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and Financial Market Efficiency**

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International Capital Flows, Economic Growth and Financial Market Efficiency

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Abstract

The recent decade has witnessed unprecedented changes in the magnitude and composition of international capital flows to developing countries. Yet, the academic literature remains rather inconclusive in addressing the driving forces behind those changes. This paper presents some further empirical evidence on the topic based on a model of international lending under information asymmetries between borrowers and potential investors. The results largely support the view that the economic growth and efficiency of domestic financial markets in developing economies are among the major determinants of foreign capital investments to these countries.

JEL classification: F21; F30; G11; G32; E44

Keywords: Capital flows; Information asymmetries; Developing countries; Panel data estimation

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1 Introduction

Globalization of economic activity, integration of financial markets and increased capital mobility have been perhaps the most remarkable features of the world economy in the recent decades. Widespread financial market liberalization measures and abolition of capital controls coupled with advances in information and transaction technologies and the introduction of new financial products have served as the major impetus for these unprecedented developments. The expansion of cross-border capital flows both across the industrial countries and emerging economies has been much larger than the growth of world GDP and growth of international trade. At the same time, however, a number of puzzles such as the Feldstein-Horioka puzzle of high savings-investment correlations, or the puzzle of home bias in equity portfolio are still robust and intractable suggesting that global financial markets remain segmented with incomplete capital mobility.

In theory, the traditional economic benefits of international mobility of goods and capital are clear. International borrowing or lending allows individuals to smooth consumption. It helps to use the world savings in financing the most productive investment opportunities, as well as to reduce the risk to the owners of capital by diversifying investment. Finally, capital mobility may increase efficiency of domestic financial markets by exposing them to foreign competition, and promote economic growth in the capital-recipient country by introducing new technology and business skills.

However, the role of capital flows in improving economic performance can be restricted by the efficiency of financial markets themselves, such as by their ability to evaluate correctly the portfolio preferences of savers, find the most productive investments, overcome the problems of incomplete information (Goldstein et al., 1991). Additionally, in practice the gains from capital inflows in many instances become subdued by a number of negative consequences that the capital inflows into an economy may imply. These are, first of all, interest rate risks and the risk of 'sudden stops' of capital inflows and their reversal. Moreover, increasing capital mobility weakens national macroeconomic autonomy via its possible effects on inflation, real exchange rate and the financial sector making domestic economy more prone to shocks.

Clearly, the analysis of determinants of international capital flows will be incomplete without analyzing the determinants of the composition of capital flows since different types of capital have different properties with respect to possible effects on economic growth, risk-sharing between creditors and debtors, tradability, reversibility, etc. Hence, the evaluation of economic benefits and risks of capital flows to developing countries will depend much on the structure rather than only on the magnitude of capital flows. In fact, as Figure (1) shows, foreign direct investments (FDI) to all developing countries have been steadily increasing since 1970s, whereas portfolio investments into equity and debt securities became significant in the beginning of the 1990s and have exhibited an unstable behavior. But the most volatile type of external financing have been other capital flows that include trade credits, loans, and bank deposits.

Despite the significance of both benefits and risks that international capital flows imply for developing countries, the empirical evidence on the determinants of capital

flows and, especially, on their composition does not seem to be conclusive. Being based on the so-called 'pull-push' approach, most empirical studies emphasize the importance of both domestic and foreign factors in driving international capital flows, but suggest no general consensus on the relative contribution of those factors in determining the direction and magnitude of capital flows.¹

In this paper, we follow a rather different approach and try to address the problem from the viewpoint of lenders who decide on investing in a developing country. We first formalize our approach by discussing a stylized model of international lending/borrowing based on Chen and Huang (1995) and Chen and Khan (1997). The major assumption is the presence of information asymmetries between borrowers and potential investors that gives rise to inefficient investment. On the economy-wide level, the attractiveness of foreign portfolio investment is then showed to depend on combinations of the degree of financial market inefficiency and the growth potential of the borrower country. The model outlined is only for an all-equity firm, which can be supported by the evidence of a heavy reliance of developing country corporations on issuing shares to finance new investments (Singh, 1995). We present further a non-technical discussion of some implications of the case when also bond and bank lending is available.²

The basic relation between capital flows and the determinants suggested by the model is then estimated using panel data for 32 developing countries over the period of 1978-1997. The capital flow variables are both equity and bond investments of the US residents in these developing countries. A dynamic panel data estimation technique has been used that accounts for a potential endogeneity of explanatory variables and controls for country-specific fixed effects. The results largely support the theoretical conjectures and show that growth and financial market efficiency are important determinants of capital flows. The findings also suggest the importance of considering the role of other financial intermediaries in search of the determinants of portfolio capital flows and their composition.

The contribution of the paper to the literature is threefold. First, it tries to link the structure of international capital flows to developing countries with financing policies and corporate financial patterns observed in these countries. Secondly, the empirical exercise employs a VAR technique to macroeconomic cross-country panel data in order to analyze the determinants of international capital flows. Thirdly, the exercise investigates the structure of capital flows by *inter alia* establishing a link between the level of domestic banking sector development and portfolio investments.

The paper is organized as follows. Section 2 summarizes previous empirical work on the determinants of the composition of international capital flows to developing countries. Section 3 outlines the theoretical framework. In Section 4, the empirical

¹See, for example, Calvo et al. (1993), World Bank (1997), Chuhan et al. (1998), Fernández-Arias and Montiel (1996), Taylor and Sarno (1997), Kim (2000), Montiel and Reinhart (2001), Mody, Taylor and Kim (2001), Edison and Warnock (2001). One possible conjecture could be to attribute to push factors the determination of the timing and magnitude of capital inflows, whereas pull factors may contribute to explaining the cross-country distribution of the flows (Montiel and Reinhart, 2001).

²Foreign direct investments are assumed to be given exogenously.

results on the determinants of capital flows to developing countries are presented and discussed. Concluding remarks are summarized in Section 5.

2 Empirical Evidence on Determinants of Composition of Capital Flows

Despite the growing recognition of the importance of differentiating among different types of capital flows, particularly aroused after the crises that hit the emerging markets in the 1990s, there is, however, surprisingly limited empirical literature on various characteristics such as volatility of different types of capital flows and on the determinants of the composition of countries' external capital structure. Lane and Milesi-Ferretti (1999, 2000), Rodrik and Velasco (1999), Buch and Pierdzioch (2000), Montiel and Reinhart (1999, 2001), Portes and Rey (1999), and Portes et al. (2001) are perhaps the major contributions to the empirical literature on the determinants of the composition of capital flows. Using data on industrial and developing countries, these studies apply cross-sectional and panel estimation techniques to stock and flow models of capital flows in an attempt to identify particular patterns of relations between the composition of external capital and some country-specific fundamentals.³

In order to make clear what kind of relations we expect to find between country-specific characteristics and the composition of countries' external capital, a set of possible explanatory variables with their relevance to the analysis of international capital flows is summarized in Table 1. The list of determinants is, of course, not exhaustive and does not include, for example, such important factors as the exchange rate regime, characteristics of regulatory environment, or region-specific factors.

As Table 1 suggests, the expected effects of the determinant factors on the composition of capital flows are rather ambiguous and need to be subject to formal empirical testing. The findings of the above referred literature can be abridged into the following empirical observations.⁴

- Trade openness
 - Poorer and more open economies tend to have larger external debt expressed in terms of GDP. Debt however shows no correlation with domestic financial variables. But more open economies with a larger share of exports of natural resources attract a larger share of FDI.
 - A larger exposure to risk via more trade openness will result in a greater reliance on equity as opposed to debt finance. At the same time, trade

³We do not report the findings of the 'pull-push' literature as the main conclusion on whether bond or equity flows are more responsive to country-specific as opposed to global (mainly, the US) factors remains unclear across various studies.

⁴We focus on developing countries, although the results contain interesting implications for differences between developing and industrial countries.

openness shows a weak relation to short-term debt suggesting a relatively insignificant role of trade related short-term capital.

Table 1: Determinants of the composition of external capital
 Implications represent the result of an increase/intensification in the determinant.
 For example, the more developed a country is, the more developed its financial system is expected to be, proxied e.g. with a higher M2 over GDP ratio, and hence, the more equity investment will the country have.

Determinant	Implication	Proxy	Possible impact on the composition of external capital
Development level	developed financial system, less information asymmetry	GDP per capita, M2/GDP, stock market capitalization	more marketed liabilities, such as debt and portfolio flows, more long-term maturities
Information asymmetry	need to overcome information barriers, agency problem	geographical proximity, language, information transmission variables*	more FDI followed by debt, but more information-intensive forms (portfolio) if there are fixed costs to information and a country size is large
Trade openness and trade structure	vulnerability to external shocks and preference for risk-sharing, lower risk of repudiation, more trade financing	Trade/GDP, natural resource exports	more equity than debt finance, but more FDI for a resource-intensive countries larger use of tradable collateral more short-term trade credits
Capital controls	direct changes in capital structure	capital account and exchange rate restrictions	depends on policy design
Sterilization policy	rise in domestic interest rate	e.g. special indices by intensity of public bond sales	more short-term and portfolio capital

* In Portes and Rey (1999) and Portes, Rey and Oh (2001), information transmission variables are proxied by telephone call traffic and multinational bank branches, while information asymmetry is captured by the degree of insider trading.

- Economic size and financial development
 - Bigger countries, as measured by their total GDP, tend to have larger equity liabilities, since they are more likely to have relatively developed stock markets than small countries.

- Countries with larger market capitalization and bigger number of listed stocks tend to have more portfolio flows, while the stock market variables have no significant impact on short-term capital flows. However, if measured with the ratio of broad money to GDP, countries with deeper financial markets tend to attract more short-term capital.
- Policy measures
 - Foreign exchange controls affect FDI and portfolio equity flows by more than debt.
 - More intensive monetary sterilization is associated with an increase in the volume of capital flows due to an increase in the short-term capital flows.
 - Capital controls have an expected negative effect on the magnitude of capital flows, which is, however, small. At the same time, capital controls seem to be effectively implemented in a sense of altering the maturity structure of the external capital in favor of long-term flows.
 - Foreign interest rates have the most significant effect on portfolio flows.

The brief review of the previous empirical findings, first of all, reveals their generality and hence points at the necessity for further elaborate investigations into the factors that determine composition of the external capital and its dynamics over time. Importantly, there is a need to comprise into analyses also corporate financing patterns evolved and observed in developing countries. In fact, although there is very little work on the latter issue in the developing country context, Singh (1995) extensively discusses some rather striking but robust facts on corporate financing structures in ten industrializing economies. In particular, it is showed that developing country corporations largely finance their growth from external sources, particularly, by using equity finance. This in turn may serve as a point of reference for analyzing the structure of foreign capital flows, which can be an important source of the corporate external financing in developing countries.

