Capital Market, Severity of Business Cycle, and Probability of an Economic Downturn

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9. September 2007

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October 2007

Abstract

This paper investigates the relationships of capital market, severity of economic contraction, and probability of an economic downturn. The finding supports a theoretical prediction that countries with more advanced capital markets would face less severe business cycle output contraction, and a lower chance of an economic downturn. The results hold even after controlling for other relevant variables, country specific effects, and state dependences. However, the marginal effects are small. Results are generated using panel estimation technique with panel data from 44 countries covering the years 1975 through 2004.

JEL: C33, C34, C35, E32, E44, G00, G21

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

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The author would like to thank Prof.Dietrich Fausten and Assoc. Prof. Mark Harris for invaluable suggestion and encouragement.

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1. Introduction

"Before the crisis broke, there was little reason to question the three decades of phenomenally solid East Asian economic growth, largely financed through the banking system. The rapidly expanding economies and bank credit growth kept the ratio of Non Performing Loans (NPLs) to total bank assets low. The failure to have backup forms of intermediation was of little consequence. The lack of a spare tire is of no concern if you do not get a flat. East Asia had no spare tires."

Greenspan (1999)

Alan Greenspan, former chairman of the Federal Reserves, had placed capital market development as a central factor in determining severity of output contraction during an Asian financial crisis. In his speech, Greenspan (2000) argued forcefully that countries that have a strong banking system plus robust capital markets can better withstand financial crises than those countries that have only one or the other. He argued further that the most important buffer against financial stress is the development of alternatives that enable financial systems under stress to maintain an adequate degree of financial intermediation should their main source of intermediation, whether banks or capital markets, freeze up in a crisis.

In contrast to the large and growing literature on the impact of finance and growth [e.g. Demirguc-kunt and Levine (2001)], theoretical and empirical work on the relationship between finance and various aspects of business cycles has been relatively scarce, and even fewer papers on the effects of capital markets. This gap in the current research is quite surprising given the importance of business cycles in the study of macroeconomics. This paper extends previous research in this field by empirically investigating the effects of capital markets on certain aspects of business cycles, namely severity of business cycles, and probability of an economic downturn.

Theoretically, capital market development affects business cycles not only in terms of volatility [see Tharavanij (2007)], but also in terms of severity of output contractions. The reasons are the following. First, capital market development would make it easier for outside investors and other intermediaries to replace failing intermediaries in providing any further credit to their clients [Rajan and Zingales (2001)]. This fact would limit the extent of output loss from credit shortage to healthy debtors due to failing or under capitalized or unwilling to lend intermediaries. Moreover, outside investors have more ability to invest and restructure failing firms or intermediaries because of higher transparency and disclosure in well-developed capital markets. Second, capital market development would allow an efficient alternative form of financing in extra to just bank lending. This would enable financial systems under stress to maintain an adequate degree of intermediation should any crisis happens in the banking sector [Greenspan (2000)]. This fact would also limit severe output contraction.

Capital market development would also theoretically reduce financial fragility of the economy and decrease the chance of major downturns. The reasons are the following. First, capital markets provide better maturity matching in financial intermediation [Rajan and Zingales (2001), Jiang et al. (2001)]. This would make the economy more robust and less dependent on banks, which are themselves subject to run. In addition, development of a bond market would allow banks to better manage their risks through securitisation. Second, capital market development would facilitate assets liquidation and mitigate any adverse price impact from asset sales. Fecht (2004) shows that fire sales of a single trouble bank could easily cause asset-price deterioration that propel other banks into crisis and sever financial intermediation in the economy. In an economy with well-developed capital markets, the markets are deep and able to limit the price impact of any fire sales, and this makes the economy less vulnerable.

The empirical results support a theoretical prediction that countries with more advanced capital markets would face less severe business cycle output contraction, and a lower chance of an economic downturn. More specifically, this paper finds that severity, measured by average negative output gap of real GDP per capita, is negatively related to measures of capital market development, after controlling for other relevant variables. This implies that more advanced capital markets would help to mitigate the effect of business cycle output contraction. Furthermore, well-functioning capital markets also reduce the chance of an economy getting into an economic downturn, defined as non-positive growth, though the marginal effects are small.

The organization of this paper is as follows. Section 2 provides literature review. Section 3 discusses measurement issues. Section 4 discusses data construction and data description. Section 5 provides methodology. Section 6 presents estimation results. Section 7 discusses robustness issues. Lastly, section 8 concludes.

2. Related Literature

The standard neoclassical theory assumes that financial systems function efficiently, and as a result, financial factors are often abstracted from the analyses. However, more recent work has established relationships between the working of financial system and business cycles. Key functions of a financial system, according to Merton and Bodie (2004), are to facilitate capital formation and efficient allocation of risk bearing, and to allow agents to manage risks effectively. These functions are performed both through intermediated channel, such as financial intermediaries (e.g. banks), and non-intermediated channel or capital markets, such as bond, equity and derivative markets. As such, a whole financial system is composed of both financial intermediaries, and capital markets. Capital markets, as one of the key component in a financial system, play a crucial role in the relationship between the well functioning of the whole financial system and business cycles.

Before we go into a review of empirical work, it is beneficial to familiarize with one of the most popular terms in the finance and growth literature [e.g. Beck et al. (2000b)], namely "Financial Development". The term itself conveys the idea that it is a measure of overall development in a whole financial system in performing its functions. However, it is not. It is actually a quantitative measure of how well financial intermediaries perform its function in terms of financing real investment or spending of both firms and households. For instances, one of the most popular measure of financial development is private credit over GDP ratio. It measures only development in "indirect financing" channel or intermediated part of a whole financial system. It does not capture any development in the capital market part of the system. This paper uses both measures of financial development and capital market development in the empirical analysis.

