Puzzles in financial development and economic growth

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January 2009

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Abstract

This paper aims to contribute to the empirical literature on the impact of financial development upon economic growth by testing the robustness of two puzzles documented in a number of recent papers (Atje and Jovanovic, 1993, Beck and Levine, 2004, Favara, 2003, Loayza and Rancière, 2006, Saci et al., 2009). One puzzling finding in the literature is related to the positive impact of private credit upon economic growth in the long-run, combined with a negative impact in the short-run. The second puzzle arises with the inclusion of stock market related variables for which there is a positive and significant impact irrespective of the time horizon.

This paper uses, to the best of the authors' knowledge, the most updated (1970-2006) and comprehensive balanced cross sectional dataset for a number of bank and stock market related variables involving least developed (LDCs) and other countries. Finally, we compare the results for short run and long run estimation with and without inclusion of countries at low level of financial intermediaries and economic development.

The paper uses recent developments in panel data analysis, including panel unit root tests, for a sample of 121 countries that includes 28 LDCs.

Our results, on the one hand, provide further evidence of a negative effect of private credit upon economic growth in the short-run (annual data). However, unlike previous contributions, we were unable to provide evidence of a strong positive relationship between private credit and economic growth in the long-run, somehow, reinforcing the first puzzle.

On the other hand, we were able to provide some evidence to mitigate the second puzzle related to the positive and significant impact of stock markets. Our results suggest that the impact of stock markets is highly dependent on the variables chosen to explain stock market development, the method of estimation and the possible role of self-selection bias.

JEL codes: C2 - Econometric Methods: Single Equation Models; C23 - Models with Panel Data; O1 – Economic Development; O16 - Financial Markets, Saving and Capital Investment

Key words: Financial development, panel data, least developed countries, economic growth

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1. Introduction

Despite the description by Rousseau and Wachtel (2002) of the robustness of the cross-sectional relationship between the size of a country's financial sector and its rate of economic growth as a "well established fact", the evidence on the impact of finance upon economic growth has been mixed and remained a debated subject.

Favara (2003) argues that the conventional positive interpretation of financial development and economic growth is based on average effects that are difficult to interpret.

In an extensive review of theoretical and empirical work on the relationship between financial development and economic growth Levine (2005) concluded:

> Theory and empirical evidence make it difficult to conclude that the financial system merely - and automatically - responds to economic activity, or that financial development is an inconsequential addendum to the process of economic growth.

Moreover, an increasing number of recent contributions (Atje and Jovanovic, 1993, Beck and Levine, 2004, Favara, 2003, Loayza and Rancière, 2006, Saci et al., 2009) have provided evidence (for a variety of sample periods, sample of countries and techniques) in favour of a negative (and significant) impact of banking activity upon economic growth in the short-term, although the impact becomes positive and significant in the long run.

This puzzling finding has also been accompanied by another one. In papers that also included a variable related to the development of stock markets, the above mentioned negative impact of the banking sector upon economic growth is usually accompanied by a positive and significant impact of the stock markets' variables upon economic growth. Tests for joint-significance, such as the Wald test, nonetheless usually support the view that stock and bank development variables together are important for economic growth (Beck and Levine, 2004, p.431). Given the fact that commercial banks are usually set up before stock markets as we will show in this paper and given the usually stringent rules applied by stock markets to select the companies allowed to issue shares, the two above mentioned puzzles are in need of further research. If they were proven to be robust, they may lead to a rather different set of policy prescriptions, in particular for developing countries.

This paper aims to provide further empirical evidence by investigating the above mentioned two puzzles in the finance and economic growth relationship. To do so, we use the latest developments of panel data analysis (panel unit root tests, and tests for deciding the optimal method among pooled least squares, fixed and random-effects) and what we believe to be the most up-to-date and comprehensive date sets currently available.

In the case of the puzzle of the positive relationship between stock markets and economic growth, we test whether such positive result could arise from self-selection bias (i.e., when only countries with functioning stock markets throughout the entire sample period are included in the study). To circumvent this possible bias, we have

created an ad-hoc sub-sample containing countries (almost by definition less developed countries that have established markets very recently) for which we have firm knowledge of the date of establishment of stock markets. In these cases, for all periods in which there was no stock exchange, the variable related to stock market development is awarded a zero, rather than simply a “Not Available” entry.

Furthermore, to complement the above tests, we will also focus on the relationship between finance and economic growth in the context of a sample of LDCs.

The remainder of the paper is organised as follows. Section 2 briefly reviews the most recent and relevant contributions regarding the two puzzles, while Section 3 presents the data and variables. Section 4 is on methodology and results and finally Section 5 concludes.

2. Literature Review

Beck and Levine (2004) initially constructed a panel with data averaged over five-year intervals over the period 1986-1998 for 40 countries. The averaging was aimed at removing the effect of the business cycle. The authors found that both financial markets and banks did indeed play a positive and significant role in influencing economic growth, even when selected control variables were added to the model.

However, the relationship between financial variables and economic growth broke down, in particular for the banking variable when using annual data (Beck and Levine, 2004, p.439). They tentatively suggested that this was due to “credit surges” that had also been found to be good predictors of banking crises and subsequent economic slowdowns.

In a recent paper, Loayza and Rancière (2006) empirically investigated and provided supportive evidence to this apparent puzzle and put forward a number of possible explanations backed up by some empirical evidence.

First, they empirically proved that the relationship between financial variables and economic growth is significant and positive in the long-run by means of a model with domestic credit by banks and other financial institutions as a percentage of GDP as their financial development variable and a number of other well established control variables. The technique they have used is a panel error-correction model that allows the estimation of both short and long-run effects from a general autoregressive distributed lags (ARDL) model.

Their sample consisted of annual data with 75 countries over the period 1960-2000. The dependent variable is rate of growth of GDP per capita, while the control variables (always included) are government consumption to GDP, volume of trade over GDP, inflation rate and initial GDP per capita. However, they incorporated only domestic credit by banks and other financial institutions as a percentage of GDP as a financial variable ignoring the stock market.

Unlike Beck and Levine (2004), Loayza and Rancière (2006) do not average the data but they estimate both short- and long-run effects using a data field composed of a relatively large sample of countries and annual observations. They suggest that

averaging hides the dynamic relationship between financial intermediation and economic activity.

Loayza and Rancière (2006) suggest that the puzzle may be explained by the effect of financial liberalisation. Another explanation also suggested by Dell'Ariccia and Marquez (2006) and Rajan (1994) is that credit expansions tend to be pro-cyclical (i.e., rates of growth in GDP tends to induce a high rate of growth in credit). Usually, if in the "good times" banks relax their criteria and lend to both good and bad projects, then when the "bad times" arrive most loans become non-performing and the source of credit dries up, rationing out even good projects.[1]

Favara (2003) found a strong relationship between domestic credit by banks and other financial institutions as a percentage of GDP and economic growth after controlling for the effect of inflation, government consumption to GDP, initial GDP per capita, domestic investment to GDP, average years of school of the population aged 15 and over, trade openness to GDP, black market premium and dummy legal origin variables. The sample consisted of 85 countries for the period 1960-1998. However, this strong relationship weakens when an instrumental variable, (IV) estimation, method is applied with dummy variables of the origins of the legal system of each country used as instruments.

When moving to annual data, the effect of domestic credit by banks and other financial institutions as a percentage of GDP is negative when real domestic investment as share of real per capita GDP is included. But it is still positive without the real domestic investment. However, no variables capturing the effect of financial markets were included.