Finally, juxtaposing the previous empirical work with the theoretical approaches on modeling the determinants of capital flows and their composition will suggest that there still exists a gap between analytical models and their empirical applicability. In this regard, our contribution in the empirical part of the paper will be an attempt to bring to data as close as possible one of the potential hypotheses on determinants of capital flows based on a corporate financing framework as outlined in the following section.

3 Towards Modeling International Capital Flows: Capital Structure Choice with Foreign Investors

Much of the theoretical research has focused on analyzing structural composition of capital given a number of assumptions about the existence of informational, legal and technological frictions and the completeness of financial markets that will determine the optimal capital structure. For example, Razin et al. (1998a, 1998b) use an analogue of the corporate finance theory on optimal capital structure. The latter suggests that given the assumptions of perfect information, no distortions, and rationality, by the Modigliani-Miller (1958) Theorem capital structure will be irrelevant. Razin et al. (1998a, 1998b) focus on the role of information asymmetry between foreign and domestic agents to suggest that FDI is the most preferred type of capital flows that allows foreign agents to overcome large informational barriers. The next in the ranking, referred to as a 'pecking-order', are debt flows, while equity will be issued as a last resort when information asymmetries are the least.⁵

However, building up a framework which would allow us to obtain financial market equilibrium with all major types of international financial flows (equity, bonds, bank debt) is still an open research area. In a domestic setup, an attempt has been made by Bolton and Freixas (2000) to provide the first synthesis of capital structure choice theories based on information asymmetries. They show that in equilibrium, all three types of financing coexist and their distribution depends on the riskiness of the project to be financed as well as on the supply of bank loans. Hull and Tesar (2000), use the model of Bolton and Freixas (2000) to derive some qualitative implications for an open economy case, which somewhat alter the conclusions from the pecking-order theory. In particular, for small countries that integrate into the global capital markets while being populated with firms that have relatively high risk and lower credit ratings, international capital inflows will be dominated by FDI and equity as opposed to bank or bond financing.⁶

In this paper, we base our discussion on a stylized model of international lending/borrowing in the presence of information asymmetry between lenders and borrowers while abstracting from other types of distortions, such as transaction costs or taxes.⁷ Suggested by Chen and Huang (1995) and Chen and Khan (1997), the model focuses only on the cost of financing aspect of capital flows. In line with the literature on optimal investment and optimal capital structure (Myers and Majluf, 1984, Dybvig and Zender, 1991), the model is presented for an all-equity firm which as argued above is rather consistent with the evidence on a large reliance of developing country corporations on financing project investment by issuing equity.

⁵See Myers and Majluf (1984) for the original idea of the pecking-order theory.

⁶Note that in contrast to the implications of the standard pecking-order theory, the results of Hull and Tesar (2000) are also consistent with the recent evidence on the growth in portfolio equity flows to developing countries.

⁷For alternative theoretical approaches to modeling the determinants of the composition and structural changes in the countries' external capital, see Kraay et al. (2000), Glick and Kasa (1997) and Albuquerque (2000).

In the model, the investment decision is based on the expected relative return to investment in the new project. In fact, by the Modigliani-Miller (1958) irrelevancy propositions, following the net present value (NPV) rule will always result in optimal investment. That is, the project should be undertaken if and only if the NPV of its cash flows is positive. However, the assumption of a perfect financial market is far from justified, especially in the developing countries which, for example, feature information asymmetries between insiders and outsiders originating from poorly developed financial market infrastructure, lack of adequate accounting standards and of efficient mechanisms of information disclosure and transmission.

Chen and Huang (1995) show first that as long as there exists asymmetric information between corporate insiders and outsiders in the market there will be a range of inefficient investment around the zero NPV which in turn consists of over- and under-investment ranges. Assume further that investment opportunities in the economy, i.e. the returns on new investment projects, are distributed as *i.i.d.* $N(\mu, \sigma^2)$, where μ can be interpreted as the average rate of return to investments or, in general, as the economy's growth potential. By comparing the expected return in a benchmark economy with a perfect financial market and no information asymmetry (developed country *A*) with the expected return in an economy with a less efficient financial market and information asymmetry (developing country *B*), Chen and Khan (1997) show that the return differential and, hence, the direction of the equity investment depend on combinations of the growth potential in the economies and the degree of inefficiency present in the financial market of a less developed economy.

Figure (A1) in Appendix A is the graphical representation of the analytical solution of the model outlined in Appendix A that defines return differential as a function of growth potential and financial market inefficiency. Only for particular combinations of the growth potential and financial market inefficiency the expected return differential is positive, i.e. above the zero-level horizontal hyperplane. The latter occurs, first, when the emerging economy has a highly efficient capital market but exhibits a very low (even negative) growth potential. As the information asymmetry problem worsens, in the range of low growth the emerging market discount becomes larger until the growth potential overweighs the negative effect of the financial market inefficiency.

Our own results from a comparative static analysis (not presented here) suggest some further insights into understanding the relations between the relative return differential and its determinants. First, for countries with the growth close to zero the return differential is very sensitive to a slight increase in the financial market inefficiency, while the higher the growth the less sensitive the return differential becomes. Secondly and more obviously, the less efficient financial markets are the higher should be the growth potential in order to attract foreign investments.

So far, the focus of the model has been on the case where the new investment project is financed only by issuing equity. By extending the model, the manager can decide to finance the new project using a mix of debt and equity. Incorporating alternative channels of financing in the model will however require making rigorous assumptions

concerning the default risk and seniority of claims of various lenders⁸. Major tradeoffs between using different types of instruments should also be taken into account. Figure (A2) in Appendix A presents a visual evaluation of a number of properties of bond, equity and bank financing based on Bolton and Freixas (2000).

For the case of bond and equity financing, Dybvig and Zender (1991) show that given a simple linear incentive compensation scheme to the manager an efficient investment (NPV rule) can be achieved and the Modigliani-Miller irrelevancy proposition can be restored. However, if the manager and the board of existing shareholders can collude and share common information about the value of the projects, or when the firms are of an owner-manager type, the inefficient investment will again arise due to information asymmetry between the corporate insiders and other potential lenders. Intuitively, if, for example, a possibility of alternative ways of financing the investment project increases the managers bargaining power in the renegotiation with existing shareholders, then in the Chen and Huang (1995) setup this will increase the manager's but decrease the board's incentive to under-invest making the overall effect on the range of inefficient investment ambiguous.

What are in general the implications for a distribution of types of capital among a continuum of projects with different expected rates of return on an aggregate economy level? In order to simplify the discussion we make a distinction between the following possible scenarios assuming also the presence of the third type of external financing, bank debt. First, for countries with efficient financial system, intermediation costs of banks will expectedly be low and the supply of bank loans will be larger relative to the demand. If a country in addition has a high growth potential in a sense of being populated with the firms with lower risk, then the investments - both domestic and international - will mostly consist of bank debt for riskier projects and of bonds for safer projects.⁹ When, in contrast, the growth potential is low and the number of riskier projects is higher, some risky projects will not be able to obtain bank financing and will be constrained to issue equity. This will also be consistent with empirical evidence that debt-equity ratios on a project level are higher (lower) the lower (higher) is cash flow variability. Secondly, the presence of inefficient financial markets will imply less availability of bank loans and a more reliance on equity financing which would be even stronger when the economy's growth potential is low and the risk-sharing incentives are strong.

Thus, in summary this section has argued that the growth potential and financial market efficiency are important determinants of portfolio capital flows. More precise conclusions about the relation between the relative return differential and its determinants will depend on particular growth-efficiency configurations, as well as on the availability of other types of funding, notably bank financing. In this context, several issues have still remained open. First of all, we have abstracted from a potential link

⁸For example, it is commonly observed in practice that in bankruptcy bank debt has priority over bonds, and equity holders are residual claimants (Bolton and Freixas, 2000).

⁹In order to avoid intermediation costs the safer firms prefer to use bond financing, at the same time bearing risks of a bad outcome and liquidation.

that may exist between the level of financial development and growth itself, as well as from an effect that capital flows may have on growth in developing countries. In fact, a number of recent empirical studies re-examine these issues in order to detect possible causality effects between economic activity, intensity of financial intermediation and equity market activity, on the one hand (Rousseau and Wachtel, 2000)¹⁰, and capital flows and economic growth, on the other hand. While there is little evidence on the effects of portfolio capital inflows on economic growth (Bailliu, 2000), the validity of possible additional interactions between growth and financial market efficiency will be discussed in the empirical part of the paper where we test our main hypotheses.

Another interesting hypothesis can be derived from the supposition that different investors face different degree of information asymmetry. Some types of investment, such as bank lending, by its nature can relatively easier overcome information asymmetries, due to say monitoring ability, and hence may serve as a signal to portfolio lenders and drive bond and stock investments to the countries in which bank lending has increased. However, as the model of Bolton and Freixas (2000) suggests, one would expect bond and stock financing to react differently to the availability of bank loans, and in fact as the bank lending increases the equity investment might decrease. Hence, the overall effect of the increase in bank lending, particularly, on equity investment becomes ambiguous and should be subject to empirical investigation.

4 Empirical Results

4.1 Data

The empirical analysis of this paper draws on three main sources of data. First, the US Treasury International Capital (TIC) Reporting System provides us with information on the US residents transactions with foreigners in long-term securities and the US banking claims on foreigners.¹¹ US portfolio capital inflows to a foreign country are defined as gross sales by foreigners to US residents of foreign securities.¹² In turn, the data on US transaction with foreigners in foreign securities are broken down into foreign bonds and stocks. Explaining US portfolio investments into a group of 32 developing countries will be the major focus of our empirical analysis.

Figures (2), (3), (4) and (5) show US gross bond and stock inflows in and, for comparison reasons, US banking claims on a number of developing countries in Latin America, Asia, Central/Eastern Europe (CEE) and Middle East/Africa, respectively.

¹⁰For a review of a debate on the importance of financial systems and, particularly, equity markets for economic growth, as well as for the results from cross-sectional growth regressions on the effect of stock market development on long-term growth, see Levine and Zervos (1996, 1998).

¹¹The author thanks Dwight Wolkow and Gary Lee of the US Treasury for their cooperation in providing the data.

¹²For a detailed description on the construction of the US Treasury database and some possible shortcomings of the reporting system see Tesar and Werner (1994), Chuhan et al. (1998), Warnock and Mason (2001).