There are only few empirical studies on the impact of financial development or capital markets on severity of business cycles or probability of an economic downturn. Braun and Larrain (2005) hypothesize that if financial conditions play an important role in aggregate cyclical behaviour, then one should expect a firm's response to negative shocks to vary with its reliance on financial markets. When investment is primarily financed with internal funds, then worsening conditions should not have as large an impact as in the case when external funds account for the bulk of financing. Since such disparate responses depend on financial market imperfections, the differential impact should be stronger when financing frictions are more prevalent. The authors tested these conjectures with a cross-country panel of yearly production growth rates for several manufacturing industries. They found that industries that are more dependent on external finance are hit harder during recessions. In particular, more dependent industries are more strongly affected in recessions when located in countries with poor financial contractibility, and when their assets are softer, providing less security to financiers. They also found that the financial mechanism is asymmetric over the cycle. The effect is stronger during downturns than in booms and especially strong when recessions are accompanied by credit crunches.

Acemoglu et al. (2002) look at the impact of macro variables and institutions on the severity of output contractions, measured by the largest output drop in the sample period, and find that coefficient on institutions is highly significant, while other macro variables, including real M2 to GDP as a measure of financial intermediation, are not significant after taking into account the influence of institutions.

Easterly et al. (2000) performed a probit analysis of an economic downturn, defined as negative GDP per capita growth. They found that financial development, measured by the ratio of credit to GDP, is marginally significant and the sign is positive. This implies that financial depth increases likelihood of a downturn. However, they also found that development of equity market, measured by stock market value traded over GDP, has the negative sign and is highly significant. They reason that stock market provides better risk diversification than do debt markets, and thus make the economy less vulnerable to an economic downturn.

3. 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. (2000b) 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 Development

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.

<u>Severity of business cycle</u>

Stock and Watson (1998) point out two approaches in empirical analysis of business cycle. The classical techniques of business cycle analysis was developed by researchers at the National Bureau of Economic Research (NBER) [Burns and Mitchell (1946)]. Conceptually, NBER researchers define a recession as a significant decline in the level of aggregate economic activity that lasts for more than a few months and define an expansion as a sustained increase in the level of activity.

An alternative approach to study economic cyclical fluctuations is to examine deviations from economic variable's long-run trends. The resulting cyclical fluctuations are referred to as growth cycles. One advantage of growth cycle chronology is that by construction, it is less sensitive to the underlying trend growth rate in the economy. In fact, some countries with high growth rates, such as post-war Japan, exhibit growth cycles but have few absolute declines and thus have few classical business cycles. This paper follows recent literatures and focus on growth cycles.

Within "growth cycle" framework, a recession is defined in terms of output gap from long-term trend, calculated by means of mechanical filters such as Hodrik-Prescott [Hodrick and Prescott (1997)], or Baxter-King [Baxter and King (1995)]. Once produced, these estimates of potential GDP series are used as a benchmark. Negative deviations of the real data from this trend would represent negative business cycles, or in other words, recessions.

There are many ways to decompose economic series into trends and cycles [see Canova (1998) for comparative results of different methods]. This paper uses Christiano-Fitzgerald (CF) band-pass filter to extract cyclical variations (defined as variations within the frequency of 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.

Dalsgaard et al. (2002) suggest that there are fundamentally three ways to proxy the amplitude of the business cycle (average size of output gaps). The first method is to use the standard deviation of the output gap. The second is to use mean absolute deviation (MAD) from trend over the whole period. The third is the root mean square (RMS) of output gaps. It is noteworthy that the average gap is zero over the whole sample by construction.

This paper follows the second method by using the average absolute size of the gap. However, since the focus of the paper is on severity, and to allow for asymmetry in amplitudes between expansions and recessions, only negative output gaps would be averaged.

Economic Downturn

As already mentioned, there are two fundamental ways to define recession, namely, "NBER classical approach" and "Growth recession approach". This paper uses classical approach method (in the sense of focusing on the level of output) in defining "economic downturn". Economic downturn is defined as non-positive growth of real GDP per capita. Easterly, et al. (2000) also use the same operational definition.

4. Data

The panel covers annual data of 44 countries from 1975 to 2004. Variable description and name list of countries in the sample classified by income level are in Appendix A and in Appendix B respectively.

For estimation of severity, annual data were transformed into six 5-year-span panel data. Period 1 covers 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 normally simple average.

To take into account the possible reverse causalities or endogeneity problems of financial development or capital market development, initial value of suspected variables instead of the average values of those variables in each sub-period will also be used in the estimation for robustness check.

The original annual data set contains some missing data in certain years. Only the available annual data are used in the calculation of the transformed variables, if there are at least three valid data points in that time span (basically more than 50% of data still valid in that time-span). Otherwise, the data are considered missing[2] in that particular period in the panel.

For negative output gap (as a measure of severity), if there are at least two valid negative gap within that time span, the average of negative gaps would be used as a measure of severity in the panel. If there is less than two negative gaps, the data is considered censored from below and a value of zero output gap would be used in the panel.

For estimation of probability of economic downturn, the estimation used original annual data without any transformation. However, six initial observations were lost in the calculation of 5-year moving average growth rate (excluding the current year) as one of the regressors. Therefore, the sample covered periods from 1981 to 2004.

Severity among countries

Table 1 shows statistics of average negative output gap as a percentage of real GDP per capita for each five-year period during 1975-2004. The table covers 44 countries classified by income level. The number in the table is the average of those values from six 5-year time spans.

Noticeably, income level explains at least partially the difference in severity. The average of negative output gap of high income countries was only 1.0%, whereas that of non-high income countries was 2.1%. However, this pattern is less clear among middle to low income countries themselves.

Economic Downturn among countries

[2] For example, the first 5-year period is from 1975-1979 and if there are annual data for variable X1 only from 1976-1979, then the transformation of annual data of X1 into a panel is performed by averaging available data from 1976-1979. However, if there are data of X1 for less than three years, for example, from 1978 to 1979, then the first data point in the panel would be n.a. (not available). In this way, not too many data in the constructed panel would be lost and the transformed data are still representative of the corresponding years.

Economic downturn is defined as non-positive growth of real GDP per capita. It equals one if the growth rate is non-positive, and zero otherwise. Easterly, et al. (2000) also used similar definition.

