Does Financial Market Development Matter in Explaining Growth Fluctuations ?

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Abstract

This paper explores the link between the level of financial development and growth volatility for a sample of 66 countries covering the period 1960 to 1999. Using traditional cross-section, instrumental variable procedure, a pooled cross-section and time-series analysis and dynamic panel techniques, we found that financial development reduces growth volatility only in the whole sample and in developed countries. However, for the case of developing countries, financial development does not exert any significant effect on growth variability and this may be explained by, *First*, high distortions that prevent financial markets to function in an optimal way. *Second*, the delay in implementing financial liberalization policies. *Finally*, the absence of a strict control on credit allocation activity by monetary authorities. Moreover, our results show that for developing countries where financial institutions are not strong enough to avoid or at least to absorb higher financial shocks, it is rather financial fluctuations which account for growth volatility.

Key words: financial development, financial volatility, growth fluctuations and dynamic panel.

I. Introduction

The recent decades have seen a large and growing body of literature both theoretical and empirical has presented evidence on the importance of financial market development for economic performance. According to this literature, financial intermediaries play a capital role in mobilizing savings, reducing transaction and information costs, improving risk management and improving corporate governance. As a result higher levels of financial development lead to faster economic growth (Goldsmith (1969), Greenwood and Jovanovic (1990), Bencivenga and Smith (1991), King and Levine (1993a, b) and Greenwood and Smith (1997). These hypotheses received a considerable support with cross-country studies (King and Levine (1993a, b) and Beck, Levine and Loayza (2000)), country case studies (McKinnon (1973)) and industry and firm level studies (Rajan and Zingales (1998) and Demirguc-Kunt and Maximovic (1999)).

However, while the recent theoretical and empirical evidence suggests a positive relationship between financial sector development and economic growth, the potential links between financial markets and economic volatility have not been thoroughly investigated. In addition, the high growth volatility that many countries experience, especially with Southeast Asian turmoil of the late nineties, and the observation that countries with lower volatility tend to grow faster (Ramey and Ramey (1995)), have brought to the forefront the question whether and to what extent output fluctuations can be related to the development of the financial sector.

Furthermore, the issue of the determinants of macroeconomic volatility and the importance of financial development in magnifying or dampening it, is capital not only for economists looking for optimal development policies but also for policy makers trying to mitigate the severity of business cycles. This issue is also of a greater concern for developing countries where real and financial fluctuations are greater because of their financial structures, smaller sizes and the economic concentration in the rest of the word (World Bank (2001)).

The existing theoretical literature on the importance of financial market development in reducing macroeconomic volatility can be summarised into two different strands. The first strand of literature insists on the ability of financial development to absorb shocks and to reduce cyclical fluctuations. In this context, Aghion, Banerjee and Piketty (1999) developed a macroeconomic model in which agents have unequal access to investment opportunities in the financial market. They found that economies with less developed financial systems tend to be more volatile and experience slower growth as the demand and supply of credit tends to be

more cyclical. Açemoglu and Zilibotti (1997) presented the important link between financial development and volatility by highlighting the role that diversification plays in reducing risk. They showed that the presence of indivisibility in investment might result in an inability to diversify risk, thereby resulting in higher economic volatility.

The second one supports the view that financial sector development affects macroeconomic volatility through financial market imperfections and informational asymmetries on output fluctuations. Bernanke and Gertler (1990) showed that the shocks that affect the net worth of borrowers amplify output volatility through an accelerator effect on capital accumulation. Greenwald and Stiglitz (1993) developed a general equilibrium model where informational asymmetries exacerbate output volatility. Kiyotaki and Moore (1997) showed that capital market imperfections can magnify the effects of transitory productivity shocks through the net wealth of credit constrained agents. Microeconomic aspect of the importance of asymmetric information has been also treated by studying the behaviour of firms and banks that are likely to be subject to information asymmetries [(Kashyap and Stein (1995, 2000)]. For the World Bank (2001) the information asymmetries are more pronounced in developing countries and this hypothesis is consistent with the fluctuations of economic growth in these countries.

However, in contrast to the outpouring empirical research in the finance and growth nexus, the relation of financial development to macroeconomic volatility has not been extensively studied. Iyigun and Owen (1999) presented preliminary evidence that financial resources allocated to the private sector are particularly important in smoothing output volatility in countries with low-income individuals. On the same line, Denizer, Iyigun and Owen (2000) found a negative and significant correlation between different measures of financial development and growth, consumption and investment volatility.

Easterly, Islam, and Stiglitz (2000) find a *U-shaped relationship* between volatility and financial sector development with volatility increasing with higher levels of development using a panel data of 70 countries. Açemoglu et al. (2002) acknowledged that in cross-country regressions financial development, measured as the ratio of M2 over GDP, *has no effect* on volatility after controlling for the quality of institutions. Finally, for Beck, Lundberg, and Majnoni (2001) "the *ambiguous effect can be explained by interactions of opposing signs between financial intermediary development and different sources of volatility*" (P: 4).

This paper contributes to the empirical literature mentioned above to more thoroughly investigate empirically the effect of financial development on growth volatility using three different datasets over the period 1960-99. We use (i) cross-country analyses over 51

countries, (ii) panel studies on 66 countries, and finally (iii) dynamic panel investigations for 42 countries. Thus, we use an assortment of different datasets and econometric methodologies to test the relationship between financial intermediary development and growth volatility. However, unlike the prevailing empirical literature, more interest is devoted to the case of developing countries where many distortions are seen and prevent financial markets to operate in an optimal way: heavy public intervention, high transaction costs, information asymmetries …etc. In addition, several countries have implemented financial reforms aiming at giving more flexibility to their financial markets under the recommendation of Bretton-woods institutions and these reforms are not finished yet. The results obtained from this orientation allow us to draw more refined conclusions about these countries.

We used three different datasets and methodologies to test the impact of financial development on growth volatility. First, we used standard cross-country growth volatility regressions. Nevertheless, because of the lack of the data, we averaged the variables over the period 1976-1999 for a set of 51 countries. The use of cross-sectional techniques is justified by the fact that it follows directly from traditional growth studies[4]. Moreover, although it does not deal rigorously as the panel data estimators with potential problems induced by simultaneity, omitted variables, and unobserved cross-country specific effects, it enables us to check the consistency of our panel findings.

The second econometric method used in the paper is a pooled cross-sectional and time-series estimator. This technique offers several advantages over purely cross-sectional estimation. Mainly, the panel estimator exploits the additional information provided by the growth volatility variation and its determinants over time, which is likely to give more accurate estimates. For that, we construct a panel data set of 66 countries, where the data are averaged over each of the four 5-year intervals and six-7 year intervals composing the period 1960-1999. Our main data set contains a measure of financial development at the beginning of a time period and a measure of subsequent growth variability.

The different cross-sectional and panel data estimations with fixed and random effects produce very consistent and similar findings: financial development is found to reduce significantly growth volatility only for the whole sample and developed countries. This result is consistent with the prevailing theoretical and empirical literature, outlined above[5], that

[4] See for example King and Levine (1993a, b), Ramey and Ramey (1994) and Levine and Zervos (1998).
[5] See for example Bernanke and Gertler (1990), Greenwald and Stiglitz (1993), Açemoglu and Zilibotti (1997), Kiyotaki and Moore (1997), Aghion, Banerjee and Piketty (1999), Iyigun and Owen (1999), Denizer, Iyigun and Owen (2000), Easterly, Islam, and Stiglitz (2000), Beck, Lundberg, and Majnoni (2001) and Açemoglu et al. (2002).

predict that better functioning financial intermediaries are likely to dampen growth fluctuations.

Nevertheless, for the case of developing countries, no significant relationship is found between financial development and growth volatility. In other words, the level of financial development by itself as measured by the different proxies is not found to exert a significant effect on growth volatility in the different regressions. For these countries, where financial intermediation is not well developed and mainly restricted to the banking system with many distortions, *it is rather* expected that the volatility of financial sectors, as measured by the standard deviation of the different financial development proxies, would be a significant determinant of output fluctuations. The base of our intuitive explanation is that in the recent financial crisis in East-Asian countries and before in some Latin American countries (Chile, Uruguay and recently Argentina) financial fluctuations are transmitted rapidly to the real activity.