The complete list of countries is given in Table B1 in Appendix B. The data are annual averages calculated over the period of 1990-1999. As the first two bars for each country show, while bond inflows have been the predominant type of US portfolio investments in the Latin American countries, US lenders preferred investing into equity in the Asian countries. However in GDP terms, yearly equity inflows to Asian countries, except Hong Kong and Singapore, were on average almost half of the magnitude of US equity investments in the Latin American countries.

The second dataset we have used is the World Bank (1999) dataset on financial development and structure. This is a unique database as it combines a wide variety of indicators that measure the size, activity and efficiency of financial intermediaries and markets across a large number of countries. Unfortunately the time-span of the data is until 1997 and the database has not been updated afterwards. Table B2 in Appendix B gives a list of and correlations between indicators for stock and bond markets, as well as measures of efficiency of a banking system and foreign bank penetration. The correlations between these indicators for our sample of 32 developing countries show, in particular, that countries with more efficient stock markets are also those that have more active stock markets, more efficient banking sector, higher share of the broad money and of private bank credit in GDP but have fewer foreign banks. No significant correlation has been detected between the stock market efficiency and the size of both stock and bond markets. While the inefficiency of a banking sector is negatively correlated with stock and bond market development characteristics, the correlation coefficients of banking variables are much more significant with the variables of stock market as opposed to private bond market. The last entry in Table B2 is the GDP share of total investment in the economy taken from the Penn World Table 6.0, and it shows a significant positive correlation with all other measures of financial development. The results of this descriptive statistic analysis remain largely unchanged when the sample of developing countries is augmented with four 'cohesion' economies of the European Union or when the pre-1989 sample period starting from 1977 is also added.

Thirdly, a number of traditional macroeconomic indicators such as GDP, exchange rates, trade and money market indicators have been taken from IFS (2001). A complete list of definitions and sources of all variables used in the empirical part of the paper is presented in Table B3 in Appendix B.

4.2 Growth and Financial Market Efficiency Patterns

As an initial check of the theoretical predictions on the determinants of capital flows to developing countries, we look into various patterns of growth and financial market efficiency revealed within a panel of 32 developing countries and 4 EU-member economies. We approximate the growth potential with the actual annual growth rate of real GDP. The efficiency of domestic stock markets, as suggested in World Bank (1999), has been measured by the stock market turnover ratio defined as the ratio of the value of total

shares traded to market capitalization.¹³ It measures activity or liquidity of a stock market relative to its size. Hence, for a small but active stock market, the turnover ratio will be high indicating also low transaction costs, whereas a less liquid stock market will have a lower turnover ratio.

In Table 2, the developing countries in our sample are classified according to the growth and stock market efficiency criteria. Both criteria are taken as annual averages over the period of 1990-1997. High (low) growth countries are those that over 1990-1997 exhibited on average more (less) than 4 percent growth in real GDP.¹⁴ As a threshold for stock market efficiency, the value of 0.45 of stock market turnover ratio has been chosen, which roughly corresponds to the lowest value of that ratio for developed countries in 1997 (World Bank, 1999). The data on average growth and average turnover ratio with the threshold levels are plotted in Figure (6).

Table 2: Classification of countries by growth and stock market efficiency

	High growth	Low growth
High efficiency	China, Hong-Kong, Korea, Malaysia, Singapore, Taiwan, Thailand, Israel, Turkey, (Ireland) /10 countries/	Brazil, Poland, (Spain) /3 countries/
Correlations	(-)/(-)*	(+)*/(-)
Low efficiency	Argentina, Chile, Colombia, Panama, Peru, India, Indonesia, Pakistan, Egypt /9 countries/	Ecuador, Guatemala, Jamaica, Mexico, Uruguay, Venezuela, Philippines, Bulgaria, Czech Rep., Hungary, Romania, South Africa, (Greece, Portugal) /14 countries/
Correlations	(+)*/(+)	(+)*/(+)*

(.)/(.) shows the sign of corr(equity, growth) and corr(equity, efficiency), respectively. Equity investments are in logs. * = significant at least at 10 percent level.

Not surprisingly, almost all Asian countries are classified as high-growth countries, while most of the Latin American and the CEE countries are included as low-growth economies. Most of the countries are showed to have low-efficiency stock markets. Brazil, Poland and Spain though growing at relatively moderate rates (2.7%, 1.6% and 2.1%, respectively) had on average high stock market turnover ratio (0.56, 1.31 and 0.6,

¹³Total value traded is the product of market price and the number of shares traded. Market capitalization is the product of share price and the number of shares outstanding for all stocks traded on the principal exchange(s) of a given country. While the former contains the components of both liquidity and activity, the latter measure is primarily a market-size indicator and reflects the importance of financing through equity issues in the capital mobilization and resource allocation processes.

¹⁴In fact, the threshold of 4 percent approximately corresponds to the median and the mean value of average growth rate across all countries over 1990-1997.

respectively). In general, the sample is dominated with countries that exhibited low efficiency, and particularly, low growth - low efficiency patterns.

Table 2 also shows signs of correlations between US stock investments in these countries and average growth and stock market efficiency measures. For the largest group of countries, that according to our convention, grew slowly and had less efficient stock markets, the stock inflows - or more precisely, return differential that determines stock inflows - is positively correlated with both growth and efficiency variables. On the other hand, the correlation of stock investments with efficiency is negative for the countries that were growing faster and had also more efficient stock markets, while the correlation with growth though negative is not significant. The results showed in Table 2 might suggest that for the countries that already exhibit high turnover in stock markets further increase in the latter do not necessarily imply a positive signal for foreign equity investors, whereas higher growth potential in countries with a low growth may indeed attract more foreign portfolio investment. At the same time, growth factor can be important in the countries that have low stock market turnover but where stock markets expand and develop due to, for example, government policy measures.¹⁵

Thus, we proceed to a formal analysis of the determinants of capital flows expecting, first of all, to detect that growing economies are attracting more stock investments with the overall effect of the increase in stock-market efficiency remaining to be established more rigorously.

4.3 Determinants of Capital Flows and of Their Composition: Evidence from Dynamic Panel Data Estimations

Using the annual panel data on the US portfolio flows to and banking claims on 32 developing countries for the period of 1978-2000, this section investigates the conjecture that the growth potential and the level of development of financial markets in capital-recipient countries are among the major determinants of portfolio flows. Moreover, since different types of flows differ in their characteristics with regard to the problem of information asymmetries, we should expect the impact of financial market efficiency on different types of capital flows to be different as well.

Figure (7) gives a general picture of the US residents total annual investments in stocks and bonds of twelve major US portfolio capital-recipient developing countries from our sample over the period of 1978-2000 showing also the effective time period of up to the year 1997, over which most of the regressions below have been performed because of the data unavailability for some of the covariates. The year 1990 in turn serves as an approximate threshold for distinguishing between the periods of restricted and more liberalized financial regimes pursued by the developing countries.

¹⁵The theoretical prediction of the relation between return differential and the growth rate for this group of countries is not unambiguous and would much depend on the convention by which the countries are classified according to the growth and efficiency criteria.

4.3.1 Econometric Methodology

Unlike previous empirical studies on the determinants of international capital flows in static panels, we employ a dynamic panel data technique that controls for country-specific effects and allows for potential endogeneity of explanatory variables. The least squares dummy variable (LSDV) estimator is known to produce biased coefficient estimates when the lagged dependent variable appears as an explanatory variable under fixed-effects formulation (Hsiao, 1986) with the bias approaching zero as N and T tend to infinity (Nickell, 1981, Kiviet, 1995). An instrumental variable approach applied to the first-differenced model that allows to obtain consistent estimates in dynamic panels has been suggested by Anderson and Hsiao (1982) and developed further by Holtz-Eakin, Newey and Rosen (1990) and Arellano and Bond (1991). Since by data constraint the time dimension of our model is short under a number of covariate specifications the choice of a correct estimator with best small-sample properties becomes crucial. Monte Carlo results of Judson and Owen (1999) suggest that the LSDV estimator with the Kiviet's (1995) correction outperforms all other estimators in a small sample. But since implementation of this technique for unbalanced panels has not been derived, as a second-best choice it is recommended to use the one-step Generalized-Method-of-Moments (GMM) estimator by Arellano and Bond (1991). On the other hand, a possible persistence observed in the data of annual US portfolio flows may result in the problem of weak instruments and losses in asymptotic efficiency when using the first-differenced GMM estimator, as showed in Blundell and Bond (1998) in the context of microeconomic applications. As an alternative, they suggest to use a so-called system GMM estimator that combines the regressions in differences used in the standard first-differenced GMM estimation with the regressions in levels. Lagged differences of variables are then used as instruments for equations in levels, in addition to lagged levels of variables that are used as instruments for equations in first differences. However, in the absence of formal simulation results with cross-sectional and time dimensions being more suitable for macroeconomic panels, we have used the first-differenced GMM estimator and checked the robustness of the empirical results by using the extended system GMM estimator.

In sum, our empirical strategy has been the following. First, being interested in the inference on the coefficients we have used one-step GMM estimator which generally tends to be less biased in small samples than the two-step estimator and outperforms the latter in macroeconomic applications. The two-step estimator was however used for robustness checks. Secondly, the one-step estimations have been implemented using both standard first-differenced and system GMM estimators with standard errors being both robust and non-robust to general heteroscedasticity over individuals and over time.¹⁶ Thirdly, the results have been checked by comparing GMM and within groups estimates and by using different sets of instruments. In fact, although the GMM procedure of Arellano and Bond (1991) implies using all lagged values as instruments, Judson and Owen (1999)

¹⁶The standard first-differenced estimations have been performed using both STATA/SE 7.0 and DPD in OxPack 3 for GiveWin 2 by Doornik et al. (2001). The system GMM estimator is available only in the latter software package.

argue that a 'restricted GMM', where the number of values of the lagged dependent variables and exogenous regressors used as instruments is reduced, does not substantially affect the performance of this technique.

In a general setup, the model is given by

$$p_{i,t} = \sum_{j=1}^k p_{i,t-j} \alpha_j + \mathbf{x}_{i,t} \boldsymbol{\beta}_1 + \mathbf{w}_{i,t} \boldsymbol{\beta}_2 + \eta_i + \varepsilon_{i,t} \quad i = 1, \dots, N; \quad t = 1, \dots, T_i \quad (1)$$

where $p_{i,t}$ is the natural logarithm of US portfolio ($p = \textit{equity, bond}$) investments in country i at time t ,¹⁷ $\mathbf{x}_{i,t}$ is a vector of exogenous covariates and $\mathbf{w}_{i,t}$ is a vector of predetermined covariates treated similarly to the lagged dependent variables. \mathbf{x} and \mathbf{w} may contain lagged independent variables and time dummies. η_j is an unobserved country-specific fixed effect, and $\varepsilon_{i,t}$ is an *i.i.d.* $(0, \sigma_\varepsilon^2)$ disturbance term.

