a larger effect on capital stock growth in lower income groups, which is also consistent with Acemoglu, Aghion, and Zilibotti (2002).

V. Conclusion

This paper investigates the channels through which financial development influences economic growth in a panel of 74 countries during 1961-1995. While some of the empirical literature has studied the effects of finance on the *sources* of growth, it has not allowed for the effects to possibly differ in developing vs. industrial countries. We examine this hypothesis, which is further motivated in the theoretical literature (e.g., Acemoglu, Aghion, and Zilibotti, 2002), but has not been tested before. In low-income countries, we find that finance affects economic growth predominantly through capital accumulation, and that it has negligible effects on productivity. Conversely, in middle- and, especially, in high-income countries, results show that the main channel is productivity.

Overall, when we do not allow for differences between income groups the coefficient estimates suggest that productivity growth is the primary channel through which financial development enhances economic growth in the broad sample of countries. This is essentially the conclusion of Beck, Levine, and Loayza (2000) and is perhaps the predominant view in the literature. Our results suggest that while that is probably the case, the contribution of financial development to productivity growth does not occur until a country has reached a certain income level, roughly in the range that defines our middle-income group. Until then, most of the effect occurs through capital accumulation.

These results are important not only because they provide us with more precise marginal effects, but also because policy decisions are based on the profession's understanding of the ways in which finance contributes to growth. For example, should the government of a developing country subsidize credits to particular sectors? If all of finance's contribution is in terms of productivity, intervention in the allocation of credit would be undesirable. However, if the economy pursues "investment-based-growth" as in Acemoglu, Aghion, and Zilibotti (2002), then financial development through some expansion of directed lending to existing enterprises may not be a bad idea despite the possible inefficiencies. Also, should it be considered a problem if most of the credit activity in less developed countries is biased toward established larger firms while small-firm credit is limited? In principle, funding for small-size upstarts is important for technological innovation. With

“investment-based growth”, however, financing the expansion of established firms may have a larger payoff in terms of growth for some time.

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Table 1
Descriptive statistics, 1961-1995, 74 countries.

Variable	GDP growth	Capital growth	Productivity growth	Initial income per capita	Average years of sec. school-ling	Private credit	Commercial-central bank	Liquid liabilities	Govern-ment size	Openness to trade	Inflation rate	Black market pre-mium
Mean	0.017	0.027	0.01	3883	1.12	0.37	0.76	0.41	0.14	0.55	0.16	0.6
Maximum	0.13	0.18	0.13	20134	5.15	2.05	1.00	1.91	0.45	2.00	3.44	109.9
Minimum	-0.10	-0.06	-0.10	107	0.00	0.003	0.12	0.05	0.04	0.09	-0.03	-0.05
Standard deviation	0.03	0.034	0.025	4792	0.94	0.23	0.20	0.25	0.06	0.30	0.32	5.52
Correlations												
GDP growth	1.00											
Capital growth	0.53	1.00										
Productivity growth	0.93	0.17	1.00									
Initial income per capita	0.10	0.02	0.10	1.00								
Average years of sec. sch.	0.15	0.01	0.17	0.69	1.00							
Private credit	0.07	0.14	0.14	0.76	0.61	1.00						
Commercial-central bank	0.28	0.28	0.22	0.51	0.32	0.58	1.00					
Liquid liabilities	0.21	0.16	0.17	0.62	0.50	0.84	0.49	1.00				
Government size	-0.01	-0.03	0.01	0.44	0.26	0.23	0.25	0.23	1.00			
Openness to trade	0.07	0.05	0.07	0.01	0.03	0.05	0.18	0.10	0.19	1.00		
Inflation rate	-0.27	-0.22	-0.22	-0.15	-0.05	-0.21	-0.24	-0.21	0.03	-0.19	1.00	
Black market premium	-0.18	-0.11	-0.17	-0.07	-0.05	-0.07	-0.10	-0.02	0.09	-0.08	0.53	1.00

Table 2
Output growth and its sources in low, middle, and high-income countries

	Low income countries	Middle income countries	High income countries
Output growth	0.009	0.020	0.023
Productivity growth	0.003 (33.3%)	0.012 (60.0%)	0.014 (60.1%)
Capital growth	0.024 (66.6%)	0.027 (40.0%)	0.032 (39.9%)

Notes: The percentage contribution of productivity and capital growth is in parentheses. The calculation is made using a capital share α=0.3. For example, in the high-income group, 0.023=0.014+0.3*0.032.