To check the consistency of this hypothesis for the case of developing countries (i.e. financial fluctuations are more likely to account for output volatility), we used both pooled cross sectional and time series estimators and GMM dynamic panel estimators. Indeed, this latter technique addresses the econometric problems induced by unobserved country-specific effects and joint endogeneity of the explanatory variables in lagged-dependent-variable models. For that, we construct a new panel dataset of 42 developing countries, where all the variables are averaged over the period 1965-1999 and divided into 4 and 6 time periods. The dependent variable is the standard deviation of per capita real GDP growth. We introduce the standard deviation of financial development indicators ($STDFD_t$) as a measure of financial volatility in the set of regressors.

The different results corroborate the advanced hypothesis in the sense that they highlight the amplifying effect of financial fluctuations on growth volatility in developing countries. The results are also robust to modifications in the estimation techniques, the conditioning information set and alterations in the sample period. The output is generally in favor of the growth volatility dampening effect of financial intermediation only in developed countries.

The remainder of the paper is organized as follows. Section 2 describes our indicators of financial development as well as those of the legal and institutional system. Section 3 explores the impact of financial development on cross-country growth volatility. Section 4 examines the link between financial development and growth volatility in a simple panel dataset. Section 5 explores whether financial fluctuations exert an impact on growth volatility

in developing countries using both cross-sectional and times series estimations or GMM for dynamic panel estimations. Section 6 concludes.

2. Data:

This section presents the indicators of financial development, growth volatility and the legal and institutional system used in the different estimations. Table (1) provides summary statistics on the financial development indicators (Summary statistics and correlations with other variables used in this paper are provided in tables (7) and (8)).

2.1. Indicators of Growth Volatility and Financial Development:

We measure economic growth volatility by the standard deviation of per capita real GDP growth rate over the different periods of the sample as it is commonly used in the literature on the topic (Easterly, Islam and Stiglitz (2000), Darrat and Haj (2000), Denizer, Iyigun and Owen (2000), Beck, Lundberg and Majnoni (2001)). However, for the development of financial sector, two proxies are used. The first one is the financial deepening ratio (M_3) over GDP (*M3Y*) and it is retained because of the upward trend in financial innovation despite the difference in the level of financial deepening between the countries in the panel. This indicator is also in accordance with the inside money model of McKinnon (1973) where the accumulation of real money balances is a required condition for investment.

The second indicator, which is defined as the ratio of the credits to the private sector to GDP (henceforth, (*CPY*)), measures the extent to which financial institutions funnel credit to private sectors activities. This proxy is supposed to delimitate with more precision the investment financing activity since it represents the role of the financial system in channelling funds to entrepreneurs. The recent empirical literature (King and Levine (1993a, b), De Gregorio and Guidotti (1995), Levine and Zervos (1998), Rajan and Zingales (1998) and Beck, Levine and Loayza (2000)) has emphasized on the positive and significant impact of private credit on capital accumulation.

Our financial development indicators exhibit a large variation across different countries, as can be seen from Table (1). Consider the value of credits by financial intermediaries to the private sector divided by GDP (*CPY*). This measure of the financial development is more than a simple measure of the size of the financial sector. Indeed, it measures the most significant activity of the financial intermediary development. Thus, high levels of *CPY* would indicate

higher levels of financial services and consequently a greater financial intermediary development. For example, *CPY* is less than 10 percent of GDP in Zaire, Sierra Leone, Ghana, Haiti, and Syria. *CPY*, however, is greater than 80 percent of GDP in Switzerland, the United States, Sweden and Japan. Standard deviation of real per capita GDP growth also exhibits considerable cross-country variation. For instance, Sweden, Switzerland, United States enjoyed standard deviations of growth rates less than 3 percent per annum over the 39 year period, while Jordan, Peru, sierra Leone and Zaire all suffered standard deviation growth rates of greater than 5 percent per year from 1960-99. Thus, thanks to the cross-country variation, the dataset allowed us exploring the link between growth volatility and financial intermediary development.

(See table 1)

The negative relationship between standard deviation of real GDP per capita growth rate and financial development is illustrated in Figure (1). Figure (1) show that in the opposite of growth volatility which are decreasing with income groups, both financial intermediary development indicators tend to increase as we move from low to high-income countries. Indeed, countries with higher levels of *CPY* tend to enjoy lower standard deviations of per capita real GDP growth rates over the 1960-99 period than countries with lower levels of financial intermediary development. Indeed, we noticed that countries that have the highest level of *CPY* are those who are endowed with lower than-average values of standard deviations of per capita growth rates (3.91). We quote for example, the "Asian miracles", such as Malaysia, Thailand, Japan, and five European countries (Spain, France, Portugal, Sweden, and Italy) that were among the top quartile of countries as ranked by financial intermediary development during this sample period. Similarly, countries such as Zaire, Sierra Leone, Ghana, Haiti, and Lesotho with highest standard deviations of real per capita GDP growth over the 39-year period were the lowest quartile of countries defined by financial intermediary development. These countries are known to have poorly developed financial systems during these last 39 years, governed by massive official interventions in credit allocation, high levels of nonperforming loans, weak financial institutions, government ownership of banks, and many other restrictions that impede their financial systems to well function, so that they could not efficiently mobilize and allocate capital.

(See Figure 1)

2.2. The legal environment:

In assessing the link between financial development and growth volatility and to examine the literature's point of view which suggested that the financial system is in fact influenced by several important underlying characteristics of the economy[6], we used three institutional indicators as instrumental variables.

Corrupt is an index of corruption ranging from 1 to 10 with lower values indicating a greater incidence of government officials demanding special payments.

Structure an index of the degree of market based versus bank-based, (i.e., an index of financial structure). Higher values of *Structure* imply that the market is relatively more important than banks.

Enforce is an indicator of the enforceability of contracts. It is actually an average of two separate indices –one which assesses the law and order tradition of an economy and the second which assesses the chances that a given government will change the provisions of a contract once it has been signed. *Enforce* ranges from 1 to 10 with higher values indicating stronger enforcement of contracts.

2.3. The legal Origin:

Legal systems with European origin can be classified into four major legal families (Reynolds and Flores 1996): the English common law and the French, German, and Scandinavian civil law countries. Since most countries have acquired their legal systems through occupation and colonization, legal origin can be regarded as relatively exogenous for the period under investigation. Furthermore, Levine (1998, 1999 and 2000a) and Levine, Loayza, and Beck (2000) have shown that the legal origin explains cross-country variations in the level of financial development. As the legal origin of a country, which has been linked to financial development, is a predetermined and exogenous variable, hence, we used it as instruments for financial development in our cross-country data set, so that we can control for simultaneity bias. Consequently, our data contains dummy variables for the legal origin of a country (French, English, Scandinavian or German).

[6] (e.g., La Porta et al., 1997, 1998, Levine, 1998, 1999, and Demirguc-Kunt and Levine, 1999)

3. Financial Development and Growth Volatility: Cross-sectional Analysis:

This section explores the impact of financial development on growth volatility using cross-sectional estimator, in a sample of 51 countries, with data averaged over the period 1976-99. We (i) describe the methodology; (ii) explore the link between the legal origin of a country and its financial intermediary development, (iii) present evidence of the impact of financial and institutional development on growth volatility. The next section uses panel techniques that allow us to exploit the additional information provided by the over-time variation in the growth rate volatility and its determinants.

3.1. Econometric Methodology:

To test for the literature's prediction that, in general, financial development reduces growth volatility at the macro level, we begin with the cross-sectional estimator because it follows the large cross-country literature on the topic. To implement our cross-country estimations, we collapse our data into two time periods. We adopted the same approach as Denizer, Iyigun and Owen (2000) and this, while using a *lagged measure of financial development* so that we examine the relationship between financial development at the beginning of a period and the subsequent growth volatility as it is represented by the following equation:

$$STDG_{i,t} = \mu_i + \alpha_1 FD_{i,t-1} + \alpha_2 X_{i,t} + \alpha_3 Z_{it-1} + \lambda_t + \varepsilon_{i,t} \qquad (3.1)$$

where the dependent variable, $STDG_{i,t}$, equals the standard deviation of real per capita GDP growth at time t for country i, $X_{i,t}$ is a vector of control variables that may help to explain growth volatility, $FD_{i,t-1}$ equals a set of measures of financial sector development in country i, Z_{it-1} includes a set of institutional variables, μ_i is a country- specific effect, λ_t is time specific effect and $\varepsilon_{i,t}$ is the error term assumed to be uncorrelated with the regressors and normally distributed with a mean of zero and a variance of σ_{it}^2.

