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Abstract

This paper investigates cross-country evidence on how capital market affects business cycle volatility. In contrast to the large and growing literature on the impact of finance and growth, empirical work on the relationship between finance and volatility has been relatively scarce. Theoretically, more developed capital market should lead to lower macroeconomic volatility. The major finding is that countries with more developed capital market have smoother economic fluctuations. Results are generated using panel estimation technique with panel data from 44 countries covering the years 1975 through 2004.

JEL: C33, E32, E44, G00, G21

Keywords: business cycle, capital market, financial development, financial structure, panel data, market-based, bank-based

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1. Introduction

The role of financial development in economic growth and stability has, for many years, been the subject of intense discussion and debate among both academicians and policy makers. The mainstream view [Demirguc-kunt and Levine (2001)] is that financial development exerts a large positive impact on economic growth. Moreover, this link holds even after controlling for other growth determinants and possible endogeneity. Many researchers also have sought to evaluate the links between capital market development (usually stock market) and growth, or between a relative measure of capital market development as captured by a financial structure index which measures the degree to which a financial system is bank-based or market-based, and growth. Interestingly, Demirguc-kunt and Levine (2001) found that financial structure does not have any explanatory power after controlling for the level of overall financial development. However, Beck and Levine (2002) do find that stock markets and banks are both individually significant in explaining economic growth. This would suggest that both markets and banks independently spur growth, and that stock markets provide different financial services from banks.

Traditional explanations of the connection between financial development and volatility are based prominently on the phenomena of credit market imperfections and asymmetric information. The "balance sheet view" [Bernanke and Gertler (1995), Bernanke et al. (1998)] postulates that nominal and real shocks to the economy are amplified by a "financial accelerator." Basically, the fall in a firm's net worth resulting from an initial shock (say, from a monetary contraction) increases agency costs by worsening the potential conflicts of interest between borrowers and lenders. This leads subsequently to higher external financing premiums, which in turn magnify

the fluctuations in borrowing, spending and investment. Therefore, to the extent that a more advanced financial system reduces this imperfection, it decreases the volatility of business cycles. Greenwald and Stiglitz (1993) also argue that efficient financial markets mitigate information asymmetries and enable economic agents to process information more effectively, resulting in lower growth volatility.

Unlike traditional theory, recent explanations focus more on specific mechanisms rather than on asymmetric information. For instance, Aghion et al. (1999) show theoretically that combining financial market imperfections with unequal access to investment opportunities across individuals can generate endogenous and permanent fluctuations in aggregate GDP, investment, and interest rates. Thus, reducing inequality of access and financial imperfection are necessary conditions for macroeconomic stability. In another important contribution Acemoglu and Zilibotti (1997) argue that the presence of indivisible projects limits the degree of diversification that an economy can achieve in the early stages of development,. The inability to diversify idiosyncratic risk, and the desire to avoid high risk investments, slow down capital accumulation and introduce large uncertainty into the growth process. By providing a closer match between savers and investors and promoting diversification, financial deepening reduces risk and dampens cyclical fluctuations.

Larrain (2004) develops a theoretical model which predicts that the effect of financial development on output volatility is ambiguous. The model shows that the effect depends on particular circumstances that constrain, firm financing's decisions. If firms need funds to smooth unfavourable cash-flow shocks, financial development reduces output volatility. In contrast, if firms need funds to expand production when confronted with positive investment opportunities, financial development increases output volatility. Thus, knowing whether the effect of financial development on

volatility is positive or negative permits inferences to be drawn about the type of shock that firms are facing.

Theoretically, the resilience of an economy is affected not only by the overall level of financial development but also by its financial structure - whether it is bank-based or market-based. Rajan and Zingales (2001) observe that "if there is one thing the arm's-length system (market-based) can do better than the relationship-based (bank-based), it is to bear and manage macroeconomic risk." They argue that due to low transparency and disclosure, assets in a bank-based system tend to be less liquid. Intermediaries (mainly banks) finance such assets by low cost demand deposit. This exposure makes them subject to runs. In other words, financing of illiquid assets in a bank-based system is likely to create a maturity mismatch in the portfolios of intermediaries. This financial fragility of intermediaries would then impose risk on the financial system.

They argue further that should a relationship-based system suffer adverse shocks that the government is not able to counter, then the flow of credit can quickly collapse. They give the following reasons. First, there is a lot of specific knowledge embedded in relationships between failing intermediaries and their clients. Therefore, other healthy intermediaries cannot easily replace them in providing any further credit to debtors of the failing ones. Secondly, since property rights are not well established in non-transparent relationships, it becomes hard for depositors and investors to distinguish between healthy and failing parties. This could lead to financial contagion among intermediaries and also give rise to bank runs.

In contrast, in market-based systems, transparency and disclosure are required to give investors the confidence to invest directly in particular firms. This greater transparency improves the ability of a system to withstand shocks. Healthy firms can

be distinguished from the terminally ill after a shock and can be dealt with differently. As a result, outside investors or intermediaries have the ability to invest and rescue the system from the consequences of failing financial intermediaries.

Haan et al. (1999) extend these ideas by developing a formal model of the propagation of business cycle shocks, given the existence of long-term relationships between entrepreneurs and lenders (which are more prevalent in bank-based system). Lenders may be constrained in their short-run access to liquidity, and when liquidity is low, relationships are subject to break-ups that lead to loss of joint surplus. In this way, feedbacks between aggregate investment and the structure of intermediation greatly magnify the effects of shocks. The authors show that, for large shocks, financial collapse is unavoidable unless external interventions occur.

Fecht (2004) developed a theoretical model which shows that in a market-based system, banks only provide access to efficient investment to unsophisticated households, whereas in a bank-based system bank deposit contracts also offer some degree of liquidity insurance. Consequently, in a bank-based system the household sector holds a larger portfolio of deposits and a smaller part in corporate investment. Fecht argues that moderately bank-dominated financial systems are fragile because fire sales of a single troubled bank can more readily cause asset-price deterioration that propels other banks into crisis. Conversely, fire sales by distressed banks are unlikely to cause a sudden drop in asset prices sufficiently large to trigger financial contagion in either market-oriented or extremely bank-dominated financial systems. In market-based financial systems, financial markets are deep and able to absorb fire sales with limited impact on prices. Alternatively, in strongly bank-dominated financial systems banks' transactions in secondary financial markets affect only a rather limited segment of their balance sheets. Therefore, banks' market exposure is

comparatively small and they are able to buffer fire sales that have a severe impact on asset prices when markets are relatively illiquid. In contrast, in moderately bank-based financial systems banks depend on liquidity inflow from assets sales and are therefore more vulnerable to adverse price movements. Banks face considerable difficulty in compensating for the shortfall of liquidity inflows after the fire sales.

Empirical studies on the impact of financial development or capital market on macroeconomic variability provide only mixed support of the hypothesis that higher financial or capital market development leads to lower volatility. Silva (2002) applied generalized method of moments technique on cross-sectional data set and found that countries with more developed financial systems had smoother business cycle fluctuations. Interestingly, the inclusion of dummy variables representing bank-based or market-based financial structure does not affect the result and the coefficient is not significantly different from zero. Lopez and Spiegel (2002) found a significant negative relationship between financial development and income volatility from a cross-country panel, suggesting that financial development does mitigate economic fluctuations in the long run.

Denizer et al. (2000) estimated fixed effects regressions with panel data and found that countries with more developed financial sectors experience smaller fluctuations in real per capita output, consumption, and investment growth. Phumiwasana (2003) empirically investigated relationships between financial structure, volatility, and economic growth. Using panel regressions, he found evidences that bank-based financial system increases the growth volatility among developed countries, while decreases growth volatility among developing countries.

Using cross-industry and cross-country data, Raddatz (2003) estimated the effect of financial development on volatility based on differences in sensitivity to

financial conditions across industries. The results show that sectors with larger liquidity needs are more volatile and experience deeper crises in financially underdeveloped countries. The result suggests that changes in financial development can generate important differences in aggregate volatility. This finding also provides indirect support to the theory that development of financial markets reduces macroeconomic volatility because it increases the ability of intermediaries to provide liquidity during periods of distress. Moreover, he found that the development of financial intermediaries is more important than the development of equity market for the reduction of volatility.

In contrast to existing literatures, which primarily focus on the relationship between financial development and growth, this paper examines empirical relationships between capital market, financial development, and macroeconomic variability. The paper finds that output and investment volatilities are negatively related to measures of capital market development after controlling for other relevant variables. In addition, there are also some evidences that capital market development also lower consumption volatility. Empirical results support the theoretical prediction that capital market development would lead to lower volatility.