Table 2 shows frequency of economic downturn occurred in each country from 1976-2004. From total observation of 1,276 (44 countries times 29 years), there are 266 downturn in the data set. This accounted for approximately 21 percent. There is at least one downturn for every country.

Table 3 shows frequency of economic downturn occurred in each year. Downturns were most frequent in year 1982-1983 with 17 and 16 countries respectively. This period was during the oil shock. On average, there are about 9 countries (or 20.85% from 44 countries) in economic downturn each year.

Table 4 shows selected statistics during economic downturn and normal time. The average growth rate of real GDP per capita was 3.45% during normal time. The average contraction during recession was -3.00%. This implies a huge growth differential of more than 6% between normal time and downturn.

5. Methodology

Estimation Strategy for Severity of Business Cycle

Severity depth of business cycle is measured by average negative output gap of real GDP per capita over a pre-specified period. For ease of computation and interpretation, the actual number used, however, would be positive. The reduced-form equation below would be estimated by panel technique.

$$Depth_{it} = \beta_0 + \beta_1.FD_{it} + \beta_2.FS_{it} + \beta_3.X + \varepsilon_{it}$$

Depth is measured by average negative output gap of real GDP per capita. FD is a measure of financial development, namely log of private credit ratio. FS is a measure of capital market development. An absolute and a relative measure would be log of turnover ratio and financial structure-aggregate index, respectively. X is a vector of standard controlled variables [see e.g. Lopez and Spiegel (2002), Beck et al. (2003)], which include log of GDP per capita, log of openness ratio [(export + import)/GDP], government consumption over GDP, standard deviation of inflation, standard deviation of changes in terms of trades, and standard deviation of changes in real effective exchange rate.

The above reduced-form equation would be estimated by panel estimation technique. One complication is that values of severity are cornered from below by definition (basically, never below zero). This fact is taken into account by applying panel Tobit estimation, including pooled and random effects.

To take into account the possible endogeneity problems of financial development or capital market development in pooled estimation, Instrumental Variable Tobit (IVTobit) is also performed [see Greene (2003) for details]. The instrumental variables are legal origin, creditor's protection, and time trend. Formally the model is

$$y_{1i}^{*} = y_{2i}.\beta + x_{1i}.\gamma + u_i$$
$$y_{2i} = x_{1i}.\prod_1 + x_{2i}.\prod_2 + v_i$$

where i = 1,.., N , y_{2i} is a (1 x p) vector of endogenous variables, x_{1i} is a (1 x k_1) vector of exogenous variables, x_{2i} is a (1 x k_2) vector of additional instruments, and the equation for y_{2i} is written in reduced form. By assumption, u_i and v_i are randomly distributed with zero means. β and γ are vectors of structural parameters, and Π_1 and Π_2 are matrices of reduced-form parameters. y^{*}_{1i} is not observed; instead, we observe

$$y_{1i} = 0 \qquad \text{if } y^*_{1i} \leq 0$$
$$\qquad y^*_{1i} \qquad \text{if } y^*_{1i} > 0$$

The order condition for identification of the structural parameters is that $k_2 \geq p$.

The Wald test of the exogeneity of the instrumented variables in IVTobit would also be performed. If the test statistic is not significant, there is not sufficient information in the sample to reject the null hypothesis of no endogeneity.

The cross sectional Tobit can be readily extended to the panel framework of random effects [see StataCorp (2005)]. The true underlying dependent variable, y^*, is a function of a set of variable, x, as well as a random effect, u_i.

$$y^*_{it} = x_{it}.\beta + u_i + \varepsilon_{it}$$

for i = 1,.., N panels, where t = 1,.., T. The random effects, u_i , are i.i.d. $N(0,\sigma^2_u)$ and e_{it} are i.i.d. $N(0,\sigma^2_e)$ independently of u_i.

The observed data, y_{it} , represent possibly censored versions of y^*_{it} . If they are left-censored, in this case at zero, all that is known is that $y^*_{it} \leq 0$. If they are uncensored, then $y^*_{it} = y_{it}$. This model can be estimated by maximum likelihood method.

It is worthy to note that there is no estimation method for a parametric conditional fixed effects tobit model, as there does not exist a sufficient statistic allowing the fixed effects to be conditioned out of the likelihood. Nevertheless, Honore (1992) has developed a semiparametric estimator for fixed effects tobit model. Unfortunately, the asymptotic variance matrix of estimated β can only be consistently estimated for a large number of cross sectional units (i > 200) [Falk and Seim (1999)]. Given the limited number of countries covered in this analysis, Honroe's semiparametric method is not pursued.

Unconditional fixed effects tobit model may still be fitted by simply adding dummy variables for cross-sectional units. However, the estimates are biased. The bias is the result of the fact that likelihood of slope parameters and cross-sectional fixed effects cannot be separated. Therefore, the inconsistency in estimating fixed effects due to limited time dimension is transmitted into the estimation of slopes, leading to "incidental bias problem." However, the result from Monte Carlo simulations reported in Greene (2004) shows that the estimators of the slopes in fixed effects tobit appear to be largely unaffected by the incidental parameters problem. Unfortunately, Greene (2004) also found downward bias in the estimated standard errors. This makes the inference unreliable. This method is also not pursued in this analysis.

To take into account the possible reverse causalities or endogeneity problems of financial development or capital market development in random effects tobit estimation, initial value of suspected variables instead of the average values of those variables in each sub-period will also be used in the estimation for robustness check. This method would mitigate the reverse causality problem, since it is hard to argue how severity in that particular period would affect the level of financial development at the beginning of the period. Moreover, this method also alleviates the problems of endogeniety because plausible endogenous variables are historical given at the first period in the time span.

Estimation Strategy for Probability of Economic Downturn

This paper follows Easterly, et al. (2000) in applying binary choice model to cross-country annual data to estimate the effect of capital market development on likelihood of economic downturn. Economic downturn is defined as a period of non-positive growth of real GDP per capita.