Economic growth volatility is measured by the standard deviation of real per capita income growth (*STDG*) within each time period. The set of control variables in X_{it} includes several variables which may account for growth volatility. We first introduced, to control for macroeconomic shocks, the standard deviation of inflation ($STDINF_t$) as a control variable for

monetary shocks. For trade shocks, we introduced the standard deviation of terms of trade ($STDTOT_t$) as regressor of growth volatility. Furthermore, to take into account the contribution of foreign direct investment, considered as an important factor of growth fluctuations in some developing countries, we added the standard deviation of this variable ($STDFDI_t$) as an explanatory variable in equation (3.1).

We added also the logarithm of real GDP per capita ($LDGP_t$) to control for the development level of the country: growth volatility is higher in countries with low income per capita. Finally, we introduced the logarithm of openness of the economy ($LOPEN_t$) as an explanatory variable in equation (1) based on the hypothesis that output fluctuations are higher in more open economies. The openness rate is calculated as the sum of imports and exports over GDP ($OPEN_t$ = Exports + Imports/GDP). To measure financial development $(FD_{i,t-1})$, we use two indicators : *first* the ratio of the liquid liabilities (M3) to the nominal GDP (*M3Y*) and *second*, the ratio of claims on the private sector to GDP (CPY).

The set of institutional variables (Z_{it-1}) includes indicators of corruption (*Corrupt*), contract enforcement efficiency (*Enforce*), and financial structure (*Structure*). All these variables used in the regressions except those of the legal and institutional environment were extracted from the World Bank's Development Indicators (WDI). We measure (Z_{it-1}) in the initial time period (1976-1980) and then measure subsequent volatility and X_{it} over the period 1980 to 1999. Thus, our cross-country dataset gives us some advantages. It gives us the ability to measure volatility over a much longer period of time.

We use both Ordinary Least Square (OLS) estimations and Instrumental Variable (IV) estimations, using the legal origin of countries as instruments for countries, as in Levine, Loayza, and Beck (2000). IV regressions allow us to control for simultaneity bias and reverse causality from standard deviation of par capita real GDP growth rates to financial development, by extracting the exogenous component of financial development. To assess the law and finance view, we used *Enforce*, *Corrupt* and *Structure* as instrumental variables for financial development to thus extract the component of finance that is defined by the legal system.

3.2. Financial development and Legal origin:

To examine the literature's view which stipulate that the legal origin do explain cross-country variations in the level of financial development, we regressed first the financial development indicators on legal origin dummy variables

(See table 2)

Table (2) presents regressions of the financial intermediary development indicators on the dummy variables for English, French, German and Scandinavian origin. Some of the regressions also control for the level of real per capita GDP. The major message is that countries with German legal origin have better developed financial intermediaries. While countries with a French legal tradition, tend to have less well-developed institutions than other countries on average. Also, as indicated by the P-values of the F-test, the legal origin variables explain a significant fraction of the cross-country variation of the financial intermediary development indicators.

3.3. Financial Development, Institutional Development and growth volatility:

To examine the impact of financial development on growth volatility, we use both Ordinary Least Square (OLS) estimations and Instrumental Variable (IV) estimations.

We attempted first to estimate equation (3.1) without including the set of institutional variables in Zi_{t-1}. Table (3) presents the results of the OLS estimation for the standard deviation of real per capita GDP growth, using each of the two financial development indicators.

(See table 3)

In general the results in table (3) suggest that financial development is associated with less volatility in GDP only in the whole sample and in developed countries; however no significant effect from financial development on growth fluctuations is found in developing countries. Indeed, the results shows that *M3Y* (financial deepening ratio) and *CPY* (the percentage of credit that is funnelled to the private sector) both retain some explanatory power in the GDP regressions suggesting that on average, countries that experience financial development and expansion of the size of their financial sector (as evidenced by increases in *M3Y* and *CPY*) face less volatility of growth volatility which is in line with the theoretical background discussed above.

Furthermore, results in the first column of table (3) show that *M3Y* is negatively related to growth volatility at the 5% risk level, while, we notice in the second column that both financial development indicators (*M3Y* and *CPY*) are negatively and significantly correlated

with the standard deviation of per capita real GDP growth rate at the 1% level. Interestingly, as for the other control variables, the standard deviation of inflation rate is positively related to GDP variability only in the developing countries sample, while the standard deviation of FDI enters positively and significantly in the whole sample and in developed countries sample.

Second, we included institutional indicators in Z_{it-1} (i.e. measures of the level of corruption, the contract enforcement efficiency and the financial structure) in the growth volatility regressions. However, the inclusion of these institutional variables has as a disadvantage of reducing the size of our sample, since data availability restricts our analysis to only 34 countries. In addition, while we believe that these additional variables we included are important components of the country-specific fixed effect, we do not believe they include all important country characteristics. Consequently, we are cautious in our interpretation of the cross-country results and present them only as supplementary to our main results. Table (4) presents the results of this estimation for the variability of per capita growth rate.

(See table 4)

Our results for the per capita GDP growth regressions are generally supportive of the conclusions we drew above. Higher levels of *CPY* and *M3Y* are associated with lower volatility of per capita GDP only in the total sample and in developed countries.

The coefficients on the additional country characteristics we included in the cross-country regressions also suggest some interesting conclusions. For instance, the coefficient of *Corrupt* is negatively and significantly associated with growth fluctuations in developed countries, but not in developing ones. This result suggests that less corrupt governments are associated with lower variability of GDP growth. Indeed, the effectiveness of the legal system in enforcing contracts will influence financial sectors activities dampening therefore growth fluctuations. On the other hand, stronger enforceability of contract are associated with lower growth fluctuations for the same sample. Finally, *Structure*, that is the reliance of the economy on the stock market relative to banks, enters positively and significantly in two of the three output regressions. This latter result indicate that financially more developed economies that have more market-based financial systems experience less growth fluctuations in comparison with developing ones.

Third, we run regressions with instrumental variable (IV) estimations, using the legal origin of countries as instruments for countries, as in Levine, Loayza, and Beck (2000). IV

regressions allow us to control for simultaneity bias and reverse causality from growth rates volatility to financial development, by extracting the exogenous component of financial development. Besides, we use as instruments specific elements of the legal system that are important for financial development. Specifically, we use *Corrupt*, *Enforce* and *Structure* as instruments for the indicators of financial development. Results of IV regressions with and without institutional variables are presented in tables 5 and 6.

(See Table 5 and 6)

The results in Tables (5) and (6) support the literature's prediction that financial development should dampen growth fluctuations and thereby strengthen the previous findings. However, this results maintain only in developed countries sample, where we can notice that in general indicators of financial development enter negatively and significantly in the regressions at the 10%-level. Furthermore, it is worth noting that the data do not reject the hypothesis that *Corrupt*, *Enforce*, and *Structure* influence growth volatility only through their effects on financial development. The coefficients show similar sizes as when using the legal origin as instruments and do not differ from those in the OLS regressions. Thus, the data are consistent with the view that the component of overall financial development explained by legal codes and their enforcement is negatively and significantly related to growth fluctuations.

4. Financial Development and Growth Volatility: Panel Data Analysis

Unlike in the previous cross-country section, this section focuses on the presumption that in general, financial development reduces growth volatility at the macro level in a panel data set of 66 countries. We (i) first discuss the econometric methodology and the additional data we use, (ii) present the regression results, (iv) summarize our findings

4.1. Econometric Methodology and the Data

We use a panel of 51 countries for the period 1960-1999 to test our hypothesis. We build on work by Denizer, Iyigun and Owen (2000) by using a *lagged measure of financial development* so that we examine the relationship between financial development at the beginning of a period and the subsequent growth volatility. Estimation using panel data, that

is pooled cross-section and time-series data has several advantages over purely cross-sectional estimation. It allows us for example to exploit the additional information provided by the over-time variation in the growth rate volatility and its determinants. We used the following regression:

$$STDG_{i,t} = \mu_i + \lambda_t + \alpha_1 FD_{i,t-1} + \alpha_2 X_{i,t} + \varepsilon_{i,t} \quad (4.1)$$

Where the dependent variable, $(STDG_{i,t})$ equals the standard deviation of real per capita GDP growth at time t for country i, $(X_{i,t})$ is the same vector of control variables as the above section that is $STDINF_t$, $STDTOT_t$, $STDFDI_t$, $LDGP_t$, $LOPEN_T$.. $(FD_{i,t-1})$ includes a set of measures of financial sector development in country i in the *preceding period*, μ_i is a country-specific effect, λ_t is time specific effect and $\varepsilon_{i,t}$ is the error term.