Saci et al. (2009) estimated the relationship for 30 developing countries with annual data over the period 1988-2001 applying two-step GMM. They found that the variable domestic credit by banks and other financial institutions as a percentage of GDP has a significantly negative coefficient with stock market traded value over GDP. When stock market traded value over GDP is replaced by, stock market turnover ratio, the effect of domestic credit by banks and other financial institutions as a percentage of GDP became insignificant. However, in each case the effect of the stock market variables on growth is positive and significant.

3. Data and Variables

The original sources of the data used in this paper are from The World Bank, IMF and UN. We have downloaded data for many of the variables using *Beyond 20/20 Web Data Server* of ESDS International[2].

[1] Database of banking crises can be found at :http://www1.worldbank.org/finance/html/database_sfd.html

[2] The Economic and Social Data Service International (ESDS) disseminates and supports both aggregate and survey international datasets for UK FE and HE. The service is jointly run by Mimas at Manchester and the UK Data Archive at Essex – http://esds.ac.uk/international/. We acknowledge the convenience of collecting data of different sources from ESDS International.

Although the "potential universe" of countries in the source dataset is large (e.g. 200 plus countries in the World Development Indicators and IMF for macro data, 225 countries in ED stats of the World Bank for Education related data), continuous and consistent time series for all our variables (in particular the bank and stock market development related and control variables mainly education related) are only available for a smaller sample of countries[3].

The most comprehensive dataset we have covers the period 1970- 2006 and 121 countries. Although we are aware that some papers (Favara, 2003, Loayza and Rancière, 2006) covered periods starting from 1960, after considerable deliberation we have decided to opt for a later start of 1970 to examine the relationship among a wide number of countries at various levels of economic achievements.[4] The list of countries included in our study is provided in Appendix table A2 (28 LDCs) and table A3 (the remaining 93 countries).

Least developed countries were chosen in accordance to four criteria established by the UN. For these LDCs, we have collected the dates of establishment[5] of the first commercial bank, the central bank and the stock exchange. With this knowledge, we would award a zero for any year when either banks[6] or stock markets did not exist. Because data availability of other variables for these 28 LDCs was reasonably good, this has also helped us create a balanced panel for our entire set of 121 countries for our long run analysis. In addition, we believe that we may have avoided a possible problem of self selection bias as we do not include only countries with functioning stock markets.

Data on financial development variables were deflated following the method suggested by Beck et al. (2000a), Beck and Levine (2004) and Favara (2003)[7].

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[3] The most comprehensive dataset also included extremely small countries such as Cayman Island, Channel Island, San Marino (list available in Appendix table A1), for 29 of them there were no data whatsoever. We feel that the exclusion of these countries should not reduce the validity and usefulness of our findings.

[4] Our sample includes 28 LDCs of which 23 are from Africa. 15 of them were declared independent between 1960 to 1970. Only one country (Sudan) was declared independent before 1960 (in 1956). Similarly, many of them had their central bank opened only after 1970.

[5] In the Appendix table A4 we provide name and year of establishment of banks, central banks and stock exchanges of LDCs. We also briefly provide the criteria of UN for classification into LDCs. The main findings* are as follows.

1) 50 % of the LDCs in our sample do not have a stock exchange (only 14 countries have a exchange as of October 2008)
2) the stock exchanges were established after 5 decades (1992 – 1943) of the establishment of banks and nearly 3 decades (1992-1964) of the establishment of central banks, and
3) In no countries the stock exchange was established before the establishment of a bank.

*Details on history of banks, central bank and stock exchange can be provided upon request.

[6] In case of banks, we find that each country had a bank prior to the start year of our sample period (i.e., 1970) so we do not award a zero.

[7] The variables representing financial developments are measured at the end of period and GDP is measured over the period. Therefore the financial development variables are deflated by end-of-period CPI and the GDP flow variables by average CPI. Taking the average of the financial development variable in period t and period t-1 and by relating it to the real flow variable for period t we reduce the problem of miss-measurement (Beck and Levine 2004). Formula used to deflate: {(0.5)*[FD/P_et + FDt-1/P_et-1]}/[GDPt/P_at].

On the variables representing bank's development, Beck et al. (2000c) have used *liquid liabilities*, *commercial to central bank* and *private credit* in their analysis of financial intermediaries' development. The authors follow Goldsmith (1969), McKinnon (1973), King and Levine (1993a), Levine (1997) while using *liquid liabilities* (currency plus demand and interest bearing liabilities of banks and non-bank financial intermediaries divided by GDP). *Liquid liabilities* include deposits by one financial intermediary into another. This may therefore cause the problem of double counting. Similarly, *commercial to central bank* (King and Levine, 1993a, King and Levine, 1993b, Levine, 1997) first used in literature by Kind and Levine (1993a) which is the ratio of commercial bank assets divided by commercial and central bank assets does not account for the effectiveness of banks in researching firms, exerting corporate control, mobilising savings, easing transactions and providing risk management facilities to clients (Beck et al., 2000c). In addition, commercial banks are not the only financial institutions intermediating society's resources (Beck et al., 2007, p.31)

Private credit in the measurement of the finance-growth relationship is a preferred (Beck et al., 2000c) indicator and is therefore used in many literature (Beck and Demirgüç-Kunt, 2008, Beck et al., 2007, Beck et al., 2001, Beck et al., 2000b, Beck et al., 2000c, Edison et al., 2002, Favara, 2003, Levine, 2002, Loayza and Rancière, 2006, Saci et al., 2009). *Private credit* is also most commonly used indicator in this area mainly because 1) it isolates credit issued to the private sector (i.e. does not account for credit issued to governments, government's agencies, and public enterprises), and 2) it excludes credit issued by central bank [as opposed to gross credit used by (King and Levine, 1993a, King and Levine, 1993b) which includes credit issued by monetary authority and government agencies.

Some works (Beck and Levine, 2004, Levine and Zervos, 1998) have used *bank credit (*to private sector*)* instead of *private credit*. Beck and Levine (2004) have mentioned that by reducing the mis-measurement problem of previous studies (by deflating and taking the average of real credit variable and relating it to the real flow variable), *bank credit* is a better variable measuring bank development. However, as noted by the authors themselves (p.428) it does not directly measure the degree to which banks ease information and transaction costs. Similarly, it does not include credits to the private sector by non-deposit money banks.

In the finance and growth relationship, literature do not use or discuss on the impact of Bank credit to all sector as % of GDP (*bank credit all sector*). This is reasonable as credit to private sector should be more powerful in helping economy grow. However, in many countries a significant portion of bank loan is made available to public enterprises. So we test for the estimation using *bank credit all sector* as well.

We experiment with *liquid liabilities, private credit, bank credit, and bank credit all sector*. However, like in other papers, *private credit* will be our key variable representing bank's development[8].

[8] The paper reports and discusses the estimation result for *private credit*. Result of other proxies of financial development can be made available upon request.

Similarly, we experiment and estimate the relationship for all common stock market variables namely *capitalisation, value traded and turnover.* The first is the measure of the size of the market whiles the second and third indicates market liquidity.

Levine & Zervos (1998) and Beck and Levine (2004) show that *capitalisation* is not a good predictor of economic growth. In addition, liquidity is considered more important than the size of the market. Liquid markets provide a ready exit-option for investors. This can foster more efficient resource allocation and faster growth (Beck and Levine, 2004, Bencivenga et al., 1995, Levine, 1991). *Value traded* does not measure the liquidity of the market. Since markets are forward looking, they will anticipate higher economic growth by higher share prices. Since *value traded* is the product of quantity and price, this indicator can rise without an increase in the number of transactions. However, *turnover* does not suffer from this weakness since both numerator and denominator contain the price (Beck and Levine, 2004).