4.3.2 Equity Flows

Table 3 reports the results for equity flows where the dependent variable is the logarithm of the US residents gross equity investments in the developing countries. In the baseline model, columns 1 and 2, stock flows to a country i are assumed to depend on the growth potential and the efficiency of the stock market in country i . As above, the growth potential is approximated with the actual annual growth rate of real GDP, while the efficiency of domestic stock markets is measured by the stock market turnover ratio.

The specification particularly includes one lag of the dependent variable, the current and lagged growth variable and the current market efficiency variable. We have specified the efficiency variable as a predetermined covariate (\mathbf{w}_{it} in equation (1)) since we can assume that by construction of the variable the error term at time t can have some feedback on the subsequent realizations of that variable.¹⁸ Furthermore, time dummies have been included into the regressions. Finally, in this and further estimations, the condition for consistency of the GMM estimators, i.e. the lack of evidence of second-order serial correlation in the first-differenced residuals, and the Sargan test of model specification have been checked and reported.

¹⁷Results of the Levin and Lin (1992) and Im, Pesaran and Shin (1997) unit root tests, not reported here, suggest that in general the nonstationarity of log of equity and bond flows can be rejected. Rejection is stronger for equity flows and for the subsample 1990-1997, as compared to bond flows and the full sample over 1978-1997, respectively, in terms of the robustness of the results to changes in lag numbers and the inclusion of the deterministic trend term.

¹⁸In fact, the Sargan test indicates that treating the efficiency variable as predetermined makes it more difficult to reject the null that over-identifying restrictions are valid.

Table 3: Determinants of US residents foreign equity investments in developing countries

	(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)
equity _{<i>i,t-1</i>}	0.51** (11.97)	0.38** (6.92)	0.43** (7.03)	0.51** (11.63)	0.49** (11.92)	0.46** (10.18)	0.33** (4.92)	0.20* (2.53)
equity _{<i>i,t-2</i>}			-0.15** (2.70)				-0.14* (2.56)	
growth _{<i>i,t</i>}	4.79** (3.51)	4.50** (2.59)	2.14 (1.35)	3.63* (2.51)	5.08** (3.89)	4.41** (3.21)	1.96 (1.14)	-0.28 (0.12)
growth _{<i>i,t-1</i>}	3.05* (2.36)	7.33** (4.19)	8.33** (5.38)	3.52* (2.44)	3.17** (2.60)	3.84** (3.07)	9.52** (5.66)	10.37** (4.93)
efficiency _{<i>i,t</i>}	0.38** (3.13)	0.32* (2.12)		0.83** (3.80)	0.35** (2.95)	0.57** (3.16)		
efficiency _{<i>i,t-1</i>}				-0.30 (1.37)				
overhead cost _{<i>i,t</i>}			2.37 (0.39)					
overhead cost _{<i>i,t-1</i>}			9.10 ⁺ (1.80)					
inflation _{<i>i,t</i>}				-0.32* (2.29)				
population _{<i>i,t</i>}					-1.23 (1.00)			
openness _{<i>i,t</i>}					-0.13 (0.41)			
M2/GDP _{<i>i,t</i>}						2.71** (3.45)		
M2/GDP _{<i>i,t-1</i>}						-1.20 ⁻ (1.59)		
bank credit _{<i>i,t</i>}							-4.31* (2.25)	
bank credit _{<i>i,t-1</i>}							2.31 (1.25)	
foreign banks _{<i>i,t</i>}							-1.32 (1.43)	
foreign banks _{<i>i,t-1</i>}							1.85 ⁺ (2.35)	
privatization _{<i>i,t</i>}								14.50* (2.10)
privatization _{<i>i,t-1</i>}								7.97 (1.12)
activity _{<i>i,t</i>}								-0.05 (0.13)
AR(2) test	0.8278	0.5615	0.7512	0.8286	0.8356	0.8025	0.8507	0.8157
Sargan test	0.7374	0.9679	0.0851	0.9046	1.0000	0.9434	1.0000	1.0000
Obs.(groups)	408(32)	212(32)	159(32)	353(28)	408(32)	366(31)	140(29)	114(24)

t-values in brackets. ** (*, +, -) = significant at 1 (5, 10,15)-percent level.

Constant and time dummies are not reported. AR(2) test refers to the test for the null of no second-order autocorrelation in the first-differenced residuals.

p-values of the AR(2) and Sargan test of over-identifying restrictions are reported.

The results show that both the real GDP growth and stock market efficiency in the developing countries positively affect the US equity investments in these countries. The findings are robust to the change in the sample period: in fact, column 1 covers the

period of 1978-1997, whereas column 2 considers the period after 1990 when most of the developing countries embarked on financial liberalization and capital market deregulation policies, as well as when the Brady Plan implementation started.¹⁹ Moreover, some covariates such as measures of banking system efficiency and bond market characteristics used further in the analysis have a time span of 1990-1997.

Table 3 proceeds further with a number of robustness tests. Several additional variables have been included into the base-line model to control for other features of financial development such as efficiency in the banking sector, financial depth and stock market activity, as well for a number of other important economic characteristics. The relation uncovered in the base-line model remains rather robust to alternative specifications, also when Hong-Kong and Singapore (as financial centers) are excluded, or even when the four EU countries are also included in the country sample.²⁰ The first lag of stock inflows enters with a significantly positive coefficient possibly indicating the observed persistence in capital flows from one period to another, whereas the second lag when significant has a negative sign suggesting that capital inflows reverse after the second year. As expected, when the system GMM estimator is used the estimated coefficient on the lagged dependent variable becomes slightly bigger correcting it for the downward bias observed in the standard first-differenced GMM estimates. Using the extended estimator however leaves the major results almost unaffected. Finally, we have checked for a potential multicollinearity between growth and efficiency variables via including the variables individually and still found significant positive effect of both of the variables on stock inflows.

As Table B2 showed, countries with a more liquid and efficient stock market also have an efficient banking sector. So, in column (3) of Table 3 a potential measure for the efficiency with which commercial banks perform their function of financial intermediation, overhead cost, has been used. Large overhead costs indicate that markets are less efficient and hence we would expect a negative effect on the stock flows. However, the result in column (3) suggests the opposite, namely, that less efficient banking sector induces more equity investment.²¹ We will discuss this finding below, as it is related to one of the main hypotheses derived from Bolton and Freixas (2000). In column 4, the benchmark model is augmented with the inflation variable, which as a characteristic of a general macroeconomic volatility, negatively affects equity inflows. Controlling for the country size as proxied by its population and for the trade openness, measured as a ratio of exports plus imports to GDP, leaves the baseline results almost unaffected (column 5) while showing insignificant coefficients for both variables. The conventional measure of the degree of financial depth, ratio of M2 to GDP, is showed to have a posi-

¹⁹An alternative could be to include dummy variables to capture episodes or intensity of financial liberalization.

²⁰Robustness has been checked also across different subgroups of countries as suggested in Table 2. Particularly, a positive and significant relation between equity flows and stock market efficiency has been detected also for the subgroup of high-growth and high-efficiency countries.

²¹When efficiency and overhead cost variables are considered together, the positive effect of the former statistically dominates. Also, by employing additional moment conditions when the system GMM estimator is used considerably improves the Sargan test result.

tive impact on equity inflows (column 6). In column (7) the effect of the supply of bank financing is tested more directly. The availability of private bank credits negatively and significantly affects equity investments along the lines of the Bolton-Freixas hypothesis on a negative relation between bank and equity financing. At the same time, the presence of more foreign banks in the domestic banking sectors of developing countries attracts more US portfolio investments. Finally, the last column considers the role of privatization measures largely implemented by the developing countries throughout the late 1980s and 1990s. Indeed, a larger share of privatization proceeds in GDP could be one of the determining factors of foreign equity inflows into these countries²², whereas the stock market total value traded in GDP terms (activity) has a negligible effect.

4.3.3 Bond Flows

The determinants of the US bond investments in the developing countries are analyzed in the same way, and the results are reported in Table 4. Before proceeding, first note that the US equity and bond investments show a rather significant correlation as it can be observed from Figure (7). This might suggest a presence of some common factors that drive both types of foreign portfolio flows. However, the US bond data do not distinguish between private and public bonds hence implying that bond flows can be driven partly by reasons related more to general macroeconomic conditions, sovereign credibility and government performance. In fact, under the same base-line specification as for the equity investment, the estimation for bond flows (not reported here) shows a complete insignificance of equity market characteristics although retaining a positive and significant impact of the growth variable. Because of the absence of data on bond market efficiency, the base-line model investigates the relation between the US gross bond investments (in logs), the growth variable and the size of the bond market instead. However, since the effect of the public bond market size statistically dominates the one of the private bond market and given also the fact that corporate bond markets are relatively less developed in emerging economies (World Bank, 2002), the further analysis uses public bond market capitalization as a measure of bond market development. The major limitation of this analysis is the data constraint, as the data on bond market capitalization are available only from 1990 onwards and for almost half of the countries in the sample.

As the results in Table 4 show, while the growth variable is in most cases insignificant, the current values of bond market capitalization have a positive and highly significant effect on the bond inflows. However, the lagged values of the bond market capitalization enter with coefficients of a commensurate magnitude but with the opposite sign suggesting that if the size of the bond market does not differ too much from period to period, its overall intertemporal impact may be rather small. Including the second lag of the bond market size ensures consistency of the GMM estimator, whereas the growth variable becomes positively significant in its third lag only (not reported

²²See United Nations (1999) on the role of privatization in attracting foreign investments to and in contributing to domestic stock market development in a number of developing countries.

here). A relatively long-term investment horizon of bonds might partly explain the significance of lagged values of regression covariates.