The main empirical question is whether capital market development has any effect on the likelihood of economic downturn. Dependent variable is a dummy variable indicating a year with non-positive growth rate of real GDP per capita. Data are on annual basis. An economic downturn is simply modelled as a binary variable, the result of an underlying latent index.

$$y_{it} = \begin{cases} 1 & \text{if } y^*_{it} >= 0 \\ 0 & \text{if } y^*_{it} < 0 \end{cases}$$

where, $y^*_{it} = \beta_0 + \beta_1.FD_{it} + \beta_2.FS_{it} + \beta_3.X + \alpha_i + u_{it}$

α_i = individual specific effect , u_{it} = time-varying random error term

y_{it} is a dummy variable indicating downturn (1 = non-positive real GDP per capita growth, 0 = otherwise). FD is a measure of financial development, namely log of private credit ratio. FS is a measure of capital market development. X is a vector of standard controlled variables, which include log of GDP per capita, log of openness ratio, log of change in terms of trade, government consumption over GDP, inflation rate (GDP deflator), and 5-year moving average growth, excluding current year.

The estimation technique applied could be broadly classified into two methods. The first method is panel binary choice model. The second method is dynamic random effects model, which allows us to model state dependence explicitly. Specifically, it allows probability of downturn this period to depend also on previous economic state, whether it is normal state or downturn.

Panel Binary Choice Model

The estimation methods include pooled probit, random effects probit, and fixed effects probit. Pooled estimation assumes that there is no individual unobserved heterogeneity. In contrast, random effects and fixed effects take into account possible unobservable time-invariant factors. The advantage of random effects is that it is efficient, as long as the assumption that regressors are not correlated with unobserved specific effects holds. However, if this exogeneity assumption does not hold, random effects estimator would be inconsistent. Fixed effects estimation, which does not rely on this assumption, is consistent but would be inefficient if the exogeneity assumption holds.

Technically in panel estimation, when T (time) tends to infinity, the maximum likelihood estimator (ML) of both β and fixed effects (α_i) are consistent. In linear case, when N (number of cross-sectional unit) tends to infinity, estimators of β are consistent but not that of α_i. In non-linear case, such as probit model, however, the likelihood of β and α_i cannot be separated. As a result, when T is fixed, the inconsistency of α_i (in terms of N) is transmitted into the ML estimator for β, leading to the famous "incidental bias problem". Even if N tends to infinity, the ML estimator of β remains inconsistent [see Hamerle and Ronning (1994) and Greene (2003)]. Fortunately, this inconsistency is not the problem here. The reason is that characteristic of the data set which contains annual data for an extended long period of time (nearly 30 years). This long time dimension would mitigate any finite-sample bias of estimated β. Therefore, the estimation of panel fixed effects probit model in this paper would be performed by simply adding cross-sectional dummies into the regressor list.

Dynamic Random Effects Model

To allow for state dependence, it is necessary to augment the vector of explanatory variables to include the economy's previous status (expansion, or downturn). The equation for the latent dependent variable is now specified as the following.

$$y^*_{it} = \gamma . y_{it-1} + X'_{it} . \beta + \alpha_i + u_{it}$$

The transition probability for country i at time t, given α_i, is given by

$$Prob[y_{it} \mid X_{it}, y_{it-1}, \alpha_i] = \Phi[(\gamma.y_{it-1} + X'_{it}.\beta + \alpha_i)(2y_{it}-1)]$$

where Φ is the cumulative distribution function of a standard normal distribution [Heckman (1981)].

Estimation of the model requires an assumption about the initial observations, y_{i1}, and in particular about their relationship with the α_i. The simplest assumption would be to take the initial conditions, y_{i1}, to be exogenous. This would be appropriate if the start of the process coincided with the start of the observation period for each individual, but this is typically not the case. Under this assumption a standard random effects probit model can be applied, since the likelihood can be decomposed into two independent factors and the joint probability for $t > 1$ maximized without reference to that for $t = 1$. However, if the initial conditions are correlated with the α_i, as would be expected in most situations, this estimator will be inconsistent and will tend to overstate the extent of state dependence, γ.

Heckman (1981) proposed a procedure to deal with this problem, involving an approximation of the reduced form equation for the initial value of the latent variable y^*_{i1} by a linear function of relevant pre-sample information. If the latent equation error terms (u_{it}) are serially uncorrelated, the model can be estimated consistently under certain conditions by maximum likelihood estimator. This paper uses explanatory variables from pre-sample period and investment growth in the estimation of initial value of the latent variable.

However, if the error terms are auto correlated, the Heckman estimator too is inconsistent. The estimator would tend to overstate the degree of state dependence, γ. Extending Heckman's method to the auto correlated case results in the need to evaluate higher dimensional integrals. Maximum Simulated Likelihood (MSL) estimator is a natural choice to use in this case [see Stewart (2006)]

Chamberlain's approach

As pointed out earlier, random effects estimation assumes uncorrelateness of individual effects (α_i) and regressors. If this assumption does not hold, then random effects estimator would be inconsistent. Fortunately, technique has been developed to overcome this problem. The Mundlak-Chamberlain approach allows us to take into account any potential correlation and to obtain consistent estimates. Technically, correlation between α_i and the observed characteristics in the model can be allowed for by assuming a relationship between α_i and the time means of the x-variables (e.g. $\alpha_i = a.\overline{x}_i + e_i$). This can be implemented by simply adding time means of Xs to the set of regressors [Wooldridge (2002)].

6. Estimation Results

Severity of Business Cycle

The results from tobit estimation, including pooled, instrumental variable, and random effects, are reported in Table 5. Turnover ratio (turnover), an absolute measure of capital market development, is negatively significant under all estimation methods. Financial structure index (struc) is significant in IV tobit estimation and always has negative signs. Among other explanatory variables, openness ratio (openness), government size (gcon), real exchange rate volatility (sd-dreer) and terms of trade volatility (sd-dtot) are consistently highly significant.

The result indicates that countries with higher capital market development and larger government size would tend to have less severe depth. On the contrary, countries that are more open to trade, or face more volatile changes in real exchange rate, tend to have deeper and more severe negative output gap.