Table 3
Financial Development in low, middle, and high-income countries

	Low income countries	Middle income countries	High income countries
Private credit	0.17	0.28	0.61
Liquid liabilities	0.27	0.35	0.59
Commercial vs. Central bank	0.67	0.72	0.89

Table 4
Financial Development and Economic Growth

Regressors	(1)	(2)
Private Credit[a]	0.009 *(0.001)*	- -
Low income[a]	- -	0.007 *(0.050)*
Middle income[a]	- -	0.015 *(0.001)*
High income[a]	- -	0.020 *(0.001)*
Initial income per capita[a]	-0.016 *(0.001)*	-0.025 *(0.001)*
Government size[a]	0.002 *(0.646)*	-0.010 *(0.109)*
Openness to trade[a]	-0.007 *(0.028)*	-0.015 *(0.004)*
Inflation[b]	-0.022 *(0.003)*	-0.010 *(0.437)*
Average years of secondary schooling	0.006 *(0.194)*	0.009 *(0.050)*
Black market premium[b]	-0.003 *(0.361)*	-0.013 *(0.003)*
Constant	0.112 *(0.001)*	0.128 *(0.001)*
Sargan test[c] *(p-value)*	*0.99*	*0.99*
Serial correlation test[d] *(p-value)*	*0.67*	*0.83*
Number of observations	451	451

Note: Numbers in parenthesis are p-values.
[a] In the regression, this variable is included as log (variable).
[b] In the regression, this variable is included as log (1+variable).
[c] The null hypothesis is that the instruments used are not correlated with the residuals.
[d] The null hypothesis is that the errors in the first-difference regression exhibit no second-order serial correlation.

Table 5
Alternative Measures of Financial Development and Economic Growth

Financial Variable	**Coefficient**	**p-value**
Commercial vs. Central Bank		
Low income	0.022	*0.001*
Middle income	0.029	*0.001*
High income	0.038	*0.001*
Sargan test[a]		*0.99*
Serial correlation test[b]		*0.42*
Liquid Liabilities		
Low income	-0.002	*0.800*
Middle income	0.015	*0.010*
High income	0.024	*0.010*
Sargan test[a]		*0.99*
Serial correlation test[b]		*0.60*
Private Credit		
Low income	0.007	*0.050*
Middle income	0.015	*0.001*
High income	0.020	*0.001*
Sargan test[a]		*0.99*
Serial correlation test[b]		*0.83*

[a] The null hypothesis is that the instruments used are not correlated with the residuals.
[b] The null hypothesis is that the errors in the first-difference regression exhibit no second-order serial correlation.

Table 6
Financial Development and Productivity Growth

Regressors	(1)	(2)
Private Credit[a]	0.007 *(0.001)*	- -
Low income[a]	- -	-0.002 *(0.500)*
Middle income[a]	- -	0.005 *(0.050)*
High income[a]	- -	0.008 *(0.079)*
Initial income per capita[a]	-0.017 *(0.001)*	-0.022 *(0.003)*
Government size[a]	0.002 *(0.733)*	0.010 *(0.246)*
Openness to trade[a]	-0.014 *(0.077)*	-0.009 *(0.079)*
Inflation[b]	-0.014 *(0.077)*	-0.022 *(0.026)*
Average years of secondary school	0.010 *(0.012)*	0.014 *(0.001)*
Black market premium[b]	0.001 *(0.919)*	-0.004 *(0.201)*
Constant	0.112 *(0.001)*	0.165 *(0.001)*
Sargan test[c] *(p-value)*	*0.99*	*0.99*
Serial correlation test[d] *(p-value)*	*0.37*	*0.37*
Number of observations	445	445

Note: Numbers in parenthesis are p-values.
[a] In the regression, this variable is included as log (variable).
[b] In the regression, this variable is included as log (1+variable).
[c] The null hypothesis is that the instruments used are not correlated with the residuals.
[d] The null hypothesis is that the errors in the first-difference regression exhibit no second-order serial correlation.

