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Financial Development and Economic Growth: New Evidence

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Abstract

Financial systems around the world have undergone considerable development. This paper analyzes the effect of financial development on economic growth. It replicates the estimation of Beck et al. (2000), one of the pioneering research papers in this field. Then, it tests the sensibility of the results by expanding the sample of countries (99) and the period (1961–2010). This study contributes to the literature by analyzing differentiated effects when a country's economic conditions are incorporated. The results show that the positive impact of financial development on economic growth found by Beck et al. (2000) becomes non-significant if financial crises and macroeconomic instability periods are taken into account. However, if income per capita level is considered, the impact becomes positive and significant in high-income countries and decreases in low-income per capita countries. This impact is influenced by each country's level of education, level of financial deepening, and average inflation rate over the last ten years.

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1. Introduction

In recent decades, financial systems around the world have undergone considerable development: the number of institutions and financial assets channeled has increased, while the intermediation processes and mechanisms have become more complex. This process begs a fundamental question: what impact has financial development had on the economic growth of countries? On this, there have been numerous studies. The theoretical literature stresses the essential function of financial systems in facilitating the allocation of resources, in time and space, in an uncertain context (Goldsmith, 1969; McKinnon, 1973; Merton and Bodie, 1995; Levine, 1997). On the other hand, empirical literature yields varied results. Pioneering studies such as King and Levine (1993a,b), Rajan and Zingales (1998) and Beck et al. (2000) find that financial development has a positive effect on economic growth; however, more recent studies dispute these results by proposing that the negative impact of financial crises undermine the benefits of a larger financial system. Ultimately, they suggest, the effect of financial development is conditional on a series of variables such as the country's level of institutional strength (legal and judicial), macroeconomic context, and level of economic development (The World Bank, 2005; Loayza and Ranciere, 2005; Demetriades and Law, 2006; Rousseau and Wachtel, 2009; Arcand et al., 2011; Gantman and Dabós, 2012).

Given these proposals, the main aim of this paper is to further the analysis of the effect of financial development on economic growth, based on Beck et al. (2000). First, this study replicates their research; that is, regresses a panel data model at the country level using generalized method of moments. Then, it validates the robustness of the results by expanding the sample of countries (from 77 to 99) and the period considered (from 1961–1995 to 1961–2010). Finally, it incorporates into the analysis the level of income per capita, level of financial deepening, level of education, and inflation rate of each country to determine whether the impact of financial development differs when the country's economic conditions are taken into account.

This study contributes to the literature in two ways: first, by testing the sensitivity of the results of one of the pioneer studies in this field; second, by incorporating an approximation to the economic conditions under which financial development benefits a country more or less.

The structure of the article is as follows: Section 2 describes the indicators and data. Section 3 proposes the methodology. Section 4 presents and discusses the results. Section 5 sets out the conclusions.

2. Data

The main function of financial systems is to facilitate the allocation of resources, in time and space, in an uncertain context (Goldsmith, 1969; McKinnon, 1973; Merton and Bodie, 1995; Levine, 1997). Then, financial development is understood to refer to the progressive elimination of friction associated with this allocation (Cermeño and Roa, 2013). Unfortunately, there is no direct way of measuring the fulfillment of these functions. Following to the literature, this study uses an indicator of financial deepening, defined as the *ratio of private credit by deposit money banks and other financial institutions to GDP*. This measure reflects the capacity of the financial

system to channel resources to the real sector—specifically, the private sector. This consideration is fundamental since it is most likely that financial systems which primarily grant loans to the private sector will provide more and better services than those systems which principally aim loans at state-run firms. Thus, although the indicator does not entirely capture all aspects involved in financial development, it is the best measurement of financial deepening available (Calderón and Liu, 2002; Beck and Levine, 2004; Loayza and Ranciere, 2005).[1] The data used for this indicator is taken from the *Global Financial Development Database*.

The dependent variable is economic growth, measured as the annual variation in real GDP per capita. The other control variables included in the analysis are as follows: initial real GDP per capita; level of education, measured with an indicator of average years of schooling of the population aged 25 and older; inflation, measured as the annual percentage variation in the Consumer Price Index (CPI); level of openness of the economy, measured, on the one hand, with the sum of imports and exports as a share of GDP; and, on the other hand, as the black market premium, defined as the ratio of the deviation of the parallel exchange rate from the official exchange rate, to the official exchange rate. The final indicator included is one of government size, measured as the general government consumption expenditure as a percentage of GDP. The data sources and the specification of each indicator are detailed in Table A.1 in the Appendix A.

