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Asset prices, Credit and Investment in Emerging Markets*

Tuomas A. Peltonen† Ricardo M. Sousa‡ Isabel S. Vansteenkiste§

Abstract

We build a panel of 31 emerging economies to uncover the determinants of private investment growth in emerging markets. Using several econometric techniques and quarterly data for the period 1990:1-2008:3, we show that: (*i*) the GDP and the cost of capital are among the fundamental determinants of private investment; (*ii*) the equity price impacts positively and significantly on investment; (*iii*) financial factors (such as, credit and lending rate) play an important role on the dynamics of investment, in particular, for Asian and Latin American countries; (*iv*) investment growth exhibits substantial persistence and responds sluggishly to shocks; and (*v*) crises episodes magnify the negative response of investment.

Keywords: *investment, credit, asset prices, emerging markets.*

JEL Classification: *E22, E44, D24.*

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Non-technical summary

There exists a broad consensus among economists and policy makers that private investment is a critical determinant of long-run economic performance, being pivotal to a country's economic growth and employment situation.

Despite the recognition of the critical role of private investment, there has been surprisingly little research on its determinants in emerging market economies. In particular, the importance of macroeconomic fundamentals and financial variables remains unclear, a feature that can not be detached from the scarcity of information.

In this paper, we uncover the determinants of private investment growth in emerging markets. Using a panel of 31 emerging economies, we show that the GDP and the cost of capital are among the "fundamental" determinants of investment in accordance with the neoclassical model. The estimated effects are economically sizeable and statistically significant: (*i*) a 10% increase in real GDP rises private investment by between 8% and 15% in the short-run; (*ii*) a 10% increase in the cost of capital reduces private investment by between 1% and 3%;

In addition, we show that "financial" factors play an important role in explaining investment in emerging markets: (*i*) a 10% increase in equity price increases private investment between 0.1% and 0.5%, supporting the Tobin's Q approach; (*ii*) a 100 basis point increase in real lending rate decreases private investment by between 0.1% and 0.3%. However, credit is estimated to be not statistically significant factor for private investment in the full sample. Finally, financial and economic crisis are estimated to have a statistically significant negative impact on private investment in emerging markets.

The results for the subsamples and sensitivity analysis confirm that the estimation results are overall robust to different estimation methods, sample selection, or inclusion of additional investment determinants found in the literature. Regarding results for regional subsamples or samples based on the degree of financial development, it can be noted that the elasticities related to output and cost of capital are found to be very robust across different estimation samples, again in line with the neoclassical model. However, there are some differences as regards to investment responses to financial variables.

In emerging Asia, credit and stock market index are, for most estimation methods, statistically significant and with a positive sign. Also in Latin America, the equity market has a statistically significant positive impact on investment growth. Moreover, the lending rate has a statistically significant negative impact on investment growth in Latin America. In emerging Europe, financial factors seem to play a less significant role in private investment dynamics.

Regarding the samples split by the level of financial development, some interesting observations arise: First, there is no statistically different investment reaction to the stock market index between the two samples. Second, the estimated elasticities for the lending rate are significantly higher in absolute terms in the low stock market capitalization sample, whereas credit elasticity is positive and statistically significant in the high stock market capitalization sample. Third, the estimated output elasticity is significantly larger in the low stock market capitalization sample.

As far as other potential determinants of private investment are concerned, we find very little evidence supporting the inclusion of inflation, public spending, external debt or commodity prices to the benchmark model.

Finally, the results suggest that investment growth exhibits a substantial persistence and responds sluggishly to shocks. This may be an important reason for concern - particularly,

in the case of a negative downturn - taking into account that these economies have often witnessed episodes of economic, financial and currency crises. In fact, despite the small short-run elasticity of investment to equity or lending rate, the empirical findings show that both the short-run and the long-run elasticiticies of investment with respect to GDP are quite large. As a result, the effects of a slowdown of the economic activity may be amplified by this intrinsic characteristic of investment in emerging markets.

In addition, given the role played by "fundamental" factors, public policies targeted at lowering the cost of capital, such as extended loss carry-forward periods or tax credits, may help boosting private investment in emerging markets. Similarly, monetary policy can be a powerful tool, not only because of its direct effect on borrowing costs, but also for its impact on the present value of future tax deductions via interest payments.

1 Introduction

There exists a broad consensus among economists and policy makers that private investment is a critical determinant of long-run economic performance, being pivotal to a country's economic growth and employment situation.

For emerging market economies, the importance private investment gains an additional relevance, as it is particularly relevant for the catching-up process with advanced countries. Indeed, stimulating and encouraging private investment has been on top of the policy agenda for many emerging market economies since decades. The anemic growth, partly due to a fall in private external financing and high interest rates, led to a shift in the sentiment in the profession and in policymaking circles towards greater reliance on the market in terms of allocation and use of resources. Moreover, conventional wisdom had it that the way to prosperity, as represented by a sustained higher rate of economic growth, requires stable and conservative macroeconomic policies, liberalization of the goods and factor markets, greater flexibility in the financial system, and an enhanced role for the private sector in economic activity.[1]

Despite the recognition that private investment plays a critical role in generating economic growth, there has been surprisingly little research on its determinants in emerging market economies. In particular, the importance of macroeconomic fundamentals and financial variables remains unclear, a feature that can not be detached from the scarcity of information on private investment and its underlying determinants.

The major goal of this paper is, therefore, to uncover the determinants of private investment in emerging markets, while improving and extending the existing literature in several directions. First, we look not only at the effects of the traditional variables that capture the "fundamentals" of investment (such as the GDP and the cost of capital), but also consider its "financial" determinants (namely, lending rate, equity prices, and the amount of credit to the private sector). In doing so, we build an "encompassing" model that can ultimately be used to test the validity of the neoclassical theory of investment and the Q approach. Moreover, we control for the potential explanatory power of additional variables, such as the inflation rate, the public investment, the external debt, and corporate spread. Second, we use data at a high frequency, that is, quarterly data (from 1990:1 to 2008:3), and are, therefore, able to obtain more precise estimates of the impact of the various explanatory variables on private investment. Third, we assess the robustness of our results to several econometric techniques including modern ones, namely, the system GMM estimator developed by Blundell and Bond (1998) that controls for endogeneity.

Using a panel of 31 emerging economies, we show that GDP and the cost of capital are among the "fundamental" determinants of investment in accordance with the neoclassical model. The estimated effects are economically sizeable and statistically significant: (i) a 10% increase in real GDP rises private investment by between 8% and 15% in the short-run; (ii) a 10% increase in the cost of capital reduces private investment by between 1% and 3%;

In addition, we show that "financial" factors play an important role in explaining investment in emerging markets: (i) a 10% increase in equity price increases private investment between 0.1% and 0.5%, supporting the Tobin's Q approach; (ii) a 100 basis point increase in real lending rate decreases private investment by between 0.1% and 0.3%. However, credit

[1] Other factors include the falling prices for primary commodity exports, the presence of a large stock of foreign debt, and the implementation of adjustment programs designed to restore balance of payments viabilities.

is estimated to be not statistically significant factor for private investment in the full sample. Finally, financial and economic crisis are estimated to have a statistically significant negative impact on private investment in emerging markets

The results for the subsamples and sensitivity analysis confirm that the estimation results are overall robust to different estimation methods, sample selection, or inclusion of additional investment determinants found in the literature.

Finally, the results suggest that investment growth exhibits a substantial persistence and responds sluggishly to shocks. This may be an important reason for concern - particularly, in the case of a negative downturn - taking into account that these economies have often witnessed episodes of economic, financial and currency crises. In fact, despite the small short-run elasticity of investment to equity or lending rate, the empirical findings show that both the short-run and the long-run elasticiticies of investment with respect to GDP are quite large. As a result, the effects of a slowdown of the economic activity may be amplified by this intrinsic characteristic of investment in emerging markets.

In addition, given the role played by "fundamental" factors, public policies targeted at lowering the cost of capital may help boosting private investment in emerging markets. Similarly, monetary policy can be a powerful tool, not only because of its direct effect on borrowing costs, but also for its impact on the present value of future tax deductions via interest payments.

The rest of the paper is organized as follows. Section 2 reviews the existing literature on the determinants of investment. Section 3 presents the estimation methodology. Section 4 describes the data. Section 5 discusses the empirical results. Finally, Section 6 concludes with the main findings and policy implications.

2 A Brief Review of the Literature

While, broadly speaking, there is more of a consensus among theorists and practitioners on modelling aggregate consumption, the description of fundamental determinants of investment behaviour is often subject to disagreement. In fact, two distinct types of models for aggregate investment compete in the literature: (*i*) the traditional neoclassical model, i.e., the Jorgenson (1963) approach; and (*ii*) the alternative Q approach by Tobin (1969).

According to the neoclassical model, investment can be modelled as the joint process with output and the cost of capital. Despite being widely used by those who forecast investment using models of systems of equations, this approach has been rejected by most theorists (Lucas, 1976).

In the Q approach, investment is defined as the joint process with the Tobin's Q ratio, that is, the ratio of the market valuation of a firm's securities to the replacement cost of the physical assets they represent (Brainard and Tobin, 1968). This ratio is an indicator of future profitability that combines asset prices in a sufficient statistic: stock prices, bond prices, and the replacement cost of the capital stock. Being preferred by theorists, the Q approach has been typically dismissed by practitioners for two major reasons: (*i*) its seemingly incurable econometric ills;[2] and (*ii*) the empirical evidence often suggests that other variables also contain important explanatory power. Taking this at face value, one concludes that none of

[2] The Q equation normally exhibits low goodness of fit, high serial correlation, unpredicted high significance of lagged investment and lagged Q, and implausible magnitude of Q coefficients.

the approaches considered alone qualifies as the maintained modelling approach for private investment.

Similarly, the existence of a link between investment and stock prices is not unanimous in the literature, although empirically it has been shown that they move together in a meaningful way. For instance, Fischer and Merton (1984) suggest that stock prices are the most important predictor of aggregate investment, while Barro (1990) and Sensenbrenner (1991) find evidence that rejects the Q approach.