The organization of this paper is as follows. Section 2 discusses measurement issues. Section 3 discusses data construction and data description. Section 4 provides methodology. Section 5 presents estimation results. Section 6 discusses robustness issues. Lastly, section 7 covers policy implications, and conclusion.

2. Measurement Issues

Financial Development

Ideally, one would like measures of financial development, which indicate the degree to which the financial system ameliorates information asymmetry and facilitates the

mobilization and efficient allocation of capital. Particularly, one would prefer indicators that capture the effectiveness with which financial systems research firms and identify profitable investment, exert corporate control, facilitate risk management, mobilize saving, and ease transaction [Merton and Bodie (2004)]. Unfortunately, no such measures are available. As a result, one must rely on several proxies of financial development that existing empirical work shows are robustly related to economic growth or other components of aggregate output.

The most commonly used measure of financial development [e.g. Levine and King (1993), Denizer, et al. (2000)] is "Private Credit", defined as the ratio of domestic credit extended to the private sector by financial intermediaries to GDP. More specifically, domestic credit to private sector refers to financial resources provided to the private sector, such as through loans, purchases of nonequity securities, and trade credits and other accounts receivable, that establish a claim for repayment. This measure captures the amount of credit channelled through financial intermediaries to the private sector. Beck et al. (2000) show that Private Credit is a good predictor of economic growth and the positive correlation between the two is not due to reverse causality.

The alternative measure is the "Liquidity Ratio", defined as the ratio of liquid liabilities (usually M3) to GDP. Levine and King (1993) introduce this variable under the name "Financial Depth" to proxy for the overall size of the formal financial intermediary sector relative to economic activity. However, such monetary aggregates do not differentiate between the liabilities of various financial institutions, and may not be closely related to financial services such as risk management and information processing [Levine and King (1993)].

This study uses "Private Credit" as a primary measure of financial development. However, it also employs the "Liquidity Ratio" as an alternative measure for robustness check.

Capital Market

Measures of capital market development can be broadly classified into two categories: absolute and relative measures. An absolute measure identifies the level of capital market development itself without reference to other developments in the financial system. Alternatively, a relative measure attempts to measure the importance of direct financing via capital markets relative to indirect financing via financial intermediaries, particularly banks. These measures were first developed to classify financial systems as bank-based or market-based systems [Levine (2002)]. Given that these relative measures compare different components of the financial system, they can be used as measures of financial structure.

Absolute measures of capital market development usually involve the size and liquidity of stock markets and/or bond markets [Beck and Levine (2002)]. Most cross-country studies use only stock market data because bond market data are usually not available for emerging economies. The standard measure is the "Turnover Ratio", defined as the value of shares traded on domestic exchanges divided by the total value of listed shares. Basically, it indicates the trading volume of the stock market relative to its size. One advantage of this measure is that it is relatively immune to business cycle and asset price fluctuation because prices appear both in the numerator and the denominator. An alternative measure is "Value Traded", defined as the value of the trades of domestic shares on domestic exchanges divided by GDP. It measures trading relative to the size of the economy. Since value traded is the product of quantity and price, this indicator could rise just from favourable expectation of the future without

any increase in transactions activity. Turnover ratio does not suffer from this shortcoming. The other alternative measure is "Capitalization Ratio", defined as the total stock market capitalization over GDP. This measure suffers the same weakness as "Value Traded". This paper uses "Turnover Ratio" as an absolute measure of capital market development and uses "Value Traded" and "Capitalization Ratio" as alternative measures for robustness checks.

Relative measures of capital market development gauge the development of capital markets relative to that of financial intermediaries, particularly the banking sector. In the literature they are known as measures of "Financial Structure", indicating whether the financial system is market-based or bank-based. Since there is no single accepted definition of financial structure, Beck et al. (2001) construct several indicators where higher values indicate that a financial system is more market-based. They aggregate these indicators into a single financial structure index. The first indicator is Structure-Activity, which measures stock market activity relative to that of banks. It is defined as the log of the ratio of Value Traded (defined as “value of total shares traded on the stock market divided by GDP”) over Bank Credit (defined as “the claims of the banking sector on the private sector as a share of GDP”).The second indicator is Structure-Size, which compares the sizes of the stock market and the banking sector. Specifically, it is defined as the log of the ratio of Market Capitalization and Bank Credit. Market Capitalization is defined as "the value of listed shares divided by GDP." Bank Credit represents the claims of the banking sector on the private sector as a share of GDP. Compared to Private Credit, this measure focuses on the commercial banking sector only, excluding the claims of non-bank financial intermediaries. Levine (2002) also proposed another indicator, Structure-Efficiency, defined as the log of the value traded ratio multiplied by

overhead costs. Overhead costs equal the overhead costs of the banking system relative to banking system assets.

The aggregate measure of financial structure is the Structure-Aggregate index which combines the three previous measures. Specifically, it is the first principal component of Structure-Activity, Structure-Size and Structure-Efficiency. In previous studies [e.g. Levine (2002)], countries with a Structure-Aggregate index higher or equal to the sample mean are classified as having a market-based financial structure. Conversely, countries with an index lower than the sample mean are classified as having a bank-based financial structure.

This study uses the "Structure-Aggregate index" as a relative measure of capital market development. However, the structure-aggregate index was constructed as the first principal component of structure-activity and structure-size indices only. The reason is that data required to construct the structure-efficiency index are not available for a number of countries and periods.

The "Financial Structure Aggregate Index" is used mainly for robustness check, and more importantly for a comparison purpose with an absolute measure of capital market development, turnover ratio. By using the index as a relative measure of capital market development, the applied methodology here related financial structure and growth literature with this study. The interpretation of results in this study should not be that a country should pursue any particular form of "financial structure" (bank-based or market-based), but rather whether a country also need well-developed capital markets, and not only financial intermediaries, to achieve more stable financial system and lower volatilities.

Business Cycle Volatility

There are two standard measures of business cycle volatility of output, namely standard deviation of growth rates of real GDP per capita, and standard deviation of business cycle components (filtered components) of a similar variable. In the first approach, growth rate is calculated by taking log difference. The second approach [e.g. Tiryaki (2003)] focuses on the magnitude of business cycle as a measure of macro-variability. The business cycle components are estimated using filtering technique [e.g. Hodrik-Prescott filter, Bakter-King filter]. This method is widely used among macroeconomist to smooth out business cycle.

This paper applied both approaches in measuring business cycle volatility. The filtering technique applied is Chistiano-Fitzgerald (CF) band-pass filters, which extract cyclical variations that last 2 to 8 years. Cyclical fluctuations in this frequency are widely considered to be associated with the business cycle [Haug and Dewald (2004)]. The applied filter was suggested by Christiano and Fitzgerald (2003). This filter uses a non-symmetric moving average with changing weights. Every observation of a time series is filtered using the full sample. Another popular filter is the Hodrick and Prescott (1997) filter. This filter amplifies the cyclical component and downplays the high frequency noise, but it still passes much of the high-frequency noise outside the business cycle frequency [Stock and Watson (1998)]. The alternative band-pass filter that could also extract fluctuation from the 2 to 8 years frequency is Baxter and King (1995) filter. This filter is a symmetric centered moving average, where the weights are chosen to minimize the squared difference between the optimal and approximately optimal filters. The drawback of this filter, however, is that there would be loss of data at the beginning and ending of the series.

For components of aggregate output, this paper use standard deviation of gross capital formation growth rate and standard deviation of household consumption growth rate as measures of investment and consumption volatility respectively.

3. Data

The panel covers annual data of 44 countries from 1975 to 2004. Data sources are International Financial Statistics (IFS), World Development Indicators (WDI), Barro-Lee data set [Barro and Lee (2000)], Legal Origin and Creditor's Protection data set [La-Porta et al. (1998)], and Financial Structure data set [Levine (2002)]. Variable description and name list of countries in the sample classified by income level are in Appendix A and in Appendix B respectively. The annual data are transformed into six five-year-span panel data. Therefore, period 1 covers the years 1975-1979, period 2 covers 1980-1984, period 3 covers 1985-1989, period 4 covers 1990-1994, period 5 covers 1995-1999, and finally period 6 covers 2000-2004.