Indeed, our objective is to avoid the endogeneity concerns and to see how the initial level of financial development affects the subsequent growth volatility in the following period. For that we use average values for financial development proxies *M3Y* and *CPY* over the periods 1960-64, 1968-72, 1976-80 and 1983-87[7] for the 4-time periods and the periods 1965-70, 1971-76, 1977-83, 1984-89, 1990-94, 1995-99 for the 6-time periods. The 4 and 6-time periods for growth volatility and the rest of the variables correspond respectively to 1965-72, 1973-80, 1981-87, 1988-99 and to 1965-70, 1971-76, 1977-82, 1983-88, 1989-94, 1995-1999 respectively.

However, it remains that an ideal characterization of the amplitude of the business cycle in each country and each time period would require a large number of annual observations to capture both the upturns and downturns of the business cycle. As we increase the number of years in each period, while it increases the accuracy with which we characterize volatility; we reduce the number periods we can use in our random-effects estimation which may reduce efficiency. Nonetheless, we are able to create 4 and 6 time-periods while still measuring volatility over a relatively long period of time, respectively 7 and 5 years.

3.2. Regression results:

Prior to presenting our main results from the estimation of equation (4.1) with all the control variables presented above, we explore first some of the correlations between financial

[7] We average the financial development through 5 years for the 4-period and 7 years for the 6-period, to smooth through any temporary events that might be affecting the financial system in any given year.

development and growth volatility. Tables (7) and (8) present the summary statistics and the correlations between the key variables in our panel data analysis. There are two important points that are drawn out by the correlations in Table (8). First, all the measures of financial development are negatively correlated with the standard deviation of GDP growth. In other words, the countries with higher levels of financial sector development experience less volatility in economic growth. Second, all three measures of financial development are positively correlated with each other. In particular, the ratio of financial deepening (*M3Y*) presents the highest correlation, while the lower correlation is between *M3Y* and the private credit share (*CPY*).

Our objective in this paper is to test the assumption that the financial development dampens growth volatility and that is true independently across countries with different income levels. The results of estimating equation (4.1) with the different financial development measures and all the control variables discussed above are presented in Table (9). With random effects estimates for the whole sample either with 6 or 4 time periods, the trance goes to the acceptance of the hypothesis that financial development dampens output fluctuations. Indeed, both measures of financial development (CPY, M3Y) are negatively and significantly correlated with the standard deviation of real GDP growth rate at the 5% risk level for the total sample, suggesting that on average, countries that experience financial development and expansion of the size of their financial sector (as evidenced by increases in M3Y, CPY) face less volatility of growth volatility which is in line with the theoretical background discussed above.

The control variables generally enter with the expected signs. In fact, greater variability of terms of trade is found to be significantly and positively correlated with higher volatility of GDP. This result is in line with the evidence is that economies with volatile trade policies, i.e. countries applying trade restrictions for short periods and then changing to unrestricted trade policies, should experience a higher volatility of output growth. However, the variability of inflation is not associated with higher output fluctuations.

However, while the correlations presented in Table (9) indicate that countries with developed financial sectors experience less volatility for the whole sample, the interpretation remains problematic since the sample is very heterogeneous with many countries differing with the level of their financial development. To address this issue, we divided the sample of countries into developed and developing countries. The different random effects estimations for *developed countries* are summarized in table (10) with the same set of financial development measures and control variables.

Table (10) suggests a large positive and statistically significant impact of key financial development measures *CPY* and *M3Y* on growth volatility at the 10% risk in the 6 period estimations. In the 4 period estimations only the share of private credit to GDP (*CPY*) enters positively and significantly with growth fluctuations at the 10% level. These results may be considered consistent with our hypothesis since we found unambiguous relation between financial development and growth volatility in developed countries. On the other hand, no significant relationship is found between inflation and terms of trade volatilities and output fluctuations which remains a plausible result for developed countries generally known for their stable growth rates and lower standard deviations of terms of trade and inflation rates.

The results of random effects estimations for *developing countries*, presented in Table (11), suggest that in general financial development indicators do not appear to have a dampening effect on growth variability except for *M3Y* where the coefficient is significant at the 10% level. For the control variables, we found that the volatilities of the terms of trade as well as of inflation are positively correlated with higher growth volatility, since the coefficients are statistically significant at the 5% level especially in the 6 period regressions.

In sum, *the level of financial development doesn't matter in accounting for output fluctuations in developing countries*. This empirical result may be explained by the following factors:

- *First*, the financial distortions (such as government intervention in the financial sector, asymmetric information, the high transaction costs, inefficiency of the banking system) which prevent the financial sector to function in an optimal way.
- *Second*, many developing countries have proceeded deliberately to reform their financial systems and these reforms have not produced yet their expected positive effects.
- *Third*, high levels of financial development measures may not necessarily represent efficient financial systems in developing countries. Indeed, higher ratios of credit to the private sector with respect to GDP for instance may entail fragile systems in the absence of an ex post efficient control of monetary authorities on the credit allocation activity by banking institutions.
- *Finally*, many developing countries have known many financial crises which had grave consequences on growth performances: the recent financial turmoil in East-Asian countries and before in some Latin American countries. Financial structures in developing countries are not strong and efficient enough to avoid or at least to absorb higher financial shocks.

This latter fact may bring to our minds the intuition that in developing countries financial fluctuations are more likely to account for output volatility. In other words, financial fluctuations are rapidly transmitted to the real activity and may magnify considerably output volatility. Consequently, we wait that growth and financial volatility are likely to be positively correlated at the same period in developing countries. In this respect, the following argument of Easterly, Islam and Stiglitz (2000) may give support to our proposition *"More recently, economic crises have often tended to go hand in hand with financial crises whose frequency and severity in developing countries has increased over the past quarter century"* (P.1).

To test this proposition we introduced a new regressor which is the standard deviation of financial development indicators ($STDFD_t$) as a measure of financial volatility in equation (4.1) as follows:

$$STDG_{i,t} = \mu_i + \lambda_t + \alpha_1 STDFD_{i,t} + \alpha_3 X_{i,t} + \varepsilon_{i,t} \qquad (4.2)$$

While we keep the set of control variables the same as in the former regressions. The standard deviations of each of the key financial variables are calculated at the same periods as the dependant variable considered in the regression. Thus according to this proposition, the sign of the coefficient of financial volatility is expected to be positive and significant in the 6 and 4 period estimations and the set of control variables are the same as in the former regressions.

Table (12) shows stronger evidence in favor of the proposition that financial fluctuations magnify growth volatility in developing countries with different time periods regressions. Indeed, financial volatility indicators as measured by standard deviations of financial development proxies enter positively and significantly at the 5% level respectively in the 4 and the 6-period regressions. Such result is not strange since financial institutions in these countries are not strong enough to avoid or at least to absorb higher financial shocks that would, in turn, prevent smooth growth rates. Another interesting result relative to the effects of inflation and terms of trade volatilities on output fluctuations must be underlined since the coefficients of these two variables are found to be positive and significant at the 5% level in particular with 6 period estimations. This result is in accordance with the general view that developing countries experience more trade and inflation volatilities as well as instable unstable growth rates than developed countries.

4. Dynamic Panel Data Analysis:

This section assesses the link between financial fluctuations and growth volatility in developing countries. We (i) present the econometric methodology and the additional data we use, (ii) present the regression results, (iii) summarize our findings

4.1. Econometric Methodology and Data:

In order to check the robustness of the preceding results and because growth volatility can be also influenced by its lagged value, we use the Generalized-Method-of-Moments (GMM) estimators developed for dynamic models of panel data that were introduced by Holtz-Eakin, Newey and Rosen (1990), Arellano and Bond (1991), and Arellano and Bover (1995). Our panel consists of data for 42 *developing countries* and 4- and 6-periods over the period 1965 to 1999.