Computationally, *turnover* equals the value of the trading of shares on domestic exchanges divided by total value of listed shares and indicates the trading volume of the stock market relative to its size. *Turnover* will therefore be our preferred stock market variable.

The following section now details on use of various control variables.

Initial GDP per capita

Analysing Maddison (1982)'s data 1870-1973, Baumol (1986) found that the slower rate of productivity growth of a country was associated with its higher level of growth in the past.

Methodologically, beta convergence of the neo-classical approach is obtained by a regression analysis estimating the growth of GDP per capita over a certain period of time in relation to its initial level. If the regression coefficient beta has negative sign it will indicate that the GDP per capita of countries with lower *initial GDP per capita* grow more rapidly than the countries with higher *initial GDP per capita*. So the variable initial GDP per capita should allow to test the degree of validity of the "convergence theory" i.e. a country with an initial high (low) income measured by GDP per capita should experience lower (higher) growth rates since gradual convergence is expected (Rousseau and Wachtel, 2002) Therefore the variable is expected to have a negative sign. A lot of care[9] was taken to compute the variable.

Education (gross enrolment rate secondary is the number of total pupils enrolled in secondary expressed as percentage of population in the theoretical age group for secondary education) has been used as a proxy for human capital investment and is expected to have a positive impact upon growth. The source of the data is UNESCO.

[9] Unlike existing literature that are silent on the definition of *Initial GDP per capita*, we define *initial GDP per capita* as the start year current GDP per capita US $ multiplied by 1+ US inflation of each year. Appendix Figure 1 shows initial and current GDP per capita for few selected developed, developing and least developed countries. We can note that Nigeria and South Korea both had an Initial GDP per capita of less than $ 300 in 1970. But there is a big difference in their current GDP per capita in 2006 at $ 796 and $ 18,340 for Nigeria and South Korea respectively.

They are downloaded using ED Stats Data Query[10] made available by the World Bank.

The variable presents a number of challenges because enrolment in most cases is different from actual active participation to the process of education. Moreover, the variable is pretty stable at around 100% for many developed countries, although some variations in the data can be found for countries at different levels (mainly developing) of income. Many countries have already achieved enrolment rates of 100% over time, in some cases even exceeding 100% due to enrolment of people outside the theoretical age group (gross basis).

However, to be consistent with previous empirical research and because we feel that the variable could still be interpreted as an overall indicator of the commitment towards investments in human capital, the variable is included as another control variable in the regression.

Other control variables used are general government consumption to GDP (*government consumption*), gross capital formation to GDP (*capitalisation*), inflation as change of CPI Index (*inflation*), import and export to GDP (*trade openness*), black market premium made using Black market rate[11] (*black market premium*) data from Bahmani-Oskooee and Tanku (2006) and dummy legal origin variables from La Porta et al. (2007).

The name list of variables used is provided in Appendix table A5. Sources of the data for the variables are available in Appendix table A6.

3. Methodology and results

Although some study has claimed that the panel estimation conceals important cross-country differences and therefore pooling of the data is invalid (Arestis et al., 2005), a majority of the literature until recently (Beck and Demirgüç-Kunt, 2008, Beck and Levine, 2004, Beck et al., 2000b, Beck et al., 2000c, Favara, 2003, Levine, 2002, Levine and Zervos, 1998, Loayza and Rancière, 2006, Rousseau and Wachtel, 2000, Saci et al., 2009) have used panel techniques. It is more of a standard practice now to use panel techniques in growth equations. We therefore apply panel technique for our estimation which apart from its various advantages (e.g. allows both cross section and time series nature of relationship, enables to study complicated behavioural models, minimises the bias) will also enable us to compare our results with the existing works.

Table 1 presents descriptive statistics and correlations.

[10] Ed Stat is the World Bank Education Project database.
[11] The discontinuity of the World Currency Yearbook publication limits the data on black market rate to 1998.

It can be noted that economic growth is more correlated with *private credit*, *capitalisation* and *value traded* for the sample[12].

While *private credit* for LDCs is only about 13% for the period 1970-2006, it is 48% for other developing and developed countries. This gap is very huge in case of stock market variables. *Capitalisation* and *value traded* of LDCs are just over 0.5% with *turnover* at 1%. This is comparatively very high for other countries at 38%, 18% and 41% respectively.

Table 1
Summary Statistics: 1970 - 2006

	Economic Growth	Private credit	Capitalisation	Value traded	Turnover
Descriptive Statistics					
Mean	1.65	0.40	0.29	0.14	0.32
Maximum	13.91	1.47	2.67	1.53	3.68
Minimum*	-2.10	0.04	0.0055	0.0002	0.0100
Std. Deviation	1.93	0.33	0.41	0.27	0.51
Observations	121	121	121	121	121
Correlations					
Economic growth	1				
Private credit	0.240	1			
	0.008				
Capitalisation	0.164	0.789	1		
	0.072	*0.000*			
Value traded	0.140	0.788	0.803	1	
	0.124	*0.000*	*0.000*		
Turnover	0.036	0.296	0.178	0.384	1
	0.692	*0.001*	*0.050*	*0.000*	

p -Values are reported in italics
*Countries with no stock markets were awarded a zero for *capitalisation, value traded* and *turnover*. Therefore zero would automatically be the minimum value. For the sake of comparability with other studies, we have however displayed in the table the minimum value that were available in the original dataset

It is well established that the stationarity of the variables in standard OLS regression can lead to spurious regression (Granger and Newbold, 1974). Therefore it is very important to establish whether variables are stationary or not. It has been suggested that testing for the unit root in panel framework is more powerful compared to performing a separate unit root test for each individual time series (Levin and Lin, 1993). In this paper, we apply the Levin, Li and Chu (LLC test) unit root test for the panel data (Levin et al., 2002), although our conclusions will also be complemented by the finding of other tests.

Appendix table A7 gives the results of the stationarity test[13] for 121 (all countries) and 28 LDCs.

As we can see from the table variables namely *private credit, bank credit, capitalisation* and *value traded* were found to be integrated of order 1 in both 121

[12] In case of stock market variables, our summary statistics differ largely from Beck and Levine (2004). We believe it is so because our sample consists of 28 LDCs whereas Beck and Levine (2004) has only one LDC (Bangladesh) in their sample.
[13] The result of the stationarity test for 93 countries, the order of integration in particular, is same as that of 121 countries and hence is not reported.

and 93 countries. In the list of 28 LDCs, we found *private credit, bank credit, bank credit all sector, capitalisation, value traded*, *capital formation and education integrated of order 1.* Based on the test, these variables will enter the model as first differences, a necessary although not ideal step to be taken.

We now report the results of the estimation using different methods.

The pooled Ordinary least square (POLS) estimates are in line with the results of previous literature while regressing without taking the first difference for I(1) series. However, the result opposes the popular conventional approach of finance and economic growth after estimating with first differenced variable for non-stationary series.

Table 2 gives the result of the POLS regression for data averaged over the 1970 – 2006 with one observation per country for all 121 countries to capture the long-run relationships. (In case of stock market related variables of LDCs, we have awarded a zero value when there was no stock exchange in such countries.)

The dependent variable is *Economic growth* (log difference of real GDP per capita). Each of the three reported regressions controls for logarithms of all five control variables namely *government consumption, capital formation, trade openness, inflation, education* and *initial GDP per capita*. The regressions include *private credit* and *capitalisation, private credit* and *value traded, private credit* and *turnover* in first, second and third regressions respectively. The p-values are provided in italics below the coefficient statistics of each variable.