The transformation method is usually just the average, but for variables that measure volatilities (such as growth, or changes in terms of trade); the transformation involves the calculation of standard deviation of that variable within that particular observation period. Moreover, for robustness check, measures of financial development, capital market development, and income level are also transformed by using the initial values within the period.

The transformed variables are based on available annual data. Where the original annual data set shows missing data in certain years the transformations have been calculated if there are at least three valid data points for a given five-year time span. That criterion implies that more than 50% of observations for a given time-span

are valid. Otherwise, the data are considered missing for that particular observation in the panel.[2]

Table 1 shows business cycle volatilities across countries. Economic performance differs widely. This is true not only with growth rate but also with growth rate volatility and business cycle component volatility. Growth volatilities vary widely from very volatile of 10.2% to almost steady of 0.3%. High income countries tend to have lower both growth volatility and business cycle volatility.

Table 2 shows capital market development among countries from last period in the panel (year 2000-2004). Higher income countries tend to have more financial development, measured by private credit ratio. In addition, higher income countries also tend to have more market-based financial structure, measured by Financial Structure index. Interestingly, turnover ratio, as a measure of capital market development, does not have a stable relationship with income.

Table 3 and 4 provide descriptive statistics and correlations, respectively. Please note that many variables are already in log form (see Appendix A for variable description). Both measures of business cycle volatility, namely growth volatility (g-vol) and business cycle component volatility (b-vol) are highly positively correlated (r = 0.91). Both, investment volatility (i-vol) and consumption volatility (c-vol) are positively correlated with both measure of output volatility (g-vol, b-vol) with correlations of 0.45 and 0.40 respectively. Interestingly, both investment and consumption volatility are relatively highly correlated with correlation of 0.68.

[2] For example, the first five-year period runs from 1975-1979. If there are, say, four annual observations for variable X_1 covering the years 1976-1979, then the transformation of those data into the panel is performed by averagingtheir values. However, if the observations onX_1 cover only less than three years in any relevant five-year interval, say 1978-1979, then the relevant data point in the panel is listed as "n.a.:" (not available). This practice avoids loosing too many data points in the panel construction while the transformed data are still representative of the corresponding years.

All volatilities (g-vol, b-vol, i-vol, c-vol) are negatively correlated with financial development (credit), income (gdp), and capital market development (turnover), and market-based financial structure (struc). This implies that countries with higher financial development, more advanced capital market, and higher income tend to have lower growth volatility and lower business cycle component variations.

Capital market development (turnover) is positively correlated with financial development (credit), and income (gdp). This means that countries with higher financial development and higher income tend to have more advanced capital market.

Income (gdp) and financial development (credit) is positively correlated. The correlation is 0.58. This means that countries with high income tend to have more developed financial system.

4. Methodology

The estimated model is a reduced-form equation relating volatility, financial development, and capital market development.

$$\sigma_{it} = \beta_0 + \beta_1.FD_{it} + \beta_2.FS_{it} + \beta_3.X_{it} + \varepsilon_{it}$$

σ_{it} is a measure of volatility. Depending on the specification, it could be log of standard deviation (sd.) of growth rate of output (g-vol), investment (i-vol), or consumption (c-vol), or sd. of CF-filtered log of output (b-vol). FD is a measure of financial development, namely log of private credit ratio (credit). FS is a measure of capital market development. An absolute and a relative measure would be log of turnover ratio (turnover) and financial structure-aggregate index (struc), respectively. X is a vector of standard controlled variables [see e.g. Lopez and Spiegel (2002), Beck et al. (2003)]

The above reduced-form equation would be estimated by panel estimation; including pooled, random effects and fixed effects with robust variance [see e.g. Greene (2003) pp.314-318]. Furthermore, to take into account possible reverse causalities and endogeneity problems of financial development or capital market development, initial value of suspected variables instead of the average values of each sub-period will also be used in the estimation. In addition, instrumental variable estimation would be performed for robustness checks. Instruments for financial development are time trend, legal origin and creditor's protection index [La-Porta, et al. (1998)]. In case of panel instrumental variable estimation, instruments are time trend, creditor's protection index, and human capital index. Controlled variables (X) include the following.

Income Level [log of real gdp per capita (gdp)]

The level of income is included to control for the fact that developing countries tend to experience much more volatility than developed countries [Easterly et al. (2000)]

Openness [log of openness ratio (openness)]

The effect of trade openness on volatility is ambiguous. On one hand, reductions of barriers to trade may increase countries' susceptibility to external shocks. On the other hand, trade with other countries can reduce the impact of domestic shocks. This volume variable is measured by the share of trade (export + import) in GDP. Our analysis does not include any measure of financial openness since the empirical literature [e.g. Buch et al. (2005)] has not been able to establish a statistically significant link between financial openness and business cycle volatility.

Government Consumption Spending over GDP (gcon)

There is general consensus at least among Keynesian macroeconomists that government has a role in promoting economic stabilization. Fiscal policy is an effective tool to counter business cycles. The mean of government consumption spending over GDP is included to take this fact into account.

Standard Deviation of Changes in Real Effective Exchange Rate (sd-dreer)

One intensely debated topics of international macroeconomics is which exchange rate regime (fixed or floating) promotes greater stability of output. The answer depends on the type of shock that hits the economy. A fixed exchange rate is better if monetary shocks dominate, whereas floating is better if real shocks dominates [Karras and Song (1996)]. The standard measure of exchange-rate flexibility is the standard deviation of the real effective exchange rate. The data can be obtained from International Financial Statistics (IFS).

Standard Deviation of Changes in Terms of Trade (sd-dtot)

The standard deviation of changes in the terms of trade is a proxy for the extent to which an economy is exposed to real shocks. Raddatz (2005) finds that among low-income countries, changes in commodity price are the most important external shocks. However, since changes in the terms of trade affect the economy through relative price movements of imported input and exported output, they only affect the tradable sector of an economy directly, whereas the non-tradable sector might be affected only indirectly. Therefore, countries with large non-tradable sectors will be relatively less affected by fluctuations in the terms of trade. This fact is controlled for by including an openness ratio (ratio of trade over GDP) in the analysis.

Legal Origin

Legal systems with European origin can be classified into four major families: the English Common Law and the French, German, and Scandinavian Civil Law countries. Civil Law has its root in Roman law, and uses primarily legal codes to resolve particular cases. Unlike Civil Law, the English legal system is based on the Common Law where judges primarily formed the law in the course of trying to resolve particular cases. La-Porta, et al. (1998) show that common law countries generally have the best, and French civil law countries the worst, legal protection of investors, with German and Scandinavian civil law countries located in the middle.

Since most countries have acquired their legal system through occupation and colonization, legal origin can be regarded as relatively exogenous. In addition, La-Porta, et al. (1998) have shown that the legal origin of a country materially influences the rights of its creditors and shareholders, its accounting standards, and the efficiency of contract enforcement. Furthermore, Levine et al. (1999) have shown that legal origin explains cross-country variations in the level of financial development.

Creditor's Protection

The creditor protection index shows how well a country protects the claims of secured creditors in the case of company restructuring or liquidation. It ranges from 0 to 4 and is composed of four dummy variables that indicate whether (1) the restructuring procedure imposes an automatic stay on assets that prevents secured creditors from taking possession of loan collateral; (2) secured creditors are ranked first in the case of liquidation; (3) management does stay in charge of the firm during restructuring, thereby enhancing creditors' power; and (4) management needs creditors' consent when filing for restructuring. Basically, higher values of Creditor Protection mean that outside investors have more rights relative to the management

and other stakeholders. This implies that outside investors should be more willing to provide external finance.

5. Estimation Results

Table 5 and 6 show estimation results of growth volatility (g-vol) using turnover ratio (turnover) and financial structure aggregate index (struc), respectively. In pooled estimation, both measures are negatively significant. This suggests that higher capital market development is associated with lower growth volatility. Interestingly, private credit (credit), a measure of financial development, and income level (gdp) are not significant, though still have negative signs as expected. These results still hold after controlling for random individual effects (in RE estimation). However, using Hausman test, we reject the null hypothesis of zero correlation of individual effects and other predictors (random effects assumption) in favour of fixed effects estimation, which does not rely on this assumption. In fixed effects estimation, we rejected the hypothesis of no individual effects, using F-statistic. Furthermore, previous results still hold, and coefficients of turnover ratio (turnover) and structure index (struc) are nearly double. To avoid reverse causality, initial values of turnover ratio, financial structure index, private credit, and income level were used in fixed effects estimation (FEI). The results are still consistent with previous findings.

