MACROECONOMIC UNCERTAINTY, SOCIOPOLITICAL INSTABILITY AND PUBLIC PROVISION: EFFECTS ON PRIVATE INVESTMENT

Constantina Kottaridi[♦] **Monica Escaleras**[°]

Abstract

This paper examines empirically the effects of macroeconomic imbalances as captured by real exchange rate volatility, sociopolitical instability using a wide array of social and political variables and provision of infrastructure on private investment. Whilst most of the available studies on private investment focus either in the macroeconomic conditions or political conditions to explain private investment patterns, this work goes beyond existing literature to jointly examine the effects of the above factors and extends the line of research by incorporating a neglected thus far element, that of infrastructure availability. The study is carried out for a wide range of developing countries for the last three decades. Interesting policy implications stemming from the analysis regard the implementation of macro policies serving to limit excess volatility in relative prices, institutional reforms that lessen social tensions and provision of adequate amount and quality of public infrastructure to enable investment undertaking by lowering investors' costs.

Keywords: private investment, real exchange rate, sociopolitical instability, public provision

JEL Classification: E62, F31, H54

♦ Corresponding Author: University of Peloponnese, School of Management and Economics, Department of Economics, Greece, Tel: +30 2710 230134, Fax: +30 2710 230139, e-mail: kottarid@uop.gr

° Florida Antlantic University, Department of Economics, USA.

1. INTRODUCTION

Understanding the determining factors of private investment is of utmost importance, as this constitutes a critical aspect of economic development and growth. Conventional wisdom states that the path of economic prosperity requires stable sociopolitical institutions, certainty in macroeconomic policies and flexibility in the financial markets. If all these criteria are met, private investment will lead to economic growth. Nevertheless, most existing literature is occupied with the economic determinants of private investment whilst there is a limited amount of studies examining the political climate.

This study goes beyond existing literature and jointly examines the impact of both macroeconomic imbalances and the sociopolitical climate. It further distinguishes the political side of the economy from the social side as captured by social unrest variables. Moreover, it extends the line of research for private investment by adding a neglected determining factor, that of infrastructure availability as a measure of public provision to facilitate the undertaking of production by the private sector.

Developing economies suffer from a high degree of macroeconomic uncertainty. Growth, inflation, real exchange rates and other key macroeconomic variables are much more volatile than in industrial economies. Recent theoretical work has identifies several channels through which uncertainty can affect investment, under various assumptions about risk aversion, adjustment costs to investment and other factors (Cabalero, 1991; Abel and Eberly, 1994). Much of the analytical work focuses on the case of risk neutral investors where the uncertainty-investment relationship depends on the relationship between the expected marginal revenue product of capital and the uncertainty variable. Hartman (1972) and Abel (1983) argue that higher price uncertainty raises expected profitability of capital which in turn increases desired capital stock and leads to an increase in investment under constant returns to scale and perfectly competitive firms. Dixit and Pindyck (1994) on the other hand claim that most investment projects are irreversible in nature and hence, investment adjustment costs are asymmetric, i.e. larger for downward that for upward adjustment. In such cases, investment takes place only when the difference between expected profitability and the cost of capital exceeds a certain threshold due to the risk of getting stuck with too much capital in unfavorable conditions; therefore higher uncertainty lowers investment. Caballero (1991) and Abel and Eberly (1994) showed that even under

asymmetric adjustment costs optimal investment by a competitive firm continues to be a nondecreasing function of uncertainty.

If it is assumed that investors are risk averse as opposed to risk neutral then the overall effect of uncertainty on investment may be negative (Zeira, 1990).

The theoretical literature thus is ambiguous regarding to uncertainty-investment relationship as this may be affected by a several factors. As a result, the effect of uncertainty to investment may ultimately be an empirical question.

Empirical studies on the impact of different forms of uncertainty on private investment usually support the negative effect. Among the variables that have commonly be used include interest rate uncertainty (Federer, 1993), real exchange rate uncertainty (Goldberg, 1993; Barby et al., 1999; Serven and Solimano 1993; Bleaney, 1996 and Serven 2002), inflation and exchange rate uncertainty (Pindyck and Solimano, 1993) and terms of trade, inflation and real exchange rate volatility (Aizerman and Marion, 1996). The real exchange rate has attracted considerable attention. Froot and Stein (1991) suggested that devaluation would reactivate the exportable sector of the economy and also be favorable to the acquisition of local assets by foreign firms at a much lower price. On the other hand though, McCulloch (1989) rejects this link suggesting that it is not the price of a domestic asset but the rate of return that determines investment. When a country's currency is depreciated in real terms not only the asset price falls but also the nominal gain of the investment.