There are a number of reasons to believe that share prices may influence investment. First, stock market valuations play a key role in Q type models of investment determination (Tobin, 1969; von Furstenberg, 1977; Doan et al., 1984; Barro, 1990; Galeotti and Schiantarelli, 1994), as it is well known that when the market value of an additional unit of capital exceeds its replacement cost, a firm can raise its profit by investing. Second, in the presence of information asymmetries in financial markets, a rise in share prices will improve the balance sheet position of the firm (Tease, 1993). As a result, it increases the ability of the firm to directly fund projects or to provide collateral for external finance, which reduces the cost of capital (Fischer and Merton, 1984) and/or increases the availability of external funding (Bernanke and Gertler, 1986). Third, if the role of management is to maximise the wealth of existing shareholders, then it should respond to market valuation even when this deviates from the true value of the firm.

In contrast, another strand of the literature argues that the share market is a passive predictor of future activity and that management is only concerned about the long-run market value of the firm (Bosworth, 1975). Moreover, it may be optimal for the firm to respond to fluctuations in stock prices by simply restructuring its financing patterns without altering investment (Blanchard et al., 1993). Consequently, there is a minor role for share prices beyond their ability to predict fundamental determinants of investment (Morck et al., 1990; Blanchard et al., 1993; Andersen and Subbaraman, 1996; Chirinko and Schaller, 1996).

In the case of emerging market economies, the neoclassical flexible-accelerator model has been the most popular in use. For example, Sundararajan and Thakur (1980), Tun Wai and Wong (1982) and Blejer and Khan (1984), apply the neoclassical model and suggest that the private investment rate should be negatively related to the real interest rate, which is considered to be a measure of the user cost of capital.[3] Nevertheless, the presence of a robust negative relationship between investment expenditures and real interest rates - or the user cost of capital more generally - has been difficult to document (Abel and Blanchard, 1986; Schaller, 2006).

These studies also suggest that the rate of growth of real output (real GDP) per capital should be positively related to the private investment rate, as is the case of developed industrial countries.[4]

Note, however, that the neoclassical model has been difficult to test in emerging markets because key assumptions (such as perfect capital markets and little or no government investment) are typically inapplicable and data for certain variables (capital stock, real wages, and real financing rates for debt and equity) are normally either unavailable or inadequate. Accordingly, research has proceeded in several directions and there is a growing literature on the effects of financial factors on investment (Whited, 1991). Firms may indeed face binding

[3]The real interest rate is closer to the spirit of the neoclassical model than other measures of financing availability.

[4]This can be readily derived from a flexible-accelerator model with a fixed relationship between the desired capital stock and the level of real output.

financial constraints in domestic capital markets because interest rates are controlled, due to endogenous credit rationing (Stiglitz and Weiss, 1981) or limited banks' capacity to extend new loans (O'Brien and Browne, 1992).

The importance of these factors are confirmed in studies of the theory of investment at the micro and macro level which persistently postulate that private investment expenditure is often constrained by the availability of financial resources in developed as well as developing market economies (Tybout, 1983; Whited, 1992; Harris et al., 1994; Jaramillo et al., 1996). These constraints have also been considered as being one of the reasons behind the poor investment performance of many developing countries in the 1980s and 1990s (Serven and Solimano, 1992). Due to the presence of repression in their financial markets, many developing countries would encounter difficulties in raising sufficient financial resources from their domestic financial markets to finance their investment expenditure (McKinnon, 1973; Shaw, 1974; Fry, 1980).

In addition, internal finance (retained earnings) and external finance (bonds, equity, or bank credit) are not perfect substitutes (Fazzari et al., 1988; Calomiris and Hubbard, 1989; MacKie-Mason 1989; Mayer, 1989; Hubbard, 1990). There is, therefore, a discrepancy in the cost of financing due to asymmetric information or agency problems: lenders in capital markets cannot evaluate the quality of investment opportunities and, as a result, the cost of new debt and equity lies above the opportunity cost of internal funds (Fazzari et al., 1988; Gilchrist and Himmelberg, 1998). In this context, Philippon (2008) proposes the yield-theory of investment, that is, an implementation of the Q theory that uses corporate bond yields instead of equity prices. In practice, aggregate Q is a linear combination of risk free rates and average yields on risky corporate debt and so is investment. Therefore, as in Bernanke (1983) and Stock and Watson (1989), the yield spreads of corporate bonds over treasuries forecast investment.

Despite the efforts to explain the heterogeneity of the pattern of private investment across countries, they have not yet produced a full-fledged model of investment behaviour and, as a result, a number of additional determinants have been explored. One of such factors is domestic inflation rate, as it is less often correlated with a rise in economic output than in industrial countries (Dornbusch and Reynoso, 1989). High rates of inflation adversely affect private investment by: (*i*) increasing the riskiness of longer-term investment projects; (*ii*) reducing the average maturity of commercial lending; and (*iii*) distorting the information content of relative prices. In addition, they can also be considered an indicator of macroeconomic instability and the country's inability to conduct sound macroeconomic policies, both of which negatively impacting on investment.

Another factor influencing private investment in developing countries is public investment (Blejer and Khan, 1984) or public infrastructure provision (Bond and Malik, 2007), although from a theoretical perspective its effect on private investment is ambiguous. On the one hand, public investment may be complementary to and thus support private investment.[5] On the other hand, public sector investment may detract from private investment activity to the extent that it substitutes for or generates important "crowding-out" effects. This may occur when the investment involves parastatal enterprise producing goods that compete with the private sector, or when heavy spending for public capital projects leads to high interest rates, severe credit rationing, or heavier current or future tax burdens (Aschauer, 1989; Afonso and

[5] In fact, when the first one involves useful infrastructure (transportation systems, schools, water and sewage systems, and the like), projects in these areas tend to raise the expected rate of return on private investment.

Sousa, 2009; Furceri and Sousa, 2009).

The presence of large external debt burdens has also been suggested as a factor reducing investment activity (Roache, 2006) in three ways. First, the higher debt-service payments associated with a large external debt reduce the amount of funding that is available for investment. Second, the existence of a large debt overhang, in the form of a high ratio of external debt to GDP, can reduce the incentives for investment, because much of the future returns must be used to repay existing debt, therefore acting as a tax (Borensztein, 1989; Claessens et al., 1991). Third, substantial external debt may make it harder or more costly to finance private investment, because it reduces the amount of funding that a country can obtain through trade. In fact, it is well known that in developing countries most imports are investment related (Mirakhor and Montiel, 1987).

Other factors - such as income per capita, exchange rate volatility (Serven, 2003), investor's confidence, measures of natural resource endowments (Papyrakis and Gerlagh, 2004; Gylfason and Zoega, 2006), political stability, the quality of political institutions (Bond and Malik, 2007), aspects of governance such as bureaucratic quality, corruption and law (Poirson, 1998; Brunetti and Weder, 1998) or indicators of political checks and balances (Henisz, 2000; Beck et al., 2001; Stasavage, 2002) - that can play an important role in investment behaviour. However and not surprisingly, these are hard to quantify and are unlikely to capture the rich diversity in institutional arrangements that exists, particularly, in developing countries. Moreover, they are also quite time invariant. For the same reason, no attempt was made to include specific measures of a country's tax and regulatory environment in the analysis.[6]

3 Estimation Methodology

The empirical model for the estimation of investment can be summarized as follows:

$$\begin{aligned} \log I_{i,t} &= \beta_0 \log I_{i,t-1} + \log \mathbf{X}'_{ji,t}\boldsymbol{\beta}_{1j} + \log \mathbf{Y}'_{ji,t}\boldsymbol{\beta}_{2j} + v_i + \varepsilon_{i,t} \\ \text{with } i &= 1,...,N \quad t = 1,...,T_i \quad j = 1,...,K \end{aligned} \tag{1}$$

where $I_{i,t}$ stands for the investment of country i at time t, $\mathbf{X}_{ji,t}$ is a vector of j "fundamental" determinants, $\mathbf{Y}_{ji,t}$ is a vector of j "financial" explanatory variables, the βs are parameters to estimate, v_i are country-specific effects, and, $\varepsilon_{i,t}$ is the error term. In the set of "fundamental determinants, we include the GDP and the cost of capital). In addition, the equity prices, the amount of credit to the private sector, the lending rate and the corporate bond spread are considered among the "financial" factors impacting on private investment.

When model (1) is estimated using ordinary least squares (OLS), substantial complications arise. In fact, in both the fixed and random effects settings, the lagged dependent variable is correlated with the error term, even if we assume that the disturbances are not themselves autocorrelated. Moreover, the estimation of the dynamic panel defined above suffers from the Nickell (1981) bias, which disappears only if T tends to infinity.

Arellano and Bond (1991) developed a generalized method of moments (GMM) estimator that solves the problems referred above, allowing one to eliminate country specific effects

[6] In general, a significant relationship between corporate tax policy and private investment has not been found (Schaller, 2006; Chirinko et al., 1999, 2004), possibly, reflecting a lack of identification (Gilchrist and Zakrajsek, 2007). In contrast, Cummins et al. (1994) and House and Shapiro (2006) document a relevant user-cost effect from corporate tax changes. For a revision of literature, see Auerbach (1983), Chirinko (1993), Hassett and Hubbard (1997) and Devereux et al. (1994).

or any time invariant country specific variable. Additionally, it also solves the endogeneity issue that may be due to the correlation of the country specific effects and the independent variables. Consequently, first differencing (1) removes v_i, and produces an equation estimable by instrumental variables:

$$\begin{aligned} \Delta \log I_{i,t} &= \beta_0 \Delta \log I_{i,t-1} + \boldsymbol{\Delta} \log \mathbf{X}'_{ji,t} \boldsymbol{\beta}_{1j} + \Delta \log \mathbf{Y}'_{ji,t} \boldsymbol{\beta}_{2j} + \Delta \varepsilon_{i,t} \\ \text{with } i &= 1, ..., N \quad t = 1, ..., T_i \quad j = 1, ..., K \end{aligned} \tag{2}$$

where Δ is the first difference operator, while the variables and parameters are defined as in (1). Following Holtz-Eakin et al. (1988), Arellano and Bond (1991) instrument the differenced pre-determined and endogenous variables with their available lags in levels: levels of the dependent and endogenous variables, lagged two or more periods; levels of the pre-determined variables, lagged two or more periods. The exogenous variables can be used as their own instruments.