All of these variables are incorporated into the analysis to replicate Beck et al. (2000), which takes into account 77 countries evaluated over the period 1961–1995. Then, in the extended analysis featuring 99 countries studied over 1961–2010, the estimation dispenses with the government size and black market premium variables included in the initial estimation, due to data availability. This entire study performs the same data treatment as Beck et al. (2000), based on data averaged over five-year periods. Table 1 shows the main descriptive statistics.

As can be observed, education is the variable with complete data, while inflation is the one with the most missing values. Evaluating the maximum and minimum values from the sample, Gabon exhibits the highest growth (15.84%) in the third period (1971–1975), while Moldavia has the lowest ratio (-15.61%) in the seventh period (1991–1996). As to the financial development variable, the lowest value in the sample corresponds to Rwanda, whose financial deepening in the first period (1961–1965) is 0.38%. On the other hand, the maximum value corresponds to Iceland (218.0%) in the tenth period (2006–2010). In the case of the initial GDP per capita variable, the lowest level pertains to Mozambique in 1986 (130 US$ 2010), while the maximum one is that of Norway (89,912 US$ 2010). In turn, Mali has the lowest value for the education variable (average of 0.13 years of schooling in the first period); while the United States exhibits the maximum level (average of 13.1 years of schooling in the tenth period). For the inflation variable, the maximum ratio corresponds to Nicaragua (4,811% in the years 1986–1990), and the minimum one recorded is that of Hong Kong (-1.35% in the years 2001–2005). Finally, Hong Kong posts the maximum ratio of imports and exports as a percentage of GDP, 426% in the tenth period; while South Korea has the lowest one, 7% in the first period.

[1] To clarify, this measure takes into account loans granted by the formal financial system.

Table 1

Descriptive statistics, 99 countries, 1961–2010.

Variable	No. Observations	Mean	Std. Dev.	Minimum	Maximum
GDP per capita growth	842	2.37	2.98	-15.61	15.84
Private credit	858	3.35	0.91	-0.97	5.38
Initial GDP per capita	834	8.41	1.49	4.87	11.41
Average years of schooling	990	1.51	0.81	-2.04	2.57
Inflation	829	0.14	0.35	-0.01	3.89
Openness to trade	830	3.96	0.70	1.91	6.05

Note: The data sources and the specification of each variable are detailed in Table A.1 in the Appendix A.

Table 2

Correlations, 99 countries, 1961–2010.

	GDP per capita growth	Private credit	Initial GDP per capita	Average years of schooling	Inflation	Openness to trade
GDP per capita growth	1.00					
Private credit	0.09	1.00				
Initial GDP per capita	-0.01	0.69	1.00			
Average years of schooling	0.03	0.56	0.73	1.00		
Inflation	-0.34	-0.26	-0.09	-0.00	1.00	
Openness to trade	0.04	0.20	0.05	0.12	-0.17	1.00

Source: Compiled by author.

Table 2 shows the correlations between variables for the sample of 99 countries.

The financial development, level of education, and openness to trade variables are correlated positively with economic growth, while initial GDP per capita and inflation present a negative sign. It is worth noting the high negative correlation between inflation and economic growth, which attests to the significant real effects of hyper-inflationary processes.

3. Methodology

This study replicates Beck et al. (2000) using generalized method of moments (GMM). Application of this method is recommended when the independent variables are not strictly exogenous, and there is over-identification (Roodman, 2006).

The following equation is taken as a starting point:[2]

$$y_{it} = \alpha + \beta * f_{it} + \gamma * c_{it} + \mu_i + \varepsilon_{it}, \tag{1}$$

where γ is the real GDP per capita growth rate per year, f is the financial development variable, c is the vector of other explanatory variables, μ is a vector of fixed effects and ε is the residue.

[2]The explanation of the estimation method is based, primarily, on that proposed by Gantman and Dabós (2012).

Given the possible correlation between μ and the explanatory variables, which would lead to biases in the estimations, the fixed effects must be eliminated by applying first differences:

$$y_{it} - y_{it-1} = \alpha + \beta(f_{it} - f_{it-1}) + \gamma(c_{it} - c_{it-1}) + (\varepsilon_{it} - \varepsilon_{it-1}). \tag{2}$$