The GMM dynamic panel estimators are specifically designed to address the econometric problems induced by unobserved country-specific effects and joint endogeneity of the explanatory variables in lagged-dependent-variable models. Thus, our panel estimator controls for unobserved country-specific effects reducing thereby biases in the estimated coefficients. Besides, it controls for the potential endogeneity of all explanatory variables by using instruments based on lagged values of the explanatory variables. All the data are averaged over the periods of 1965-72, 1973-80, 1981-87, 1988-99 for the 4-time periods and 1965-70, 1971-76, 1977-82, 1983-88, 1989-94, 1995-1999 for the 6-time periods respectively composing the period 1965-1999. We estimate the following equation:

$$STDG_{i,t} - STDG_{i,t-1} = (\alpha-1)STDG_{i,t-1} + \alpha_1 STDFD_{i,t} + \alpha_2 X_{i,t} + \mu_i + \lambda_t + \varepsilon_{i,t} \qquad (4.1)$$

Where $STDG_{i,t}$ is the standard deviation of real per capita GDP growth at time t for country i,, $STDFD_{i,t}$ is a set of variables used to measure financial fluctuations such as the standard deviation of private credit to GDP (*SDCPY*) and the standard deviation of liquid liabilities to GDP (*SDM3Y*), $X_{i,t}$ represent the set of explanatory variables (other than lagged standard deviation of per capita real GDP growth) such as standard deviations of inflation, of terms of trade and of foreign direct investment, Logarithm of GDP and logarithm of openness, μ_i the country- specific effect, λ_t is the time-specific effect , $\varepsilon_{i,t}$ is the error term and the subscript i and t represent country and time period, respectively.

Before estimating the model, we can re-write the equation (4.1) under a dynamic form:

$$STDG_{i,t} = \alpha STDG_{i,t-1} + \alpha_1 STDFD_{i,t} + \alpha_2 X_{i,t} + \mu_i + \lambda_t + \varepsilon_{i,t} \quad (4.2)$$

The presence of the lagged-dependent-variable as exogenous variables on the right side of the equation (4.2) doesn't allow for standards econometric techniques like OLS to obtain efficient estimates of such a model. That why we have to use the Generalized Method of Moments in dynamic panel which allows to control for the individual and temporal specific effects, and to mitigate skews of endogeneity of the variables.

Now, to eliminate the country-specific effect, take first-differences of equation (4.2):

$$STDG_{i,t} - STDG_{i,t-1} = \alpha (STDG_{i,t-1} - STDG_{i,t-2}) + \alpha_1 (STDFD_{i,t} - STDFD_{i,t-1}) + \alpha_2 (X_{i,t} - X_{i,t-1}) + (\varepsilon_{i,t} - \varepsilon_{i,t-1}) \quad (4.3)$$

The use of instruments is required to deal with, first the likely endogeneity of the explanatory variables, and, second the problem that by construction the new error term, $\varepsilon_{i,t} - \varepsilon_{i,t-1}$ is correlated with the lagged dependent variable $STDG_{i,t-1} - STDG_{i,t-2}$.

We employ two GMM panel estimators; both are based on the use of lagged observations of the explanatory variables as instruments. In the first GMM panel estimator (i.e. *Difference* estimator) is based on the two conditions that (1) the error term, ε , is not serially correlated, and (b) the explanatory variables, X, are weakly exogenous (i.e., the explanatory variables are assumed to be uncorrelated with the future realizations of the error term). However, this usual difference estimator is imprecise and presents potential biases. To mitigate these problems we used a new estimator that combine in a system the regression in differences with the regression in levels [Arellano and Bover (1995) and Blundell and Bond 1997].

4.2. Regression results:

Table (13) gives the full results from *system* dynamic-panel estimation. It also presents the Sargan test, where the null hypothesis is that the instrumental variables are uncorrelated with the residuals.

(See table 13)

The standard deviation of private credit to GDP (*CPY*) is positive and significant in both 4 and 6-period regressions, while the standard deviation of liquid liabilities to GDP (*M3Y*) enters positively and significantly only in the 6-period estimation. This result supports our assumption that it is rather financial fluctuations that affect growth volatility in developing countries. For instance, an increase in the standard deviation of the credit to the private sector to GDP of 10% entail 9 points of additional percentage of the growth volatility. These results also show that real and monetary volatility amplifies growth volatility in developing countries.

5. Conclusion

This paper explores empirically the correlation between financial development and growth fluctuations. There exist at least two different but related strands in the recent economic literature which assert that financial development should reduce growth volatility. Our results for cross-sectional, panel data and dynamic panel data estimations for 66 countries covering the years between 1960 and 1999 shed doubts on previous studies in favor of a negative effect of financial sector development on growth fluctuations. We found, in particular, that this hypothesis is confirmed only in developed countries generally known for their growth stability, high level development of their financial sectors.

For the case of developing countries, we have found that financial development does not exert any significant effect on growth variability. The absence of a dampening effect may be explained by: *First*, the financial distortions in the financial sectors of these countries which prevent them to function in an optimal way. *Second*, many developing countries reformed their financial systems and they are still waiting for the expected positive effects on capital accumulation as well on the efficiency of the banking sector. *Finally*, the absence of a strict control on credit allocation activity by monetary authorities which entailed in many cases fragile financial structures.

Moreover, for the case of developing countries we found that it is rather financial fluctuations which account for growth volatility. In fact, some of these countries have known many financial crises which had grave consequences over growth performances which may be considered as a support of our intuition. In addition, the regressions achieved with the standard deviation of financial development indicators as regressors of growth volatility showed significant and positive correlations.

Finally, the data shows that cross-country differences in legal and accounting systems account for the gap in financial development between countries. These findings suggest that legal and institutional reforms that strengthen creditor rights, contract enforcement, can boost financial development dampening thereby financial fluctuations which help reducing growth volatility in developing countries.

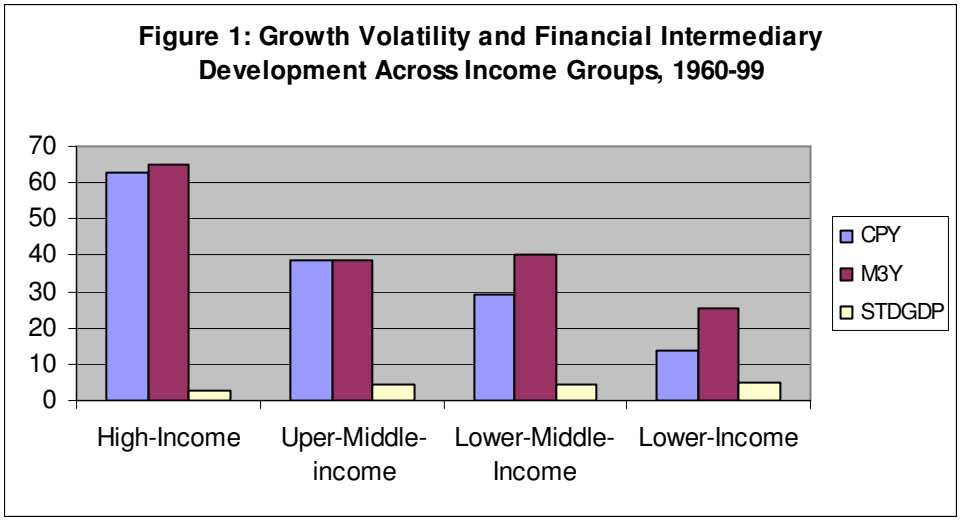
Appendices

Financial Intermediary Development and growth volatility

Table (1): Descriptive Statistics: 1960-1999

	CPY	M3Y	STDGDP
Mean	39.61	44.75	3.91
Maximum	137.51	135.09	8.44
Minimum	2.34	12.36	1.62
Std. Dev.	26.70	24.06	1.64
Observations	66	62	66

CPY: credit by deposit money banks and other financial institutions to the private sector divided by GDP.
M3Y: liquid liabilities of the financial system (currency plus demand and interest-bearing liabilities of banks and nonblank financial intermediaries) divided by GDP



Table(2): Legal Origin and Financial Intermediary Development: OLS Regressions, 1960-99

	(1)	(2)	(3)	(4)
	CPY	CPY	M3Y	M3Y
English	-7.707	-5.510	4.386	5.752
	(0.70)	*(0.51)*	*(0.42)*	*(0.55)*
French	-12.062	-10.975	-2.611	-1.579
	(1.12)	*(1.04)*	*(0.25)*	*(0.15)*
German	49.574	45.943	49.332	47.090
	*(3.31)***	*(3.12)***	*(3.47)***	*(3.30)***
Scandinavian	27.907	26.017	13.044	11.876
	(1.49)	*(1.42)*	*(0.74)*	*(0.67)*
LGDP		1.341		0.828
		*(2.00)**		*(1.24)*
C	44.233	30.121	40.702	31.986
	*(4.43)***	*(2.50)**	*(4.29)***	*(2.72)***
Obs.	66	66	62	62
Prob(F-test)	*0.000*	*0.000*	*0.000*	*0.000*
R-squared	0.34	0.38	0.27	0.29