A problem of this difference-GMM estimator is that lagged levels are weak instruments for first-differences if the series are very persistent (Blundell and Bond, 1998). According to Arellano and Bover (1995), efficiency can be increased by adding the original equation in levels to the system. If the first-differences of explanatory variables are uncorrelated with the individual effects, both lagged values of the first-differences of the explanatory variables and of the dependent variable can be used as instruments in the equation in levels. In this case, the estimation combines the set of moment conditions available for the first-differenced equations with the additional moment conditions implied for the levels equation. Blundell and Bond (1998) show that this system GMM estimator is preferable to that of Arellano and Bond (1991) and, for this reason, the current paper also uses that estimation methodology.

4 Data

The dataset consists of an unbalanced panel of 31 main emerging economies, 10 from emerging Asia (China, Hong Kong, India, Indonesia, Korea, Malaysia, Philippines, Singapore, Taiwan, and Thailand), 6 from Latin America (Argentina, Brazil, Chile, Colombia, Mexico, and Peru), 12 from emerging Europe (Bulgaria, Croatia, Czech Republic, Estonia, Hungary, Latvia, Lithuania, Poland, Romania, Russia, Slovakia, and Slovenia) and 3 other countries (Israel, South Africa, and Turkey).

In what concerns the time span of the dataset, we use quarterly data for 1990:1-2008:3 (where available). The main source for the National Accounts data is Haver Analytics: Investment (Gross Fixed Capital Formation at constant prices), and GDP (at constant prices) that is used to proxy for economic activity and the business cycle. Moreover, the cost of capital is proxied using the ratio of investment deflator to GDP deflator.

Regarding financial variables, stock price indices (composite indices) are obtained from Haver Analytics and Global Financial Database (Argentina, Chile, Colombia, Croatia, Czech Republic, Hong Kong, Israel, Korea, Peru, Philippines, Russia, Singapore, and South Africa). The availability of credit is proxied by claims on private sector, which is provided by the IMF International Financial Statistics (IFS). The interest rate available to firms is proxied by lending rate or the interbank rate (Romania, and Turkey) also from the IMF IFS. Finally, the data for the additional regressions in the sensitivity analysis are obtained as follows: inflation is measured by the annual change of the consumer price index (all items) from Haver Analytics, external debt is measured as international debt securities by the Bank for

International Settlements (BIS), public investment by government consumption expenditure (at constant prices) from Haver Analytics and commodity prices by Reuters/Jefferies CRB all commodities futures price index. To proxy for the interest rate at which firms are able to raise capital in the international capital markets, we use CEMBI spread from JP Morgan.

For the econometric analysis, data are transformed in several ways. First, the financial variables are deflated using the GDP deflator, with the exception of Singapore, where the CPI index (all items) is used. Second, data on real GDP, real investment and the corresponding deflators for China are annual, and, therefore, we interpolate them using a cubic conversion method. In addition, the following missing data points are linearly interpolated: credit (Hong Kong 1990-1993, South Africa 1991:3-4) and lending rate (Argentina 2002:2). Third, the following variables are seasonally adjusted using the X11 ARIMA procedure:[7] gross fixed capital formation at constant prices (India, Korea, Mexico, and Romania), gross fixed capital formation at current prices (India and Korea), GDP at constant prices (Korea and Romania), GDP at nominal prices (Korea), and claims on private sector (all countries).

Table A.1 in the Appendix provides a detailed description of the variables and data sources used in the analysis, while Tables A.2 to A.5 also present a range of descriptive statistics. Finally, we use the panel unit root tests of Levin et al. (2002), and Im et al. (2003) to assess the presence of unit roots in the data. Table A.6 summarizes the empirical findings and show that the log differences (year-on-year) of all key variables are stationary following the rejection of the null hypothesis of a unit root.

Data on private investment rates over the period 1990-2007 are summarized in Table A.7. Looking at the data reveals several interesting patterns. First, there is a wide discrepancy in private investment rates across countries. A few countries, in particular the large emerging Asian countries, exhibit very high rates of private investment, exceeding 30%. At the other extreme, Brazil and the Philippines experience much lower rates of private investment, falling below 20% of GDP. For most countries in the sample however, private investment averaged between 20-25% during most of the sample period. The data in Table A.7 also indicate a significant decline in private investment activity in 1998 in most emerging Asian countries, showing, therefore, the impact of the Asian crisis on private investment in the region. The decline was the most pronounced in Malaysia where the private investment rate fell from 43% to 27% in 1998 and further to 21% in 1999. While thereafter in most countries the investment rate recovered, the current average rate remains however below the 1997 figure. By contrast, in emerging Europe, since 2002, investment rates have risen and reached their highest level over the whole sample period in 2007. Finally, in Latin America, private investment rates were also affected by economic crises in several countries, however, since 2003, private investment rates have picked up in the region and are now, on average at 22% for the region as a whole.

5 Empirical Results

In this section we present the estimation results from the dynamic panel as defined in Equation 2 in Section 3. The section is divided into to subsections with the main results presented in Section 5.1 and the sensitivity analysis in Section 5.2. In the benchmark models, the set of explanatory variables includes: the lag of investment, gross domestic product, cost of capital, equity prices, domestic private credit and lending rate, a dummy variable for economic/financial crises, and a constant. The results for the full sample are presented in

[7] The other series are seasonally adjusted either by the national source or by Haver Analytics.

Tables 1 and 2, followed by the empirical findings for three subsamples, namely emerging Asia (Table 3), Latin America (Table 4) and Emerging Europe (Table 5).

In the sensitivity analysis, we add the following variables to the benchmark model: inflation rate, public investment, external debt, commodity price index and corporate bond spread (Tables 6 and 7). In addition, we estimate the models for two equally-sized subsamples according to their stock market capitalization per GDP to proxy for the level of financial development (Tables 8 and 9). Moreover, throughout the paper, we assess the robustness of the results using several econometric technics, namely: (*i*) the pooled DOLS (dynamic ordinary least squares) estimator; (*ii*) the pooled DOLS estimator with time effects; (*iii*) the pooled DOLS with both time and country effects; (*iv*) the fixed effects estimator; (*v*) the random effects estimator; (*vi*) the IV/GMM estimator; and (*vii*) the Blundell and Bond, 1998 estimator. It is important to note that in the cases of the IV/GMM and the Blundell and Bond estimators, the crisis dummy and a constant are considered to be strictly exogenous, while the remaining ones are included in the set of endogenous variables.

5.1 Main Results

As mentioned earlier, the results for the benchmark models with the full sample are presented in Table 1, for the short-run elasticities and Table 2, for the derived long-run elasticities. The estimated short-run elasticities for the regional subsamples are presented in Tables 3 to 5.

The Table 1 shows that for all specifications, the lag of investment is statistically significant, reflecting a strong persistence of investment growth and its sluggish response to shocks (the short-run elasticities range from 0.49 to 0.56, depending on the estimation method). Such a finding goes against the outcomes of the convex adjustment models of investment, which show that only fundamentals and financial variables should explain investment. However, in general, the empirical literature finds that lagged investment is statistically significant and economically important (Chirinko, 1987; Audretsch and Elston, 2002; Gilchrist and Himmelberg, 1998). There could be three reasons for this. First, the adjustment cost structure may be richer than modelled in the convex adjustment models. Second, it is possible that investment itself helps predict future fundamentals and financial variables. Finally, it is possible that the model is correctly specified but shocks exhibit serial correlation (Gilchrist and Himmelberg, 1998).

Besides lagged investment growth, we also systematically find that GDP growth and the cost of capital (with the exception of the IV estimation) are statistically significant. In the case of output growth, we find a positive relation with the short-run elasticities ranging from 0.78 to 1.53 and the long-run elasticities from 1.94 to 3.00. Both the short-run and the long-run elasticitiicies of investment with respect to GDP are economically substantial: a 10% increase in real GDP would imply 7.8% to 15.3% increase in investment in the short-run, and 19.4% to 30.0% increase in the long-run. As a result, the effects of a slowdown of the economic activity may be amplified by this intrinsic characteristic of investment in emerging markets. In contrast, we find that an increase in the cost of capital reduces investment growth with the estimated short-run elasticities ranging from -0.10 to -0.27 and the long-run elasticities from -0.25 to -0.61. Overall, such findings are consistent with the neoclassical model of investment and is generally supported by the empirical literature (Blomstrom et al.,1996).

In addition to the lagged investment and the cost of capital, which are variables that have been applied earlier both to advanced and emerging market economies alike, we also include financial variables and variables that are seen to be relevant for conventional investment

equations for developing countries. Chief among the latter additional regressors are policy variables. A number of different policy variables have been used in investment equations, and it is not clear *a priori* which variables to use. It is of some comfort, therefore, that policy variables tend to be highly correlated with each other (Collier and Dollar, 1999). This means that attention can be confined to a few indicators thought to be especially relevant to investment.

This paper considers the credit to the private sector as the policy variables of choice. Private sector credit, used in investment equations by Serven and Solimano (1992), is potentially an important determinant of investment growth, because low real interest rates induce savers to not deposit their savings in banks, which are therefore unable to intermediate funds towards potentially profitable investment projects. Financial repression also takes the form of non-price rationing, whereby scarce savings are pre-allocated to selected investors, usually the government. King and Levine (1993) show that investment and the share of credit allocated to the private sector are positively correlated. Credit availability was also shown to be a statistically significant determinant of private investment by Vogel and Buser (1976), Fry (1980), Tun Wai and Wong (1982), Blejer and Khan (1984), Gupta (1984), Garcia (1987), Leff and Sato (1988), and Oshikoya (1994). However, the results in our paper do not confirm this finding, as in all cases, the credit variable is not statistically significant. Such a finding may, however, reflect the fact that the series on credit growth also includes credit to the household sector (and not only the corporate sector), and might therefore be an inadequate proxy of true credit growth to the corporate sector.