To take into account possible endogeneity of financial and capital market development, instrumental variable estimation (IV) were conducted. Turnover ratio (turnover) and structure index (struc) are still negatively significant and the coefficients are even more negative than those in pooled estimation. The last columns report results from fixed effects IV estimation (IVFE). Unlike in normal fixed effects, we cannot reject null hypothesis of no individual effects, using F-statistic. This

validates previous results from IV estimation. Interestingly, both turnover and struc are not significant, though still have negative signs.

Among other explanatory variables, only trade openness ratio (openness) is consistently significant across various estimation methods. After controlling for country fixed effects, higher trade openness is associated with lower growth volatility.

Table 7 and 8 show estimation results of business cycle component volatility (b-vol) using turnover ratio (turnover) and financial structure aggregate index (struc), respectively. With turnover ratio (turnover) as an absolute measure of capital market development, results are broadly similar to previous cases of growth volatility. Turnover ratio is consistently significant with negative signs across different estimation methods except in fixed effects instrumental variables estimation (IVFE). Both Hausman and F statistics justify the use of fixed effects. Using Hausman statistic, we reject null hypothesis of zero correlation between individual effects and other predictors, and using F statistic, we reject null hypothesis of no individual effects.

In sharp contrast, structure index (struc) as a relative measure of capital market development, is not significant under most estimation methods except in fixed effects using initial value data (FEI) and instrumental variable estimation (IV). However, the signs are consistently negative.

Surprisingly, private credit (credit), a measure of financial development, is almost always not significant. Income level (gdp) is negatively significant in pooled, random effects, and IV estimation, but becomes insignificant with positive signs after we controlled for fixed effects.

Among other explanatory variables, trade openness ratio (openness) and real effective exchange rate volatility (sd-dreer) are consistently significant. Similar to the

case of growth volatility, higher trade openness is associated with lower business cycle component volatility after controlling for country fixed effects. On the other hand, higher real exchange rate volatility is consistently associated with higher volatility of business cycle.

Table 9 and 10 show estimation results of investment volatility (i-growth) using turnover ratio (turnover) and financial structure aggregate index (struc), respectively. Both measures are negatively significant across all estimation methods. Using Chi2 statistics in random effects estimation, and F statistics in fixed effects estimation, we rejected null hypothesis of no individual effect. From Hausman statistics, we cannot reject hypothesis of zero correlation between individual effects and other predictors. In this case, both random and fixed effects estimators are consistent, but random effects estimator is also efficient. Interestingly, turnover ratio (turnover) and financial structure index (struc) are negatively significant even in fixed effects instrumental variable estimation (IVFE).

Private credit (credit), a measure of financial development, is negatively significant in both pooled and random effects estimation. However, though still has negative signs, it became insignificant once we controlled for possible endogeniety in IV estimation. Income level (gdp) is not significant in any estimation.

Among other explanatory variables, only real effective exchange rate volatility (sd-dreer) is consistently positively significant across various estimation methods. The results suggest that higher real exchange rate volatility is associated with higher investment volatility.

Table 11 and 12 show estimation results of consumption volatility (c-vol) using turnover ratio (turnover) and financial structure aggregate index (struc), respectively. Though, both measures are significant under certain estimation methods,

there is no evidence of robust relationship. Income level (gdp) is negatively significant under most estimation methods. This result seems to suggest that rich countries have better ways to smooth out consumption variability. Private credit, a measure of financial development, is not significant under any estimation method. Other explanatory variables are also not consistently significant, except real exchange rate volatility (sd-dreer), which is positively significant when financial structure index (struc) is used as a measure of capital market development.

6. Robustness Check

For robustness check, estimations are also performed using alternative measures of financial and capital market development. More specifically, liquidity ratio (M3/GDP) is used instead of private credit ratio (private credit/GDP) to measure a degree of financial development. Value traded ratio (stock value traded/GDP) and market capitalization ratio (stock market capitalization/GDP) are used instead of turnover ratio (stock value traded/stock market capitalization) as a measure of capital market development. The results, not reported here, are that major findings from previous sections do not materially change with alternative measures. In both growth volatility and investment volatility regressions, coefficients of value traded ratio and market capitalization ratio are consistently significant with negative sign. However, they are not significant in explaining consumption growth volatility, but this is the same result we found with turnover ratio and private credit ratio.

Other plausible relevant variables (e.g. standard deviation of inflation, average inflation rate, and investment ratio) are also included in the estimation, but have never been significant. Therefore, they are dropped from the reported tables.

7. Policy Implications and Conclusion

The above econometric analysis supports theoretical prediction that the development of capital markets reduces output, investment, and consumption volatilities. The coefficients of alternative measures of capital market development are significant in most specifications with negative signs. Nevertheless, the values of the coefficients are rather small, always less than unity. This raises the question whether the effect of capital market development on aggregate volatility is economically meaningful, even if it is statistically significant.

To investigate the above question, the simple calculation below use a coefficient of log of turnover ratio (turnover) from fixed effects estimation (FEI) of growth volatility in Table 5 as a benchmark. The coefficient is -0.16. The inter-quartile range of turnover ratio in the sample is 49.36. In terms of log difference, it is 1.67. Therefore, the effect of an inter-quartile improvement in turnover ratio is -0.27 (-0.16 * 1.67) or a reduction of 27% of volatility (note that: the left-hand side variable is log of volatility). The average growth volatility is 2.1%. Therefore, a decrease of 27% would mean a decrease of 0.50 percentage point (2.1-2.1*exp(-0.27)) in standard deviation of growth rate.

In summary, capital market does exert a statistically significant influence on volatility, and the magnitude of the decrease in volatility is quite large. However, when we measure the change in absolute terms as the proportionate change of the standard deviation of growth, then the size of the effect seems to be quite small, approximately half a percentage point.

To conclude, this chapter investigates the effect of capital market development on output, investment and consumption volatilities in forty-four countries using data from 1975 to 2004 period. The main result is that output, investment and consumption

volatilities are negatively related to measures of capital market development after controlling for other relevant variables. Hence, the empirical findings corroborate the theoretical prediction that more advaced capital market is associated with lower volatilities.

Interestingly, econometric analysis here could not find robust negative relationship between financial development and output volatility as in previous studies [e.g. Silva (2002), Tiryaki (2003)]. Nevertheless, the evidence here suggests that there is a significant negative relationship between financial development and investment volatility. This study also found that income level (gdp) has a relatively robust negative relationship with consumption volatility.

The next interesting question would be whether capital market development affects economic stability in some other ways. It may be the case that capital market development affects the likelihood of a recession occurring, or its depth. Moreover, little is known about the mechanism by which the deepening of capital markets affects aggregate volatility. These are interesting topics for future research.

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Table 1: Business Cycle Volatility (%) classified by Income Level.
(Data cover six 5-year time span from 1975-2004 for 44 countries)