The results of the POLS estimate do not support the findings of the existing literature on the positive relationship of *private credit* upon *economic growth* in the long run. Our results, if anything, reinforce one of the two puzzles since the coefficient of private credit is negative and strongly significant. The Wald test, however, provides evidence that the bank and market variables, together, are significant and have an overall positive impact, apart from the combination of private credit and market turnover, when the overall impact is significant but negative. The results for the stock market depend on the variable. The relationship is positive and significant for *capitalisation* and *value traded*, but negative for and significant for the variable usually chosen in the literature, namely *turnover*.

Table 2
Growth Effect with Private Credit and Stock Market - Cross-sectional

Method: Pooled Least Squares
Sample: 1970 2006 (mean of 37 years)

Regressors	1	2	3
Constant	-0.0356	-0.0344	-0.0307
	0	*0*	*0*
Private credit (first difference)	-0.0758	-0.0759	-0.0796
(domestic credit to private sector - % of GDP)	*0*	*0*	*0*
Capitalisation (first difference)	1.6010		
(market capitalization of listed companies - % of GDP)	*0.0119*		
Value traded (first difference)		2.2513	
(stocks traded, total value - % of GDP)		*0.0009*	
Turnover			*-0.2700*
(stocks traded, turnover ratio)			*0*
Government consumption	-0.0082	-0.0084	-0.0075
(government final consumption expenditure -% of GDP)	*0*	*0*	*0*
Capital formation	0.2458	0.2446	0.2414
(gross capital formation - % of GDP)	*0*	*0*	*0*
Trade openness	-0.0017	-0.0013	-0.0023
(trade - % of GDP)	*0.0004*	*0.0098*	*0*
Inflation	-0.0101	-0.0091	-0.0120
(inflation, consumer prices - annual %)	*0*	*0*	*0*
Education	0.0050	0.0052	0.0062
(secondary school enrollment - %)	*0*	*0*	*0*
Initial Income	-0.0012	-0.0014	-0.0013
(Initial GDP per capita)	*0.0002*	*0*	*0.0001*
Wald test for joint significance (*p* -Values)	*0*	*0*	*0*
R-square	0.4286	0.4292	0.4318
Countries	121	121	121

Notes:
p- values are reported in Italics

The above estimation for 121 countries includes 28 LDCs. In order to align ourselves to the existing literature [for instance Beck and Levine (2004) included only one LDC – Bangladesh] and to verify if the inclusion of a large numbers of LDCs had any impact on the relationship, we re-estimated the model for 93 non-LDCs. The results of the estimation reported in Appendix table A8 and are consistent with the report in table 2 above.

In order to remove a possible endogeneity of the financial variables, the model was also estimated by two-stage pooled least square (TSLS) for both 121 countries and 93 countries (non-LDCs) separately. As in much of the existing literature, variables capturing the origins of the legal system of the countries were used as instrumental variables alongside lagged values of the explanatory variables. The results reported in table 3 (for 121 countries) and table 4 (for 93 countries) are similar to POLS estimation in table 2[14].

Table 3
Growth Effect with Private Credit and Stock Market - Cross-sectional
Method: Two Stage Least Squares
Sample: 1970 2006 (mean of 37 years)

Regressors	1	2	3
Constant	-0.0326	-0.0316	-0.0279
	0	*0*	*0*
Private credit (first difference)	-0.0770	-0.0763	-0.0802
(domestic credit to private sector - % of GDP)	*0*	*0*	*0*
Capitalisation (first difference)	3.1452		
(market capitalization of listed companies - % of GDP)	*0*		
Value traded (first difference)		2.5249	
(stocks traded, total value - % of GDP)		*0.0003*	
Turnover			*-0.2669*
(stocks traded, turnover ratio)			*0*
Government consumption	-0.0075	-0.0079	-0.0071
(government final consumption expenditure -% of GDP)	*0*	*0*	*0*
Capital formation	0.2479	0.2457	0.2423
(gross capital formation - % of GDP)	*0*	*0*	*0*
Trade openness	-0.0019	-0.0012	-0.0022
(trade - % of GDP)	*0.0001*	*0.0147*	*0*
Inflation	-0.0088	-0.0078	-0.0108
(inflation, consumer prices - annual %)	*0*	*0*	*0*
Education	0.0053	0.0056	0.0066
(secondary school enrollment - %)	*0*	*0*	*0*
Initial Income	-0.0016	-0.0017	-0.0016
(Initial GDP per capita)	*0*	*0*	*0*
Wald test for joint significance (*p*-Values)	*0*	*0*	*0*
R-square	0.4260	0.4275	0.4301
Countries	121	121	121

Notes:
p- values are reported in Italics

[14] In line with existing literature (Beck and Levine 2004, Favara, 2003), we also check upon the results by applying *black market premium* as another control variable. The results (appendix table A9) are the same as in POLS, although the variable *private credit* is now not significant. The sign however is still negative. The preferred variable of the literature *turnover* is now positive and significant. The reason for relegating the results using *black market premium* is due to the fact that data availability is limited to 1998 and the size of our cross sections data is reduced to 88 countries.

Table 4
Growth Effect with Private Credit and Stock Market - Cross-sectional

Method: Two Stage Least Squares
Sample: 1970 2006 (mean of 37 years)

Regressors	1	2	3
Constant	-0.0124	-0.0122	-0.0084
	0.0021	*0.0025*	*0.0307*
Private credit (first difference)	-0.0467	-0.0464	-0.0499
(domestic credit to private sector - % of GDP)	*0*	*0*	*0*
Capitalisation (first difference)	14.4475		
(market capitalization of listed companies - % of GDP)	*0*		
Value traded (first difference)		3.5856	
(stocks traded, total value - % of GDP)		*0.134*	
Turnover			*-0.2677*
(stocks traded, turnover ratio)			*0*
Government consumption	-0.0036	-0.0054	-0.0044
(government final consumption expenditure -% of GDP)	*0.0001*	*0*	*0*
Capital formation	0.2025	0.1929	0.1878
(gross capital formation - % of GDP)	*0*	*0*	*0*
Trade openness	-0.0024	0.0004	-0.0008
(trade - % of GDP)	*0.0001*	*0.4349*	*0.1065*
Inflation	-0.0086	-0.0076	-0.0117
(inflation, consumer prices - annual %)	*0*	*0.0001*	*0*
Education	0.0046	0.0050	0.0057
(secondary school enrollment - %)	*0*	*0*	*0*
Initial Income	-0.0028	-0.0023	-0.0021
(Initial GDP per capita)	*0*	*0*	*0*
Wald test for joint significance (*p* -Values)	*0*	*0*	*0*
R-square	0.1621	0.2753	0.2823
Countries	93	93	93

Notes:
p- values are reported in Italics

To briefly summarise our main findings in the long run, unlike in previous literature, private credit has a robust but negative impact upon economic growth, somehow reinforcing the first puzzle. This is same for both POLS and TSLS estimations. However, the impact of stock markets according to our results is dependent upon the variable used. In the case of *turnover*, the relationship is negative and significant.

To test the existence of the puzzle, we start by conducting the estimation for short run now i.e., using annual data.