In instrumental variable tobit estimation, exogeneity test of instrumented variables has also been conducted. The variables instrumented are capital market development measures (turnover, and struc), and a measure of financial development (credit). The instrumental variables are creditor's rights index (crights), legal origin (lawuk, lawfr), and time trend (t) [see La-Porta et al. (1998), (1997) for details]. The Wald test of exogeneity could not reject the null hypothesis of exogeneity of suspected variables.

The table also reports Lagrangian Multiplier (LM) statistics [$Chi2_u$] for random effects. These statistics test the null hypothesis that variance of cross-section specific random effect is zero, implying no cross-section specific effect and justifying pooled estimation. The hypothesis cannot be rejected. This evidence gives support to the results from pooled estimation.

To take into account the possible reverse causalities or endogeneity problems of financial development or capital market development in random effects Tobit estimation, initial value of suspected variables instead of turnover, struc, credit and gdp have been used in the estimation for robustness check. The main result (not reported here) does not materially change from random effects Tobit. From Lagrange Multiplier statistics, the null hypothesis of no random individual effects cannot be rejected. This evidence again gives support to the results from pooled estimation.

Table 7 reports marginal effects, evaluated at the means of regressors, of each variable in pooled Tobit estimation conditioning on being uncensored. Basically, the table reports marginal effects in the event that countries are already having negative output gaps.

The overall result indicates that countries with higher capital market development would tend to have less severe output contraction over business cycle. This result is robust to possible endogeneity and individual specific effects.

Economic Downturn

The results from probit estimation, including pooled, random effects and fixed effects, are reported in Table 8. Table 9 reports results from probit random effects estimation following Chamberlain's approach. Both measures of capital market development (turnover, and struc) are highly significant with negative signs under all estimation methods. The tables also report Lagrangian Multiplier (LM) statistics [$chi2_u$] for random effects. These statistics test the null hypothesis that variance of cross-section specific random effect is zero, implying no cross-section specific effect and justifying pooled estimation. The hypothesis is rejected in specification with financial structure index, but not in specification with turnover.

Under fixed effects probit and Chamberlain's random effects probit estimation, which do not rely on zero correlation of individual effects and other regressors, average growth rate (growth5ma) is highly significant, but surprisingly with positive sign. This would imply that faster growing economy would have more chance to face an economic downturn. This result is counter-intuitive at first but after investigating further we would also find that the average long run growth (mgrowth5ma) is also highly significant with negative sign. The interpretation is that higher growth country would have lower chance of facing a downturn, however, if the country grows too fast above its sustainable long run rate, then it faces higher chance of growth collapse.

Table 10 reports results from dynamic probit estimation. Turnover ratio (turnover), an absolute measure of capital market development, is highly significant with negative signs under all estimation method. The economy's previous state is also highly significant with positive sign. This implies that countries in economic downturn last period would be more likely to also have downturn in this period. Please note that income level (gdp) is not included as an explanatory variable. The reason is that it has never been significant in any previous estimation.

The overall result strongly suggests that countries with more advanced capital market would have lower chance of having an economic downturn.

7. Robustness Issues

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 result, not reported here, is that major findings from previous sections do not materially change with alternative measures.

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 estimation.

8. Policy Implication and Conclusion

The econometric analysis supports theoretical prediction that countries with more advanced capital market development would face less severe business cycle output contraction and have a lower chance of facing an economic downturn. The coefficients of capital market development (turnover or struc) are highly significant in all specifications with negative signs. However, this still leaves the question of whether the magnitude of this effect is economically meaningful.

To investigate the above question concerning the effect on severity, the following simple calculation uses estimated marginal effect reported in Table 7. The coefficient is -0.10. The inter-quartile range of turnover ratio (in period 6: 2000-2004) is 49.36 (1.67 in terms of log difference). The effect of an inter-quartile improvement in turnover ratio on average negative output gap is -0.17% of potential output. The average negative output gap (% of real GDP per capita) is 1.5%. A decrease of 0.17% would imply a decrease of 11.3% from sample average negative output gap.

In terms of probability of getting into a downturn, the marginal effect on probability (evaluated at the means) of turnover ratio in fixed-effect probit estimation is -0.05% (see Table 8). This implies that an inter-quartile improvement in turnover ratio would lead to lower probability of economic downturn (non-positive growth) by 0.0835 percentage point.

In summary, this paper find that capital market development helps to mitigate the severity of output contraction and likelihood of an economic downturn, though the marginal effects are small. Future research should explore in more detail the mechanisms in which capital markets affect both severity and downturn probability.

A major policy implication of this study is that it is not adequate for a country to develop only stable financial institutions that better provide financial services. Countries also need well-functioning capital markets if they desire less volatile business cycles and more stable financial systems.

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Table 1: Average Negative Output Gap (% of real GDP per capita) among countries classified by Income level. (data cover six 5-year time span from 1975-2004)