	Standard deviation of growth rate (%)				Standard deviation of filtered log GDP p.c. (%)			
COUNTRY	Mean	Median	Max	Min	Mean	Median	Max	Min
High Income	**1.8**	**1.6**	**6.4**	**0.3**	**1.2**	**1.0**	**3.9**	**0.2**
Australia	1.8	1.4	4.1	0.7	1.1	1.0	2.4	0.4
Belgium	1.6	1.8	1.9	0.9	0.9	1.0	1.2	0.6
Canada	1.8	1.4	3.3	0.7	1.3	1.2	2.0	0.6
Denmark	1.8	2.0	2.4	0.3	1.0	1.1	1.4	0.5
Finland	1.9	1.6	3.0	1.1	1.3	1.3	2.1	0.4
France	1.0	1.1	1.5	0.5	0.7	0.7	0.8	0.5
Germany	1.2	1.1	2.7	0.6	1.0	1.0	1.4	0.5
Greece	1.8	1.8	2.9	0.6	1.1	1.1	2.3	0.2
Iceland	2.6	3.0	3.2	1.3	1.3	1.6	1.9	0.3
Ireland	3.0	3.0	3.7	2.0	1.8	1.9	2.3	1.4
Israel	2.5	2.3	4.5	1.2	1.7	1.9	2.5	0.5
Italy	1.1	1.1	1.8	0.4	0.7	0.7	1.1	0.4
Japan	1.3	1.5	2.0	0.6	0.8	0.9	1.3	0.2
Korea, South	2.7	1.8	6.0	1.2	1.9	1.7	3.9	0.8
Netherlands	1.6	1.6	2.0	1.2	1.0	0.9	2.0	0.5
New Zealand	2.1	1.9	3.3	0.8	1.1	1.0	2.1	0.6
Norway	1.4	1.3	2.2	1.0	1.0	0.9	1.7	0.5
Portugal	1.8	2.2	2.5	0.4	0.9	0.9	1.1	0.7
Singapore	3.9	3.8	6.4	0.8	2.5	2.9	3.3	1.4
Spain	1.4	1.3	2.2	0.8	0.6	0.6	1.1	0.2
Sweden	1.3	1.3	2.1	0.3	0.9	0.9	1.3	0.5
Switzerland	1.7	1.6	2.6	1.1	1.2	1.1	1.8	0.7
United Kingdom	1.2	1.0	2.2	0.5	1.0	1.1	1.2	0.6
United States	1.7	1.3	4.0	0.8	1.3	1.1	2.2	0.8
Upper Middle Income	**3.9**	**3.3**	**10.2**	**0.6**	**2.7**	**2.1**	**6.5**	**1.0**
Argentina	6.1	6.2	8.8	3.5	4.2	4.0	5.6	2.9
Brazil	3.2	2.8	5.4	1.6	1.9	1.6	3.8	1.1
Chile	4.3	3.7	7.4	2.7	2.7	1.9	5.7	1.6
Malaysia	3.2	2.9	7.2	0.6	2.3	2.1	4.6	1.1
Mexico	3.1	2.9	5.3	1.0	1.7	1.6	2.7	1.2
South Africa	2.0	1.7	3.9	0.8	1.7	1.7	2.1	1.0
Uruguay	4.7	3.6	9.1	1.9	3.3	2.9	5.4	2.2
Venezuela	4.9	4.3	10.2	2.2	3.4	3.2	6.5	1.9
Lower Middle Income	**3.4**	**2.6**	**7.9**	**0.7**	**2.2**	**2.1**	**5.8**	**0.3**
Columbia	1.8	1.6	3.6	0.7	1.0	0.9	2.1	0.3
Ecuador	2.6	2.6	3.6	1.6	1.6	1.6	2.0	0.9
Indonesia	4.1	2.6	7.9	2.1	2.8	1.9	5.5	1.2
Morocco	4.5	4.5	7.1	2.0	2.5	2.6	3.4	1.3
Philippines	3.3	2.5	5.8	2.0	2.6	2.5	3.8	1.2
Thailand	2.8	2.0	7.6	0.9	1.8	1.5	4.6	0.4
Turkey	4.8	4.7	5.9	3.6	2.9	2.7	3.7	2.3

Table 1 (continued)

	Standard deviation of growth rate (%)				Standard deviation of filtered log GDP p.c. (%)			
COUNTRY	Mean	Median	Max	Min	Mean	Median	Max	Min
Low Income	**3.2**	**2.6**	**9.0**	**0.4**	**2.2**	**1.8**	**5.7**	**0.4**
China	3.1	3.4	5.5	0.4	1.9	1.9	3.8	0.4
Cote d'Ivoire	2.9	2.6	6.5	0.7	2.4	2.5	4.3	0.5
India	2.4	2.1	5.6	1.2	1.8	1.6	3.4	0.8
Nigeria	5.3	4.5	9.0	3.2	3.4	3.3	5.7	1.4
Pakistan	2.1	1.9	3.1	1.6	1.5	1.6	2.1	0.9
All	**2.6**	**2.1**	**10.2**	**0.3**	**1.7**	**1.4**	**6.5**	**0.2**

Table 2: Capital Market Development among countries
(Data cover last panel period of year 2000-2004 for 44 countries)

COUNTRY	Private Credit Ratio	Turnover Ratio	Financial Structure Index
High Income	**113.6**	**91.9**	**1.3**
Australia	93.6	69.8	1.7
Belgium	76.4	21.3	0.8
Canada	81.0	65.1	1.8
Denmark	147.8	69.7	0.6
Finland	61.0	94.3	2.7
France	87.6	81.5	1.5
Germany	116.2	118.1	0.8
Greece	66.7	42.0	1.2
Iceland	125.0	57.6	1.0
Ireland	117.2	40.1	0.7
Israel	91.2	62.7	1.2
Italy	82.7	105.8	1.1
Japan	151.6	79.2	0.3
Korea, South	97.6	289.4	1.5
Netherlands	149.9	120.9	1.6
New Zealand	115.4	41.3	0.2
Norway	68.6	88.3	1.1
Portugal	146.7	55.0	0.3
Singapore	115.2	54.1	2.1
Spain	108.7	179.0	1.5
Sweden	91.7	112.0	1.9
Switzerland	158.4	86.2	2.1
United Kingdom	143.4	103.4	1.8
United States	232.4	169.7	1.3
Upper Middle Income	**57.3**	**22.1**	**0.9**
Argentina	16.3	6.5	1.0
Brazil	35.4	34.6	0.4
Chile	64.0	8.7	1.1
Malaysia	141.2	30.3	1.2
Mexico	17.3	27.4	0.7
South Africa	124.1	45.5	1.6
Uruguay	49.4	n.a.	n.a.
Venezuela	11.0	1.7	0.0

Table 2 (continued)

COUNTRY	Private Credit Ratio	Turnover Ratio	Financial Structure Index
Lower Middle Income	**39.0**	**75.0**	**0.2**
Columbia	24.5	4.0	-0.6
Ecuador	24.2	2.0	-1.3
Indonesia	20.4	229.5	1.0
Morocco	56.1	8.0	-0.3
Philippines	37.1	11.5	0.6
Thailand	101.4	96.8	0.8
Turkey	19.2	173.2	1.4
Low Income	**44.4**	**125.8**	**0.6**
China	134.8	100.1	0.4
Cote d'Ivoire	14.7	1.7	-0.4
India	31.9	145.1	1.4
Nigeria	15.4	10.5	0.5
Pakistan	25.3	371.7	1.2
All	**82.6**	**81.7**	**1.0**

Table 3: Descriptive Statistics

	Mean	Median	Maximum	Minimum	Std. Dev.	Observations
G-VOL	0.7	0.8	2.3	-1.3	0.7	270
B-VOL	0.3	0.3	1.9	-1.5	0.7	270
C-VOL	1.1	1.0	8.2	-0.9	1.0	247
I-VOL	2.3	2.2	5.6	-0.1	0.7	251
TURNOVER	3.2	3.5	5.9	-1.0	1.3	230
STRUC	0.0	0.2	2.7	-4.8	1.3	225
CREDIT	3.9	4.0	5.4	-0.1	0.8	269
GDP	9.1	9.4	10.5	6.5	1.0	270
OPENNESS	4.0	4.0	5.8	2.3	0.6	270
GCON	16.2	15.5	38.7	0.0	5.7	270
SD-DREER	7.6	5.3	47.7	0.5	7.3	222
SD-DTOT	7.0	4.6	44.6	0.6	6.9	242

Table 4: Selected pairwise correlations

	G-VOL	B-VOL	C-VOL	I-VOL	TURNOVER	STRUC	CREDIT	GDP	OPENNESS	GCON	SD-DREER	SD-DTOT
G-VOL	1.00											
B-VOL	0.82	1.00										
C-VOL	0.40	0.40	1.00									
I-VOL	0.45	0.45	0.68	1.00								
TURNOVER	-0.25	-0.27	-0.23	-0.40	1.00							
STRUC	-0.17	-0.15	-0.31	-0.27	0.57	1.00						
CREDIT	-0.37	-0.35	-0.32	-0.40	0.45	0.40	1.00					
GDP	-0.38	-0.43	-0.38	-0.27	0.37	0.37	0.58	1.00				
OPENNESS	-0.03	-0.04	-0.07	0.01	-0.01	0.34	0.23	0.24	1.00			
GCON	-0.33	-0.34	-0.21	-0.17	0.07	0.16	0.31	0.52	0.28	1.00		
SD-DREER	0.33	0.38	0.28	0.34	-0.30	-0.17	-0.33	-0.39	-0.17	-0.24	1.00	
SD-DTOT	0.20	0.23	0.21	0.23	-0.34	-0.38	-0.45	-0.50	-0.22	-0.36	0.46	1.00

Table 5: Growth Volatility - using absolute measure of capital market development