Using annual data, as reported in table 5 (for all countries using POLS fixed effects), table 6 (for all countries using GMM, TSLS and POLS fixed effects), and table 7 (POLS fixed effects - LDCs only) the relationship between *private credit* and *economic growth* is always negative, although it is not significant in the case of TSLS. This result is very much in line with the findings of the existing literature. We would also emphasise that the results were obtained after controlling whether the variables were stationary. *Private credit*, *capitalisation* and *value traded* were found to be I(1)

for sample involving all 121 countries (all countries in the sample) and 93 countries (without LDCs) and therefore entered the estimations as first difference.

Moreover, when we estimated our model with panel data analysis we ran the estimation with POLS, fixed and random effects. Based on the redundant likelihood test (to select the best method between pooled and fixed effects) and the Hausman specification test (to select the best method between fixed and random), we were able to choose the fixed effect method both for country and time period as our preferred estimation effect (results of the tests available in Appendix table A10).

Table 5 reports the result of POLS estimation with fixed effect for both country and time period. The estimation is based on 121 countries. However, when the variable *capitalisation* is included the estimation is based on only 120 countries. The country excluded is Solomon Islands, for which there were no data on market capitalisation.

The results show that private credit is always negative and significant, and the variables capturing the development of stock markets are always positive and significant.

Table 5
Growth Effect with Private Credit and Stock Market - Annual Data

Sample (adjusted): 1975 2006	Method: Panel Least Square Fixed Effect - Cross section and time		
Regressors	1	2	3
Constant	0.3133	0.3127	0.3168
	0.1571	*0.1577*	*0.1529*
Private credit (first difference)	-0.0276	-0.0271	-0.0245
(domestic credit to private sector - % of GDP)	*0.0003*	*0.0004*	*0.0012*
Capitalisation (first difference)	1.5163		
(market capitalization of listed companies - % of GDP)	*0.0402*		
Value traded (first difference)		1.9875	
(stocks traded, total value - % of GDP)		*0.0004*	
Turnover			*0.3467*
(stocks traded, turnover ratio)			*0.0731*
Government consumption	-0.0437	-0.0398	-0.0395
(government final consumption expenditure -% of GDP)	*0*	*0*	*0*
Capital formation	0.2378	0.2468	0.2408
(gross capital formation - % of GDP)	*0*	*0*	*0*
Trade openness	0.0324	0.0309	0.0308
(trade - % of GDP)	*0*	*0*	*0*
Inflation	-0.0244	-0.0238	-0.0239
(inflation, consumer prices - annual %)	*0*	*0*	*0*
Education	0.0098	0.0056	0.0058
(secondary school enrollment - %)	*0.1688*	*0.4161*	*0.3917*
Initial Income	-0.0524	-0.0519	-0.0524
(Initial GDP per capita)	*0.0685*	*0.071*	*0.069*
Wald test for joint significance (*p*-Values)	*0*	*0*	*0*
R-square	0.4365	0.4378	0.4286
Countries	120	121	121
Total panel (unbalanced) observations	1348	1356	1374

Notes:
p- values are reported in Italics

Table 6 reports the result derived using GMM, TSLS and POLS fixed effects methods. We can note that the results are consistent for all methods in particular for *private credit*, although the sign and level of significance of the variable capturing the development of stock markets (*turnover*) is influenced by the estimation method. The relationship is positive and significant only for POLS, while it becomes insignificant for the other two methods.

Table 6
Growth Effect with Private Credit and Stock Market - Annual Data

Cross-section fixed (dummy variables) Period fixed (dummy variables)	GMM	TSLS	POLS
Constant		0.2232	0.3168
		0.502	*0.1529*
Private credit (first difference)	-0.0514	-0.0353	-0.0245
(domestic credit to private sector - % of GDP)	*0*	*0.2584*	*0.0012*
Turnover	-0.0769	-0.3013	*0.3467*
(stocks traded, turnover ratio)	*0.9614*	*0.596*	*0.0731*
Government consumption	-0.0733	-0.0395	-0.0395
(government final consumption expenditure -% of GDP)	*0*	*0.0005*	*0*
Capital formation	0.2825	0.2466	0.2408
(gross capital formation - % of GDP)	*0*	*0.0017*	*0*
Trade openness	0.0532	0.0361	0.0308
(trade - % of GDP)	*0*	*0.0029*	*0*
Inflation	-0.0493	0.0085	-0.0239
(inflation, consumer prices - annual %)	*0.0014*	*0.4983*	*0*
Education	0.0293	0.0013	0.0058
(secondary school enrollment - %)	*0.0008*	*0.901*	*0.3917*
Initial Income	-0.0639	-0.0396	-0.0524
(Initial GDP per capita)	*0.2826*	*0.3562*	*0.069*
Wald test for joint significance (*p*-Values)	*0*	*0*	*0*
R-square		0.5045	0.4286
Countries	117	119	121
Total panel (unbalanced) observations	968	1021	1374

Notes:
p- values are reported in Italics

Finally, we test the relationship for the set of LDCs separately now. In this respect, we believe we have improved over existing literature as we test the puzzles for a sub-set of countries (LDCs) for which we collected the establishment date of stock markets and banks (i.e., any gap in data before that date of establishment are not due to non-availability)[15]. We then award a zero for periods in which there were no banks or stock market in existence. We believe by awarding a zero for a market related data for such period in which market was not in existence we have improved over the existing literature (the literature is silent on this issue).

Table 7 gives the short run result of the POLS fixed effect estimation for LDCs.

[15] Please see Appendix table A4 for further details.

Table 7

Growth Effect with Private Credit and Stock Market - Annual Data (LDCs)

Sample (adjusted): 1991 2006	Method: Panel Least Square Fixed Effect - Cross section and time		
Regressors	1	2	3
Constant	0.2526	0.2492	0.2516
	0.4659	*0.4681*	*0.4665*
Private credit (first difference)	-0.0977	-0.0961	-0.0923
(domestic credit to private sector - % of GDP)	*0.0004*	*0.0004*	*0.0006*
Capitalisation (first difference)	19.8015		
(market capitalization of listed companies - % of GDP)	*0.7255*		
Value traded (first difference)		-125.0317	
(stocks traded, total value - % of GDP)		*0.5795*	
Turnover			*-4.1569*
(stocks traded, turnover ratio)			*0.6796*
Government consumption	-0.0862	-0.0862	-0.0827
(government final consumption expenditure -% of GDP)	*0*	*0*	*0*
Capital formation (first difference)	0.0217	0.0199	0.0185
(gross capital formation - % of GDP)	*0.6875*	*0.7099*	*0.7304*
Trade openness	0.0840	0.0827	0.0834
(trade - % of GDP)	*0*	*0*	*0*
Inflation	-0.0334	-0.0321	-0.0349
(inflation, consumer prices - annual %)	*0.3841*	*0.397*	*0.3594*
Education (first difference)	0.1626	0.1612	0.1542
(secondary school enrollment - %)	*0.0037*	*0.0037*	*0.0052*
Initial Income	-0.0614	-0.0610	-0.0597
(Initial GDP per capita)	*0.2659*	*0.2654*	*0.2779*
Wald test for joint significance (*p*-Values)	*0*	*0*	*0*
R-square	0.5940	0.5946	0.5877
Countries	27	27	27
Total panel (unbalanced) observations	188	190	191

Notes:

p- values are reported in Italics

The estimation is based on 27 countries. The country excluded is Solomon Islands due to lack of sufficient data.

As can be noted from table 7, the variable *private credit* is always negative and significant, while the variables capturing the effect of stock markets are also negative and in all cases insignificant.