1/ Absolute value of t statistics in parentheses
2/ * significant at 10%; ** significant at 5%; *** significant at 1%

CPY: Private Credit/GDP
M3Y: Liquid liabilies/GDP
LGDP: Logarithm of real GDP per capita

Table (3): Financial Development and Growth volatility: OLS Regressions, 1980-1999

Dependent variable: Standard deviation of real GDP growth rate (x 100)

	Sample	Whole Sample		Developed countries		Developing countries	
	Variables	1	2	1	2	1	2
[1]	CPY	-0.009		-0.011		0.023	
		(1.19)		*(2.45)**		*(1.08)*	
[2]	M3Y		-0.021		-0.015		-0.016
			*(2.78)****		*(2.36)**		*(0.68)*
[3]	SDINF	0.934	0.940	0.130	0.194	9.606	8.720
		(0.60)	*(0.72)*	*(0.40)*	*(0.55)*	*(3.43)****	*(3.01)****
[4]	STDTOT	10.792	8.013	-0.860	-3.024	7.300	2.870
		*(2.95)****	*(2.15)**	*(0.07)*	*(0.19)*	*(1.07)*	*(0.45)*
[5]	STDFDI	0.886	0.877	0.752	1.002	0.650	0.830
		*(2.13)**	*(2.16)**	*(2.29)**	*(2.51)**	*(1.06)*	*(1.56)*
[6]	LGDP	0.631	0.674	0.015	0.191	0.885	0.992
		*(1.68)**	*(1.72)**	*(0.05)*	*(0.47)*	*(1.93)**	*(2.37)**
[7]	LOPEN	-0.071	-0.048	0.035	0.023	0.043	0.065
		(0.91)	*(0.68)*	*(0.34)*	*(0.24)*	*(0.34)*	*(0.52)*
[8]	Constant	0.032	0.456	1.688	1.305	-2.909	-2.137
		(0.02)	*(0.22)*	*(1.04)*	*(0.67)*	*(1.00)*	*(0.68)*
	Obs.	46	50	22	18	28	28
	Number of Countries	51	51	28	28	23	23
	R- squared	0.40	0.45	0.25	0.40	0.35	0.35

1/ Robust t statistics in parentheses
2/ * significant at 10%; ** significant at 5%; *** significant at 1%

Table (4): Financial Development and Growth volatility: OLS Regression with institutional variables, 1976-1999

Dependent variable: Standard deviation of real GDP growth rate (x 100)

	Sample	Whole Sample		Developed countries		Developing countries	
	Variables	1	2	1	3	1	2
[1]	CPY_{t-1}	-0.011		-0.002		0.052	
		(1.44)		*(0.44)*		*(1.38)*	
[2]	$M3Y_{t-1}$		-0.021		-0.008		-0.053
			*(2.28)***		*(2.24)**		*(0.89)*
[3]	SDINF	0.460	0.783	-1.628	-1.384	20.013	9.619
		(0.52)	*(0.97)*	*(2.88)***	*(3.35)***	*(1.93)*	*(0.58)*
[4]	STDTOT	4.988	6.222	3.792	-1.080	-31.360	-16.36
		(0.47)	*(0.61)*	*(0.58)*	*(0.14)*	*(1.09)*	*(0.52)*
[5]	STDFDI	0.602	0.647	1.155	1.461	-1.040	-0.305
		(1.52)	*(1.49)*	*(4.99)****	*(4.78)****	*(1.58)*	*(0.31)*
[6]	LGDP	0.066	0.733	-.1877	-0.180	0.063	-0.088
		(0.61)	*(2.36)*	*(2.37)***	*(2.53)***	*(0.18)*	*(0.26)*
[7]	LOPEN	0.645	0.063	0.570	0.483	0.106	0.415
		*(2.44)***	*(0.63)***	*(2.15)*	*(2.94)***	*(0.12)*	*(0.26)*
[8]	ENFORCE	0.106	0.187	-0.366	-0.367	0.449	0.567
		(0.41)	*(0.74)*	*(1.74)*	*(2.47)***	*(1.28)*	*(1.07)*
[9]	CORRUPT	*-0.277*	*0-.269*	*-0.339*	*-0.298*	*-0.244*	*-0.047*
		(1.29)	*(1.31)*	*(-1.76)*	*(2.25)**	*(1.01)*	*(0.16)*
[10]	STRUCTURE	*0.683*	*0.702*	*0.212*	*0.279*	*-0.148*	*0.527*
		*(3.47)****	*(4.00)****	*(1.08)*	*(2.01)**	*(0.23)*	*(0.73)*
[11]	Intercept	*0.004*	*0-.430*	*7.479*	*7.705*	*1.741*	*2.659*
		(0.00)	*(0.17)*	*(3.58)****	*(4.38)****	*(0.30)*	*(0.35)*
	Obs.	33	29	21	17	12	12
	R- squared	0.46	0.55	0.75	0.87	0.86	0.84

1/ Robust t statistics in parentheses

2/ * significant at 10%; ** significant at 5%; *** significant at 1%

3/ Values for SDGDP, CPY, M3Y, SDINF, SDTOT, SDFDI, LGDP, LOPEN are averages over the 1980-99 period.

4/ Values for institutional indicators (Enforce, corrupt and structure) are averages over the 1976-80 period.

Table (5): Financial Development and Growth volatility: IV (2SLS) regression s

Dependent variable: Standard deviation of real GDP growth rate (x 100)

	Sample	Whole Sample		Developed countries		Developing countries	
	Variables	1	2	1	2	1	2
[1]	CPY_{t-1}	-0.001		-0.017		0.099	
		(0.06)		*(3.00)****		*(0.76)*	
[2]	$M3Y_{t-1}$		-0.006		-0.015		-0.519
			(0.42)		*(2.56)***		*(0.23)*
[3]	$SDINF_t$	0.906	0.867	0.184	0.192	10.190	-13.767
		(0.55)	*(0.55)*	*(0.64)*	*(0.56)*	*(2.69)***	*(0.14)*
[4]	$STDTOT_t$	12.921	11.735	-3.111	-2.988	17.821	-35.057
		*(2.67)***	*(2.48)***	*(0.25)*	*(0.18)*	*(0.97)*	*(0.21)*
[5]	$STDFDI_t$	0.815	0.827	0.903	0.997	0.016	0.384
		*(1.87)**	*(1.99)**	*(2.62)***	*(2.39)***	*(0.01)*	*(0.11)*
[6]	$LGDP_t$	-0.101	-0.089	0.045	0.023	-0.081	-0.451
		(1.13)	*(1.22)*	*(0.45)*	*(0.24)*	*(0.28)*	*(0.19)*
[7]	$LOPEN_t$	0.719	-0.006	-0.117	0.193	0.762	3.177
		*(1.90)**	*(0.42)*	*(0.33)*	*(0.47)*	*(1.03)*	*(0.35)*
[8]	Intercept	-0.391	-0.400	2.383	1.289	-3.539	16.255
		(0.18)	*(0.18)*	*(1.30)*	*(0.59)*	*(1.07)*	*(0.19)*
	Obs.	50	46	22	18	28	28
	R- squared	0.39	0.40	0.22	0.40	0.03	0.04

1/ Robust t statistics in parentheses

2/ * significant at 10%; ** significant at 5%; *** significant at 1%
Instrumented: cpy, m3y

3/ Instruments: sdinf sdtot sdfdi lopen lgdp legor_uk legor_fr legor_ge legor_sc

Table (6): Financial Development and Growth volatility: IV (2SLS) regressions with institutional variables
Dependent variable: Standard deviation of real GDP growth rate (x 100)