Table 4: Determinants of US residents foreign bond investments in developing countries

	(1)	(2)	(3)	(4)	(5)	(6)
bond _{<i>i,t-1</i>}	0.11 (0.84)	-0.04 (0.27)	0.18* (2.19)	0.48** (10.69)	0.01 (0.05)	0.06 (0.45)
bond _{<i>i,t-2</i>}	-0.37** (3.29)	-0.37** (3.36)	0.05 (0.72)	0.11* (2.54)	-0.37** (3.31)	-0.36** (2.74)
growth _{<i>i,t</i>}	-0.30 (0.07)		2.36 (0.74)	1.85 ⁻ (1.45)	-0.98 (0.22)	3.03 (0.63)
growth _{<i>i,t-1</i>}	1.06 (0.27)		3.99 (1.41)	-0.65 (0.51)	-2.74 (0.69)	6.78 (1.44)
market size _{<i>i,t</i>}	15.24** (3.25)	16.31** (3.64)			15.60** (3.43)	13.11* (2.68)
market size _{<i>i,t-1</i>}	-7.50 (1.08)	-7.62 (1.11)			-12.55 ⁺ (1.81)	-9.55 (1.27)
market size _{<i>i,t-2</i>}	-10.22* (2.23)	-11.60* (2.45)			-9.68* (2.18)	-6.17 (1.15)
GDP\$ _{<i>i,t</i>}		2.53 ⁺ (1.92)				
GDP\$ _{<i>i,t-1</i>}		-0.27 (0.20)				
overhead cost _{<i>i,t</i>}			-19.20 ⁺ (1.73)			
overhead cost _{<i>i,t-1</i>}			1.14 (0.01)			
population _{<i>i,t</i>}				-0.66 (0.50)		
openness _{<i>i,t</i>}				-0.39 (0.90)		
M2/GDP _{<i>i,t</i>}					-6.76** (2.91)	
M2/GDP _{<i>i,t-1</i>}					-0.48 (0.22)	
bank credit _{<i>i,t</i>}						-7.21 ⁻ (1.60)
bank credit _{<i>i,t-1</i>}						12.17* (2.35)
AR(2) test	0.9266	0.8128	0.8389	0.4176	0.5563	0.9027
Sargan test	1.0000	1.0000	0.2204	0.2965	1.0000	1.0000
Obs.(groups)	56(13)	57(13)	159(32)	532(32)	56(13)	53(12)

t-values in brackets. ** (*, +, -) = significant at 1 (5, 10,15)-percent level.

Constant and time dummies are not reported. AR(2) test refers to the test for the null of no second-order autocorrelation in the first-differenced residuals.

p-values of the AR(2) and Sargan test of over-identifying restrictions are reported.

The results remain largely invariant to a number of robustness tests. Overhead costs, as an alternative measure of financial market efficiency, show an expected negative impact on the bond inflows (column 3), which is the opposite of what we have

obtained for the US equity investments (cf. Table 3, column 3). This may imply that bond investment is more sensitive to financial market inefficiency than equity investment and offer some further evidence in favor of the Bolton and Freixas (2000) argument as opposed to the 'pecking-order' hypothesis. Moreover, availability of bank financing to private sector increases bond investment (column 6). The results that include privatization and inflation variables are not reported as the former case do not yield significant results while in the latter case the GMM estimator is mostly inconsistent under various specifications.

Although the focus of the paper is on foreign portfolio investment, a similar exercise for the US banking claims has been performed as well. The results, not reported here, have showed that countries with higher growth rate, higher ratio of M2 to GDP and more efficient stock market attract more bank financing. The impact of the size of both public and private bond markets is significant but the direction of the impact, particularly of public bond market capitalization, alternates from period to period, whereas the significant lagged impact of private bond market capitalization is positive.

4.3.4 Capital Structure

In the remaining part of this section, we try to address the issue of the determinants of the composition of capital flows when different types of capital flows are taken relative to each other rather than individually. We consider three relations that may partially characterize the composition of capital flows: the ratio of stock investment to banking claims (*equity/bank*), the ratio of bond investment to banking claims (*bond/bank*), and the ratio of stock to bond investment (*equity/bond*).

Columns (1), (2) and (3)-(5) of Table 5 present the dynamic panel data estimation results on the determinants of stock and bond investments relative to banking claims and stock investments relative to bond investments, respectively. High growth, as expected from previous results, contributes to more equity than bond financing relative to bank financing. More efficient stock markets attract more stock investments (column 1), whereas the intertemporal effect of the size of public bond market again remains ambiguous (column 2). For both equity and bond inflows inflation and openness to trade have a negative and significant impact. This suggests that while portfolio investments are more sensitive to macroeconomic volatility, more trade openness is linked to bank financing rather than to equity financing as the theoretical prediction in Table 1 conjectured.

Most strikingly, however, when equity and bond inflows are taken relative to each other neither of the explanatory variables is showed to be significant (column 3).²³ However, when we use the measure of efficiency of the banking sector such as overhead costs in column 4, we obtain a similar prediction as above, namely that the more inefficient banking sector is (with less bank financing available) the higher is the

²³Also Portes, Rey and Oh (2001) find that US transactions in corporate bonds and equities seem to be equally sensitive to informational asymmetries proxied by the geographic proximity and other explicit information variables such as telephone call traffic.

equity-bond ratio.²⁴ Column 5 supports the robustness of the latter result for the full sample of countries when the bond market size variable is dropped. These preliminary findings suggest that in search of the determinants of portfolio capital flows the role of other financial intermediaries and, first of all, banks should also be taken into account.

Table 5: Determinants of the composition of capital flows

	<i>equity/bank</i>	<i>bond/bank</i>	<i>equity/bond</i>		
	(1)	(2)	(3)	(4)	(5)
$\text{growth}_{i,t}$	5.07** (3.30)	1.72 (0.32)	1.87 (0.30)	1.57 (0.27)	1.35 (0.40)
$\text{growth}_{i,t-1}$	3.16* (2.10)	-2.25 (0.49)	9.27 (1.34)	9.54 ⁻ (1.56)	8.35** (2.69)
$\text{efficiency}_{i,t}$	0.73** (3.17)		0.82 (1.14)	0.49 (0.93)	0.39 (1.38)
$\text{efficiency}_{i,t-1}$	-0.44 ⁺ (1.91)		-0.41 (0.56)	-0.32 (0.52)	
$\text{market size}_{i,t}$		16.77* (2.65)	-8.09 (1.24)	-3.95 (0.70)	
$\text{market size}_{i,t-1}$		-7.21 (0.87)	5.31 (0.78)	4.88 (0.79)	
$\text{market size}_{i,t-2}$		-13.65* (2.48)			
$\text{openness}_{i,t}$	-0.89* (2.03)	-5.29* (2.36)	0.31 (0.15)		
$\text{inflation}_{i,t}$	-0.26 ⁺ (1.75)	-0.78 ⁺ (1.74)	0.14 (1.29)		
$\text{bank credit}_{i,t}$		-2.60 (0.68)			
$\text{overhead cost}_{i,t}$				35.24* (2.28)	24.80** (2.83)
AR(2) test	0.5519	0.4261	0.8494	0.9045	0.9073
Sargan test	0.8678	1.0000	1.0000	1.000	0.9998
Obs.(groups)	353(28)	51(12)	58(11)	57(12)	172(32)

t-values in brackets. ** (*, +, -) = significant at 1 (5, 10, 15)-percent level.

Constant and time dummies are not reported. AR(2) test refers to the test for the null of no second-order autocorrelation in the first-differenced residuals. *p*-values of the AR(2) and Sargan test of over-identifying restrictions are reported.

5 Concluding Remarks

During the recent decades the world economy has witnessed unprecedented developments in the process of internationalization of capital markets and upsurge in cross-border borrowing and lending. Increasing capital flows to developing countries have become one of the salient features of the world's changing financial landscape. Yet, the academic literature on the determinants of the magnitude and composition of capital flows to developing countries offers rather limited explanations to these issues.

²⁴Controlling more directly for bank credit availability results in a similar prediction albeit not very robust to alternative estimation methods, and hence it is not reported here.

In this paper, we first departed from the corporate financing framework and used the theoretical setup developed in Chen and Huang (1995) and Chen and Khan (1997) to conjecture that under the assumption of information asymmetries between corporate insiders and potential lenders the decision to make equity investment in a country with a less efficient financial market will depend on the differences in the degree of financial market inefficiency and the growth potential between capital-recipient and capital-exporting countries. The effect of introducing other outside options of financing, such as bond issues and bank loans remains ambiguous. However, as in Bolton and Freixas (2000), the availability of bank funding with costly monitoring may change the distribution of bond and equity investments across projects with different expected rates of return or riskiness in favor of more bond investments.

The data on the US residents foreign portfolio investments to 32 developing countries from Latin America, Asia, Central/Eastern Europe, Middle East and Africa have been used to investigate the relation between portfolio inflows into these countries and their economic growth and financial market efficiency characteristics. The results from dynamic panel data estimations over the period of 1978-1997 have overwhelmingly supported the hypothesis that higher growth and more efficient stock markets largely contribute to attracting more US equity investments. A similar analysis of the US foreign bond investments in the developing countries have provided somewhat weaker support to the importance of growth as one of the determinants of capital flows suggesting however that bond flows are more sensitive to inefficiencies in banking system of these countries than equity flows. Indirectly, this preliminary finding can be considered as, to our knowledge, the first empirical evidence that supports the Bolton and Freixas (2000) argument on the effect of efficiency of the domestic banking sector on the capital structure choice. Clearly, to obtain more direct evidence of this hypothesis the capital market equilibrium with all foreign and domestic portfolio investments should be considered. However, the main lesson remains suggesting that in search of the determinants of portfolio capital flows and their composition the role of other financial intermediaries and, first of all, banks should also be taken into account.

A straightforward policy implication from the paper is that measures aimed at developing further financial market infrastructure, introducing adequate accounting standards and efficient mechanisms of information disclosure and transmission will help developing countries to attract more portfolio capital investments. But without commensurate real economic growth and availability of efficient absorptive capacities capital flows may not be sustainable and may rather feature high volatility. In this context, the link between capital flows, economic growth and financial market development should be further investigated within a unified framework. Further research may try also to address more rigorously the relation between capital flows and domestic corporate financing patterns in developing countries.