Estimation of this equation using GMM is known as *GMM in differences*. It uses the lags of the explanatory variables in levels as instruments; that is, a *weak* type of endogeneity is assumed. This assumption implies that the regressors may be affected by present or past realizations of the economic growth rate, but they cannot be correlated to the future realizations of the error (Beck et al., 2000). That is,

$$E[f_{it-s}(\varepsilon_{it} - \varepsilon_{it-1})] = 0 \qquad \text{para} \quad t = 3, \ldots, T\,; s \geq 2, \tag{3}$$

$$E[c_{it-s}(\varepsilon_{it} - \varepsilon_{it-1})] = 0 \qquad \text{para} \quad t = 3, \ldots, T\,; s \geq 2. \tag{4}$$

Although *GMM in differences* allows eliminating the fixed effects, if the explanatory variables are persistent, the lags are weak instruments (Blundell and Bond, 1995). Likewise, first-differencing result in data loss, so Arellano and Bover (1995) incorporate a *GMM system* estimator into the analysis. The equation in differences is estimated with lagged regressors, while the equation in levels is estimated with lags of the differentiated variables.[3] Thus, the conditional moments are as follows:

$$E[(f_{it-s} - f_{it-s-1})(\varepsilon_{it} + \mu_i)] = 0 \qquad \text{para} \quad t = 3, \ldots, T\,; s = 1, \tag{5}$$

$$E[(c_{it-s} - c_{it-s-1})(\varepsilon_{it} + \mu_i)] = 0 \qquad \text{para} \quad t = 3, \ldots, T\,; s = 1. \tag{6}$$

Because the consistency of the estimators is based on the validity of the instruments and the no autocorrelation assumption, the Hansen and the error autocorrelation tests are verified.

4. Results

The results are shown in Table 3. Column (1) shows the results obtained by Beck et al. (2000). As can be observed, the effect of financial development on economic growth is positive and statistically significant. The estimations in columns (2), (3) and (4) are performed using the same data treatment and estimation method, but by modifying the sample of countries and/or period of analysis.[4]

Thus, column (2) shows the results of replicating the study of Beck et al. (2000). Even though the same database is used, data is missing for some countries, so the estimation only takes into account 62 countries out of the 77 referred to by the authors. The coefficient of private credit is similar to that obtained in their study and statistically significant at 10%. The other variables present the expected sign; however, only the level of education and black market

[3] Given that the lags in the variables in levels are used as instruments for the equation in differences, only the most recent lag is used as an instrument (Arellano and Bover, 1995).

[4] To make the estimations comparable, a paper by Arellano and Bond (1998), which details the commands utilized in the Gauss program, is employed.

Table 3
Results.

Variables	(1) Beck et al. (2000)	(2) Replication Beck et al. (2000) (1961–1995)	(3) Extended replication Beck et al. (2000) (1961–2010)	(4) Results 99 countries (1961–2010)
Private credit	1.443***	1.439*	0.336	0.368
Initial GDP per capita	-0.496***	-0.337	-0.286	-0.516
Avg. years of schooling	0.950***	1.460**	1.738***	1.471**
Inflation	0.181	-0.444	-1.934**	-4.098***
Openness to trade	1.311***	0.770	-0.166	0.811
Government size	-1.445***	-1.712	-1.071	
Black market premium	-1.192***	-1.313**		
Constant	0.082	2.416	6.567*	2.663
AR(2) test (p-value)	0.80	0.71	0.25	0.06
Hansen test (p-value)	0.51	0.71	1.00	0.12
Observations	365	291	490	664
Countries	77	62	64	99

Note: The null hypothesis of the Hansen test is that the instruments are not correlated with the residues. The null hypothesis of the AR(2) test is that there is no autocorrelation in the error. Time dummies are not reported. *** p<0.01, ** p<0.05, * p<0.1.

premium variables are statistically significant. The model satisfies the associated tests. For its part, the estimation in column (3) seeks to determine the effect of financial development when the countries sample used by Beck et al. (2000) is held constant, but the period is extended to 1961–2010.[5] As a result, private credit becomes not statistically significant. The other variables present the expected sign, except the openness to trade indicator, but only education and inflation are statistically significant. However, the Hansen test indicates that the estimation is affected by the increase in instruments, a consequence of extending the period without increasing the number of countries. Therefore, in column (4), the sample is expanded to 99 countries evaluated over the period 1961–2010.[6] The financial development variable remains non-significant, similar to the result obtained by Gantman and Dabós (2012).

Sensitivity Analysis

Table 4 shows the sensitivity of the results obtained in column (4) in Table 3. If countries with high economic growth rates are excluded, financial development variable remains non-significant.[7] The result is the same if countries with negative growth rates,[8] countries that could be considered outliers,[9] the 25 countries with the highest financial deepening, or outlier observations of inflation

[5]The black market premium variable is discarded due to data availability.