The findings of the literature of a negative relationship between private credit and economic growth (the first puzzle) is being strongly supported even when the possible selection bias is excluded. However, the second puzzle, the positive impact of stock markets, does not survive the elimination of the self-selection bias (i.e. including only countries with established stock markets).

4. Conclusions

This paper followed the work of Beck and Levine (2004), Favara (2003) and Loayza & Rancière (2006) and re-examined the relationship between financial development and economic growth using updated and improved dataset for a very large number of countries including 28 LDCs.

Unlike many papers that equate financial development to the development of banks, we included variables capturing both bank and stock market development in our model. In addition, we included a wide range of proxies to measure these variables. Moreover, we carefully reviewed the nature of data for our various variables and tested for stationarity of the series.

As we included LDCs in our analysis (many of which are still at a lower level of financial development), we gathered knowledge upon the historical development of banks and stock market in those countries. With the information on establishment dates of financial intermediaries, we were able to award a zero for such countries in which stock exchange did not exist during our sample period. We believe, we have avoided the problem of self selection biasness in our estimation, since papers showing positive impact of stock market upon economic growth seems to have included in their studies only countries which have active stock market e.g. Beck and Levine (2004).

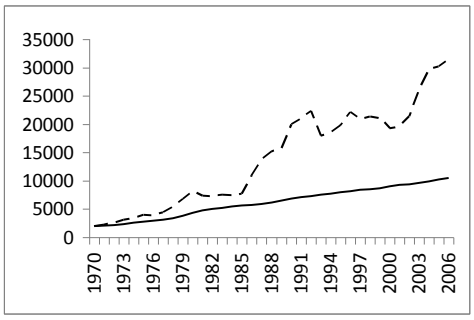
Our results have provided further and robust evidence of a negative effect of private credit upon economic growth in the short-run for a variety of methods and samples. However, unlike previous contributions, we were unable to provide evidence of a strong positive relationship between private credit and economic growth in the long-run, somehow, reinforcing the first puzzle.

The results also provide some evidence to mitigate the second puzzle related to the positive and significant impact of stock markets. The results suggest that the impact of stock markets highly depend on the variable chosen to explain stock market development, the method of estimation and the possible role of self-selection bias.

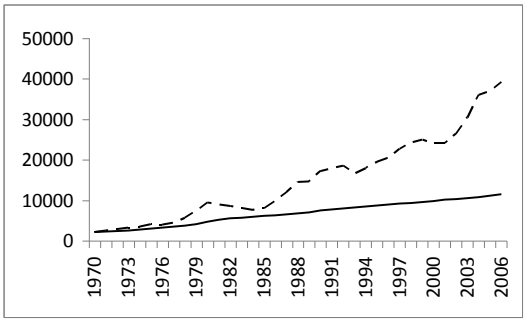
Appendices

Figure 1

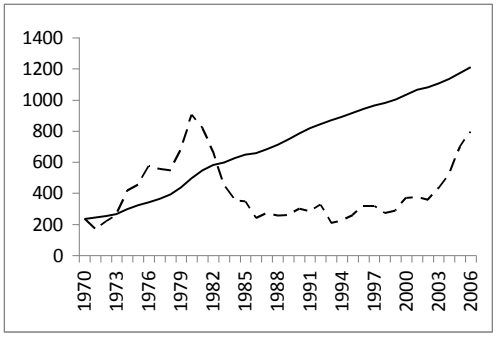
Italy



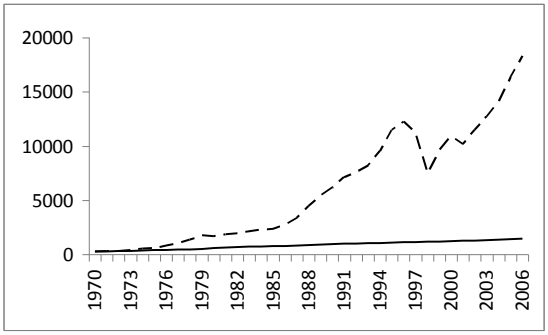
United Kingdom



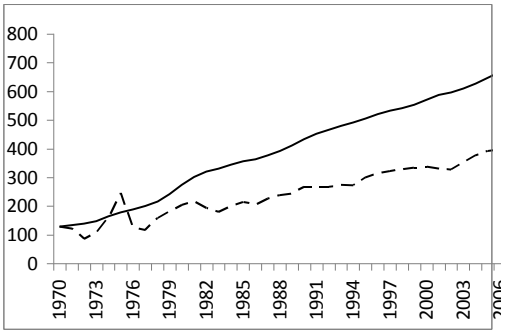
Nigeria



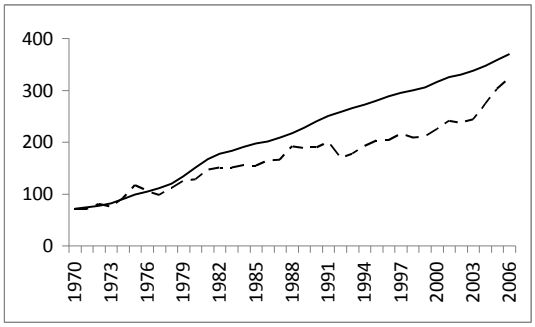
South Korea



Bangladesh



Nepal



Where,
Initial GDP per capita ————
Current GDP per capita - - - - - - - - -

Table A1

List of countries with no or very limited data

	Country		
1	American Samoa	16	Macao, China
2	Andorra	17	Marshall Islands
3	Aruba	18	Mayotte
4	Bermuda	19	Micronesia, Fed. Sts.
5	Cayman Islands	20	Monaco
6	Channel Islands	21	Netherlands Antilles
7	Cuba	22	New Caledonia
8	Faeroe Islands	23	Northern Mariana Islands
9	French Polynesia	24	Palau
10	Greenland	25	Puerto Rico
11	Guam	26	San Marino
12	Iraq	27	Somalia
13	Isle of Man	28	Virgin Islands (U.S.)
14	Korea, Dem. Rep.	29	West Bank and Gaza
15	Liechtenstein		

Table A2

List of countries (LDCs)

1	Bangladesh	15	Mali
2	Benin	16	Mauritania
3	Burkina Faso	17	Mozambique
4	Burundi	18	Nepal
5	Central African Rep.	19	Niger
6	Chad	20	Rwanda
7	Equatorial Guinea	21	Senegal
8	Ethiopia	22	Sierra Leone
9	Gambia, The	23	Solomon Islands
10	Guinea-Bissau	24	Sudan
11	Haiti	25	Togo
12	Lesotho	26	Uganda
13	Madagascar	27	Vanuatu
14	Malawi	28	Zambia

Table A3

List of countries (Non LDCs)

1	Argentina	32	Guatemala	63	New Zealand
2	Armenia	33	Guyana	64	Nigeria
3	Australia	34	Hong Kong, China	65	Norway
4	Austria	35	Hungary	66	Oman
5	Bahrain	36	Iceland	67	Pakistan
6	Barbados	37	India	68	Panama
7	Belgium	38	Indonesia	69	Paraguay
8	Bolivia	39	Iran, Islamic Rep.	70	Peru
9	Botswana	40	Ireland	71	Philippines
10	Brazil	41	Israel	72	Poland
11	Bulgaria	42	Italy	73	Portugal
12	Canada	43	Jamaica	74	Romania
13	Chile	44	Japan	75	Saudi Arabia
14	Colombia	45	Jordan	76	Slovak Republic
15	Costa Rica	46	Kazakhstan	77	Slovenia
16	Cote d'Ivoire	47	Kenya	78	South Africa
17	Croatia	48	Korea, Rep.	79	Spain
18	Cyprus	49	Kuwait	80	Sri Lanka
19	Czech Republic	50	Kyrgyz Republic	81	Swaziland
20	Denmark	51	Latvia	82	Sweden
21	Ecuador	52	Lithuania	83	Switzerland
22	Egypt, Arab Rep.	53	Luxembourg	84	Tanzania
23	El Salvador	54	Macedonia, FYR	85	Thailand
24	Estonia	55	Malaysia	86	Trinidad and Tobago
25	Fiji	56	Malta	87	Tunisia
26	Finland	57	Mauritius	88	Turkey
27	France	58	Mexico	89	United Kingdom
28	Georgia	59	Moldova	90	United States
29	Germany	60	Mongolia	91	Uruguay
30	Ghana	61	Morocco	92	Venezuela, RB
31	Greece	62	Netherlands	93	Zimbabwe