References

- [1] Albuquerque, R. (2000) The Composition of International Capital Flows: Risk Sharing Through Foreign Direct Investment, mimeo.
- [2] Anderson, T.W., and C. Hsiao (1982) Formulation and Estimation of Dynamic Panel Models Using Panel Data. *Journal of Econometrics*, 18: 47-82.
- [3] Arellano, M., and S. Bond (1991) Some Tests of Specification for Panel Data: Monte Carlo Evidence and an Application to Employment Equations. *Review of Economic Studies*, Vol. 58(2): 277-297.
- [4] Bailliu, J.N. (2000) Private Capital Flows, Financial Development, and Economic Growth in Developing Countries. Bank of Canada Working Paper 2000-15, Bank of Canada.
- [5] Blundell, R., and S. Bond (1998) Initial Conditions and Moment Restrictions in Dynamic Panel Data Models, *Journal of Econometrics* 87, 115-143.
- [6] Bohn, H., and L. Tesar (1996) U.S. Equity Investment in Foreign Markets: Portfolio Rebalancing or Return Chasing? *American Economic Review*, Vol. 86(2): 77-81.
- [7] Bolton, P., and X. Freixas (2000) Equity, Bonds, and Bank Debt: Capital Structure and Financial Market Equilibrium under Asymmetric Information. *Journal of Political Economy*, 108(2): 324-351.
- [8] Buch, C., and C. Pierdzioch (2000) The Growth and the Volatility of International Capital Flows: Reconciling the Evidence. Paper prepared for the Kiel Week Conference held in Kiel, June 19-20, 2000.
- [9] Calvo, G., Leiderman, L., and C. Reinhart (1993) Capital Inflows and Real Exchange Rate Appreciation in Latin America: The Role of External Factors. IMF Staff Papers, Vol. 40 (1): 108-151.
- [10] Chen, Z., and H. Huang (1995) Investment Trap. London School of Economics Financial Market Group, Discussion Paper 227.
- [11] Chen, Z., and M. Khan (1997) Patterns of Capital Flows to Emerging Markets: A Theoretical Perspective. IMF Working Paper, WP/97/13, International Monetary Fund, Washington D.C.
- [12] Chuhan, P, Claessens, S., and N. Mamingi (1998) Equity and Bond Flows to Latin America and Asia: The Role of Global and Country Factors. *Journal of Development Economics*, 55: 439-463.
- [13] Doornik, J.A., Arellano, M. and S. Bond (2001) Panel Data Estimations Using DPD for Ox, Nuffield College, Oxford, mimeo.

- [14] Dybvig, P., and J. Zender (1991) Capital Structure and Dividend Irrelevance with Asymmetric Information. *The Review of Financial Studies*, Vol. 4(1): 201-219.
- [15] Edison, H.J., and F.E. Warnock (2001) Cross-Border Listings, Capital Controls, and Equity Flows to Emerging Markets. Federal Reserve Board, mimeo.
- [16] Fernández-Arias, E., and P. Montiel (1996) The Surge in Capital Inflows to Developing Countries: An Analytical Overview. *The World Bank Economic Review*, Vol. 10 (1): 51-77.
- [17] Glick, R., and Kasa, K. (1997) The Composition of International Capital Flows: Theory and Evidence. Mimeo. Federal Reserve Bank of San Francisco. <http://www.sf.frb.org/econsrch/wklyltr/2000/el2000-18.html> (downloaded April 2001).
- [18] Goldstein, M., Mathieson, D.J, and T. Lane (1991) Determinants and Systemic Consequences of International Capital Flows. In *IMF Research Department, Determinants and Systemic Consequences of International Capital Flows*. Occasional Paper 77, International Monetary Fund, Washington, D.C.
- [19] Holtz-Eakin, D., Newey W., and H.S.Rosen (1988) Estimating Vector Autoregressions with Panel Data. *Econometrica*, 56 (6): 1371-1395.
- [20] Hsiao, C. (1986) *Analysis of Panel Data*. Cambridge University Press. Cambridge.
- [21] Hull, L., and L.L. Tesar (2000) The Structure of International Capital Flows. Paper prepared for the Kiel Week Conference held in Kiel, June 19-20, 2000.
- [22] Im, K.S., Pesaran, M.H., and Y. Shin (1997) Testing for Unit Roots in Heterogenous Panels. Department of Applied Economics, University of Cambridge, mimeo.
- [23] International Financial Statistics (IFS) (2001) CD-ROM September 2001, International Monetary Fund, Washington DC.
- [24] Judson R.A., and A.L. Owen (1999) Estimating Dynamic Panel Data Models: A Guide for Macroeconomists *Economics Letters* 65: 9-15.
- [25] Kim, Y. (2000) Causes of Capital Flows in Developing Countries. *Journal of International Money and Finance*, 19: 235-253.
- [26] Kiviet, J.F. (1995) On Bias, Inconsistency, and Efficiency of Various Estimators in Dynamic Panel Data Models. *Journal of Econometrics*, 68: 53-78.
- [27] Kraay, A., Loayza, N., Serven, L., and J. Ventura (2000) Country Portfolios. NBER Working Paper 7795, National Bureau of Economic Research, Cambridge, MA.
- [28] Lane, P., and G.M. Milesi-Ferretti (1999) The External Wealth of Nations: Measures of Foreign Assets and Liabilities for Industrial and Developing Countries. IMF Working Paper, WP/99/115, International Monetary Fund, Washington D.C.

- [29] — (2000) External Capital Structure: Theory and Evidence. IMF Working Paper, WP/00/152, International Monetary Fund, Washington D.C.
- [30] Levin, A., and C. Lin (1992) Unit Root Tests in Panel Data: Asymptotic and Finite-Sample Properties. Discussion Paper 92-23, University of California, San Diego.
- [31] Levine, R., and S. Zevros (1996) Stock Market Development and Long-run Growth. *World Bank Economic Review*, 10: 323-339.
- [32] — (1998) Stock Markets, Banks and Economic Growth. *American Economic Review*, 88: 537-558.
- [33] Modigliani, M., and M. Miller (1958) The Cost of Capital, Corporation Finance and the Theory of Investment. *The American Economic Review*, Vol. 48 (3): 261-297.
- [34] Mody, A., Taylor, M.P., and J.Y.Kim (2001) Modelling Fundamentals for Forecasting Capital Flows to Emerging Markets. *International Journal of Finance and Economics* 6: 201-216.
- [35] Montiel, P., and Reinhart, C. (1999) Do Capital Controls and Macroeconomic Policies Influence the Volume and Composition of Capital Flows? Evidence from the 1990s. *Journal of International Money and Finance*, 18: 619-635.
- [36] — (2001) The Dynamics of Capital Movements to Emerging Economies During the 1990s. In S. Griffith-Jones, M. Montes, A. Nasution (eds) *Short-Term Capital Flows and Economic Crises*, Oxford University Press, Oxford.
- [37] Myers, S., and N. Majluf (1984) Corporate Financing and Investment Decisions When Firms Have Information Investors Do Not Have. *Journal of Financial Economics*, 13: 187-221.
- [38] Nickell, S. (1981) Biases in Dynamic Models with Fixed Effects. *Econometrica*, 49(6): 1417-1426.
- [39] Portes, R., and H. Rey (1999) The Determinants of Cross-Border Equity Flows. NBER Working Paper 7336, National Bureau of Economic Research, Cambridge, MA.
- [40] Portes, R., Rey, H. and Y. Oh (2001) Information and Capital Flows: The Determinants of Transactions in Financial Assets. *European Economic Review* 45: 783-796.
- [41] Razin, A., Sadka, E., and C-W. Yuen (1998a) A Pecking Order of Capital Flows and International Tax Principles. *Journal of International Economics*, 44: 45-68.
- [42] — (1998b) Capital Flows with Debt- and Equity-Financed Investment: Equilibrium Structure and Efficiency Implications. IMF Working Paper, WP/98/159, International Monetary Fund, Washington D.C.

- [43] Rodrik, D., and A. Velasco (1999) Short-Term Capital Flows. NBER Working Paper 7364, National Bureau of Economic Research, Cambridge, MA.
- [44] Rousseau, P.L., and P. Wachtel (2000) Equity Markets and Growth: Cross-country Evidence on Timing and Outcomes, 1980-1995. *Journal of Banking and Finance*, 24: 1933-1957.
- [45] Singh, A. (1995) Corporate Financial Patterns in Industrializing Economies: A Comparative International Study, International Finance Corporation, Technical Paper Number 2, The World Bank, Washington, D.C.
- [46] Taylor, M., and L. Sarno (1997) Capital Flows to Developing Countries: Long- and Short-Term Determinants. *The World Bank Economic Review*, Vol. 11 (3), The International Bank for Reconstruction and Development, Washington, D.C.: 451-470.
- [47] Tesar, L., and I. Werner (1994) International Equity Transactions and U.S. Portfolio Choice. NBER Working Paper 4611, National Bureau of Economic Research, Cambridge, MA.
- [48] US Treasury (2001a) Treasury International Capital (TIC) Reporting System, TIC Capital Movements, U.S. Transactions with Foreigners in Long-Term Securities, U.S. Treasury Department, <http://www.treas.gov/tic/ticsec.htm>
- [49] US Treasury (2001b) Treasury International Capital (TIC) Reporting System, TIC Capital Movements, Claims on Foreigners Reported by Banks in the U.S., U.S. Treasury Department, <http://www.treas.gov/tic/ticclaim.htm>
- [50] Warnock, F., and M. Mason (2001) The Geography of Capital Flows: What We Can Learn from Benchmark Surveys of Foreign Equity Holdings. *Emerging Markets Quarterly* (forthcoming), <http://www.federalreserve.gov/pubs/ifdp/2000/688/default.htm> (downloaded April 2001).
- [51] World Bank (2002) Building Corporate Bond Markets in Emerging Market Countries. A. Harwood, http://www1.worldbank.org/finance/assets/images/Harwood_slides.pdf
- [52] — (1999) A New Database on Financial Development and Structure. T. Beck, A. Demirguc-Kunt, R. Levine, <http://www.worldbank.org/research/projects/finstructure/database.htm>
- [53] — (1997) Private Capital Flows to Developing Countries: The Road to Financial Integration (Oxford University Press for the World Bank, New York).
- [54] World Development Indicators (WDI), 2001, CD-ROM 2001, The World Bank, Washington, D.C.