[6]In turn, the government size variable is also excluded for similar reasons.

[7]China, Armenia, and Kazakhstan are the countries excluded, with average growth rates greater than 6% (9.7%, 8.5%, and 7.6%, respectively), over the period 1961–2010.

[8]Gabon, Togo, and Brunei are the countries excluded, with average growth rates of -1.1%, -0.8% and -0.3%, respectively.

[9]With the aid of scatter plots, Norway (high real GDP per capita); Serbia, Turkey and Venezuela (average inflation rates of 24.3%, 22.2% and 21.7%, respectively, the median being 4%); and Hong Kong and Singapore

Table 4

Results following changes to the sample.

Variables	(1) Results 99 countries (1961–2010)	(2) Without countries growth> 6%	(3) Without countries growth< 0%	(4) Without "atypical" countries	(5) Without upper FD quartile	(6) Without outlier obs. of inflation
Private credit	0.368	0.549	0.188	0.467	0.458	0.211
Initial GDP per capita	-0.516	-0.148	-0.628	-0.487	0.199	-0.658
Avg. years of schooling	1.471**	0.850	1.714**	1.187*	0.410	1.999**
Inflation	-4.098***	-2.458**	-4.249***	-4.025***	-3.367**	-5.063**
Openness to trade	0.811	1.190*	0.905	0.0352	0.141	1.583**
Constant	2.663	-1.834	3.528	5.411	-0.222	1.118
AR(2) test (p-value)	0.06	0.08	0.02	0.08	0.1	0.07
Hansen test (p-value)	0.12	0.11	0.15	0.21	0.67	0.11
Observations	664	651	645	627	482	639
Countries	99	96	96	93	74	99

Note: The null hypothesis of the Hansen test is that the instruments are not correlated with the residues. The null hypothesis of the AR(2) test is that there is no autocorrelation in the error. Time dummies are not reported. *** p<0.01, ** p<0.05, * p<0.1.

(rates higher than 150%)[10] are excluded.

Differentiated Effects of Financial Development on Economic Growth

This section will further the analysis and determine the variables that influence the impact of financial development (FD) on economic growth. First, if a study by level of income per capita is included, using dummies that multiply the FD indicator,[11] the results in Table 5 are obtained.[12] As can be seen, if high-income countries are the reference group, the effect of FD is positive and statistically significant at 5%. That is, financial development has a significant positive effect on high-income countries. On the other hand, the coefficients of the interactive dummies are statistically significant at 1%. This result indicates that there are significant differences in the effect of financial development if the level of income per capita is taken into account. The negative signs imply that non-high-income countries benefit less from financial development. Moreover, the growing magnitude of the coefficients shows that the lower a country's income per capita, the less it benefits from financial development. The estimation satisfies the associated tests.

Given the base result, the question arises as to whether there are variables other than level of income per capita that play a crucial role in the impact of financial development on economic growth. For example, it may be the case that countries with lower income per capita benefit less from financial development only if they also present a low level of education. To this end,

(openness to trade equal to 397% and 353%, respectively, the median being 71%) are identified as the outlier countries.

[10] Fourteen observations are identified with the histogram of the variable.

[11] The coefficients associated with interactive dummies indicate how the effect of financial development differs across groups. For a more detailed explanation, see Williams (2015).

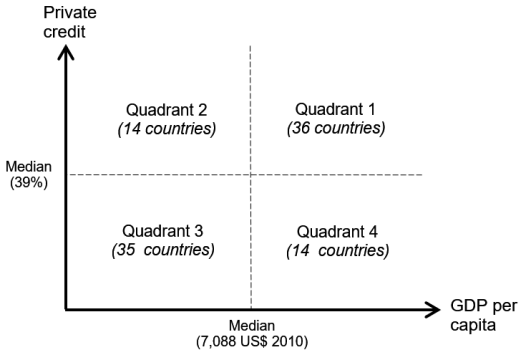
[12] The World Bank categorization of countries as high-income, medium-high income, medium-low income, and low-income is employed.

Table 5

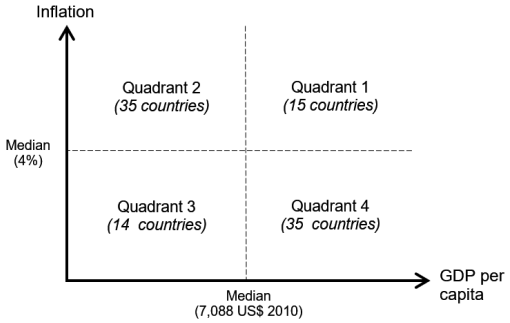
Results by level of income per capita.