	Sample	Whole Sample		Developed countries		Developing countries	
	Variables	1	2	1	2	1	2
[1]	CPY_{t-1}	-0.009		-0.005		-0.190	
		(0.54)		*(0.99)*		*(0.35)*	
[2]	$M3Y_{t-1}$		-0.004		-0.008		-0.053
			(0.32)		*(2.06)**		*(0.90)*
[3]	$SDINF_t$	0.433	0.244	-1.50	-1.388	15.20	9.743
		(0.48)	*(0.26)*	*(2.32)***	*(3.13)***	*(0.41)*	*(0.59)*
[4]	$STDTOT_t$	4.923	4.249	2.897	-1.065	-9.88	-16.497
		(0.47)	*(0.39)*	*(0.43)*	*(0.13)*	*(0.12)*	*(0.53)*
[5]	$STDFDI_t$	0.589	0.506	1.193	1.460	1.92	-0.306
		(1.30)	*(1.15)*	*(5.37)****	*(4.77)****	*(0.25)*	*(0.31)*
[6]	$LGDP_t$	0.061	0.019	-0.159	-0.181	0.458	-0.085
		(0.47)	*(0.17)*	*(1.78)*	*(2.28)**	*(0.50)*	*(0.20)*
[7]	$LOPEN_t$	0.659	0.821	0.510	0.484	-0.179	0.410
		*(2.14)***	*(2.93)****	*(2.00)**	*(2.94)***	*(0.05)*	*(0.26)*
[8]	$ENFORCE_{t-1}$	0.102	0.101	-0.354	-0.368	0.714	0.566
		(0.38)	*(0.36)*	*(1.55)*	*(2.49)***	*(0.38)*	*(1.07)*
[9]	$CORRUPT_{t-1}$	-0.281	-0.306	-0.308	-0.299	-0.079	-0.049
		(1.36)	*(1.40)*	*(1.55)*	*(2.17)**	*(0.10)*	*(0.17)*
[10]	$STRUCTURE_{t-1}$	0.674	0.608	0.242	0.278	1.764	0.523
		*(3.07)****	*(3.03)*	*(1.34)*	*(1.97)*	*(0.45)*	*(0.74)*
[11]	Intercept	0.019	-0.078	7.16	7.711	-0.230	2.641
		(0.01)	*(-0.03)*	*(3.27)****	*(4.12)****	*(0.01)*	*(0.35)*
	Obs.	33	29	21	17	12	12
	R- squared	0.46	0.47	0.74	0.87	0.53	0.84

1/ Robust t statistics in parentheses

2/ * significant at 10%; ** significant at 5%; *** significant at 1%
Instrumented: cpy, m3y
Instruments: sdinf sdtot sdfdi lopen lgdp enforce corrupt structure legor_uk legor_fr legor_ge

3/ Legor_sc

Table (7): Descriptive Statistics

Sample	Variables	Mean	Standard Deviation	Minimum	Maximum	Countries
4 periods						66
	$SDGDP_t$	3.36	2.03	.584	12.64	
	CPY_{t-1}	0.343	0.263	1.25	1.56	
	$M3Y_{t-1}$	0.419	0.252	4.25	1.64	
6 periods						66
	$SDGDP_t$	4.40	2.19	0.006	12.69	
	CPY_{t-1}	0.335	0.264	0.001	1.59	
	$M3Y_{t-1}$	0.401	0.252	0.04	1.59	

SDGDP : Standard deviation of per capita gdp growth (constant LCU)
CPY : Private credit divided by gross domestic product
M3Y : Liquid liabilities/GDP

Table (8): Correlations, 1960-99, 4 and 6 period samples

Sample Variables	$SDGDP_t$	CPY_{t-1}	$M3Y_{t-1}$
6-period			
$SDGDP_t$	1		
CPY_{t-1}	-0.221	1	
$M3Y_{t-1}$	-0.223	0.851	1
4-period			
$SDGDP_t$	1		
CPY_{t-1}	-0.250	1	
$M3Y_{t-1}$	-0.230	0.862	1

SDGDP : Standard deviation of per capita GDP growth (constant LCU)
CPY : Private credit divided by gross domestic product
M3Y : Liquid liabilities/GDP

Table (9): Financial development and Growth volatility: Random Effects Regressions

Dependant variable: Standard deviation of real GDP growth rate (x 100)

	Sample	The whole sample					
	Periods	6-period			4-period		
	Variables	1	2	3	1	2	3
[1]	CPY_{t-1}	-0.009*			-0.010*		
		(-2.02)			*(-1.97)*		
[2]	$M3Y_{t-1}$		-0.014*			-0.014*	
			(-2.64)			*(-2.42)*	
[3]	$SDINF_t$	0.143*	0.144*	0.155*	0.020	0.019	0.021
		(2.95)	*(2.89)*	*(2.97)*	*(0.95)*	*(0.86)*	*(0.91)*
[4]	$SDTOT_t$	12.21*	11.66*	10.47*	6.48*	5.99*	4.83*
		(6.02)	*(5.62)*	*(4.64)*	*(3.20)*	*(2.93)*	*(2.14)*
[5]	$SDFDI_t$	0.247	0.255	0.177	0.314**	0.314**	0.320
		(1.35)	*(1.35)*	*(0.86)*	*(1.73)*	*(1.69)*	*(1.55)*
[6]	$LGDP_t$	0.009	0.015	0.029	-0.037	-0.046	-0.034
		(0.82)	*(0.36)*	*(0.66)*	*(-0.85)*	*(-1.05)*	*(-0.73)*
[7]	$LOPEN_t$	0.478**	0.625*	0.644*	0.168	0.300	0.338
		(1.86)	*(2.31)*	*2.32)*	*(0.68)*	*(1.18)*	*(1.25)*
[8]	Intercept	0.201	-0.037	-0.288	2.49*	2.37*	2.05
		(0.16)	*(-0.03)*	*(-0.22)*	*(2.14)*	*(1.99)*	*(1.65)*
	Obs.	273	253	222	204	191	167
	Number of Countries	64	60	53	64	60	53
	R- squared	0.24	0.23	0.19	0.20	0.20	0.14

1/ t-Students in parentheses

2/ *, ** respectively denote significance at the 5 percent and 10 percent levels

3/ Country-specific and time-specific random effects estimate

Table (10): Financial development and Growth volatility in developed countries: Random Effects Regressions

Dependant variable: Standard deviation of real GDP growth rate (x 100)

	Sample	Developed countries					
	Periods	6-period			4-period		
	Variables	1	2	3	1	2	3
[1]	CPY_{t-1}	-0.007*			-0.006		
		(-1.99)			*(-1.35)*		
[2]	$M3Y_{t-1}$		-0.006			-0.012*	
			(-1.42)			*(-2.51)*	
[3]	$SDINF_t$	0.539	0.431	0.250	0.052	0.213	0.012
		(0.81)	*(0.62)*	*(0.32)*	*(0.07)*	*(0.28)*	*(0.01)*
[4]	$SDTOT_t$	5.81	5.94	2.12	11.04*	7.19	-0.227
		(1.14)	*(0.99)*	*(0.29)*	*(2.09)*	*(1.24)*	*(-0.03)*
[5]	$SDFDI_t$	0.104	0.079	0.161	-0.089	0.011	0.184
		(0.46)	*(0.31)*	*(0.46)*	*(-0.38)*	*(0.05)*	*(0.50)*
[6]	$LGDP_t$	0.040	0.056	0.119	0.060	0.053	0.110
		(0.80)	*(0.92)*	*(1.25)*	*(1.02)*	*(0.88)*	*(1.16)*
[7]	$LOPEN_t$	-0.024	0.135	0.230	0.037	-0.013	-0.011
		(-0.09)	*(0.44)*	*(0.54)*	*(0.14)*	*(-0.05)*	*(-0.03)*
[8]	Intercept	1.62	0.852	-.167	1.24	2.00	1.58
		(1.15)	*(0.52)*	*(-0.08)*	*(0.90)*	*(1.37)*	*(0.88)*
	Obs.	99	78	49	75	61	37
	Number of Countries	23	19	12	23	19	12
	R- squared	0.09	0.07	0.10	0.11	0.14	0.16

1/ t-Students in parentheses

2/ *, ** respectively denote significance at the 5 percent and 10 percent levels

3/ Country-specific and time-specific random effects estimate

Table (11): Financial development and Growth volatility in developing countries: Random Effects Regressions

Dependant variable: Standard deviation of real GDP growth rate (x 100)