COUNTRY	Average Negative Output Gap	Average growth	Turnover ratio	Private Credit to GDP
High Income	1.0	2.33	54.0	81.8
Australia	1.0	1.99	36.3	54.4
Belgium	0.7	1.96	15.0	50.0
Canada	1.0	1.84	38.0	72.2
Denmark	0.7	1.78	31.7	59.9
Finland	1.3	2.12	48.0	61.9
France	0.7	1.78	44.2	87.1
Germany	0.8	2.02	81.6	92.0
Greece	1.2	1.75	25.7	42.1
Iceland	1.1	2.41	33.7	55.3
Ireland	1.3	5.07	50.5	62.1
Israel	1.4	1.45	55.6	68.1
Italy	0.6	2.13	48.3	62.3
Japan	0.6	2.29	53.8	165.4
Korea, South	1.6	5.64	135.0	63.8
Netherlands	0.8	1.77	57.6	87.8
New Zealand	1.2	1.08	28.3	64.5
Norway	1.1	2.72	53.4	67.0
Portugal	0.8	2.59	26.9	83.8
Singapore	3.0	4.73	41.1	98.5
Spain	0.5	2.07	68.3	81.2
Sweden	0.7	1.61	46.2	93.4
Switzerland	0.8	0.84	139.3	140.8
United Kingdom	0.7	2.12	46.0	87.6
United States	1.0	2.17	76.9	162.2
Middle to Low Income	2.1	1.88	40.0	40.5
Upper Middle Income	2.4	1.38	24.3	49.5
Argentina	3.8	0.36	31.1	21.0
Brazil	2.1	1.28	46.0	46.4
Chile	2.0	3.86	8.1	53.7
Malaysia	2.1	3.89	30.6	93.5
Mexico	1.3	1.35	43.9	20.1
South Africa	1.3	-0.08	14.3	91.2
Uruguay	3.0	1.23	4.8	38.8
Venezuela	3.1	-0.82	3.0	31.4
Lower Middle Income	1.8	2.10	43.5	34.0
Columbia	0.6	1.47	8.4	28.1
Ecuador	1.1	0.78	4.3	22.7
Indonesia	2.2	3.87	58.9	30.9
Morocco	1.9	1.74	10.6	36.6
Philippines	1.9	0.69	25.4	36.3
Thailand	2.1	4.81	78.6	83.0
Turkey	2.2	1.93	100.0	12.7
Low Income	2.0	2.12	63.7	36.1
China	2.4	7.31	156.5	85.7
Cote d'Ivoire	2.6	-1.37	2.6	29.2
India	1.6	3.09	84.0	26.4
Nigeria	2.4	0.27	2.7	12.8
Pakistan	1.1	2.43	131.7	26.5
All countries	1.5	2.12	47.8	62.6

Table 2: Economic Downturn occurred in each country during 1976-2004
(note: 1 = non-positive growth of GDP per capita, 0 = otherwise
proportion of total years is in parenthesis)

COUNTRY	0	1	Total	COUNTRY	0	1	Total
Argentina	16 (55.17)	13 (44.83)	29 (100.00)	Korea, South	27 (93.10)	2 (6.90)	29 (100.00)
Australia	26 (89.66)	3 (10.34)	29 (100.00)	Malaysia	25 (86.21)	4 (13.79)	29 (100.00)
Belgium	26 (89.66)	3 (10.34)	29 (100.00)	Mexico	20 (68.97)	9 (31.03)	29 (100.00)
Brazil	19 (65.52)	10 (34.48)	29 (100.00)	Morocco	20 (68.97)	9 (31.03)	29 (100.00)
Canada	25 (86.21)	4 (13.79)	29 (100.00)	Netherlands	25 (86.21)	4 (13.79)	29 (100.00)
Chile	26 (89.66)	3 (10.34)	29 (100.00)	New Zealand	20 (68.97)	9 (31.03)	29 (100.00)
China	28 (96.55)	1 (3.45)	29 (100.00)	Nigeria	16 (55.17)	13 (44.83)	29 (100.00)
Columbia	24 (82.76)	5 (17.24)	29 (100.00)	Norway	27 (93.10)	2 (6.90)	29 (100.00)
Cote d'Ivoire	10 (34.48)	19 (65.52)	29 (100.00)	Pakistan	25 (86.21)	4 (13.79)	29 (100.00)
Denmark	24 (82.76)	5 (17.24)	29 (100.00)	Philippines	20 (68.97)	9 (31.03)	29 (100.00)
Ecuador	19 (65.52)	10 (34.48)	29 (100.00)	Portugal	24 (82.76)	5 (17.24)	29 (100.00)
Finland	24 (82.76)	5 (17.24)	29 (100.00)	Singapore	25 (86.21)	4 (13.79)	29 (100.00)
France	28 (96.55)	1 (3.45)	29 (100.00)	South Africa	17 (58.62)	12 (41.38)	29 (100.00)
Germany	26 (89.66)	3 (10.34)	29 (100.00)	Spain	26 (89.66)	3 (10.34)	29 (100.00)
Greece	21 (72.41)	8 (27.59)	29 (100.00)	Sweden	25 (86.21)	4 (13.79)	29 (100.00)
Iceland	22 (75.86)	7 (24.14)	29 (100.00)	Switzerland	18 (62.07)	11 (37.93)	29 (100.00)
India	26 (89.66)	3 (10.34)	29 (100.00)	Thailand	27 (93.10)	2 (6.90)	29 (100.00)
Indonesia	26 (89.66)	3 (10.34)	29 (100.00)	Turkey	21 (72.41)	8 (27.59)	29 (100.00)
Ireland	28 (96.55)	1 (3.45)	29 (100.00)	United Kingdom	25 (86.21)	4 (13.79)	29 (100.00)
Israel	22 (75.86)	7 (24.14)	29 (100.00)	United States	25 (86.21)	4 (13.79)	29 (100.00)
Italy	28 (96.55)	1 (3.45)	29 (100.00)	Uruguay	20 (68.97)	9 (31.03)	29 (100.00)
Japan	24 (82.76)	5 (17.24)	29 (100.00)	Venezuela	14 (48.28)	15 (51.72)	29 (100.00)
				Total	1,010 (79.15)	266 (20.85)	1,276 (100.00)

Table 3: Number of countries in downturn each year during 1976-2004
(note: 1 = non-positive growth of GDP per capita, 0 = otherwise
proportion of total years is in parenthesis)