Variables	Results with dummies by income levels
FD	1.983**
FD * Dummy 2 (medium-high income countries)	-1.111***
FD * Dummy 3 (medium-low income countries)	-2.539***
FD * Dummy 4 (low-income countries)	-4.393***
Initial GDP per capita	-3.665***
Avg. years of schooling	0.614
Inflation	-4.152***
Openness to trade	-0.302
Constant	31.18***
AR(2) test (p-value)	0.06
Hansen test (p-value)	0.17
Observations	664
Countries	99

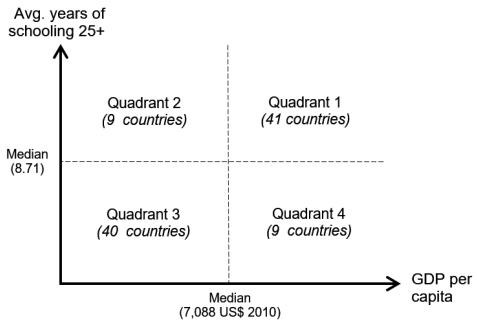
Note: The null hypothesis of the Hansen test is that the instruments are not correlated with the residues. The null hypothesis of the AR(2) test is that there is no autocorrelation in the error. Time dummies are not reported. *** p<0.01, ** p<0.05, * p<0.1.



(a) Financial deepening vs. GDP per capita.



(b) Inflation vs. GDP per capita.



(c) Level of education vs. GDP per capita.

Note: With averaged information for the period 2000–2010. Compiled by author.

Figure 1. Sample composition by financial deepening, inflation and level of education vs. GDP per capita.

the sample of 99 countries is divided, as shown in Figure 1, considering their level of financial deepening, inflation, level of education, and GDP per capita. For instance, quadrant 1 in Figure 1a includes the 36 countries whose GDP per capita and financial deepening over the last ten years is greater than the median of the sample.

Table 6 shows the results when interactive dummies by quadrants of Figure 1a are included in the regression. If the reference group are countries with GDP per capita and financial deepening above the median, there is a positive but non-significant effect for this group of countries. Only the coefficients associated with quadrants 2 and 3 are negative and statistically significant. This result implies that, without taking into account the level of financial deepening, financial development will have a lesser effect if the country has a lower GDP per capita. However, because the dummy coefficient of quadrant 3 is more negative, it can be inferred that if a country presents a lower GDP per capita as well as low financial deepening, it will benefit less from financial development.

Table 6

Results by quadrants of Figure 1a — Financial deepening and GDP per capita.

Variables	Results with dummies by quadrants of Figure 1a
FD	0.703
FD * Dummy quadrant 2	-0.598*
FD * Dummy quadrant 3	-0.838**
FD * Dummy quadrant 4	0.0926
Initial GDP per capita	-1.800***
Avg. years of schooling	1.831***
Inflation	-4.063***
Openness to trade	0.632
Constant	13.32***
AR(2) test (p-value)	0.06
Hansen test (p-value)	0.09
Observations	664
Countries	99

Note: Estimation base category = countries with high FD and high GDP per capita. Definition of dummies: quadrant 2 = countries with high FD and low GDP per capita; quadrant 3 = countries with low FD and low GDP per capita; quadrant 4 = countries with low FD and high GDP per capita. The null hypothesis of the Hansen test is that the instruments are not correlated with the residues. The null hypothesis of the AR(2) test is that there is no autocorrelation in the error. Time dummies are not reported.
*** p<0.01, ** p<0.05, * p<0.1.

Table 7 shows the results by including interactive dummies by quadrants of Figure 1b. If the base category is countries with GDP per capita above the median as well as low inflation, financial development will have a positive but non-significant effect for this group of countries. Coefficient of the dummy associated with the countries in quadrant 3 is negative and statistically significant. It is inferred that, even with low inflation, countries with low GDP per capita benefit less from financial development than the reference countries. However, the coefficient of quadrant 2 is more negative. This result indicates that the effect of financial development will be much less if the country presents not only low income per capita but also high inflation.

Table 7

Results by quadrants of Figure 1b — Inflation and GDP per capita.