In contrast, the lending rate is found to be statistically significant in all estimated models with the estimated short-run elasticities ranging from -0.0014 to -0.0027 and the corresponding long-run elasticities ranging from -0.0031 to -0.0067. This implies that a 100 basis point increase in real lending rate decreases private investment by between 0.1% and 0.3% in the short-run, and by 0.3% to 0.7% in the long-run. Despite the estimated elasticities are economically rather small, they highlight the importance of the link between monetary policy and real activity, and the role of bank lending channel in the monetary policy transmission mechanism, and are in accordance with the works of Tybout (1983), Bernanke and Gertler (1986), and Harris et al. (1994).

Beyond private sector credit, we also include the stock market price index in our models. In the empirical literature, the specific link between stock markets and investment activities is generally based on the Q theory of investment. Empirically, there exist, however, diverging views on the explicit role for stock markets in investment growth. For instance, some studies show that large and liquid stock markets could facilitate pooling of savings and channel capital to investment projects (Greenwood and Smith, 1997). In contrast, some other studies observe that compared to banks, equity markets are a trivial source of funds for corporate investment (Mayer, 1990; Corbett and Jenkinson, 1997).

As in Table 1, we find that stock prices generally have a statistically significant positive impact on investment growth, with the short-run elasticities ranging from 0.0092 to 0.054 and the long-run elasticities ranging from 0.0180 to 0.1338. This implies that a 10% increase in equity price would lead to 0.09% to 0.5% growth in investment in the short-run, and 0.18% to 1.3% growth in the long-run. These results would suggest a relatively small economic impact of the equity market on investment.

Table 1: Dynamic panel regressions - Full sample (Short-run elasticities).

	OLS pooled	OLS time effects	OLS time & country effects	Fixed effects	Random effects	IV/GMM	Blundell-Bond
L. Investment	0.5296***	0.5409***	0.4961***	0.4887***	0.5296***	0.5988***	0.5525***
	[0.0243]	[0.0258]	[0.0260]	[0.0176]	[0.0173]	[0.0361]	[0.0320]
GDP	1.3054***	1.2470***	1.4970***	1.5320***	1.3054***	0.7774***	1.3641***
	[0.0768]	[0.0777]	[0.0897]	[0.0666]	[0.0614]	[0.1470]	[0.1718]
Cost of capital	-0.2032***	-0.2049***	-0.2131***	-0.2077***	-0.2032***	-0.1018	-0.2736***
	[0.0461]	[0.0469]	[0.0505]	[0.0399]	[0.0387]	[0.1100]	[0.1027]
Equity	0.0174***	0.0218***	0.0143*	0.0092*	0.0174***	0.0537***	0.0211
	[0.0064]	[0.0083]	[0.0082]	[0.0054]	[0.0054]	[0.0124]	[0.0172]
Credit	-0.0166	-0.0165	-0.0281	-0.0280*	-0.0166	-0.0278	-0.0453
	[0.0172]	[0.0170]	[0.0196]	[0.0154]	[0.0134]	[0.0267]	[0.0445]
Lending rate	-0.0024**	-0.0026***	-0.0022***	-0.0021***	-0.0024***	-0.0027***	-0.0014***
	[0.0011]	[0.0008]	[0.0008]	[0.0005]	[0.0005]	[0.0005]	[0.0003]
Crisis (Econ+Fin)	-0.0355***	-0.0348***	-0.0286**	-0.0287***	-0.0355***	-0.0360*	-0.0257*
	[0.0134]	[0.0132]	[0.0132]	[0.0092]	[0.0090]	[0.0212]	[0.0136]
Constant	-0.0329***	0.0109	0.0255	-0.0395***	-0.0329***	-0.0135**	-0.0353***
	[0.0033]	[0.0313]	[0.0333]	[0.0031]	[0.0029]	[0.0053]	[0.0064]
Observations	1469	1469	1469	1469	1469	1438	1469
# of countries	31	31	31	31	31	31	31
R-squared	0.78	0.79	0.80	0.77	0.78	0.76	
Hansen J-stat						0.00	
Sargan p-value							0.00
Hansen p-value							0.99
AR2 p-value							0.02

Note: Heteroscedasticity and serial correlation robust standard errors in brackets. All series are in log differences.* statistically significant at 10% level; ** at 5% level; *** at 1% level.

Table 2: Dynamic panel regressions - Full sample (Long-run elasticities).

	OLS pooled	OLS time effects	OLS time & country effects	Fixed effects	Random effects	IV/GMM	Blundell-Bond
GDP	2.7751***	2.7162***	2.9708***	2.9963***	2.7751***	1.9377***	3.0483***
Cost of capital	-0.4320***	-0.4463***	-0.4229***	-0.4062***	-0.4320***	-0.2537***	-0.6114***
Equity	0.0370***	0.0475***	0.0284*	0.0180*	0.0370***	0.1338***	0.0472
Credit	-0.0353	-0.0359	-0.0558	-0.0548*	-0.0353	-0.0693	-0.1012
Lending rate	-0.0051**	-0.0057***	-0.0044***	-0.0041***	-0.0051***	-0.0067***	-0.0031***

Note: * statistically significant at 10% level; ** at 5% level; *** at 1% level.

Besides the results for the full sample of emerging market economies, we also estimate the same models for three subsamples where we consider countries from three regions: (*i*) emerging Asia; (*ii*) Latin America; and (*iii*) emerging Europe. The estimated short-run elasticities are presented in Tables 3 to 5[8]. In general, for the subsample estimates, we can confirm the importance of the lagged investment and output growth in shaping aggregate investment growth in all regions. Whereas investment process seems to be most persistent in emerging Asia (short-run elasticities range from 0.53 to 0.61), it is the least persistent in Latin America (short-run elasticities range from 0.41 to 0.51). Regarding sensitivity to output changes, we find that the estimated elasticities with respect to real GDP are the highest in Latin America (short-run elasticities range from 1.47 to 1.94) and the lowest in emerging Asia (short-run elasticities range from 0.63 to 1.15). Moreover, in emerging Europe, the cost of capital has a statistically significant and economically important negative impact on investment (the short-run elasticities range from -0.20 to -0.27). In the other two regions, cost of capital is estimated not to be statistically significant. All in all, one can conclude that variables derived from the neoclassical model seem to be useful in modelling investment process, especially in emerging Europe.

In contrast, financial factors seem to play more important role in the other regions and higher fit can be achieved by encompassing the models with financial factors. In emerging Asia, credit growth and changes in the stock market price are, for most estimation methods, statistically significant and with a positive sign. Regarding credit, the estimated short-run elasticities range from 0.087 to 0.11, implying economically rather significant role for the credit channel in the investment dynamics in the region. By contrast, the estimated short-run elasticities (0.017-0.048) for the equity market index imply economically a much smaller impact on investment.

Also in Latin America, the equity market has a statistically significant impact on investment growth, with the estimated short-run elasticities ranging from 0.032 to 0.084, i.e. significantly higher than in emerging Asia (or in emerging Europe). Moreover, the lending rate has a statistically significant negative impact on investment growth in Latin America with estimated short-run elasticities ranging from -0.0015 to -0.0171, implying economically a rather small impact through real interest rates on investment in Latin America.[9]

Finally, as regards to the investment sensitivity crisis dummy, it can be noted that both in emerging Asia and Latin America, the estimated impact is negative and statistically significant with the short-run elasticities ranging from -0.055 to -0.093. However, in the case of emerging Europe, the estimated elasticity is positive, with the short-run elasticity ranging from 0.028 to 0.042.

[8] The calculated long-run elasticities are omitted due to space constrains. However, they are available upon request.

[9] In addition, we find that credit growth appears to have a significant but negative impact. However, as noted also for the aggregate sample, this result may be driven by the fact that the measure for credit growth also includes credit to households.

Table 3: Dynamic panel regressions - Asia (Short-run elasticities).

	OLS pooled	OLS time effects	OLS time & country effects	Fixed effects	Random effects	IV/GMM	Blundell-Bond
L. Investment	0.5559***	0.6021***	0.5773***	0.5328***	0.5559***	0.6054***	0.5428***
	[0.0394]	[0.0404]	[0.0416]	[0.0278]	[0.0273]	[0.0599]	[0.0457]
GDP	0.9727***	0.7997***	1.0017***	1.1537***	0.9727***	0.6258***	1.0415***
	[0.1049]	[0.1116]	[0.1300]	[0.1079]	[0.0960]	[0.1728]	[0.1864]
Cost of capital	-0.0835	-0.0979	-0.1371	-0.1123	-0.0835	-0.0517	-0.0605
	[0.0812]	[0.0893]	[0.0994]	[0.0782]	[0.0728]	[0.0935]	[0.1070]
Equity	0.0173*	0.0109	0.0088	0.0122	0.0173*	0.0479***	0.0237*
	[0.0091]	[0.0115]	[0.0114]	[0.0098]	[0.0096]	[0.0170]	[0.0133]
Credit	0.0873**	0.0964**	0.1108***	0.0984***	0.0873***	0.0436	0.0821*
	[0.0367]	[0.0381]	[0.0407]	[0.0353]	[0.0333]	[0.0318]	[0.0448]
Lending rate	0.0710	0.1028	0.1261	0.0857	0.0710	0.0536	0.1481***
	[0.0820]	[0.0881]	[0.0887]	[0.0694]	[0.0692]	[0.1185]	[0.0517]
Crisis (Econ+Fin)	-0.0803***	-0.0771***	-0.0657***	-0.0687***	-0.0803***	-0.0800***	-0.0714***
	[0.0204]	[0.0195]	[0.0198]	[0.0140]	[0.0135]	[0.0309]	[0.0197]
Constant	-0.0302***	0.0436	0.0357	-0.0389***	-0.0302***	-0.0146**	-0.0330***
	[0.0054]	[0.0397]	[0.0380]	[0.0055]	[0.0050]	[0.0071]	[0.0080]
Observations	527	527	527	527	527	517	527
# of countries	10	10	10	10	10	10	10
R-squared	0.79	0.83	0.83	0.78	0.79	0.78	
Hansen J-stat						0.00	
Sargan p-value							0.00
Hansen p-value							0.99
AR2 p-value							0.29

Note: Heteroscedasticity and serial correlation robust standard errors in brackets. All series are in log differences.* statistically significant at 10% level; ** at 5% level; *** at 1% level.

Table 4: Dynamic panel regressions - Latin America (Short-run elasticities).