YEAR	0	1	Total	YEAR	0	1	Total
1976	38 (86.36)	6 (13.64)	44 (100.00)	1991	29 (65.91)	15 (34.09)	44 (100.00)
1977	38 (86.36)	6 (13.64)	44 (100.00)	1992	29 (65.91)	15 (34.09)	44 (100.00)
1978	39 (88.64)	5 (11.36)	44 (100.00)	1993	21 (47.73)	23 (52.27)	44 (100.00)
1979	39 (88.64)	5 (11.36)	44 (100.00)	1994	40 (90.91)	4 (9.09)	44 (100.00)
1980	37 (84.09)	7 (15.91)	44 (100.00)	1995	36 (81.82)	8 (18.18)	44 (100.00)
1981	32 (72.73)	12 (27.27)	44 (100.00)	1996	41 (93.18)	3 (6.82)	44 (100.00)
1982	27 (61.36)	17 (38.64)	44 (100.00)	1997	38 (86.36)	6 (13.64)	44 (100.00)
1983	28 (63.64)	16 (36.36)	44 (100.00)	1998	32 (72.73)	12 (27.27)	44 (100.00)
1984	39 (88.64)	5 (11.36)	44 (100.00)	1999	31 (70.45)	13 (29.55)	44 (100.00)
1985	38 (86.36)	6 (13.64)	44 (100.00)	2000	40 (90.91)	4 (9.09)	44 (100.00)
1986	39 (88.64)	5 (11.36)	44 (100.00)	2001	32 (72.73)	12 (27.27)	44 (100.00)
1987	35 (79.55)	9 (20.45)	44 (100.00)	2002	29 (65.91)	15 (34.09)	44 (100.00)
1988	36 (81.82)	8 (18.18)	44 (100.00)	2003	34 (77.27)	10 (22.73)	44 (100.00)
1989	38 (86.36)	6 (13.64)	44 (100.00)	2004	43 (97.73)	1 (2.27)	44 (100.00)
1990	32 (72.73)	12 (27.27)	44 (100.00)	Total	1,010 (79.15)	266 (20.85)	1,276 (100.00)

Table 4: Selected Statistics during downturn and normal time

Statistics	Normal Time	Downturn
Frequency	1,029	276
(percent frequency)	78.85%	21.15%
Avg. Inflation	19.41%	58.40%
Avg. growth rate	3.45%	-3.00%

Table 5: Descriptive Statistics

	Mean	Median	Maximum	Minimum	Std. Dev.	Observations
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
SD-INF	20.9	2.5	1,251.1	0.2	113.3	270

Table 6: Tobit Estimation Results

depth	Pooled Tobit		Instrumental Variable Tobit		Random Effects Tobit	
turnover	-0.15 **		-0.51 **		-0.15 **	
	(0.08)		(0.21)		(0.08)	
struc		-0.09		-0.36 **		-0.09
		(0.07)		(0.16)		(0.07)
credit	-0.18	-0.26	0.55	0.49	-0.18	-0.26
	(0.18)	(0.17)	(0.60)	(0.60)	(0.18)	(0.17)
gdp	-0.05	-0.06	-0.16	-0.26	-0.05	-0.07
	(0.14)	(0.14)	(0.27)	(0.27)	(0.14)	(0.15)
openness	0.33 **	0.40 ***	0.23	0.53 ***	0.32 **	0.39 **
	(0.15)	(0.16)	(0.19)	(0.20)	(0.15)	(0.16)
gcon	-0.04 **	-0.04 **	-0.05 **	-0.04 *	-0.04 ***	-0.04 **
	(0.02)	(0.02)	(0.02)	(0.02)	(0.02)	(0.02)
sd-dreer	0.05 ***	0.05 ***	0.04 ***	0.07 ***	0.05 ***	0.05 ***
	(0.01)	(0.01)	(0.02)	(0.02)	(0.01)	(0.01)
sd-dtot	-0.04 **	-0.04 **	-0.05 ***	-0.04 **	-0.04 **	-0.04 **
	(0.02)	(0.02)	(0.02)	(0.02)	(0.02)	(0.02)
sd-inf	0.01	0.00	0.01	0.00	0.01	0.00
	(0.01)	(0.01)	(0.01)	(0.01)	(0.01)	(0.01)
N	177	177	163	163	177	177
left-censored at 0	21	21	20	20	21	21
uncensored	156	156	143	143	156	156
# of countries	44	44	44	44	44	44
Chi2	44.02 ***	41.70 ***	43.79 ***	42.48 ***	49.99 ***	46.41 ***
Chi2-ex	-	-	1.17	1.27	-	-
$Chi2_u$	-	-	-	-	0.07	0.08

Note: robust standard error in parenthesis. * sig. at 10%, ** sig. at 5%, *** sig. at 1%
Chi2= Chi2 for testing sig. of all Xs except constant
Chi2-ex = Wald test of the exogeneity of the instrumental variables
$Chi2_u$ = Chi2 of LM test for random effects $Var(u_i) = 0$
variables instrumented: turnover, struc, credit
excluded instruments: t, crights, lawuk, lawfr
t= time trend, crights= creditor's right index, lawuk= dummy for British Common Law, lawfr= dummy for Frence Civil Law

Table7: Marginal effects of pooled Tobit conditioning on being uncensored

Variable	Pooled Tobit	
turnover	-0.10	
struc		-0.06
credit	-0.12	-0.17
gdp	-0.03	-0.04
openness	0.21	0.26
gcon	-0.03	-0.02
sd-dreer	0.03	0.03
sd-dtot	-0.03	-0.02
sd-inf	0.00	0.00

note: marginal effects are evaluated at the mean of the regressors

Table 8: Probit Estimation Results: Marginal Effect

Downturn	Pool Probit		Random Effects Probit		Fixed Effects Probit	
turnover	-0.07 ***		-0.25 ***		-0.05 **	
	(0.01)		(0.05)		(0.02)	
struc		-0.04 ***		-0.18 ***		-0.06 ***
		(0.01)		(0.05)		(0.02)
credit	0.00	-0.02	0.02	-0.06	0.08	0.04
	(0.03)	(0.03)	(0.11)	(0.12)	(0.05)	(0.05)
gdp	-0.02	-0.02	-0.08	-0.13	-0.06	0.03
	(0.02)	(0.02)	(0.10)	(0.11)	(0.13)	(0.15)
growth5ma	-0.01	-0.02 ***	-0.02	-0.01	0.03 ***	0.03 ***
	(0.01)	(0.01)	(0.03)	(0.04)	(0.01)	(0.01)
dtot	0.00	0.00	-0.01 *	-0.01	0.00	0.00
	(0.00)	(0.00)	(0.01)	(0.01)	(0.00)	(0.00)
openness	-0.05 *	-0.02	-0.23 *	-0.15	-0.25 ***	-0.17 *
	(0.03)	(0.03)	(0.13)	(0.15)	(0.09)	(0.09)
gcon	0.00	0.00	0.01	0.03 *	0.01 **	0.02 ***
	(0.00)	(0.00)	(0.02)	(0.02)	(0.01)	(0.01)
inf	0.00	0.00	0.00	0.00	0.00	0.00
	(0.00)	(0.00)	(0.00)	(0.00)	(0.00)	(0.00)
N	799.00	799.00	799.00	799.00	772.00	772.00
# of countries	-	-	44.00	44.00	41.00	41.00
pseudo-R2	0.08	0.06	0.00	0.01	0.16	0.17
Chi2	55.66 ***	47.84 ***	47.57 ***	31.32 ***	113.47 ***	117.63 ***
$Chi2_u$	-	-	1.01	5.87 ***	-	-