Figures

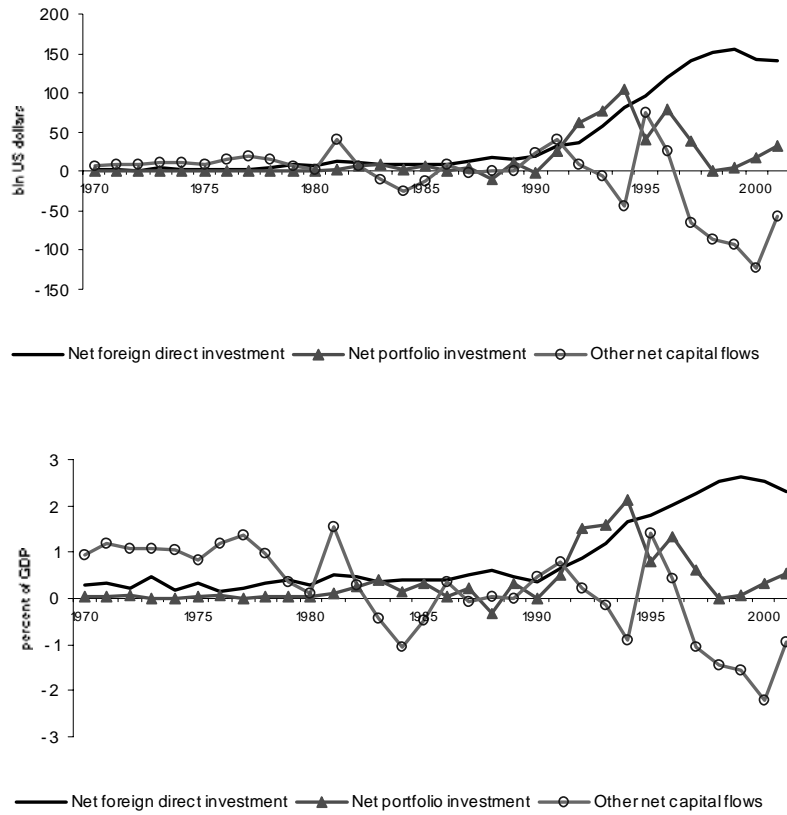


Figure 1: Composition of capital flows to developing and transition countries (in levels and in percent to their total GDP)

Source: International Monetary Fund, World Economic Outlook database, own calculations

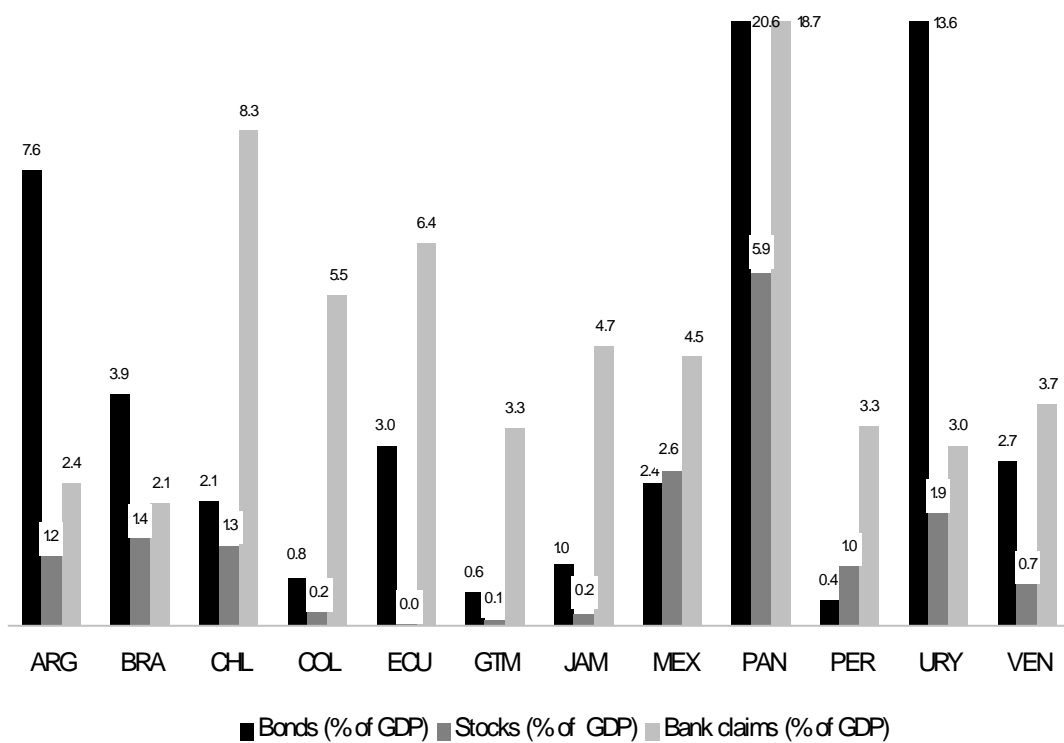


Figure 2: US residents gross bond and stock investments in and US banking claims on the Latin American countries (yearly averages over the 1990s)
 Source: US Treasury (2001a,b), IFS(2001), own calculations

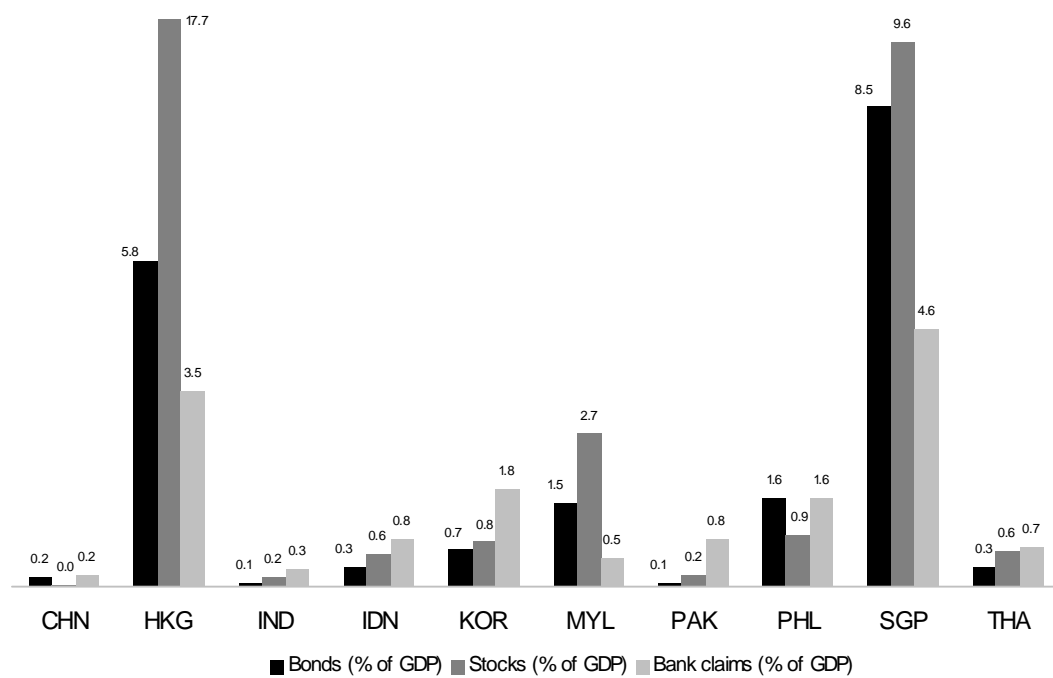


Figure 3: US residents gross bond and stock investments in and US banking claims on the Asian countries (yearly averages over the 1990s)
 Source: US Treasury (2001a,b), IFS(2001), own calculations



Figure 4: US residents gross bond and stock investments in and US banking claims on the CEE countries (yearly averages over the 1990s)

Source: US Treasury (2001a,b), IFS(2001), own calculations



Figure 5: US residents gross bond and stock investments in and US banking claims on Egypt, Israel, Turkey and South Africa (yearly averages over the 1990s)
 Source: US Treasury (2001a,b), IFS(2001), own calculations

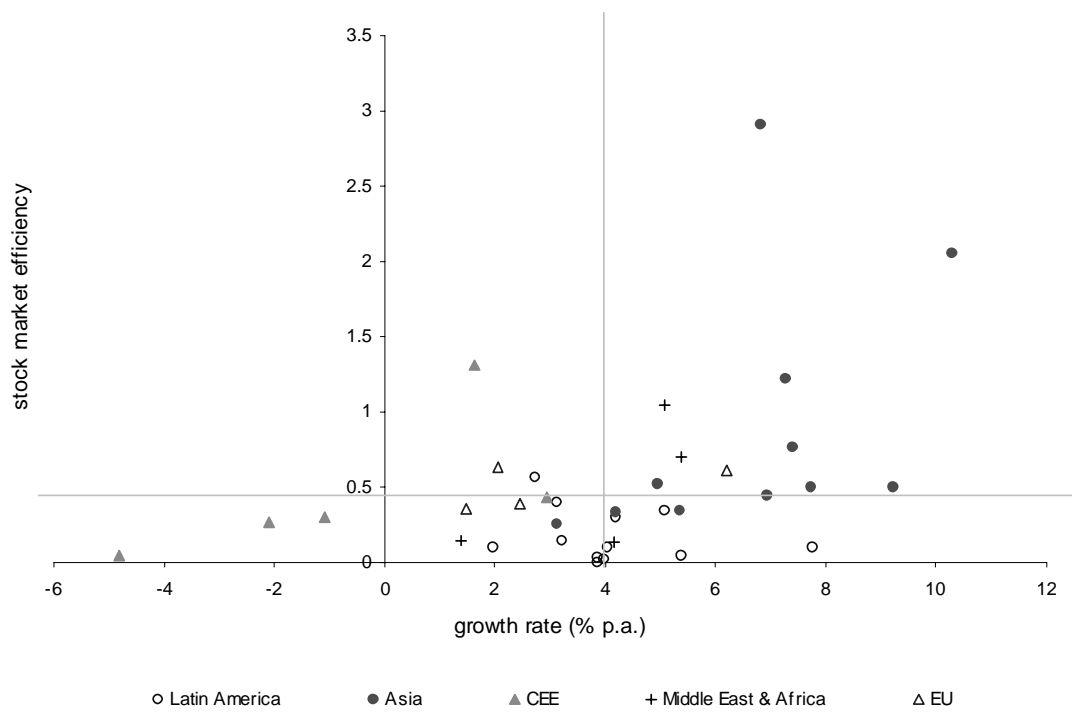


Figure 6: Average annual growth rate of real GDP and average stock market turnover ratio (efficiency), 1990-1997