	OLS pooled	OLS time effects	OLS time & country effects	Fixed effects	Random effects	IV/GMM	Blundell-Bond
L. Investment	0.4162***	0.4299***	0.4184***	0.4072***	0.4162***	0.5148***	0.4177***
	[0.0410]	[0.0432]	[0.0441]	[0.0326]	[0.0322]	[0.0626]	[0.0610]
GDP	1.9118***	1.8175***	1.8591***	1.9439***	1.9118***	1.4663***	1.9401***
	[0.1455]	[0.1497]	[0.1549]	[0.1235]	[0.1209]	[0.2807]	[0.2158]
Cost of capital	-0.1126	-0.133	-0.1408	-0.1220*	-0.1126	0.2703	-0.1091**
	[0.0852]	[0.0812]	[0.0900]	[0.0737]	[0.0717]	[0.2061]	[0.0484]
Equity	0.0357***	0.0609***	0.0636***	0.0360***	0.0357***	0.0840***	0.0315***
	[0.0121]	[0.0191]	[0.0197]	[0.0116]	[0.0114]	[0.0163]	[0.0068]
Credit	-0.1114***	-0.1592***	-0.1439***	-0.0984***	-0.1114***	-0.1399***	-0.1116*
	[0.0282]	[0.0296]	[0.0319]	[0.0260]	[0.0246]	[0.0438]	[0.0664]
Lending rate	-0.0022**	-0.0167*	-0.0171*	-0.0022***	-0.0022***	-0.0044***	-0.0015***
	[0.0011]	[0.0095]	[0.0098]	[0.0006]	[0.0006]	[0.0008]	[0.0003]
Crisis (Econ+Fin)	-0.0697***	-0.0545**	-0.0553**	-0.0692***	-0.0697***	-0.0933***	-0.0738***
	[0.0244]	[0.0224]	[0.0232]	[0.0192]	[0.0188]	[0.0334]	[0.0189]
Constant	-0.0363***	0.0602**	0.0656**	-0.0379***	-0.0363***	-0.0238**	-0.0364***
	[0.0063]	[0.0305]	[0.0317]	[0.0055]	[0.0054]	[0.0102]	[0.0050]
Observations	344	344	344	344	344	338	344
# of countries	6	6	6	6	6	6	6
R-squared	0.85	0.90	0.90	0.85	0.85	0.82	
Hansen J-stat						0.00	
Sargan p-value							0.00
Hansen p-value							0.99
AR2 p-value							0.13

Note: Heteroscedasticity and serial correlation robust standard errors in brackets. All series are in log differences.* statistically significant at 10% level; ** at 5% level; *** at 1% level.

Table 5: Dynamic panel regressions - Europe (Short-run elasticities).

	OLS pooled	OLS time effects	OLS time & country effects	Fixed effects	Random effects	IV/GMM	Blundell-Bond
L. Investment	0.5192***	0.5311***	0.4771***	0.4731***	0.5192***	0.6454***	0.4605***
	[0.0455]	[0.0474]	[0.0485]	[0.0377]	[0.0366]	[0.0976]	[0.0777]
GDP	1.1218***	1.0753***	1.3559***	1.3600***	1.1218***	0.5176*	1.3759***
	[0.1482]	[0.1572]	[0.1717]	[0.1430]	[0.1311]	[0.2976]	[0.2648]
Cost of capital	-0.2039***	-0.1970**	-0.2311***	-0.2279***	-0.2039***	-0.1453	-0.2679***
	[0.0753]	[0.0854]	[0.0861]	[0.0714]	[0.0699]	[0.1542]	[0.0918]
Equity	0.0138	0.0180	0.0080	0.0056	0.0138	0.0440***	0.0134
	[0.0098]	[0.0124]	[0.0126]	[0.0095]	[0.0093]	[0.0169]	[0.0122]
Credit	0.0348	0.0385*	0.0102	0.0100	0.0348	0.0306	0.0400
	[0.0232]	[0.0230]	[0.0290]	[0.0280]	[0.0228]	[0.0264]	[0.0248]
Lending rate	-0.0134	-0.0382	-0.0245	-0.0093	-0.0134	0.0400	0.0550
	[0.0289]	[0.0345]	[0.0343]	[0.0283]	[0.0269]	[0.0447]	[0.0339]
Crisis (Econ+Fin)	0.0283	0.0258	0.0195	0.0254	0.0283*	0.0419**	0.0320**
	[0.0185]	[0.0192]	[0.0180]	[0.0175]	[0.0172]	[0.0210]	[0.0146]
Constant	-0.0317***	-0.1201	-0.0938	-0.0357***	-0.0317***	-0.0115	-0.0410***
	[0.0063]	[0.0910]	[0.0893]	[0.0075]	[0.0064]	[0.0113]	[0.0103]
Observations	439	439	439	439	439	427	439
# of countries	12	12	12	12	12	12	12
R-squared	0.66	0.70	0.72	0.60	0.66	0.64	
Hansen J-stat						0.00	
Sargan p-value							0.14
Hansen p-value							0.99
AR2 p-value							0.05

Note: Heteroscedasticity and serial correlation robust standard errors in brackets. All series are in log differences.* statistically significant at 10% level; ** at 5% level; *** at 1% level.

5.2 Sensitivity Analysis

The results for the sensitivity analysis are presented in Tables 6 and 7 for models with additional regressors, and in Tables 8 and 9 for the subsamples based on the level of financial development proxied by stock market capitalization per GDP[10].

As mentioned earlier, we include additional regressors to the benchmark model in order to evaluate the sensitivity of investment to other potential factors as suggested in the literature. Table 6 presents the results for models estimated with inflation, public spending, external debt and commodity prices included into the bechmark model[11]. Overall, we find that the inclusion of these additional variables do not qualitatively alter the benchmark results and that only in a very few cases inflation and commodity price variables are statistically significant. However, as before, the estimated coefficients for lagged investment, real GDP and cost of capital are highly statistically significant with expected signs, highlighting the fit of the neoclassical model. Moreover, both the estimated elasticities for equity price and lending rate are statistically significant, in line with the Q theory, and emphasizing the need to include the financial variables to improve the fit of the model.

Another financial variable we consider in our estimation is the corporate spread CEMBI with the estimation results presented in Table 7. The use of the bond prices (as opposed to equity prices) as a proxy for the Tobin's Q in empirical studies was, for instance, recently proposed by Gilchrist and Zakrajsek (2007) and Philippon (2008). The authors suggest two main reasons why the bond price may be a more suitable proxy for the Tobin's Q than the equity price. First, the bond market might be less susceptible to bubbles than the equity market[12]. In fact, there is empirical and theoretical support for the idea that mispricing is more likely to happen when returns are positively skewed (Barberis and Huang, 2007). Second, purely rational explanations can also be proposed. These explanations typically involve different degrees of asymmetric information, market segmentation, and heterogeneity in adjustment costs and stochastic processes.[13]

However, as shown in the Table 7, the corporate spread is not statistically significant in any of the specifications. Two possible explanations could be put forward why our results differ from the empirical findings for the US. First, the time series availability for the CEMBI yield is very limited (reducing our sample period to cover only 5 years and 19 countries) and also coincides with a rapid increase in corporate spreads. Second, the bond market development is still at an initial stage in many emerging market economies, and may hence be at a too preliminary stage to have an impact on aggregate business investment.

[10] Stock market capitalization per GDP is measured at the end of 2008 and arranged to the ratio and split to two equal sized subsamples. The countries with high stock market capitalization per GDP are the following: Hong Kong, South Africa, Singapore, India, Taiwan, Malaysia, Chile, Israel, Korea, China, Croatia, Thailand, Brazil, Colombia, and Philippines.

[11] The sample used in the sensitivity analysis includes only 30 countries (missing Taiwan) and has 254 observation fewer as the additional variables are not available for the full sample.

[12] However, one can also argue that corporate debt market is less liquid than the equity market.

[13] Consider for instance the random arrival of a new technology. News about the technology can have a large impact on equity values, but if it is not possible to invest in the new technology before it actually arrives, there would be no corresponding change in capital expenditures. In addition, firms might be reluctant to use equity to finance capital expenditures, because of adverse selection, in which case the bond market might provide a better measure of investment opportunities (Myers, 1984).

Table 6: Dynamic panel regressions - Full Sample, Including additional regressors.

	OLS pooled	OLS time effects	OLS time & country effects	Fixed effects	Random effects	IV/GMM	Blundell-Bond
L. Investment	0.5583***	0.5687***	0.5160***	0.5063***	0.5583***	0.6422***	0.5193***
	[0.0272]	[0.0292]	[0.0294]	[0.0196]	[0.0191]	[0.0488]	[0.0279]
GDP	1.2680***	1.2222***	1.5195***	1.5260***	1.2680***	0.6538***	1.4479***
	[0.0939]	[0.0937]	[0.1059]	[0.0785]	[0.0735]	[0.1667]	[0.1673]
Cost of capital	-0.1520***	-0.1503***	-0.1798***	-0.1566***	-0.1520***	-0.0278	-0.2864***
	[0.0510]	[0.0527]	[0.0571]	[0.0439]	[0.0427]	[0.1233]	[0.0793]
Equity	0.0141**	0.0166**	0.0048	0.0027	0.0141**	0.0348***	0.0114
	[0.0067]	[0.0084]	[0.0084]	[0.0061]	[0.0060]	[0.0101]	[0.0121]
Credit	-0.0108	-0.0071	-0.0421*	-0.0370*	-0.0108	-0.0023	-0.0208
	[0.0183]	[0.0182]	[0.0220]	[0.0191]	[0.0150]	[0.0220]	[0.0443]
Lending rate	-0.0666***	-0.0689***	-0.0715***	-0.0588***	-0.0666***	-0.1811*	-0.0395
	[0.0205]	[0.0215]	[0.0193]	[0.0175]	[0.0175]	[0.1071]	[0.0312]
Inflation	0.0585	0.0752	0.2074***	0.025	0.0585**	0.063	0.0597
	[0.0367]	[0.0597]	[0.0719]	[0.0365]	[0.0282]	[0.0561]	[0.0374]
Public investment	0.0265	0.0461	0.0625	0.0454	0.0265	0.1675	0.0647
	[0.0381]	[0.0384]	[0.0437]	[0.0360]	[0.0346]	[0.1255]	[0.1046]
External debt	-0.0022	-0.0015	0.0056	0.007	-0.0022	-0.0139	0.0009
	[0.0053]	[0.0055]	[0.0052]	[0.0053]	[0.0050]	[0.0132]	[0.0054]
Commodity	0.0115	0.0233	0.2239***	0.0147	0.0115	0.0314	0.0071
	[0.0142]	[0.0566]	[0.0723]	[0.0146]	[0.0145]	[0.0198]	[0.0187]
Crisis (Econ+Fin)	-0.0336**	-0.0340**	-0.0284*	-0.0289***	-0.0336***	-0.0369*	-0.0218
	[0.0148]	[0.0146]	[0.0146]	[0.0103]	[0.0100]	[0.0221]	[0.0162]
Constant	-0.0369***	-0.0549***	-0.0361**	-0.0420***	-0.0369***	-0.0204***	-0.0445***
	[0.0042]	[0.0140]	[0.0167]	[0.0043]	[0.0036]	[0.0059]	[0.0078]
Observations	1215	1215	1215	1215	1215	1185	1215
# of countries	30	30	30	30	30	30	30
R-squared	0.78	0.79	0.81	0.77	0.78	0.76	
Hansen J-stat						0.00	
Sargan p-value							0.00
Hansen p-value							0.99
AR2 p-value							0.03

Note: Heteroscedasticity and serial correlation robust standard errors in brackets. All series are in log differences.* statistically significant at 10% level; ** at 5% level; *** at 1% level.