Variables	Results with dummies by quadrants of Figure 1b
FD	0.737
FD * Dummy quadrant 3	-0.627*
FD * Dummy quadrant 2	-0.648**
FD * Dummy quadrant 1	0.112
Initial GDP per capita	-1.707***
Avg. years of schooling	1.849***
Inflation	-4.106***
Openness to trade	0.518
Constant	12.70***
AR(2) test (p-value)	0.06
Hansen test (p-value)	0.10
Observations	664
Countries	99

Note: Estimation base category = countries with low inflation and high GDP per capita. Definition of dummies: quadrant 3 = countries with low inflation and low GDP per capita; quadrant 2 = countries with high inflation and low GDP per capita; quadrant 1 = countries with high inflation and high GDP per capita. The null hypothesis of the Hansen test is that the instruments are not correlated with the residues. The null hypothesis of the AR(2) test is that there is no autocorrelation in the error. Time dummies are not reported. *** p<0.01, ** p<0.05, * p<0.1.

Table 8

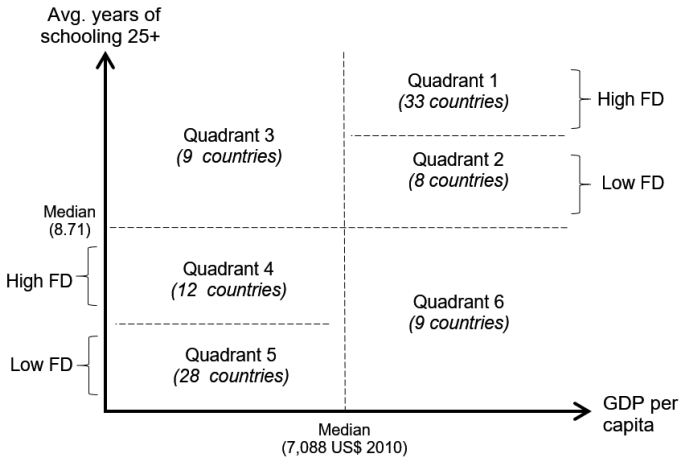
Results by quadrants of Figure 1c — Level of education and GDP per capita.

Variables	Results with dummies by quadrants of Figure 1c
FD	1.073*
FD * Dummy quadrant 2	-0.590*
FD * Dummy quadrant 3	-0.890***
FD * Dummy quadrant 4	-0.136
Initial GDP per capita	-1.859***
Avg. years of schooling	1.241
Inflation	-4.146***
Openness to trade	-0.0740
Constant	16.17***
AR(2) test (p-value)	0.06
Hansen test (p-value)	0.13
Observarions	664
Countries	99

Note: Estimation base category = countries with high level of education and high GDP per capita. Definition of dummies: quadrant 2 = countries with high level of education and low GDP per capita; quadrant 3 = countries with low level of education and low GDP per capita; quadrant 4 = countries with low level of education and high GDP per capita. The null hypothesis of the Hansen test is that the instruments are not correlated with the residues. The null hypothesis of the AR(2) test is that there is no autocorrelation in the error. Time dummies are not reported. *** p<0.01, ** p<0.05, * p<0.1.

Table 8 shows the results when interactive dummies by quadrants of Figure 1c are generated. If the reference group is countries with GDP per capita and level of education above the median, the coefficient of the FD variable is positive and statistically significant at 10%. This result implies that financial development has a positive effect in countries with higher GDP per capita and higher level of education. The coefficients corresponding to quadrants 2 and 3 are negative and statistically significant, the latter being the most negative. That is, a country with lower income per capita benefits much less from financial development, if, moreover, its level of education is deficient.

What happens if the analysis takes into account not only GDP per capita and the level of education but also the level of financial deepening? Figure 2 shows how the sample is divided.[13] If again, interactive dummies by quadrant are included, the results shown in Table 9 are obtained. Considering the group of countries in quadrant 1 as the base category, the coefficient of the FD variable is positive and statistically significant at 10%. That is, financial development has a positive and statistically significant impact on countries with higher income, higher level of education, and higher financial deepening. Interactive dummy of quadrant 2 is non-significant. This result implies that, for countries with higher income and higher level of education, the degree of financial deepening doesn't play a significant role in the impact of FD on economic growth. Interestingly, the same is not the case if the country has income below the median of the sample, as the coefficients of the dummies of quadrants 4 and 5 are negative and statistically significant. Since the coefficient of quadrant 5 is more negative, it can be concluded that if a country has a low level of education, low income per capita and low financial deepening, it will benefit much less from financial development.



Note: With averaged information for the period 2000–2010. The threshold for determining a high or low level of FD is the median financial deepening of the sample countries (39%).
Source: Compiled by author.

Figure 2. Sample composition by education level, financial deepening and GDP per capita.

[13]For full details of the countries in each quadrant of Figure 2, see Table 2 in the appendix of the thesis from which this paper is adapted (http://tesis.pucp.edu.pe/repositorio/handle/20.500.12404/8971).