Table A4

Name, establishment date of bank, central bank and stock exchange in LDCs

#	Countries	Oldest / major Bank	Estb	Central Bank	Estb	First exchange	Estb
1	Bangladesh	Standard Chartered Bank	1905	Bangladesh Bank	1971	Dhaka stock exchange ltd	1954
2	Benin	Bank of Africa	1990	BCEAO	1959	BRVM	1998
3	Burkina Faso	Bank of Africa	1998	BCEAO	1959	BRVM	1998
4	Burundi	Banque De Credit Bujumbura	1909	Bank of the Republic of Burundi	1964	NA	
5	Central African Rep.	*		BEAC	1972	NA	
6	Chad	*		BEAC	1972	NA	
7	Equatorial Guinea	*		BEAC	1972	NA	
8	Ethiopia	Bank of Abysinia	1906	National Bank of Ethiopia	1963	NA	
9	Gambia	Standard Chartered Bank	1894	Central bank of gambia	1971	NA	
10	Guinea-Bissau	*		BCEAO	1997	BRVM	1998
11	Haiti	Bank of the Republic of Haiti	1880	Bank of the Republic of Haiti	1880	NA (web page says under construction)	
12	Lesotho	*		Central Bank of Lesotho	1978	NA	
13	Madagascar	Banque de Madagascar	1926	Banque de Madagascar et des Comores	1973	NA	
14	Malawi	African Lakes Corporation	1894	Reserve Bank of Malawi	1965	Malawi Stock Exchange	1994
15	Mali	Bank of Africa	1982	BCEAO	1984	BRVM	1998
16	Mauritania	*	1973	Central Bank of Mauritania	1973	NA	
17	Mozambique	Banco Std. Totta de Mocambique	1975	Bank of Mozambique	1975	Maputo Stock Exchange	1999
18	Nepal	Nepal Bank Ltd.	1937	Nepal Rastra Bank	1956	Nepal Stock Exchange	1976
19	Niger	Bank of Africa	1994	BCEAO	1959	BRVM	1998
20	Rwanda	Banque Commerciale du Rwanda	1963	National Bank of Rwanda	1964	NA	
21	Senegal	Bank of Africa	2001	BCEAO	1959	BRVM	1998
22	Sierra Leone	Standard Chartered Bank	1894	Bank of Sierra Leone	1964	NA	
23	Solomon Islands	National Bank of Solomon Island	1978	Central Bank of Solomon Island	1976	NA	
24	Sudan	Bank of Khartoum	1913	Central Bank of Sudan	1960	Khartum Stock Exchange	1994
25	Togo	Bank of Africa	1982	BCEAO	1963	BRVM	1998
26	Uganda	Standard Chartered Bank Uganda	1912	EACB (Bank of Uganda since 1966)	1919	Uganda Securities Exchange	1997
27	Vanuata	*		Reserve Bank of Vanuata	1980	NA	
28	Zambia	Standard Chartered Bank	1906	Bank of Zambia	1956	Lusaka stock exchange	1993

Note:-

** Not Availalbe (The countries colonising were operating some kind of banking operations and or the countries were having some level of banking operation before 1970)*
BCEAO: Central Bank of West African States , BEAC: Bank of Central African States, BRVM: Bourse Régionale des Valeurs Mobilières S.A.
LDCs are defined by UN, Development Policy and Analysis Division (2006 review) based on four criteria -
1) three year (2000 – 2002) average GNI per capita threshold of US $ 745, 2) the level of development of human capital (that includes percentage of undernourished children, mortality rate for children aged five years or under, the gross secondary school enrolment ratio and the adult literacy rate), 3) economic vulnerability index (comprising population, export concentration, remoteness i.e. the distance to world market, share of agriculture, forestry and fisheries in GDP, homelessness due to natural disaster, and instability of agricultural production and export), and 4) excluding low income countries with population above 75 million.

Table A5

Variables used

No.	Variables	Detail
1	Economic growth	Percentage change of Real GDP per capita
2	Private credit	Domestic credit to private sector to GDP
3	Liquid liabilities	Broad money (M3) to GDP
4	Bank credit	Domestic credit to private sector by banks to GDP
5	Bank credit all sector	Domestic credit provided by the banks to all sectors to GDP
6	Capitalisation	Stock market capitalisation to GDP
7	Value traded	Stock market value traded to GDP
8	Turnover	Stock market turnover ratio
9	Government consumption	General government final consumption expenditure to GDP
10	Capital formation	Gross capital formation to GDP
11	Trade openness	Trade - the sum of exports and imports to GDP
12	Inflation	Inflation - change CPI
13	Education	gross enrolment rate secondary education
14	Initial GDP per capita	Initial GDP per capita
15	Black market premium	Black market premium
16	lo_uk	Dummy variable for British legal origin
17	lo_fr	Dummy variable for French legal origin
18	lo_ge	Dummy variable for German legal origin
19	lo_sc	Dummy variable for Scandinavian legal origin
20	lo_so	Dummy variable for Socialist legal origin

Table A6

Source of data

No.	Variables	Source of Data
1	Economic growth *	World Bank national accounts data, and OECD National Accounts data files
2	Private credit	IMF’s IFS - via The World Bank
3	Liquid liabilities	IMF’s IFS - via The World Bank
4	Bank credit	IMF’s IFS - via The World Bank
5	Bank credit all sector *	IMF's IFS and data files, and World Bank and OECD GDP estimates
6	Capitalisation	IMF’s IFS - via The World Bank
7	Value traded	IMF’s IFS - via The World Bank
8	Turnover	IMF’s IFS - via The World Bank
9	Government consumption *	World Bank national accounts data, and OECD National Accounts data files
10	Capital formation *	World Bank national accounts data, and OECD National Accounts data files
11	Trade openness *	World Bank national accounts data, and OECD National Accounts data files
12	Inflation *	IMF's IFS and data files
13	Education **	UNESCO
14	Initial GDP per capita *	World Bank national accounts data, and OECD National Accounts data files
15	Black market premium***	Bahmani-Oskooee and Tanku (2006) and Official Exchange Rate from IMF's IFS
16	Legal Origin related****	

** imported from ESDS International*

*** imported from ED Stat of The World Bank*

**** the Official Exchange Rate is from IMF's IFS downloaded via ESDS International*

***** Data on legal origin (lo_uk, lo_fr, lo_ge, lo_sc, lo_so) are from La Porta et al. (2007)*

Table A7 **Test on Stationarity of the series using Levin, Lin & Chu (2002) test**