Table 7: Dynamic panel regressions - Full Sample, Including additional regressors and corporate spread.

	OLS pooled	OLS time effects	OLS time & country effects	Fixed effects	Random effects	IV/GMM	Blundell-Bond
L. Investment	0.6305***	0.6587***	0.5240***	0.5232***	0.6305***	0.6779***	0.6090***
	[0.0441]	[0.0473]	[0.0559]	[0.0391]	[0.0355]	[0.0893]	[0.0361]
GDP	0.8482***	0.8059***	1.1540***	1.1434***	0.8482***	0.217	0.9256***
	[0.1672]	[0.1733]	[0.2191]	[0.1739]	[0.1324]	[0.2564]	[0.1854]
Cost of capital	0.0058	0.0101	0.0649	0.1442*	0.0058	0.0795	0.0069
	[0.0677]	[0.0714]	[0.0788]	[0.0767]	[0.0641]	[0.1215]	[0.0965]
Equity	0.0343***	0.0374***	0.0146	0.0193*	0.0343***	0.0509***	0.0444***
	[0.0091]	[0.0123]	[0.0117]	[0.0105]	[0.0099]	[0.0194]	[0.0136]
Credit	-0.0362	-0.0314	-0.0694	-0.0301	-0.0362	-0.0104	-0.0434
	[0.0420]	[0.0418]	[0.0471]	[0.0368]	[0.0287]	[0.0411]	[0.0668]
Lending rate	-0.1263**	-0.1244**	-0.1782***	-0.1334**	-0.1263**	-0.306	-0.1214**
	[0.0508]	[0.0518]	[0.0530]	[0.0534]	[0.0535]	[0.2004]	[0.0585]
Inflation	0.2026*	0.1966	0.2196	0.0586	0.2026***	0.2355	0.2037
	[0.1117]	[0.1641]	[0.1939]	[0.1099]	[0.0662]	[0.1805]	[0.1325]
Public investment	0.0038	0.029	0.0238	-0.0142	0.0038	0.0981	-0.004
	[0.0475]	[0.0511]	[0.0520]	[0.0563]	[0.0513]	[0.2509]	[0.0837]
External debt	-0.0209	-0.0250*	-0.0242	-0.0181	-0.0209	-0.0017	-0.0296*
	[0.0145]	[0.0144]	[0.0219]	[0.0217]	[0.0149]	[0.0225]	[0.0177]
Commodity	-0.0149	0.002	0.3945***	-0.0085	-0.0149	-0.0207	-0.0088
	[0.0236]	[0.0796]	[0.1307]	[0.0252]	[0.0233]	[0.0300]	[0.0294]
Corporate spread	0.0650*	0.0475	-0.0271	0.0471	0.0650*	0.0986	0.062
	[0.0390]	[0.0418]	[0.0470]	[0.0390]	[0.0380]	[0.0748]	[0.0510]
Constant	-0.0240***	-0.0187	-0.016	-0.0225**	-0.0240***	-0.0059	-0.0271***
	[0.0071]	[0.0155]	[0.0264]	[0.0113]	[0.0069]	[0.0091]	[0.0095]
Observations	346	346	346	346	346	326	346
# of countries	19	19	19	19	19	19	19
R-squared	0.74	0.75	0.79	0.60	0.74	0.70	
Hansen J-stat						0.00	
Sargan p-value							0.00
Hansen p-value							0.99
AR2 p-value							0.52

Note: Heteroscedasticity and serial correlation robust standard errors in brackets. All series are in log differences.* statistically significant at 10% level; ** at 5% level; *** at 1% level.

Table 8: Dynamic panel regressions - Countries with High Stock Market Capitalization.

	OLS pooled	OLS time effects	OLS time & country effects	Fixed effects	Random effects	IV/GMM	Blundell-Bond
L. Investment	0.5334***	0.5411***	0.5111***	0.5060***	0.5334***	0.6171***	0.5376***
	[0.0307]	[0.0330]	[0.0334]	[0.0218]	[0.0215]	[0.0507]	[0.0428]
GDP	1.1646***	1.0563***	1.2759***	1.3653***	1.1646***	0.6434***	1.1627***
	[0.0845]	[0.0883]	[0.1022]	[0.0838]	[0.0754]	[0.1761]	[0.1907]
Cost of capital	-0.1509**	-0.1726***	-0.1717**	-0.1438***	-0.1509***	-0.0386	-0.121
	[0.0612]	[0.0636]	[0.0713]	[0.0552]	[0.0530]	[0.1372]	[0.0766]
Equity	0.0147*	0.0221**	0.0182*	0.0087	0.0147*	0.0587***	0.0210*
	[0.0079]	[0.0106]	[0.0111]	[0.0077]	[0.0076]	[0.0117]	[0.0110]
Credit	0.0455*	0.0609**	0.0686***	0.0513**	0.0455**	-0.0049	0.0343
	[0.0257]	[0.0258]	[0.0264]	[0.0234]	[0.0226]	[0.0363]	[0.0449]
Lending rate	-0.0023**	-0.0024***	-0.0021***	-0.0021***	-0.0023***	-0.0025***	-0.0016***
	[0.0010]	[0.0007]	[0.0008]	[0.0006]	[0.0005]	[0.0007]	[0.0003]
Crisis (Econ+Fin)	-0.0813***	-0.0770***	-0.0643***	-0.0680***	-0.0813***	-0.0766***	-0.0794***
	[0.0187]	[0.0194]	[0.0201]	[0.0124]	[0.0121]	[0.0245]	[0.0191]
Constant	-0.0319***	0.0237	0.0084	-0.0400***	-0.0319***	-0.0115*	-0.0314***
	[0.0043]	[0.0392]	[0.0399]	[0.0040]	[0.0037]	[0.0070]	[0.0063]
Observations	850	850	850	850	850	835	850
# of countries	15	15	15	15	15	15	15
R-squared	0.78	0.80	0.81	0.78	0.78	0.76	
Hansen J-stat						0.00	
Sargan p-value							0.00
Hansen p-value							0.99
AR2 p-value							0.10

Note: Heteroscedasticity and serial correlation robust standard errors in brackets. All series are in log differences.* statistically significant at 10% level; ** at 5% level; *** at 1% level.

Table 9: Dynamic panel regressions - Countries with Low Stock Market Capitalization.

	OLS pooled	OLS time effects	OLS time & country effects	Fixed effects	Random effects	IV/GMM	Blundell-Bond
L. Investment	0.4904***	0.5096***	0.4464***	0.4355***	0.4904***	0.5548***	0.4486***
	[0.0363]	[0.0395]	[0.0412]	[0.0298]	[0.0292]	[0.0732]	[0.0552]
GDP	1.5874***	1.4650***	1.7373***	1.8258***	1.5874***	1.1930***	1.8083***
	[0.1486]	[0.1570]	[0.1674]	[0.1090]	[0.1040]	[0.3001]	[0.2729]
Cost of capital	-0.2141***	-0.1783**	-0.2143***	-0.2492***	-0.2141***	-0.1153	-0.2691**
	[0.0668]	[0.0703]	[0.0713]	[0.0567]	[0.0556]	[0.1834]	[0.1120]
Equity	0.0171*	0.0202*	0.013	0.0086	0.0171**	0.0419**	0.0123
	[0.0093]	[0.0119]	[0.0118]	[0.0075]	[0.0075]	[0.0177]	[0.0171]
Credit	-0.0495**	-0.0387*	-0.0528**	-0.0617***	-0.0495***	-0.046	-0.0638
	[0.0218]	[0.0220]	[0.0269]	[0.0205]	[0.0170]	[0.0293]	[0.0450]
Lending rate	-0.0741***	-0.0778***	-0.0689***	-0.0660***	-0.0741***	-0.1384	-0.0527*
	[0.0195]	[0.0210]	[0.0185]	[0.0180]	[0.0178]	[0.1066]	[0.0270]
Crisis (Econ+Fin)	0.0219	0.02	0.0191	0.0204	0.0219*	0.0271	0.0246
	[0.0152]	[0.0146]	[0.0143]	[0.0134]	[0.0131]	[0.0268]	[0.0203]
Constant	-0.0390***	-0.0306***	-0.0346***	-0.0442***	-0.0390***	-0.0276***	-0.0447***
	[0.0051]	[0.0055]	[0.0114]	[0.0049]	[0.0044]	[0.0105]	[0.0104]
Observations	619	619	619	619	619	603	619
Number of Country	16	16	16	16	16	16	16
R-squared	0.79	0.81	0.83	0.78	0.79	0.78	
Hansen J-stat						0.00	
Sargan p-value							0.00
Hansen p-value							0.99
AR2 p-value							0.13

Note: Heteroscedasticity and serial correlation robust standard errors in brackets. All series are in log differences.* statistically significant at 10% level; ** at 5% level; *** at 1% level.