	Sample	Developing countries					
	Periods	6-period			4-period		
	Variables	1	2	3	1	2	3
[1]	CPY_{t-1}	-0.001			-0.001		
		(-0.16)			*(-0.09)*		
[2]	$M3Y_{t-1}$		-0.017**			-0.002	
			(-1.74)			*(-0.25)*	
[4]	$SDINF_t$	0.153*	0.153*	0.162*	0.027	0.026	0.026
		(2.64)	*(2.67)*	*(2.82)*	*(1.04)*	*(1.01)*	*(1.04)*
[5]	$SDTOT_t$	11.18*	10.32*	9.20*	4.67**	4.53**	5.03**
		(4.45)	*(4.19)*	*(3.51)*	*(1.87)*	*(1.85)*	*(1.94)*
[6]	$SDFDI_t$	0.232	0.265	0.159	0.296	0.306	0.286
		(0.96)	*(1.11)*	*(0.65)*	*(1.21)*	*(1.26)*	*(1.19)*
[7]	$LGDP_t$	0.038	0.034	0.038	-0.010	-0.013	-0.013
		(0.72)	*(0.65)*	*(0.75)*	*(-0.20)*	*(-0.25)*	*(-0.24)*
[8]	$LOPEN_t$	0.577**	0.801*	0.737*	0.209	0.265	0.175
		(1.71)	*(2.27)*	*(2.15)*	*(0.64)*	*(0.76)*	*(0.51)*
[9]	Intercept	-0.343	-0.524	-0.393	2.31	2.21	2.32
		(-0.22)	*(-0.34)*	*(-0.26)*	*(1.57)*	*(1.49)*	*(1.55)*
Obs.		174	175	173	129	130	130
Number of countries		42	42	42	42	42	42
R- squared		0.13	0.14	0.14	0.06	0.06	0.05

1/ t-Students in parentheses

2/ *, ** respectively denote significance at the 5 percent and 10 percent levels

3/ Country-specific and time-specific random effects estimate

Table (12): Financial Development and Growth volatility: Random Effects Regressions

Dependent variable: Standard deviation of real GDP growth rate (x 100)

	Sample	Developing countries					
	Periods	6-period			4-period		
	Variables	1	2	3	1	2	3
[1]	$STDCPY_t$	0.048			0.106		
		(1.31)			*(2.85)****		
[2]	$STDM3Y_t$		0.083			0.104	
			*(2.02)***			*(2.10)***	
[4]	$SDINF_t$	0.152	0.152	0.147	0.011	0.007	0.016
		*(2.62)****	*(2.65)****	*(2.54)***	*(0.37)*	*(0.23)*	*(0.52)*
[5]	$STDTOT_t$	11.738	11.195	11.636	7.177	5.532	5.677
		*(4.82)****	*(4.69)****	*(4.82)****	*(2.31)***	*(1.78)**	*(1.80)**
[6]	$STDFDI_t$	0.237	0.234	0.253	0.325	0.263	0.350
		(1.00)	*(0.99)*	*(1.06)*	*(1.34)*	*(1.04)*	*(1.39)*
[7]	$LGDP_t$	0.034	0.070	0.036	-1.401	-0.928	-0.848
		(0.64)	*(1.27)*	*(0.68)*	*(1.40)*	*(0.94)*	*(0.83)*
[8]	$LOPEN_t$	0.614	0.550	0.559	-0.024	-0.120	-0.195
		*(1.84)**	*(1.66)**	*(1.67)**	*(0.02)*	*(0.12)*	*(0.20)*
[9]	Intercept	-0.737	-0.899	-0.577	14.430	11.003	10.654
		(0.47)	*(0.58)*	*(0.37)*	*(2.04)***	*(1.58)*	*(1.45)*
	Obs.	175	175	175	132	132	132
	Number of countries	42	42	42	42	42	42
	R- squared	0.14	0.15	0.14	0.15	0.12	0.09

1/ t-Students in parentheses

2/ * significant at 10%; ** significant at 5%; *** significant at 1%

3/ Country-specific and time-specific random effects estimate

Table (13): Financial Fluctuations and Growth volatility: Arellano-Bond dynamic panel-data estimation, two-step system GMM results

Dependent variable: Standard deviation of real GDP growth rate (x 100)

	Sample	Developing countries			
	Periods	6-period		4-period	
	Variables	1	2	1	2
[1]	L.SDGDP	0.171	0.184	0.072	0.061
		(1.45)	*(2.19)***	*(0.78)*	*(0.36)*
[2]	SDCPY	0.094		0.129	
		*(3.11)****		*(1.87)**	
[3]	SDM3Y		0.114		0.177
			(1.66)		*(2.34)***
[4]	SDINF	0.107	0.088	-0.040	-0.080
		*(2.23)***	*(1.81)**	*(0.24)*	*(0.33)*
[5]	SDTOT	15.805	16.046	-0.085	-2.551
		*(2.88)****	*(4.65)****	*(0.02)*	*(0.39)*
[6]	SDFDI	0.080	0.112	0.363	-0.007
		(0.25)	*(0.44)*	*(1.60)*	*(0.03)*
[7]	LOPEN	1.407	1.433	-2.693	-3.720
		(0.92)	*(1.78)**	*(1.54)*	*(1.92)**
[8]	LGDP	0.037	0.058	-0.217	-0.297
		(0.65)	*(1.51)*	*(0.38)*	*(0.39)*
[9]	Intercept	-5.272	-5.798	14.996	20.249
		(0.80)	(1.74)*	(1.37)	(1.53)
	Obs.	172	172	111	111
	Number of countries	42	42	42	42
	Hansen test (p-value)	0.587	0.604	0.321	0.628

1/ Robust t statistics in parentheses

2/ * significant at 10%; ** significant at 5%; *** significant at 1%

Table (15): Countries Included in Sample

High income (24)[1]

Australia*, Austria*, Belgium*, Canada*, Denmark*, Spain*, Finland, France*, Great Britain*, Greece*, Ireland*, Iceland*, Israel*, Italy*, Japan*, Korea*, Netherlands*, Norway*, New Zealand*, Portugal*, Singapore*, Sweden*, Switzerland*, United States*

Upper-middle income (9)**

Argentina, Brazil, Chile*, Mexico, Mauritius*, Malaysia*, Saudi-Arabia, South Africa*, Uruguay*

Lower-middle income (20)**

Algeria, Colombia, Costa Rica*, Dominican Republic*, Ecuador*, Egypt*, Fiji*, Jordan, Sri Lanka*, Morocco*, Panama*, Peru, Philippines*, Paraguay*, Tunisia, Turkey, Swaziland*, Syria, Thailand*, St. Vincent

Low income (13)**

Burundi*, Bangladesh*, Cameroon*, Ghana*, Haiti*, India*, Kenya*, Lesotho*, Nepal, Pakistan*, Sierra Leone*, Congo (Zaire), Zimbabwe*

[1] Income groups according to the *World Development Indicators* database.

* Included in the 51 country pure-sectional data set.

** Included in the 42 country dynamic-panel data set

Table (16): Definitions and Sources of Data

Variable	Definition	Source
SDGDP	Within-period standard deviation of annual change in ln (Real GDP per capita)	World Bank, World Development Indicators database (WDI)
LGDP	Ln (real GDP per capita)	WDI
LOPEN	Ln (sum of real exports and imports as share of real GDP)	WDI
CPY	Credit to private sector refers to financial resources provided to the private sector, such as through loans, purchases of non-equity securities, and trade credits and other accounts receivable that establish a claim for repayment	WDI
M3Y	Liquid liabilities/GDP	WDI
SDCPY	Standard deviation of private credit to GDP	WDI
SDM3Y	Standard deviation of liquid liabilities to GDP	WDI
SDTOT	Within-period standard deviation of the annual change in the ratio of import and export price indices	WDI
SDINF	Inflation as measured by the standard deviation of annual growth rate of the gross domestic product implicit deflator	WDI
SDFDI	Within-period standard deviation of annual change in log of FDI/GDP	WDI
STRUCTURE	Is an index of the extent to which the financial system is based on the stock market rather than banks.	Demirguc-Kunt and Levine (1999)
ENFORCE	Enforce is an indicator of enforceability of contracts, ranging from 1 to 10 with higher values indicating stronger enforcement of contracts.	Demirguc-Kunt and Levine (1999)
CORRUPT	Is an index of corruption ranging from 1 to 10 with lower values indicating a greater incidence of government officials demanding special payments.	Demirguc-Kunt and Levine (1999)
LEGAL ORIGIN	Dummy variables for the legal origin of a country (i.e., French, English, Scandinavian or German).	LLSV (1998)

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