G-VOL	Pool	RE	FE	FEI	IV	IVFE
TURNOVER	-0.10***	-0.11***	-0.17**	-0.16**	-0.29**	-0.03
	(0.04)	(0.04)	(0.08)	(0.07)	(0.13)	(0.22)
CREDIT	-0.07	-0.04	0.12	0.08	0.26	-1.02
	(0.12)	(0.13)	(0.19)	(0.18)	(0.33)	(0.70)
GDP	-0.11	-0.13	0.39	0.61	-0.14	0.87
	(0.09)	(0.10)	(0.43)	(0.38)	(0.14)	(0.86)
OPENNESS	0.31***	0.28***	-0.63**	-0.70***	0.24***	-0.54
	(0.07)	(0.08)	(0.29)	(0.27)	(0.09)	(0.44)
GCON	-0.03***	-0.03***	0.03	0.03	-0.03***	0.03
	(0.01)	(0.01)	(0.02)	(0.02)	(0.01)	(0.03)
SD-DREER	0.02***	0.02***	0.01	0.01	0.03***	0.05***
	(0.01)	(0.01)	(0.01)	(0.01)	(0.01)	(0.01)
SD-DTOT	-0.02*	-0.02*	-0.02	-0.01	-0.03**	-0.02
	(0.01)	(0.01)	(0.01)	(0.01)	(0.01)	(0.02)
Observations	177.00	177.00	177.00	177.00	163.00	149.00
No. of countries	-	44.00	44.00	44.00	-	40.00
R2	0.30	0.03	0.12	0.14	0.23	0.00
F / Chi2	10.48***	53.43***	3.33***	3.78***	11.56***	177.64***
F_u / $Chi2_u$	-	0.35	1.74***	1.86***	-	1.04
Correlation(Xb, u_i)	-	-	-0.86	-0.91	-	-0.80
Hausman	-	31.35***	-	-	-	-
J stat	-		-	-	0.45	0.05

Note: robust standard error in parenthesis. * sig. at 10%, ** sig. at 5%, *** sig. at 1%
Pool= pooled estimation, RE = random effects, FE= fixed effects, FEI= fixed effects using initial value data of lturnover, lcredit and lgdp, IV= instrumental variable estimation (instruments: time trend, legal origin, creditor's protection index), IVFE= fixed effects instrumental estimation (instruments: time trend, creditor's protection index, human capital index)

R2 = R^2 or Within-R^2 [squared correlation between $(y_{it} - \overline{y}_i)$ and $(x_{it} - \overline{x}_i).\hat{\beta}$]
F / Chi2 = F or Chi2 statistics for testing sig. of all Xs except constant
F_u / $Chi2_u$ = F or Chi2 statistics for testing sig. of cross-sectional individual effects,
Corr(Xb,u_i)= correlation of predicted valued (Xb) and individual fixed effects (u_i)
Hausman = Hausman Chi2 statistics for testing of no-correlation between u_i and Xs
J stat = J statistics for GMM overeidentifying test

Table 6: Growth Volatility - using relative measure of capital market development

G-VOL	Pool	RE	FE	FEI	IV	IVFE
STRUC	-0.07**	-0.08**	-0.16**	-0.19***	-0.13*	-0.04
	(0.04)	(0.04)	(0.07)	(0.07)	(0.08)	(0.19)
CREDIT	-0.12	-0.09	0.01	-0.05	0.07	-1.05
	(0.12)	(0.13)	(0.19)	(0.19)	(0.30)	(0.72)
GDP	-0.11	-0.13	0.57	0.87**	-0.18	0.94
	(0.09)	(0.10)	(0.41)	(0.40)	(0.14)	(0.99)
OPENNESS	0.36***	0.34***	-0.53*	-0.52	0.39***	-0.50
	(0.08)	(0.09)	(0.30)	(0.33)	(0.07)	(0.49)
GCON	-0.03***	-0.02**	0.03	0.03	-0.03***	0.03
	(0.01)	(0.01)	(0.02)	(0.02)	(0.01)	(0.03)
SD-DREER	0.03***	0.03***	0.02*	0.02*	0.03***	0.05***
	(0.01)	(0.01)	(0.01)	(0.01)	(0.01)	(0.01)
SD-DTOT	-0.02	-0.02*	-0.02	-0.02	-0.02**	-0.02
	(0.01)	(0.01)	(0.01)	(0.01)	(0.01)	(0.02)
Observations	177.00	177.00	177.00	173.00	164.00	150.00
No. of countries	-	44.00	44.00	45.00	-	41.00
R2	0.29	0.03	0.12	0.13	0.29	0.00
F / Chi2	11.11***	56.41***	3.04***	2.87***	13.21***	182.97***
F_u / $Chi2_u$	-	0.45	1.80***	1.79***	-	1.09
Correlation(Xb, u_i)	-	-	-0.90	-0.93	-	-0.81
Hausman	-	32.99***	-	-	-	-
J stat	-	-	-	-	3.22	0.02

Note: robust standard error in parenthesis. * sig. at 10%, ** sig. at 5%, *** sig. at 1%
Pool= pooled estimation, RE = random effects, FE= fixed effects, FEI= fixed effects using initial value data of lturnover, lcredit and lgdp, IV= instrumental variable estimation (instruments: time trend, legal origin, creditor's protection index), IVFE= fixed effects instrumental estimation (instruments: time trend, creditor's protection index, human capital index)

R2 = R^2 or Within-R^2 [squared correlation between $(y_{it} - \overline{y}_i)$ and $(x_{it} - \overline{x}_i).\hat{\beta}$]
F / Chi2 = F or Chi2 statistics for testing sig. of all Xs except constant
F_u / $Chi2_u$ = F or Chi2 statistics for testing sig. of cross-sectional individual effects,
Corr(Xb,u_i)= correlation of predicted valued (Xb) and individual fixed effects (u_i)
Hausman = Hausman Chi2 statistics for testing of no-correlation between u_i and Xs
J stat = J statistics for GMM overeidentifying test

Table 7: Business Cycle Volatility - using absolute measure of capital market development

B-VOL	Pool	RE	FE	FEI	IV	IVFE
TURNOVER	-0.10***	-0.12***	-0.15***	-0.14***	-0.39***	-0.01
	(0.04)	(0.04)	(0.06)	(0.05)	(0.12)	(0.16)
CREDIT	0.02	0.10	0.15	0.10	0.73**	-0.07
	(0.11)	(0.12)	(0.15)	(0.13)	(0.37)	(0.51)
GDP	-0.15*	-0.22**	0.32	0.50*	-0.29**	0.00
	(0.08)	(0.11)	(0.34)	(0.29)	(0.15)	(0.62)
OPENNESS	0.26***	0.03	-1.02***	-1.07***	0.18*	-1.16***
	(0.08)	(0.13)	(0.28)	(0.27)	(0.10)	(0.32)
GCON	-0.02	0.00	0.05**	0.05**	-0.02	0.03
	(0.01)	(0.01)	(0.02)	(0.02)	(0.01)	(0.03)
SD-DREER	0.03***	0.02***	0.02**	0.02**	0.03***	0.04***
	(0.01)	(0.01)	(0.01)	(0.01)	(0.01)	(0.01)
SD-DTOT	-0.01	-0.01	0.00	0.00	-0.02	-0.02
	(0.01)	(0.01)	(0.01)	(0.01)	(0.01)	(0.01)
Observations	177.00	177.00	177.00	177.00	163.00	149.00
No. of countries	-	44.00	44.00	44.00	-	40.00
R2	0.31	0.10	0.24	0.25	-	0.28
F / Chi2	8.17***	32.03***	5.56***	5.77***	8.83***	78.75***
F_u / $Chi2_u$	-	7.98***	3.62***	3.81***	-	3.13***
Correlation(Xb, u_i)	-	-	-0.86	-0.89	-	-0.81
Hausman	-	22.00***	-	-	-	-
J stat	-	-	-	-	0.35	0.04

Note: robust standard error in parenthesis. * sig. at 10%, ** sig. at 5%, *** sig. at 1%
Pool= pooled estimation, RE = random effects, FE= fixed effects, FEI= fixed effects using initial value data of lturnover, lcredit and lgdp, IV= instrumental variable estimation (instruments: time trend, legal origin, creditor's protection index), IVFE= fixed effects instrumental estimation (instruments: time trend, creditor's protection index, human capital index)