Tables 8 and 9 present the estimation results for the subsamples based on the level of financial development proxied by stock market capitalization per GDP[14]. A couple of interesting observations arise: First, there is no statistically different reaction to the change in the stock price between the two samples, as the estimated elasticities are roughly equal between the two samples. Second, the estimated elasticities for the lending rate are higher in absolute terms in the low stock market capitalization sample, whereas credit elasticity is positive and statistically significant in the high stock market capitalization sample. Third, the estimated elasticity for output is significantly higher in the lower stock market capitalization sample. This can potentially imply that in less developed financial systems, firms are more sensitive to changes in their revenue streams and retained earnings when making their investment decisions than in countries with higher level of financial development where investments can be financed through capital markets. As a final observation, it can be noted that the crisis dummy seems to have statistically significant and negative impact on investment in the high stock market capitalization sample.

6 Conclusion

In this paper, we uncover the determinants of private investment growth in emerging markets. Using a panel of 31 emerging economies, we show that the GDP and the cost of capital are among the "fundamental" determinants of investment in accordance with the neoclassical model. The estimated effects are economically sizeable and statistically significant: (*i*) a 10% increase in real GDP rises private investment by between 8% and 15% in the short-run; (*ii*) a 10% increase in the cost of capital reduces private investment by between 1% and 3%;

In addition, we show that "financial" factors play an important role in explaining investment in emerging markets: (*i*) a 10% increase in equity price increases private investment between 0.1% and 0.5%, supporting the Tobin's Q approach; (*ii*) a 100 basis point increase in real lending rate decreases private investment by between 0.1% and 0.3%. However, credit is estimated to be not statistically significant factor for private investment in the full sample. Finally, financial and economic crisis are estimated to have a statistically significant negative impact on private investment in emerging markets

The results for the subsamples and sensitivity analysis confirm that the estimation results are overall robust to different estimation methods, sample selection, or inclusion of additional investment determinants found in the literature. Regarding results for regional subsamples or samples based on the degree of financial development, it can be noted that the elasticities related to output and cost of capital are found to be very robust across different estimation samples, again in line with the neoclassical model. However, there are some differences as regards to investment responses to financial variables.

In emerging Asia, credit and stock market index are, for most estimation methods, statistically significant and with a positive sign. Also in Latin America, the equity market has a statistically significant positive impact on investment growth. Moreover, the lending rate has a statistically significant negative impact on investment growth in Latin America. In

[14]One can argue that stock market capitalization per GDP is only a rough approximation of the level of financial development. However, the aim of the sensitivity analysis is to show that estimation results are relatively robust to the choice of the estimation sample or method. Another way to split the sample would be based on the GDP per capita. Again, the estimation results from these subsamples show a relatively robust outcome. These results are not shown due to space constraints, but are available upon request.

emerging Europe, financial factors seem to play a less significant role in private investment dynamics.

Regarding the samples split by the level of financial development, some interesting observations arise: First, there is no statistically different investment reaction to the stock market index between the two samples. Second, the estimated elasticities for the lending rate are significantly higher in absolute terms in the low stock market capitalization sample, whereas credit elasticity is positive and statistically significant in the high stock market capitalization sample. Third, the estimated output elasticity is significantly larger in the low stock market capitalization sample.

As far as other potential determinants of private investment are concerned, we find very little evidence supporting the inclusion of inflation, public spending, external debt or commodity prices to the benchmark model.

Finally, the results suggest that investment growth exhibits a substantial persistence and responds sluggishly to shocks. This may be an important reason for concern - particularly, in the case of a negative downturn - taking into account that these economies have often witnessed episodes of economic, financial and currency crises. In fact, despite the small short-run elasticity of investment to equity or lending rate, the empirical findings show that both the short-run and the long-run elasticiticies of investment with respect to GDP are quite large. As a result, the effects of a slowdown of the economic activity may be amplified by this intrinsic characteristic of investment in emerging markets.

Additionally, the prominent role played by "fundamental" factors suggests that public policies that lower the cost of capital can help stimulating private investment in emerging market economies. Moreover, monetary policy can also be crucial both for its direct effect on lending rates (and, therefore, on borrowing costs) and on credit availability, and its indirect effect on the present value of future tax deductions via interest payments.

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7 Appendix

A Data and Summary Statistics

Table A.1: Data sources.

Variable	Source	Definition	Remark
Investment	HA	Gross Fixed Capital Formation	CP, SA
GDP	HA	Gross Domestic Product	CP, SA
Cost of capital	HA	Ratio investment / GDP deflator	CP, SA
Equity	HA / GFD*	Composite Index	Deflated
Credit	IMF code SAP	Claims on Private Sector	Deflated
Lending rate	IMF code IP**	Lending rate	Deflated
Inflation	HA	Annual change in CPI	SA
Public spending	HA	Government consumption expenditure	CP, SA
External debt	BIS	International debt securites	
Commodity price	HA	Reuters/Jefferies CRB All Commodities Index	Deflated
Corporate spread	JPM	CEMBI	Deflated

Notes: * for Argentina, Chile, Colombia, Croatia, Czech Republic, Hong Kong, Israel, Korea, Peru, Philippines, Russia, Singapore, South Africa; ** interbank rate for Romania and Turkey.
In the source section, HA stands for Haver Analytics, GFD for Global Financial Database, IMF for International Monetary Fund IFS statistics, BIS for Bank for International Settlements, JPM for JP Morgan. In the remark section, CP means constant price, SA means seasonally adjusted, and Deflated means deflated using the GDP deflator.

Table A.2: Annual average change in log series.

Variable	Obs	Mean	Std. Dev.	Min	Max
Investment	1469	0.0552	0.1268	-0.8383	0.4051
GDP	1469	0.0450	0.0374	-0.1652	0.1594
Cost of capital	1469	-0.0081	0.0418	-0.2123	0.2377
Equity	1469	0.0714	0.3411	-2.5877	1.4276
Credit	1469	0.0922	0.1355	-0.4754	0.6037
Lending rate	1469	-0.1284	2.9841	-101.8218	1.6363
Inflation	1465	0.0641	0.0786	-0.0599	0.7613
Public spending	1418	0.0463	0.1434	-0.2683	3.3704
External debt	1266	0.0901	0.3547	-0.7055	4.0800
Commodity price	1469	-0.0342	0.1996	-4.0320	0.3254
Corporate spread	346	-0.0122	0.0742	-0.5061	0.1757

Table A.3: Sample period and number of observations per country.

Country	Obs	Sample period
Argentina	55	1995:1-2008:3
Brazil	43	1998:1-2008:3
Bulgaria	28	2001:4-2008:3
Chile	67	1992:1-2008:3
China	43	1997:2-2007:4
Colombia	51	1996:1-2008:3
Croatia	27	2002:1-2008:3
Czech Republic	43	1998:1-2008:2
Estonia	44	1997:2-2008:1
Hong Kong	68	1991:4-2008:3
Hungary	47	1997:1-2008:3
India	42	1998:2-2008:3
Indonesia	30	2001:2-2008:3
Israel	47	1997:1-2008:3
Korea	74	1990:2-2008:3
Latvia	31	2001:1-2008:3
Lithuania	31	2001:1-2008:3
Malaysia	46	1997:2-2008:3
Mexico	57	1994:3-2008:3
Peru	71	1991:1-2008:3
Philippines	71	1990:2-2007:4
Poland	36	1998:1-2006:4
Romania	27	2002:1-2008:3
Russia	47	1997:1-2008:3
Singapore	71	1990:2-2007:4
Slovakia	42	1998:2-2008:3
Slovenia	36	1998:1-2006:4
South Africa	74	1990:2-2008:3
Taiwan	27	2002:1-2008:3
Thailand	55	1995:1-2008:3
Turkey	38	1999:1-2008:3

Table A.4: Annual average change in log series by region and country.

	Investment	GDP	Cost of capital	Equity	Credit
All	0.0552	0.0450	-0.0081	0.0714	0.0922
Emerging Asia	0.0383	0.0466	-0.0011	0.0254	0.0615
Latin America	0.0547	0.0384	-0.0077	0.1039	0.0598
Emerging Europe	0.0817	0.0524	-0.0161	0.1039	0.1620
Other	0.0390	0.0337	-0.0098	0.0643	0.0712
Argentina	0.0404	0.0303	0.0028	0.0643	0.0001
Brazil	0.0302	0.0300	0.0068	0.0940	0.0382
Bulgaria	0.1573	0.0586	-0.0097	0.3059	0.2963
Chile	0.0866	0.0546	-0.0265	0.0777	0.0956
China	0.0387	0.0188	0.0000	0.0235	0.0420
Colombia	0.0326	0.0319	-0.0145	0.0923	0.0477
Croatia	0.1013	0.0446	-0.0062	0.1627	0.1308
Czech Republic	0.0316	0.0352	-0.0167	0.0678	0.0032
Estonia	0.1126	0.0695	-0.0288	0.1006	0.2127
Hong Kong	0.0347	0.0403	-0.0092	0.0932	0.0405
Hungary	0.0510	0.0384	-0.0173	0.0843	0.1381
India	0.1044	0.0689	0.0036	0.0865	0.1363
Indonesia	0.0690	0.0509	0.0184	0.1170	0.0862
Israel	0.0129	0.0372	0.0033	0.1113	0.0688
Korea	0.0456	0.0547	0.0019	-0.0069	0.0992
Latvia	0.1156	0.0753	-0.0082	0.0823	0.2845
Lithuania	0.1234	0.0738	-0.0072	0.1538	0.2660
Malaysia	-0.0016	0.0447	-0.0173	-0.0393	0.0158
Mexico	0.0434	0.0288	-0.0057	0.0592	-0.0058
Peru	0.0753	0.0470	-0.0038	0.2094	0.1468
Philippines	0.0256	0.0371	-0.0106	-0.0057	0.0547
Poland	0.0374	0.0385	-0.0417	0.0701	0.0912
Romania	0.1454	0.0621	-0.0105	0.1910	0.3046
Russia	0.0816	0.0535	-0.0204	0.0137	0.1849
Singapore	0.0616	0.0652	-0.0140	0.0478	0.0718
Slovakia	0.0323	0.0499	-0.0084	0.0498	0.0231
Slovenia	0.0591	0.0410	-0.0077	0.1002	0.1409
South Africa	0.0463	0.0268	-0.0138	0.0384	0.0502
Taiwan	0.0291	0.0450	0.0284	0.0828	0.0558
Thailand	-0.0099	0.0361	0.0174	-0.0727	0.0177
Turkey	0.0572	0.0429	-0.0183	0.0563	0.1153

Table A.4 (continued): Annual average change in log series by region and country.