Recent research has focused on the interrelationship between institutions and private investment (Greene and Villanueva, 1990; Pastro and Hill, 1993; Pastor and Sung, 1995; Feng and Chen, 1997; and Feng, 2001)[1]. Political scientists and economists have recognized that not only economic failures in developing countries lead to a decline in economic growth but also political and institutional failures adversely affect economic performance. Alesina and Perotti (1996) studied the effect of an index capturing political unrest in 71 countries for the period 1960-1985 and concluded that this created a significant drag on investment. Venieris and Gupta (1986) examined the relationship of political instability and the saving rate and obtained an inverse relationship. Similar results can be found in Barro (1991, 1997), Campos et al. (2002) and Alesina et al. (1997).

[1] These studies focus on the role of democracy on investment and growth.

A recent study examining political risk on private investment while controlling for economic risk belongs to Le (2004). Le decomposes political risk into three elements, socio-political instability, regime change instability and policy uncertainty controlling for exchange rate and inflation variance for 25 developing countries over the period 1975 to 1995. Le (2004) shows that not all types of political risk deteriorate private investment.

Nevertheless, while each of these studies contributes to our understanding of private investment, there is no work to date to the best of our knowledge that systematically examines the relationship between sociopolitical instability and private investment within the context of macroeconomic imbalances. An exception belongs to Thomakos and Escaleras (2007) who investigate this relationship for eight Latin American countries for the period 1970 to 1995. Indeed, they found that macroeconomic instability and sociopolitical instability have a joint negative and statistically significant effect on private investment stressing that an empirical model using only the sociopolitical variables does not explain as much variability of private investment as an empirical model with only the economic variables.

The role of poor infrastructure and deficient public services has received little attention in the economic literature. The existing empirical evidence based on cross-country data indicates that the effect of public spending and investment on growth is at best ambiguous (Barro and Sala-I-Martin 1995; Easterly and Rebelo, 1993; Devarajan, Swaroop and Zoo, 1996). This ambiguity may simply be a problem of identification; more spending does not necessarily imply more public capital or services (Pritchett, 1996; Ablo and Reinika, 1998, Svensson, 1999a). In fact when output measures of public capital such as telephones per worker or roads availability rather than spending have been used to proxy infrastructure constraints, a positive relationship between infrastructure quality and growth emerges (Easterly and Levine, 1997). Reinikka and Svensson (1999b) used microeconomic data coming from a survey of 243 firms in 1998 in Uganda and found that poor public capital proxied by unreliable and inadequate power supply significantly reduces productive investments by firms.

Public infrastructure investment and capital can affect private investment through various channels. Turnovsky (1996) claimed that the availability and quality of public capital in infrastructure affects some of the costs that firms may incur when investing. For instance a better road network may reduce expenses associated with the

construction of a new factory or the transportation of heavy equipment. By lowering production costs and raising the expected rate of return (by raising the marginal productivity of private inputs, labor and capital) public capital in infrastructure may have a strong impact on private investment. Nevertheless, public capital may crowd out private investment if the public sector finances its investment through distortionary taxes or through borrowing on domestic financial markets and its positive net effect on private investment may be mitigated[2].

The effect of physical infrastructure availability is examined to some extent as an important factor in attracting foreign direct investment by improving the investment climate (Loree and Guisinger, 1995 and Mody and Srinivasan, 1996). More recently Kumar (2001) analyses the role of infrastructure availability in explaining attractiveness of countries for FDI flows, by constructing a composite index capturing transport, telecommunications, information and energy infrastructure for 66 developed and developing countries over the period 1982 –1994. Globerman and Shapiro (2002) study the effects of human development, health status and environmental sustainability on inward and outward FDI flows for 144 countries for the period 1995-1997. Their results indicate that these are significant factors attracting foreign investments and on top of that they crate the conditions under which domestic MNEs emerge and invest abroad.

Nevertheless, no study exists to date that systematically examines the existence of physical infrastructure availability on total private investment. This study fills this gap in the literature by incorporating various measures of physical infrastructure in the basic models of macroeconomic imbalances and sociopolitical unrest.