R2 = R^2 or Within-R^2 [squared correlation between $(y_{it} - \overline{y}_i)$ and $(x_{it} - \overline{x}_i).\hat{\beta}$]
F / Chi2 = F or Chi2 statistics for testing sig. of all Xs except constant
F_u / $Chi2_u$ = F or Chi2 statistics for testing sig. of cross-sectional individual effects,
Corr(Xb,u_i)= correlation of predicted valued (Xb) and individual fixed effects (u_i)
Hausman = Hausman Chi2 statistics for testing of no-correlation between u_i and Xs
J stat = J statistics for GMM overeidentifying test

Table 8: Business Cycle Volatility - using relative measure of capital market development

B-VOL	Pool	RE	FE	FEI	IV	IVFE
STRUC	-0.03	-0.06	-0.09	-0.12**	-0.20**	-0.02
	(0.04)	(0.05)	(0.06)	(0.05)	(0.09)	(0.14)
CREDIT	-0.04	0.03	0.08	0.00	0.54	-0.08
	(0.12)	(0.13)	(0.15)	(0.13)	(0.36)	(0.52)
GDP	-0.17**	-0.24**	0.33	0.59*	-0.36**	0.04
	(0.09)	(0.12)	(0.33)	(0.31)	(0.16)	(0.71)
OPENNESS	0.29***	0.08	-1.01***	-0.97***	0.37***	-1.14***
	(0.09)	(0.13)	(0.30)	(0.33)	(0.09)	(0.36)
GCON	-0.01	0.00	0.05**	0.05**	-0.02	0.04
	(0.01)	(0.01)	(0.02)	(0.02)	(0.01)	(0.03)
SD-DREER	0.03***	0.03***	0.02**	0.02**	0.04***	0.04***
	(0.01)	(0.01)	(0.01)	(0.01)	(0.01)	(0.01)
SD-DTOT	-0.01	-0.01	-0.01	-0.01	-0.01	-0.02
	(0.01)	(0.01)	(0.01)	(0.01)	(0.01)	(0.01)
Observations	177.00	177.00	177.00	173.00	164.00	150.00
No. of countries	-	44.00	44.00	45.00	-	41.00
R2	0.29	0.08	0.22	0.22	0.08	0.28
F / Chi2	8.20***	31.42***	4.25***	4.18***	9.49***	82.41***
F_u / $Chi2_u$	-	8.75***	3.64***	3.56***	-	3.42***
Correlation(Xb, u_i)	-	-	-0.88	-0.91	-	-0.81
Hausman	-	113.44***	-	-	-	-
J stat	-	-	-	-	4.07	0.03

Note: robust standard error in parenthesis. * sig. at 10%, ** sig. at 5%, *** sig. at 1%
Pool= pooled estimation, RE = random effects, FE= fixed effects, FEI= fixed effects using initial value data of lturnover, lcredit and lgdp, IV= instrumental variable estimation (instruments: time trend, legal origin, creditor's protection index), IVFE= fixed effects instrumental estimation (instruments: time trend, creditor's protection index, human capital index)

R2 = R^2 or Within-R^2 [squared correlation between $(y_{it} - \overline{y}_i)$ and $(x_{it} - \overline{x}_i).\hat{\beta}$]
F / Chi2 = F or Chi2 statistics for testing sig. of all Xs except constant
F_u / $Chi2_u$ = F or Chi2 statistics for testing sig. of cross-sectional individual effects,
Corr(Xb,u_i)= correlation of predicted valued (Xb) and individual fixed effects (u_i)
Hausman = Hausman Chi2 statistics for testing of no-correlation between u_i and Xs
J stat = J statistics for GMM overeidentifying test

Table 9: Investment Volatility - using absolute measure of capital market development

I-VOL	Pool	RE	FE	FEI	IV	IVFE
TURNOVER	-0.19***	-0.18***	-0.17***	-0.15***	-0.32***	-0.31*
	(0.05)	(0.05)	(0.06)	(0.06)	(0.11)	(0.17)
CREDIT	-0.28***	-0.20*	-0.13	-0.12	-0.03	-0.40
	(0.11)	(0.11)	(0.13)	(0.14)	(0.33)	(0.57)
GDP	0.11	-0.07	-0.36	-0.21	0.06	0.58
	(0.09)	(0.12)	(0.43)	(0.38)	(0.17)	(0.84)
OPENNESS	0.14	0.00	-0.09	-0.20	0.11	-0.45
	(0.12)	(0.16)	(0.31)	(0.31)	(0.11)	(0.38)
GCON	-0.02*	0.00	0.04	0.04	-0.03**	0.00
	(0.01)	(0.02)	(0.03)	(0.03)	(0.01)	(0.03)
SD-DREER	0.02***	0.02***	0.02**	0.02***	0.02**	0.03***
	(0.01)	(0.01)	(0.01)	(0.01)	(0.01)	(0.01)
SD-DTOT	0.00	0.00	0.00	0.00	0.00	-0.01
	(0.01)	-(0.01)	(0.01)	(0.01)	(0.01)	(0.01)
Observations	166.00	166.00	166.00	166.00	152.00	138.00
No. of countries	-	42.00	42.00	42.00	-	38.00
R2	0.30	0.18	0.21	0.19	0.32	0.22
F / Chi2	11.75***	51.67***	4.53***	3.84***	10.37***	2576.02***
F_u / $Chi2_u$	-	93.13***	4.78***	4.77***	-	3.37***
Correlation(Xb, u_i)	-	-	-0.27	-0.14	-	-0.43
Hausman	-	-1.32	-	-	-	-
J stat	-	-	-	-	3.35	0.56

Note: robust standard error in parenthesis. * sig. at 10%, ** sig. at 5%, *** sig. at 1%
Pool= pooled estimation, RE = random effects, FE= fixed effects, FEI= fixed effects using initial value data of lturnover, lcredit and lgdp, IV= instrumental variable estimation (instruments: time trend, legal origin, creditor's protection index), IVFE= fixed effects instrumental estimation (instruments: time trend, creditor's protection index, human capital index)

R2 = R^2 or Within-R^2 [squared correlation between $(y_{it} - \overline{y}_i)$ and $(x_{it} - \overline{x}_i).\hat{\beta}$]
F / Chi2 = F or Chi2 statistics for testing sig. of all Xs except constant
F_u / $Chi2_u$ = F or Chi2 statistics for testing sig. of cross-sectional individual effects,
Corr(Xb,u_i)= correlation of predicted valued (Xb) and individual fixed effects (u_i)
Hausman = Hausman Chi2 statistics for testing of no-correlation between u_i and Xs
J stat = J statistics for GMM overeidentifying test

Table 10: Investment Volatility - using relative measure of capital market development

I-VOL	Pool	RE	FE	FEI	IV	IVFE
STRUC	-0.13 *	-0.12 *	-0.11 *	-0.15 ***	-0.26 ***	-0.31 *
	(0.07)	(0.06)	(0.06)	(0.06)	(0.08)	(0.17)
CREDIT	-0.37 ***	-0.29 ***	-0.23 *	-0.23	-0.04	-0.55
	(0.10)	(0.11)	(0.14)	(0.15)	(0.32)	(0.62)
GDP	0.09	-0.09	-0.31	0.04	-0.01	1.00
	(0.10)	(0.13)	(0.43)	(0.42)	(0.17)	(1.03)
OPENNESS	0.22 *	0.06	-0.06	-0.16	0.27 **	-0.14
	(0.12)	(0.17)	(0.33)	(0.36)	(0.12)	(0.44)
GCON	-0.01	0.01	0.04	0.05	-0.02	0.03
	(0.01)	(0.02)	(0.03)	(0.03)	(0.01)	(0.03)
SD-DREER	0.03 ***	0.02 ***	0.02 ***	0.03 ***	0.03 ***	0.04 ***
	(0.01)	(0.01)	(0.01)	(0.01)	(0.01)	(0.01)
SD-DTOT	0.00	0.00	-0.01	-0.01	0.00	-0.01
	(0.01)	(0.01)	(0.01)	(0.01)	(0.01)	(0.01)
Observations	166.00	166.00	166.00	161.00	153.00	139.00
No. of countries	-	42.00	42.00	42.00	-	39.00
R2	0.27	0.17	0.19	0.19	0.21	0.12
F / Chi2	8.75 ***	41.89 ***	4.10 ***	4.64 ***	9.40 ***	2328.14 ***
F_u / $Chi2_u$	-	88.15 ***	4.84 ***	4.32 ***	-	3.22 ***
Correlation(Xb, u_i)	-	-	-0.19	-0.14	-	-0.72
Hausman	-	8.21	-	-	-	-
J stat	-	-	-	-	2.05	0.32