Source: IFS (2001), World Bank (1999), own calculations

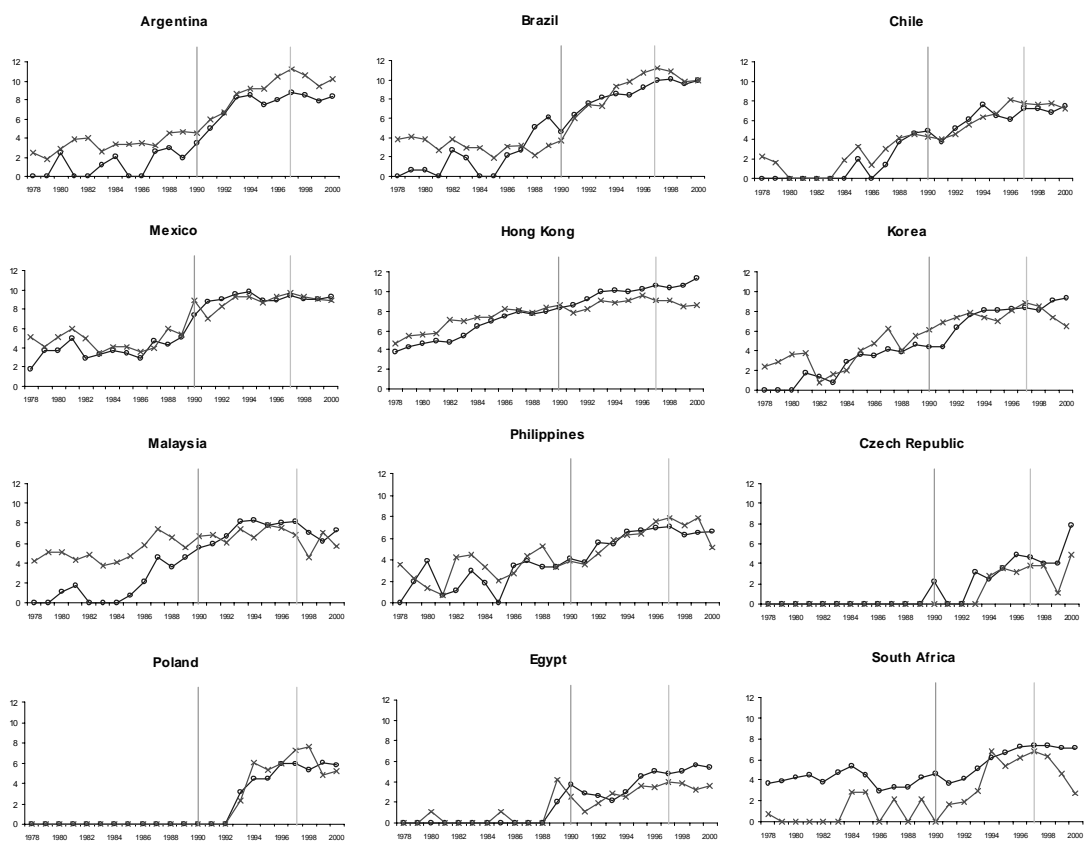


Figure 7: US residents foreign equity and bond investments in selected developing countries (equity - lines with circles, bond - lines with crosses; logarithmic scale). The vertical lines correspond to the years 1990 and 1997.

Source: US Treasury (2001a), own calculations

Appendix A

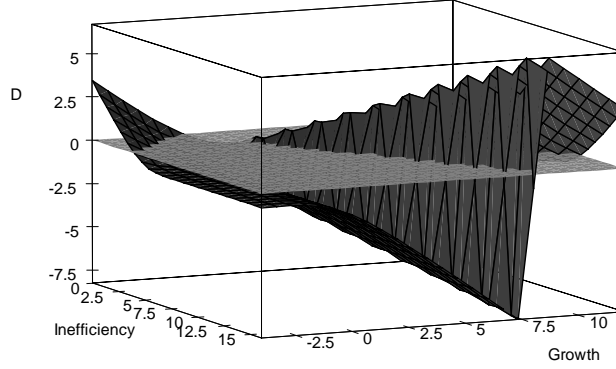


Figure A1: Expected return differential between an emerging and a developed economies

Note on Figure (A1):

The expected return differential is defined as

$$E[D(r^*; \mu, \sigma)] = E_B[r | r \in (-r^*; 0) \cup (r^*; +\infty)] - E_A[r | r > 0] \quad (\text{A1})$$

The first term in the RHS is the conditional expected return in economy B with a less efficient financial market and information asymmetry when inefficient investment occurs and $-r^* = r^* > 0$, such that $(-r^*, 0)$ and $(0, r^*)$ capture over- and under-investment ranges, respectively.²⁵ The second term is the conditional expected return in the benchmark economy A with perfect financial market and no information asymmetry where the NPV rule holds and $-r^* = r^* = 0$. Assuming that investment opportunities in the economy, i.e. the returns on new investment projects, are distributed as *i.i.d.* $N(\mu_i, \sigma_i^2)$, $i = A, B$, eq. (A1) becomes

$$E[D(r^*; \mu, \sigma)] = \frac{f\left(\frac{-r^* - \mu_B}{\sigma_B}\right) - f\left(-\frac{\mu_B}{\sigma_B}\right) + f\left(\frac{r^* - \mu_B}{\sigma_B}\right)}{F\left(-\frac{\mu_B}{\sigma_B}\right) - F\left(\frac{-r^* - \mu_B}{\sigma_B}\right) + 1 - F\left(\frac{r^* - \mu_B}{\sigma_B}\right)} - \frac{f\left(-\frac{\mu_A}{\sigma_A}\right)}{1 - F\left(-\frac{\mu_A}{\sigma_A}\right)} \quad (\text{A2})$$

where $f(\cdot)$ and $F(\cdot)$ are the standard normal density function and the standard normal cumulative distribution, respectively.

In Figure (A1), we have assumed for simplicity that the growth potential in the financially more developed economy is zero, $\mu_A = 0$, or relatively small compared with the growth potential of the emerging economy, μ_B , as well as that $\sigma_A = \sigma_B = 1$.²⁶

²⁵The equality between the ranges of over- and under-investment, $(-r^*, 0)$ and $(0, r^*)$ holds as an approximation and can be assumed w.l.o.g. See Chen and Huang (1995) for derivation of exact values of the thresholds.

²⁶The assumption of equality of standard deviations of returns to investment in developed and developing countries is though not very realistic does not however qualitatively change further results.

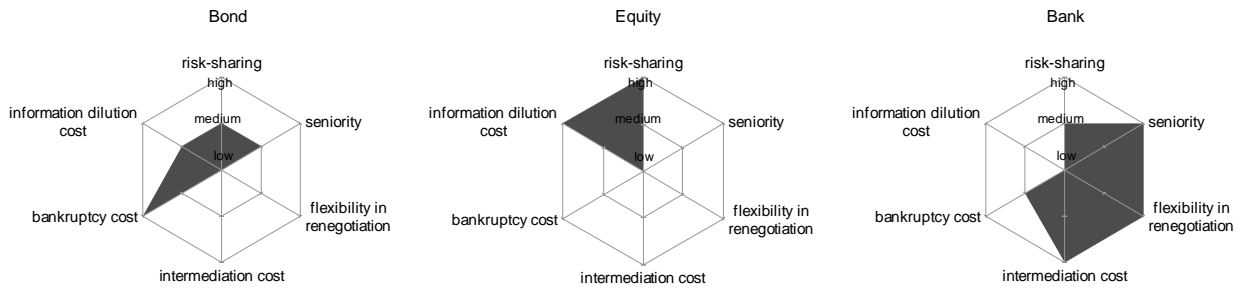


Figure A2: Tradeoffs between bond, equity and bank financing

Appendix B

Table B1: Country sample

Latin America	Asia	CEE	Middle East & Africa	EU
Argentina	China	Bulgaria	Egypt	Greece
Brazil	Hong Kong	Czech Republic	Israel	Ireland
Chile	India	Hungary	South Africa	Portugal
Colombia	Indonesia	Poland	Turkey	Spain
Ecuador	Korea	Romania		
Guatemala	Malaysia			
Jamaica	Pakistan			
Mexico	Philippines			
Panama	Singapore			
Peru	Taiwan			
Uruguay	Thailand			
Venezuela				

Table B2: Correlations between various measures of financial market development

	size stock	activity stock	efficienty stock	size private bond	size public bond	overhead cost	interest margin	M2/GDP	bank credit	other fin assets	foreign banks	investment
size stock	1.00											
activity stock	0.56*	1.00										
efficienty stock	0.13	0.66*	1.00									
size private bond	0.34*	0.26*	0.05	1.00								
size public bond	0.36*	0.23 ⁺	-0.16	0.03	1.00							
overhead cost	-0.38*	-0.32*	-0.30*	-0.14	-0.33*	1.00						
interest margin	-0.29*	-0.25*	-0.19*	-0.13	-0.18	0.76*	1.00					
M2/GDP	0.62*	0.45*	0.24*	-0.02	0.04	-0.57*	-0.57*	1.00				
bank credit	0.68*	0.60*	0.46*	0.16	0.08	-0.60*	-0.51*	0.84*	1.00			
other fin assets	0.41*	0.37*	0.07	0.40*	0.06	-0.43*	-0.40*	0.34*	0.48*	1.00		
foreign banks	-0.14	-0.24*	-0.27*	-0.28*	-0.13	0.14 ⁺	0.03	-0.10	-0.12	-0.04	1.00	
investment	0.53*	0.19*	0.28*	0.36*	0.39*	-0.35*	-0.24*	0.39*	0.58*	0.33*	-0.14 ⁺	1.00

* and ⁺ = significant at 1- and 5-percent level.

Table B3: Data definitions and sources

Variable	Definition	Source
equity	Gross sales by foreigners to US residents of foreign stocks, millions of US dollars (if not otherwise specified)	US Treasury (2001a)
bond	Gross sales by foreigners to US residents of foreign bonds, millions of US dollars (if not otherwise specified)	US Treasury (2001a)
bank	US banking claims, millions of US dollars	US Treasury (2001b)
GDP	Gross domestic product, millions of domestic currency	IFS (2001)
GDP\$	GDP converted into US dollars at the current exchange rate, in logs	IFS (2001)
real GDP	GDP volume, index number, 1995=100	IFS (2001)
growth	Percentage change in real GDP	IFS (2001)
size stock	Ratio of stock market capitalization to GDP, deflated by CPI	World Bank (1999)
activity (stock)	Ratio of stock market total value traded to GDP	World Bank (1999)
efficiency (stock)	Ratio of the value of total shares traded to market capitalization.	World Bank (1999)
market size of private or public bonds	Ratio of total amount of domestic debt securities issued by private or public domestic entities to GDP, deflated by CPI	World Bank (1999)
overhead cost	Accounting value of a bank's overhead costs as a share of its total assets	World Bank (1999)
interest margin	Accounting value of a bank's net interest revenue as a share of its total assets	World Bank (1999)
inflation	Inflation rate calculated as the first difference of log(CPI)	IFS (2001)
population	millions, in logs	
openness	Ratio of exports plus imports to GDP	PWT 6.0
investment	Investment share of GDP, constant prices	PWT 6.0
bank credit	Private credit by deposit money banks to GDP	World Bank (1999)
other fin assets	Other (than deposit banks) financial institutions assets to GDP	World Bank (1999)
foreign banks	Number of foreign banks in total number of banks	World Bank (1999)
GDP\$ per capita	Ratio of GDP in US dollars to population, in logs	IFS (2001)
M2/GDP	Ratio of broad money (money plus quasi-money) to GDP	IFS (2001)
privatization	Ratio of privatization proceeds (millions of US dollars) to GDP\$	WDI(2001), IFS(2001)