The present study we believe makes a threefold contribution to the political economy literature on private investment. First we examine the potential joint effect of macroeconomic and sociopolitical instability on private investment, in contrast to previous studies that have looked at either economic risk or sociopolitical risk in isolation. We are interested in particular in examining whether macroeconomic risk or sociopolitical instability remains economically and statistically significant when one controls for each other. Second, we assess the significance of public provision for private investment in the context of macroeconomic and sociopolitical instability, as captured by various measures used in the above context. Third, we distinguish

[2] Public investment and capital in infrastructure may also affect private capital formation indirectly through changes in output and relative prices, see Chrinko, 1993 and Agenor et al. 2005.

between social unrest and political instability as opposed to other studies that group them together to check for the relative significance of these two aspects on private investment.

2. MACROECONOMIC IMBALANCES, SOCIOPOLITICAL INSTABILITY AND INFRASTRUCTURE AVAILABILITY

2.1 Measuring macroeconomic imbalances

Empirical studies have use various proxies to capture macroeconomic imbalances with the emphasis on the effects of uncertainty on private investment. We use here the most widespread notion of uncertainty, i.e., the real exchange rate[3], s_t, as it reflects the currency-adapted relative prices. We also utilize the inflation rate[4], as a macroeconomic instability factor.

To obtain an approximation of uncertainty one may use the standard deviation of the underlying variable (Akhat and Hilton, 1984; Gotur, 1985). Nevertheless, this requires that the distribution of the variable needs to be normal, which is not the case for the real exchange rate.

To measure uncertainty we use the implied volatility of the real exchange rate using past information of the underlying variable. Such a model is the Generalized Autoregressive Conditional Heteroskedasticity (GARCH) model of Bollerslev (1986). Let $F_{t-1} = (def)I(s_{t-1}, s_{t-2}, ...)$ denote the set of all past values of the real exchange rate available at time $t-1$; we take this to be our information set at time $t-1$. Based on F_{t-1}, we consider the difference of s_t from its "best" prediction made at $t-1$, $\varepsilon_t = (def)s_t - E[s_t | F_{t-1}]$. Here $E[.|F_{t-1}]$ denotes the conditional expectation operator. The real exchange rate uncertainty, which is denoted by σ_t, is then taken to be the conditional standard deviation of this difference, given by:

$$\sigma_t^2 = (def)Var[s_t | F_{t-1}] = E[\varepsilon_t^2 F_{t-1}] \qquad (1)$$

[3] The real exchange rate should be the real effective exchange rate. However, due to data limitation about our sample countries we were not able to use this. We instead constructed the real exchange rate using the nominal exchange rate of the domestic currency relative to the US$ and the domestic and US prices accordingly.

[4] The inflation rate is constructed in two ways: the change in the Consumer Price Index and the change of the GDP deflator

To implement the GARCH model let $E[s_t|F_{t-1}]$ be given by $E[s_t|F_{t-1}] = (def)\phi_0 + \phi_1 s_{t-1}$, so that the real exchange rate is assumed to be modelled by a first-order autoregression. Then we assume that σ_t^2 follows a first-order difference equation and we write the complete, estimable model as:

$$\begin{aligned} s_t &= \phi_0 + \phi_1 s_{t-1} + \varepsilon_t \\ \sigma_t^2 &= \tau_0 + \tau_1 \sigma_{\tau-1}^2 + \omega_1 \varepsilon_{t-1}^2 \end{aligned} \tag{2}$$

This is a GARCH(1,1) model (Bollerslev, 1986 and Hamilton, 1994). The model's parameter vector $\boldsymbol{\theta} = (def)(\phi_0, \phi_1, \tau_0, \tau_1, \omega_1)'$ can be estimated by maximum likelihood. Once the parameters are available one can estimate σ_t, and we use this estimate as our measure of real exchange rate uncertainty. We applied the model of equation (2) to each country separately.

2.2 Socio-political instability

There are a number of studies that examine the role of several indices of socio-political instability on growth, savings and investment. Hibbs (1973) and Alesina and Perotti (1996) used the principal components method to construct such indices, while Venieris and Gupta (1996) constructed a socio-political index by using discriminant analysis.

The objective of principal components is to find linear combinations among a set of related variables so that to reduce the number of variables involved in the estimation. Let z_t be a $(q \times 1)$ vector of variables with mean error $E[z_t] = (def)\boldsymbol{\mu}$ and variance-covariance matrix $Cov[z_t] = (def)\boldsymbol{V} = E[(z_t - \mu)(z_t - \mu)'] \succ 0$. So the linear combinations regard the variables in z_t, say $p_{tj} = (def)\alpha_j' z_t$ with $\|a\| = 1$ for j = 1, 2, …, q, such that $Var[p_{ti}] \geq ... Var[p_{tq}]$ and $Cov[p_{ti}, p_{tj}] = 0$ for $i \neq j$. That is p_{ti} is that linear combination that is uncorrelated with all others and has the largest variance. The optimisation problem for principal components is then given by:

$$\begin{aligned} &\max_{a,\lambda} \Lambda(\alpha, \lambda) = (def) Var[a' z_t] + \lambda(1 - \alpha'\alpha) \end{aligned} \tag{3}$$

whose first order conditions are:

$$\begin{aligned} V\alpha &= \lambda\alpha \\ \alpha'\alpha &= 1 \end{aligned} \tag{4}$$