Table 9

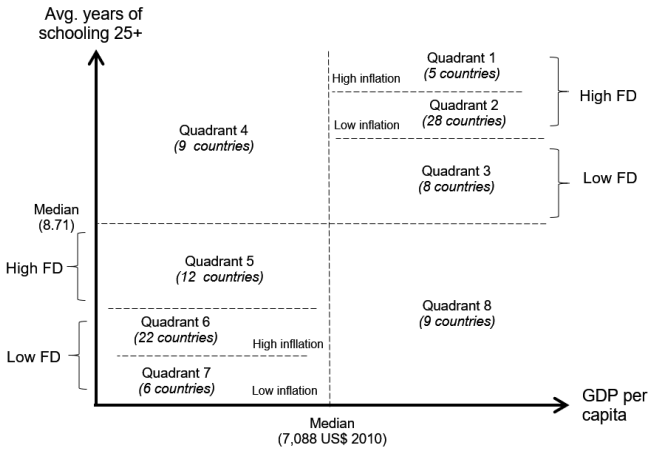
Results by quadrants of Figure 2 — Level of education, financial deepening and GDP per capita.

Variables	Results with dummies by quadrants of Figure 2
FD	1.057*
FD * Dummy quadrant 2	0.142
FD * Dummy quadrant 3	-0.623*
FD * Dummy quadrant 4	-0.752**
FD * Dummy quadrant 5	-1.260***
FD * Dummy quadrant 6	-0.213
Initial GDP per capita	-1.922***
Avg. years of schooling	0.790
Inflation	-4.240***
Openness to trade	-0.357
Constant	18.47***
AR(2) test (p-value)	0.07
Hansen test (p-value)	0.12
Observations	664
Countries	99

Note: Estimation base category = countries with high FD, high level of education and high GDP per capita. Definition of dummies: quadrant 2 = countries with low FD, high level of education and high GDP per capita; quadrant 3 = countries with high level of education and low GDP per capita; quadrant 4 = countries with high FD, low level of education and low GDP per capita; quadrant 5 = countries with low FD, low level of education and low GDP per capita; quadrant 6 = countries with low level of education and high GDP per capita. The null hypothesis of the Hansen test is that the instruments are not correlated with the residues. The null hypothesis of the AR(2) test is that there is no autocorrelation in the error. Time dummies are not reported. *** p<0.01, ** p<0.05, * p<0.1.

Finally, what happens if the average inflation rate over the last ten years is included in the analysis? Figure 3 shows how the sample is divided.[14] If again, interactive dummies by quadrant are included, the results shown in Table 10 are obtained. The effect of FD is positive and statistically significant at 10% in the countries of quadrant 2, the reference group. Dummies of quadrants 5, 6, and 7 also prove statistically significant. Specifically, the coefficients of quadrants 6 and 7 are negative, such that, without taking into account their inflation, countries with low GDP per capita, low level of education and low financial deepening benefit much less from financial development. Against expectations, the coefficient is more negative in countries with low inflation. That is, a low inflation rate does not lead to greater gains in the impact of financial development on the economy if the other sectors are deficient.

[14]For full details of the countries in each quadrant of Figure 3, see Table 2 in the appendix corresponding to the thesis from which this paper is adapted (http://tesis.pucp.edu.pe/repositorio/handle/20.500.12404/8971).



Note: With averaged information for the period 2000–2010. The threshold for determining a high or low level of FD is the median financial deepening of the sample countries (39%). The threshold for determining high or low inflation is 4%, the median of the sample. *Source*: Compiled by author.

Figure 3. Sample composition by level of education, financial deepening, inflation and GDP per capita.

Table 10

Results by quadrants of Figure 3 — Level of education, financial deepening inflation and GDP per capita.

Variables	Results with dummies by quadrants of Figure 3
FD	1.096*
FD * Dummy quadrant 1	0.185
FD * Dummy quadrant 3	0.219
FD * Dummy quadrant 4	-0.569
FD * Dummy quadrant 5	-0.757**
FD * Dummy quadrant 6	-1.124**
FD * Dummy quadrant 7	-1.911***
FD * Dummy quadrant 8	-0.209
Initial GDP per capita	-1.859***
Avg. years of schooling	0.464
Inflation	-4.355***
Openness to trade	-0.416
Constant	18.37***
AR(2) test (p-value)	0.07
Hansen test (p-value)	0.11
Observations	664
Countries	99