Note: robust standard error in parenthesis. * sig. at 10%, ** sig. at 5%, *** sig. at 1%
Pool= pooled estimation, RE = random effects, FE= fixed effects, FEI= fixed effects using initial value data of lturnover, lcredit and lgdp, IV= instrumental variable estimation (instruments: time trend, legal origin, creditor's protection index), IVFE= fixed effects instrumental estimation (instruments: time trend, creditor's protection index, human capital index)

R2 = R^2 or Within-R^2 [squared correlation between $(y_{it} - \overline{y}_i)$ and $(x_{it} - \overline{x}_i).\hat{\beta}$]
F / Chi2 = F or Chi2 statistics for testing sig. of all Xs except constant
F_u / $Chi2_u$ = F or Chi2 statistics for testing sig. of cross-sectional individual effects,
Corr(Xb,u_i)= correlation of predicted valued (Xb) and individual fixed effects (u_i)
Hausman = Hausman Chi2 statistics for testing of no-correlation between u_i and Xs
J stat = J statistics for GMM overeidentifying test

Table 11: Consumption Volatility - using absolute measure of capital market development

C-VOL	Pool	RE	FE	FEI	IV	IVFE
TURNOVER	-0.09	-0.13 **	-0.11	-0.04	-0.35 **	-0.48 ***
	(0.06)	(0.06)	(0.08)	(0.07)	(0.18)	(0.18)
CREDIT	-0.17	0.07	0.33	0.24	0.10	0.39
	(0.12)	(0.12)	(0.21)	(0.22)	(0.45)	(0.62)
GDP	-0.25 **	-0.48 ***	-1.74 ***	-1.44 **	-0.27	-0.54
	(0.11)	(0.17)	(0.71)	(0.66)	(0.24)	(0.92)
OPENNESS	0.19	0.05	0.51	0.21	0.17	0.16
	(0.11)	(0.17)	(0.42)	(0.41)	(0.13)	(0.41)
GCON	-0.01	0.01	0.01	0.02	-0.02	-0.03
	(0.02)	(0.02)	(0.04)	(0.03)	(0.02)	(0.03)
SD-DREER	0.02 ***	0.02 *	0.01	0.01	0.01	0.02
	(0.01)	(0.01)	(0.01)	(0.01)	(0.01)	(0.01)
SD-DTOT	-0.01	-0.01	-0.01	-0.01	-0.02	-0.01
	(0.01)	(0.01)	(0.01)	(0.01)	(0.01)	(0.01)
Observations	166.00	166.00	166.00	166.00	152.00	138.00
No. of countries	-	42.00	42.00	42.00	-	38.00
R2	0.19	0.15	0.19	0.15	0.16	0.12
F / Chi2	10.46 ***	33.72 ***	3.68 ***	2.57 **	12.43 ***	439.50 ***
F_u / $Chi2_u$	-	169.30 ***	7.56 ***	7.14 ***	-	6.58 ***
Correlation(Xb, u_i)	-	-	-0.81	-0.70	-	-0.45
Hausman	-	4.53	-	-	-	-
J stat	-	-	-	-	3.64	0.23

Note: robust standard error in parenthesis. * sig. at 10%, ** sig. at 5%, *** sig. at 1%
Pool= pooled estimation, RE = random effects, FE= fixed effects, FEI= fixed effects using initial value data of lturnover, lcredit and lgdp, IV= instrumental variable estimation (instruments: time trend, legal origin, creditor's protection index), IVFE= fixed effects instrumental estimation (instruments: time trend, creditor's protection index, human capital index)

R2 = R^2 or Within-R^2 [squared correlation between $(y_{it} - \overline{y}_i)$ and $(x_{it} - \overline{x}_i).\hat{\beta}$]
F / Chi2 = F or Chi2 statistics for testing sig. of all Xs except constant
F_u / $Chi2_u$ = F or Chi2 statistics for testing sig. of cross-sectional individual effects,
Corr(Xb,u_i)= correlation of predicted valued (Xb) and individual fixed effects (u_i)
Hausman = Hausman Chi2 statistics for testing of no-correlation between u_i and Xs
J stat = J statistics for GMM overeidentifying test

Table 12: Consumption Volatility - using relative measure of capital market development

C-VOL	Pool	RE	FE	FEI	IV	IVFE
STRUC	-0.20 *	-0.16	-0.11	-0.08	-0.21 **	-0.46 **
	(0.11)	(0.10)	(0.08)	(0.07)	(0.11)	(0.19)
CREDIT	-0.18	0.00	0.25	0.19	0.21	0.17
	(0.11)	(0.12)	(0.20)	(0.23)	(0.42)	(0.68)
GDP	-0.20	-0.43 **	-1.61 ***	-1.32 **	-0.41 *	0.04
	(0.14)	(0.19)	(0.61)	(0.68)	-(0.22)	(1.13)
OPENNESS	0.30 ***	0.18	0.57	0.39	0.29 **	0.62
	(0.12)	(0.19)	(0.46)	(0.44)	(0.12)	(0.48)
GCON	-0.01	0.01	0.01	0.02	-0.01	0.02
	(0.02)	(0.02)	(0.04)	(0.03)	(0.02)	(0.04)
SD-DREER	0.03 ***	0.02 **	0.01	0.02 ***	0.03 ***	0.03 **
	(0.01)	(0.01)	(0.01)	(0.01)	(0.01)	(0.01)
SD-DTOT	-0.02	-0.01	-0.01	-0.01	-0.02	-0.01
	(0.01)	(0.01)	(0.01)	(0.01)	(0.01)	(0.02)
Observations	166.00	166.00	166.00	161.00	153.00	139.00
No. of countries	-	42.00	42.00	42.00	-	39.00
R2	0.22	0.15	0.19	0.19	0.21	0.00
F / Chi2	11.04 ***	33.75 ***	3.25 ***	3.77 ***	13.93 ***	385.87 ***
F_u / $Chi2_u$	-	157.02 ***	7.09 ***	6.77 ***	-	5.49 ***
Correlation(Xb, u_i)	-	-	-0.77	-0.65	-	-0.32
Hausman	-	6.01	-	-	-	-
J stat	-	-	-	-	5.00 *	0.42

Note: robust standard error in parenthesis. * sig. at 10%, ** sig. at 5%, *** sig. at 1%
Pool= pooled estimation, RE = random effects, FE= fixed effects, FEI= fixed effects using initial value data of lturnover, lcredit and lgdp, IV= instrumental variable estimation (instruments: time trend, legal origin, creditor's protection index), IVFE= fixed effects instrumental estimation (instruments: time trend, creditor's protection index, human capital index)

R2 = R^2 or Within-R^2 [squared correlation between $(y_{it} - \overline{y}_i)$ and $(x_{it} - \overline{x}_i).\hat{\beta}$]
F / Chi2 = F or Chi2 statistics for testing sig. of all Xs except constant
F_u / $Chi2_u$ = F or Chi2 statistics for testing sig. of cross-sectional individual effects,
Corr(Xb,u_i)= correlation of predicted valued (Xb) and individual fixed effects (u_i)
Hausman = Hausman Chi2 statistics for testing of no-correlation between u_i and Xs
J stat = J statistics for GMM overeidentifying test

Appendix A: Variables

Variables	Description
g-vol	log (sd. of growth rate of gdp per capita)
b-vol	log (sd. of business cycle component of gdp per capita)
c-vol	log (sd. of household consumption growth rate)
i-vol	log (sd. of gross capital formation growth rate)
turnover	log (turnover ratio) = log (value of shares traded / GDP)
struc	financial structure- aggregate index
credit	log (private credit ratio) = log (private credit / GDP)
gdp	log (gdp per capita)
openness	log (openness ratio) = log ([export + import] / GDP)
gcon	government consumption over gdp ratio
sd-dreer	sd. of changes in real effective exchange rate
sd-dtot	sd. of changes in terms of trade

Appendix B: Countries covered (44) classified by Income Level

High Income (24): Australia Belgium Canada Denmark Finland France Germany Greece Iceland Ireland Israel Italy Japan Korea Netherlands New_Zealand Norway Portugal Singapore Spain Sweden Switzerland United_Kingdom United_States

Upper Middle Income (8): Argentina Brazil Chile Malaysia Mexico South_Africa Uruguay Venezuela

Lower Middle Income (7): Columbia Ecuador Indonesia Morocco Philippines Thailand Turkey

Low Income (5): Bangladesh Cote_d'lvoire India Nigeria Pakistan China