Note: robust standard error in parenthesis. * sig. at 10%, ** sig. at 5%, *** sig. at 1%
downturn= dummy variable for economic downturn
Chi2 = Chi2 for testing sig. of all Xs except constant
$Chi2_u$ = Chi2 of LM test for random effects $Var(u_i) = 0$

Table 9: Probit Random Effects Estimation (Chamberlain's approach): Marginal Effect

Downturn	Random Effects	
turnover	-0.18 **	
	(0.08)	
struc		-0.23 ***
		(0.07)
credit	0.35 **	0.19
	(0.17)	(0.17)
gdp	0.01	0.35
	(0.45)	(0.47)
growth5ma	0.09 **	0.09 ***
	(0.04)	(0.04)
dtot	-0.01	0.00
	(0.01)	(0.01)
openness	-1.01 ***	-0.68 **
	(0.31)	(0.33)
gcon	0.05 **	0.06 ***
	(0.02)	(0.02)
inf	0.00	0.00
	(0.00)	(0.00)
mturnover	0.21 **	
	(0.11)	
mstruc		0.28 ***
		(0.11)
mgdp	-0.07	-0.41
	(0.46)	(0.48)
mcredit	-0.33 *	-0.17
	(0.18)	(0.19)
mgrowth5ma	-0.38 ***	-0.39 ***
	(0.07)	(0.06)
mdtot	-0.05	-0.04
	(0.05)	(0.05)
mopenness	1.34 ***	0.96 ***
	(0.36)	(0.37)
mgcon	-0.07 ***	-0.08 ***
	(0.03)	(0.03)
minf	0.00 *	0.00 **
	(0.00)	(0.00)
N	799.00	799.00
# of countries	44.00	44.00
Chi2	97.11 ***	100.17 ***
$Chi2_u$	1.68 *	1.92 *

Note: robust standard error in parenthesis. * sig. at 10%, ** sig. at 5%, *** sig. at 1%
downturn= dummy variable for economic downturn, lagdown= downturn at t-1
Chi2 = Chi2 for testing sig. of all Xs except constant
$Chi2_u$ = Chi2 of LM test for random effects $Var(u_i) = 0$

Table 10: Dynamic Probit Estimation Results: Margainal Effects

Downturn	Random effects	Random effects + Chamberlain	Random effects + Heckman	Random effects + Heckman + Chamberlain	Random effects + Heckman + Chamberlain + AR1
lagdown	0.63 ***	0.62 ***	0.80 ***	0.80 ***	0.64 **
	(0.12)	(0.12)	(0.18)	(0.18)	(0.28)
turnover	-0.22 ***	-0.13 **	-0.24 ***	-0.22 ***	-0.24 ***
	(0.04)	(0.06)	(0.07)	(0.07)	(0.08)
credit	0.12	0.40 ***	0.07	0.06	0.02
	(0.09)	(0.14)	(0.19)	(0.20)	(0.18)
growth5ma	0.02	0.14 ***	0.06	0.05	0.04
	(0.03)	(0.03)	(0.05)	(0.05)	(0.05)
openness	-0.25 **	-1.11 ***	-0.31	-0.49	-0.48
	(0.12)	(0.27)	(0.21)	(0.32)	(0.33)
gcon	0.00	0.03 *	-0.01	0.01	0.01
	(0.01)	(0.02)	(0.02)	(0.03)	(0.03)
N	972.00	972.00	1,080.00	1,080.00	1,080.00
Chi2	68.80 ***	143.64 ***	38.44 ***	39.96 ***	29.00 ***
$Chi2_u$	2.28 *	2.69 **	507.65 ***	497.05 ***	-

Note: robust standard error in parenthesis. * sig. at 10%, ** sig. at 5%, *** sig. at 1%
downturn= dummy variable for economic downturn, lagdown= downturn at t-1
Chi2 = Chi2 for testing sig. of all Xs except constant
$Chi2_u$ = Chi2 of LM test for random effects $Var(u_i) = 0$

Appendix A: Variables

Variables	Description	Sources
depth	average negative output gap	calculated from World Development Indicator (WDI)
downturn	dummy variable for non-positive growth rate of real GDP per capita	calculated from WDI
turnover	log (turnover ratio) = log (value of shares traded / GDP)	Beck et al. (2000a)
struc	financial structure- aggregate index	calculated from Beck, et al. (2000a)
credit	log (private credit ratio) = log (private credit / GDP)	WDI
gdp	log (gdp per capita)	WDI
openness	log (openness ratio) = log ([export + import] / GDP)	WDI
gcon	government consumption over gdp ratio	WDI
sd-dreer	sd. of changes in real effective exchange rate	calculated from International Financial Statistics (IFS)
sd-dtot	sd. of changes in terms of trade	calculated from IFS
sd-inf	sd. of inflation rate (GDP deflator)	calculated from WDI
growth5ma	prior 5-year moving average growth rate	calculated from WDI
dtot	change of terms of trade	calculated from IFS
inf	average inflation rate (GDP deflator)	WDI
m + "variable name"	mean of that "variable"	

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