	Lending rate	Inflation	Public spending	External debt	Corporate spread
All	-0.1284	0.0641	0.0463	0.0901	-0.0122
Emerging Asia	-0.0027	0.0376	0.0439	0.0859	-0.0176
Latin America	-0.5192	0.0820	0.0843	0.0592	-0.0067
Emerging Europe	-0.0173	0.0695	0.0244	0.1208	-0.0117
Other	-0.0059	0.0991	0.0254	0.0667	0.0010
Argentina	-0.0068	0.0553	0.0239	-0.0499	-0.0275
Brazil	-0.0285	0.0657	0.0285	-0.0667	-0.0062
Bulgaria	-0.0068	0.0634	0.0272	-0.1665	
Chile	0.0005	0.0579	0.0452	0.1104	0.0025
China	-0.0033	0.0117	0.0192	-0.0589	-0.0125
Colombia	-0.0116	0.0926	0.0576	0.0676	-0.0092
Croatia	-0.0035	0.0289	0.0239	0.0418	
Czech Republic	-0.0010	0.0349	0.0182	0.2037	
Estonia	0.0038	0.0487	0.0204	0.2763	
Hong Kong	0.0005	0.0263	0.0274	0.1123	-0.0070
Hungary	-0.0048	0.0811	0.0182	0.0072	
India	-0.0002	0.0513	0.0542	0.1087	0.0050
Indonesia	-0.0132	0.0902	0.0759	0.0871	-0.0871
Israel	-0.0043	0.0292	0.0189	0.1714	0.0044
Korea	0.0000	0.0435	0.0490	0.0777	0.0033
Latvia	-0.0154	0.0609	0.0275	0.1804	
Lithuania	-0.0178	0.0279	0.0379	0.1921	
Malaysia	-0.0111	0.0255	0.0655	0.0524	-0.0203
Mexico	-0.0062	0.1093	0.0068	-0.0891	-0.0022
Peru	-2.4804	0.1072	0.2831	0.3722	0.0133
Philippines	-0.0024	0.0696	0.0293	0.0726	
Poland	-0.0090	0.0439		0.1400	
Romania	-0.0194	0.1062	0.0307	0.0158	
Russia	-0.0985	0.1839	0.0143	0.1852	-0.0117
Singapore	-0.0012	0.0145	0.0681	0.3282	-0.0161
Slovakia	-0.0095	0.0618	0.0253	0.1553	
Slovenia	-0.0077	0.0569	0.0343	0.0848	
South Africa	0.0003	0.0720	0.0248	0.0878	-0.0156
Taiwan	-0.0007	0.0130	0.0064	0.1056	0.0145
Thailand	-0.0026	0.0357	0.0390	-0.0142	-0.0090
Turkey	-0.0197	0.2385	0.0349	-0.0889	-0.0205

Table A.5: Correlation coefficients (variables in log differences).

	Investment	GDP	Cost of capital	Equity	Credit	Lending rate	Inflation	Public spending	External debt	Commodity price	Corporate spread
Investment	1.0000										
GDP	0.6339	1.0000									
Cost of capital	-0.1767	-0.0838	1.0000								
Equity	0.2581	0.2523	0.0130	1.0000							
Credit	0.2758	0.3016	-0.0598	0.0770	1.0000						
Lending rate	-0.1110	-0.0578	0.0161	0.0717	0.3495	1.0000					
Inflation	0.1240	-0.0084	0.1232	-0.1505	0.0099	-0.2685	1.0000				
Public spending	0.1795	0.2609	-0.0753	-0.0051	0.1394	0.0854	0.0861	1.0000			
External debt	-0.0484	0.1736	0.1962	0.1676	0.0764	0.1143	-0.2694	0.1413	1.0000		
Commodity price	-0.1556	-0.0605	0.0973	-0.3485	-0.068	0.0066	-0.161	0.0061	0.0466	1.0000	
Corporate spread	0.0668	0.0649	-0.0276	0.0863	0.1661	0.4629	-0.3273	0.0833	-0.0196	0.1201	1.0000

Note: Sample 346 obs.

Table A.6: Panel unit root test results.

	LLC t-stat	p-value	IPS W-stat	p-value
Investment	-4.9499	0.0000	-8.1168	0.0000
GDP	-4.9035	0.0000	-8.5123	0.0000
Cost of capital	-6.8433	0.0000	-11.8380	0.0000
Equity	-15.5231	0.0000	-12.4805	0.0000
Credit	-2.4534	0.0071	-6.2376	0.0000
Lending rate	-114.736	0.0000	-43.6758	0.0000
Inflation	-4.5274	0.0000	-3.9998	0.0000
Public spending	-4.5296	0.0000	-18.5661	0.0000
External debt	-6.3507	0.0000	-8.6236	0.0000
Commodity price	-15.4333	0.0000	-17.8202	0.0000
Corporate spread	-1.5561	0.0598	-4.4659	0.0000

Note: All series are in log differences.

Table A.7: Ratio of investment to GDP.

Date	1990	1991	1992	1993	1994	1995	1996	1997	1998	1999	2000	2001	2002	2003	2004	2005	2006	2007
Argentina				19.0	19.9	17.9	18.1	19.4	19.9	18.0	16.2	14.1	11.9	15.1	19.2	21.4	23.3	24.2
Brazil					20.9	18.4	16.9	17.4	17.0	15.7	16.8	17.0	16.4	15.3	16.1	15.9	16.7	17.8
Bulgaria					14.3	15.3	13.0	11.3	13.0	15.0	15.7	18.2	18.2	19.3	20.5	24.1	25.9	29.8
Chile	23.8	20.7	23.2	25.9	24.4	25.2	26.4	26.9	25.8	20.5	20.2	21.1	20.5	20.2	19.3	21.2	19.5	20.6
China	21.4	23.0	26.4	30.9	29.6	28.3	27.8	27.3	28.3	28.7	29.4	29.7	31.1	33.6	34.8	35.1	34.9	34.3
Colombia					27.8	28.3	24.4	22.8	21.6	14.1	15.7	16.7	17.1	18.9	20.0	21.6	24.3	24.9
Croatia								24.2	23.3	23.3	21.8	22.3	24.3	28.5	28.2	28.1	29.8	30.0
Czech Republic						31.5	32.1	30.0	28.2	27.0	28.0	28.0	27.5	26.7	25.8	24.9	24.6	24.1
Estonia						27.0	26.5	28.2	30.5	24.7	26.0	26.6	29.7	31.7	31.0	30.7	33.8	32.5
Hong Kong	26.1	26.2	27.0	26.9	29.2	30.0	30.8	33.1	30.0	25.7	26.4	25.6	22.4	21.2	21.3	20.9	21.8	20.3
Hungary						20.0	21.4	22.4	23.8	24.4	23.8	23.6	23.3	22.2	22.5	22.9	21.2	21.1
India								25.4	24.6	25.4	25.1	25.3	25.8	26.4	30.0	33.1	35.0	37.1
Indonesia											19.8	19.7	19.4	19.5	22.4	23.6	24.1	24.8
Israel						23.7	23.7	22.6	20.6	20.2	18.7	17.8	17.3	16.6	16.5	16.4	17.1	18.7
Korea	37.0	38.9	36.9	36.3	36.4	37.3	37.5	35.6	30.3	29.7	31.1	29.5	29.1	29.9	29.5	29.3	29.0	28.8
Latvia			11.9	13.6	14.7	13.5	16.4	16.9	24.7	23.0	24.2	24.8	23.8	24.4	27.5	30.6	32.6	32.3
Lithuania				24.6	20.6	21.0	21.1	22.6	24.0	22.0	18.8	20.2	20.3	21.1	22.3	22.7	25.2	28.0
Malaysia							42.5	43.2	26.8	21.9	25.3	25.1	23.5	22.4	21.0	20.5	20.8	21.7
Mexico				18.6	19.3	16.2	17.8	19.4	20.9	21.2	21.4	20.0	19.3	18.9	19.6	19.3	20.4	20.8
Peru	19.9	17.1	17.3	19.4	22.2	24.8	22.8	24.1	23.6	21.1	20.1	18.8	18.4	18.4	18.1	17.8	20.0	22.9
Philippines	23.1	20.1	20.9	23.7	23.6	22.2	23.4	24.4	21.2	19.1	21.2	17.9	17.6	16.8	16.1	14.4	14.0	14.8
Poland							29.1	28.7	28.0	26.8	24.9	20.6	18.4	18.2	19.1	18.2	19.5	22.0
Romania								21.0	18.3	18.1	18.9	20.7	21.3	21.4	21.9	23.0	25.6	30.4
Russia				21.7	22.2	20.8	20.0	18.3	16.3	14.4	16.8	18.9	17.9	18.4	18.4	17.7	18.4	21.0
Slovakia				29.9	26.6	26.0	32.6	34.9	36.3	30.0	25.7	28.5	27.3	24.8	23.9	26.5	26.4	26.1
Slovenia						20.9	21.8	23.1	24.2	26.5	26.5	25.0	23.4	24.4	25.5	25.7	26.7	28.1
South Africa	19.2	17.2	15.7	14.7	15.1	15.9	16.3	16.5	17.1	15.5	15.1	15.1	15.0	15.9	16.2	17.1	18.9	21.1
Taiwan	22.3	22.1	23.9	25.0	24.4	24.8	22.4	22.7	23.7	23.1	23.9	19.4	18.6	18.6	21.9	21.3	21.3	21.2
Thailand				39.5	39.7	41.0	41.1	33.9	22.4	20.9	22.0	23.0	22.9	24.1	26.0	29.0	28.2	26.4
Turkey									23.0	19.0	20.4	16.1	16.7	17.0	20.3	21.0	22.3	21.6

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