Variable	121 countries				28 countries (LDCs)			
	Intercept and trend	Intercept only	No-Intercept & Trend	Order of Integration	Intercept and trend	Intercept only	No-Intercept & Trend	Order of Integration
LGROWTH	-21.257	-18.848	-20.377	I(0)	-7.453	-9.592	-14.674	I(0)
	0	*0*	*0*		*0*	*0*	*0*	
LPC	1.890	-1.100	-8.899	I(1)	0.289	-1.220	-2.586	I(1)
	0.971	*0.136*	*0*		*0.614*	*0.111*	*0.0048*	
LPCBS	2.119	-1.878	-9.169	I(0)	0.597	-0.493	-2.423	I(1)
	0.983	*0.030*	*0.000*		*0.725*	*0.311*	*0.008*	
LBC	3.473	0.104	2.289	I(1)	1.784	1.018	-2.326	I(1)
	1.000	*0.542*	*0.989*		*0.963*	*0.846*	*0.010*	
LM3	2.924	-3.849	-10.586	I(0)	-0.823	-2.463	-4.633	I(0)
	0.998	*0.0001*	*0*		*0.205*	*0.0069*	*0*	
LMV	4.866	-4.906	5.489	I(1)	0.002	0.022	-0.727	I(1)
	1	*0*	*1*		*0.5006*	*0.5089*	*0.2337*	
LTO	-15.568	-10.144	-3.980	I(0)	-2.041	-0.257	-1.378	I(0)
	0	*0*	*0*		*0.0206*	*0.3987*	*0.0841*	
LVT	-48.892	3.344	1.415	I(1)	0.719	-0.187	-1.378	I(1)
	0	*1.000*	*0.921*		*0.7638*	*0.426*	*0.084*	
LGEXP	-2.573	-5.275	-5.232	I(0)	-1.479	-0.859	-1.486	I(0)
	0.005	*0*	*0*		*0.070*	*0.195*	*0.0686*	
LCAPF	0.958	-2.397	-3.580	I(0)	0.730	-0.346	0.740	I(1)
	0.831	*0.008*	*0.0002*		*0.767*	*0.365*	*0.7703*	
LPI	-71.871	-84.549	-35.993	I(0)	-7.631	-6.200	-6.504	I(0)
	0	*0*	*0*		*0*	*0*	*0*	
LOPEN	-4.395	-2.136	-10.689	I(0)	-4.118	-3.149	-5.298	I(0)
	0	*0.0163*	*0*		*0*	*0.0008*	*0*	
LEDU	-2.865	-4.226	-12.744	I(0)	-0.910	0.255	-7.231	I(1)
	0.0021	*0*	*0*		*0.1815*	*0.6006*	*0*	
LSTART	-16.191	0.000	0.000	I(0)	-7.684	-14.206	3.624	I(0)
	0	*0*	*0*		*0*	*0*	*0.9999*	
LBMP	-6.363	-4.774	-1.320	I(0)	-1.562	-1.313	-4.604	I(0)
	0	*0.000*	*0.093*		*0.0591*	*0.095*	*0.000*	

Note:-
Order of Integration for 93 Non LDCs are same as that of all 121 countries.

Table A8

Growth Effect with Private Credit and Stock Market - Cross-sectional (93 countries)

Method: Pooled Least Squares
Sample: 1970 2006 (mean of 37 years)

Regressors	1	2	3
Constant	-0.0137	-0.0125	-0.0075
	0.0003	*0.0009*	*0.0517*
Private credit (first difference)	-0.0437	-0.0442	-0.0486
(domestic credit to private sector - % of GDP)	*0*	*0*	*0*
Capitalisation (first difference)	0.7783		
(market capitalization of listed companies - % of GDP)	*0.1894*		
Value traded (first difference)		2.0983	
(stocks traded, total value - % of GDP)		*0.0009*	
Turnover			*-0.2810*
(stocks traded, turnover ratio)			*0*
Government consumption	-0.0053	-0.0054	-0.0044
(government final consumption expenditure -% of GDP)	*0*	*0*	*0*
Capital formation	0.1903	0.1903	0.1853
(gross capital formation - % of GDP)	*0*	*0*	*0*
Trade openness	-0.0003	0.0001	-0.0010
(trade - % of GDP)	*0.5288*	*0.884*	*0.0389*
Inflation	-0.0107	-0.0095	-0.0128
(inflation, consumer prices - annual %)	*0*	*0*	*0*
Education	0.0049	0.0051	0.0060
(secondary school enrollment - %)	*0*	*0*	*0*
Initial Income	-0.0019	-0.0021	-0.0021
(Initial GDP per capita)	*0*	*0*	*0*
Wald test for joint significance (*p* -Values)	*0*	*0*	*0*
R-square	0.2747	0.2766	0.2825
Countries	93	93	93

Notes:
p- values are reported in Italics

Table A9

Growth Effect with Private Credit and Stock Market - Cross-sectional

Method: Panel two stage Least Square
Sample: 1970 2006 (mean of 37 years)

Regressors	1	2	3
Constant	0.0242	0.0219	0.0240
	0	*0*	*0*
Private credit (first difference)	-0.0061	-0.0052	-0.0020
(domestic credit to private sector - % of GDP)	*0.2713*	*0.3546*	*0.7097*
Capitalisation (first difference)	5.9883		
(market capitalization of listed companies - % of GDP)	*0*		
Value traded (first difference)		2.2571	
(stocks traded, total value - % of GDP)		*0.0002*	
Turnover			*1.3304*
(stocks traded, turnover ratio)			*0*
Government consumption	-0.0007	-0.0022	-0.0030
(government final consumption expenditure -% of GDP)	*0.3477*	*0.0036*	*0*
Capital formation	0.1849	0.1818	0.1634
(gross capital formation - % of GDP)	*0*	*0*	*0*
Trade openness	-0.0023	-0.0004	0.0030
(trade - % of GDP)	*0*	*0.3908*	*0*
Inflation	-0.0114	-0.0098	-0.0032
(inflation, consumer prices - annual %)	*0*	*0*	*0.0236*
Education	0.0115	0.0117	0.0102
(secondary school enrollment - %)	*0*	*0*	*0*
Initial Income	-0.0062	-0.0059	-0.0066
(Initial GDP per capita)	*0*	*0*	*0*
Black market premium	*0.0003*	*0.0002*	*-0.0005*
[(Black market rate - official rate)/ official rate)]	*0.1252*	*0.312*	*0.0051*
Wald test for joint significance (*p* -Values)	*0*	*0*	*0*
R-square	0.4761	0.4780	0.5243
Countries	88	88	88

Notes:
p- values are reported in Italics

Table A10

Results of Redundant Fixed Effect (POLS Vs. Fixed effect test)

Test cross-section and period fixed effects

Effects Test	Statistic	d.f.	Prob.
Cross-section Fixed effect	3.123546	-1,201,226	0
Period Fixed effect	3.244266	-191,226	0
Cross-Section/Period Fixed effect	3.339746	-1,391,226	0

Hypothesis for the test above

Ho: Estimates of the co-efficients of the cross-section dummies are equal to zero therefore fixed effect is not correct

H1: Estimates of the co-efficients of the cross-section dummies are different from zero therefore fixed effect is not correct

Correlated Random Effects - Hausman Test (Fixed Vs. Random effect test)

Test cross-section random effects

Test Summary	Chi-Sq. Statistic	Chi-Sq. d.f.	Prob.
Cross-section random	34.222594	8	0

Hypothesis for the test above

Ho: Estimates by Random are not different from those from fixed effects. Random should be preferred

H1: Estimates by Random effects are different from those from fixed effects. Random are not appropriate

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