Note: Estimation base category = countries with low inflation, high FD, high level of education and high GDP per capita. Definition of dummies: quadrant 1 = countries with high inflation, high FD, high level of education and high GDP per capita; quadrant 3 = countries with low FD, high level of education and high GDP per capita; quadrant 4 = countries with high level of education and low GDP per capita; quadrant 5 = countries with high FD, low level of education and low GDP per capita; quadrant 6 = countries with high inflation, low FD, low level of education and low GDP per capita; quadrant 7 = countries with low inflation, low FD, low level of education and low GDP per capita; quadrant 8 = countries with low level of education and high GDP per capita. The null hypothesis of the Hansen test is that the instruments are not correlated with the residues. The null hypothesis of the AR(2) test is that there is no autocorrelation in the error. Time dummies are not reported. *** p<0.01, ** p<0.05, * p<0.1.

5. Conclusions

The objective of this study was to evaluate the effect of financial development on economic growth. First, with a sample of 99 countries and a period of analysis from 1961 to 2010, the impact of financial development on economic growth is positive but not statistically significant. The non-significance is robust to modifications in the sample. As such, it is concluded that the results obtained by Beck et al. (2000) are sensitive to the sample. Some facts explain this result.

On the one hand, this study incorporates periods of macroeconomic instability and financial crises. Although Loayza and Ranciere (2005) note the importance of distinguishing between the short- and long-run effects of financial crises, the literature shows that such ones cause system fragility. This aspect of crises ends up affecting the relationship between the financial system and the real sector (Rousseau and Wachtel, 2009); therefore, there is an impact in the long run (Reinhart and Rogoff, 2009). On the other hand, the analysis considers periods that include processes of financial liberalization pursued in various countries that lacked the necessary institutional base. According to Rousseau and Wachtel (2009), without the required legal and regulatory institutions, policies that promote an increase in credit end up altering the structural relationship between finances and growth. Thereby, credit booms can be triggered, which not necessarily mean financial development.

Second, this study concludes that the level of income per capita of a country plays a crucial role in the effect of financial development on economic growth. High-income countries benefit the most from financial development. The impact of financial development is comparatively lower when the country has a lower income per capita. This result is explained by the fact that, in general, countries with higher income per capita have solid economic determinants, enabling better capital allocation. Their institutional base provides more incentives for investing in innovation, which influences technological change and, thus, the economic growth of those countries.

Third, the impact of financial development on economic growth is also influenced by the level of income per capita, the level of education, and the degree of financial deepening. The study reaches three main conclusions.

First, the level of education influences the effect of financial development across all sample countries: countries with higher income per capita and a higher level of education benefit most from financial development; on the other hand, lower income countries with lower levels of education benefit the least. This result attests to the importance of the level of education as an economic determinant that allows productivity gains, even in the financial sector.

Second, the level of financial deepening influences the effect of financial development, primarily in lower income countries. Specifically, low-income countries that also have smaller financial sector are those who benefit the least from financial development. Instead, countries with higher income per capita benefit from financial development even if their financial deepening has been low over the last ten years. This result motivates the evaluation of a non-monotonic relationship between finance and growth, an aspect pointed out by Arcand et al. (2011) and highlights the importance of a higher financial deepening in developing countries to take more advantage of

financial development.

Third, inflation affects the impact of financial development, mainly in lower income countries. Financial and economic fragility that characterizes some of these countries explain this result.

Therefore, the relationship between financial development and economic growth needs a more in-depth analysis that incorporates country specific characteristics in order to implement suitable policies for each country.

Appendix A

Table A.1

Model variables: definition and source.

Variables	Specification	Source
GDP per capita growth	$\left(\frac{\text{Real GDP per capita}_t}{\text{Real GDP per capita}_{t-1}} - 1\right) x\,100$	World Development Indicators
Private credit	$\ln(\text{private credit (\% GDP)}\, x\, 100)$	Global Financial Development Database
Initial GDP per capita	$\ln(\text{initial real GDP per capita})$	World Development Indicators
Average years of schooling	$\ln(\text{avg. years of schooling of the population aged 25 and older})$	Barro and Lee (2013)
Inflation	$\ln(\text{inflation rate} + 1)$	World Development Indicators
Openness to trade	$\ln(\text{imports} + \text{exports (\% GDP)}\, x\, 100))$	World Development Indicators
Government size	$\ln(\text{general government consumption expenditure (\% GDP)}\, x\, 100)$	World Development Indicators
Black market premium	$\ln\left(\frac{\text{parallel exchange rate} - \text{official exchange rate}}{\text{official exchange rate}} + 1\right)$	World's Currency Yearbook; Wood (1988)

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