Table 7
Alternative Measures of Financial Development and Productivity Growth

Financial Variable	Coefficient	p-value
Commercial V.S. Central Bank		
- Low income	0.025	*0.001*
- Middle income	0.027	*0.001*
- High income	0.039	*0.001*
Sargan test[a] (p-value)		*0.99*
Serial correlation test[b] (p-value)		*0.26*
Liquid Liabilities		
- Low income	0.001	*0.960*
- Middle income	0.014	*0.010*
- High income	0.024	*0.010*
Sargan test[a]		*0.99*
Serial correlation test[b] (p-value)		*0.37*
Private Credit		
- Low income	-0.002	*0.500*
- Middle income	0.005	*0.050*
- High income	0.008	*0.079*
Sargan test[a]		*0.99*
Serial correlation test[b] (p-value)		0.37

[a] The null hypothesis is that the instruments used are not correlated with the residuals.
[b] The null hypothesis is that the errors in the first-difference regression exhibit no second-order serial correlation.

Table 8
Financial Development and Capital Growth

Regressors	(1)	(2)
Private Credit[a]	0.004 *(0.012)*	- -
Low income[a]	- -	0.009 *(0.050)*
Middle income[a]	- -	0.007 *(0.126)*
High income[a]	- -	-0.005 *(0.348)*
Initial income per capita[a]	-0.006 *(0.122)*	0.012 *(0.059)*
Government size[a]	0.010 *(0.028)*	0.019 *(0.005)*
Openness to trade[a]	0.009 *(0.099)*	-0.004 *(0.418)*
Inflation[b]	0.002 *(0.845)*	-0.017 *(0.102)*
Average years of secondary school	0.009 *(0.021)*	0.007 *(0.105)*
Black market premium[b]	-0.013 *(0.001)*	-0.013 *(0.005)*
Capital growth (-1)	0.347 *(0.001)*	0.307 *(0.001)*
Constant	0.083 *(0.020)*	-0.032 *(0.459)*
Sargan test[c] *(p-value)*	*0.99*	*0.99*
Serial correlation test[d] *(p-value)*	*0.20*	*0.16*
Number of observations	401	401

Note: Numbers in parenthesis are p-values.
[a] In the regression, this variable is included as log (variable).
[b] In the regression, this variable is included as log (1+variable).
[c] The null hypothesis is that the instruments used are not correlated with the residuals.
[d] The null hypothesis is that the errors in the first-difference regression exhibit no second-order serial correlation.

Table 9
Alternative Measures of Financial Development and Capital Growth

Financial Variable	Coefficient	p-value
Commercial vs. Central Bank		
Low income	0.034	*0.001*
Middle income	0.033	*0.001*
High income	0.028	*0.001*
Sargan test[a] (p-value)		*0.99*
Serial correlation test[b] (p-value)		*0.88*
Liquid Liabilities		
Low income	0.007	*0.124*
Middle income	0.011	*0.010*
High income	0.004	*0.597*
Sargan test[a]		*0.99*
Serial correlation test[b] (p-value)		*0.50*
Private Credit		
Low income	0.009	*0.050*
Middle income	0.007	*0.126*
High income	-0.005	*0.348*
Sargan test[a]		*0.99*
Serial correlation test[b] (p-value)		*0.16*

[a] The null hypothesis is that the instruments used are not correlated with the residuals.
[b] The null hypothesis is that the errors in the first-difference regression exhibit no second-order serial correlation.

Appendix. List of countries used in the estimations ranked by per capita GDP in 1971.

Low income	Middle income	High income
Cameroon	Algeria	Iran, Islamic Republic of
Central African Republic	Bolivia	Portugal
Egypt, Arab Rep.	Brazil	Argentina
Gambia, The	Chile	Australia
Ghana	Colombia	Austria
Haiti	Costa Rica	Belgium
Honduras	Cyprus	Canada
India	Dominican Republic	Denmark
Indonesia	Ecuador	Finland
Kenya	El Salvador	France
Lesotho	Guatemala	Germany
Malawi	Iran, Islamic Republic of	Greece
Niger	Jamaica	Ireland
Pakistan	Korea, Republic of	Israel
Philippines	Malaysia	Italy
Rwanda	Mauritius	Japan
Senegal	Mexico	Netherlands
Sierra Leone	Nicaragua	New Zealand
Sri Lanka	Panama	Norway
Sudan	Papua New Guinea	Spain
Thailand	Paraguay	Sweden
Togo	Peru	Switzerland
Zaire	Portugal	Trinidad and Tobago
Zimbabwe	South Africa	United Kingdom
	Syria	United States
	Uruguay	Venezuela