The solution to equation (3) is to select α_1 as the first characteristic vector of $\boldsymbol{V}$. It follows that $Var[p_1] = \rho_1$ where $\rho_1 \geq \rho_2 \geq ... \geq \rho_m$ are the ordered characteristic roots of $\boldsymbol{V}$, and similarly for all other components. Using the properties of characteristic roots and vectors we have that the sum of the variances of the individual components of z_t is given by $\sum_{j=1}^{q} Var[z_{tj}] = (def)V_t = \sum_{j=1}^{q} \rho_j$. Therefore, the first principal component explains the largest proportion of the total variability of the elements of z_t, with the proportion being given by ρ_1 / V_t.

To implement principal components one estimates $\boldsymbol{\mu}$ and $\boldsymbol{V}$ from the observations on z_t and computes the spectral decomposition of the sample variance-covariance matrix, from which the characteristic roots and vectors are extracted. Then an index can be constructed by computing the sample principal component. However, note that for such an index to be practically useful one would like to have the first component to explain a large proportion of the total variability of the elements of z_t. Otherwise, one would need to examine the individual variables in her analysis along with the principal component.

In our study we use a wide range of social and political variables. Unlike all other studies though, we separate social unrest variables from the one capturing political turmoil especially regarding government instability. For the first, we have variables measuring assassinations, riots, revolutions, etc as essentially counts of events and are demonstrated in Table 1. Regarding the political variables we use government crises, anti-government demonstrations, type of regime and coup d'etats. We believe that it is more suitable to discriminate between social turbulence and government instability as measured by the above.

The correlation matrix of the social variables indicates that these are not closely linked to one another; hence we may infer that using principal components analysis would not be useful. Indeed, the first component explains only 31% of the total variability of the individual variables, which is no use whatsoever. We would at least need four components in order to explain 78%. In this case, it is better to examine the variables individually.

Political variables give the same result. The first component explains about 35% of the total variability, two components explain about 62% whilst we would need to use

three components to explain 84%. In this case, we go ahead and examine the variables individually.

2.3 Public investment and infrastructure availability

In order to examine the effect of public provision on private investment, we follow two alternative ways; first we examine the effect of public investment as a percentage of GDP, i.e., in terms of amount of expenditures, and second, we examine the infrastructure availability by taking the principal components of available variables as discussed in the previous section. We use the two measures interchangeably. The first principal component of the above explains 79% of the total variability of the individual variables, thus we include it in our estimations

3. DATA

We use annual data from 1970 to 2000 for fifty developing countries from all over the world. Table 1 shows the countries under consideration and the regions where they belong. All economic data were put together from the World Bank, World Development Indicators database. Real private investment is at constant prices as a percentage of GDP and is taken from the International Finance Corporation (IFS) Statistics of the Economics Department of International Monetary Fund (IMF). Unfortunately, the latest statistics reach up to the year 2000 and hence our analysis is limited up to this. Real public investment is also taken from the same source. The nominal interest rate is represented by the lending rate (as the end of year average). Other series include the real GDP in constant prices, a real exchange rate index (1990=100), and inflation (the annual percentage change in both the consumer price index and the GDP deflator). The real interest rate is calculated by subtracting the concurrent inflation from the nominal interest rate. The socio-political and infrastructure variables were gathered from the Arthur S. Banks Cross National Time-Series Data Archive (2006). Regarding the socio-political variables we distinguish between two sets of variables. First, variables that capture social unrest and these include the number of politically motivated assassinations, the number of strikes, purges, riots etc. Second variables related to political instability with the type of regime as the most representative one. All variables and descriptions may be found in Table …

In regards to the infrastructure measures, the variables of interest regard passenger cars per capita to capture transportation infrastructure, telecommunications infrastructure is captured by a teledensity variable and information infrastructure is measured by intensity of electronic media, i.e. televisions and radios.

4. EMPIRICAL METHODOLOGY

We use our data as a panel and our estimable equations are specified accordingly. Let i stand for the country index and t stand for the time index and denote y_{it} the logarithm of real private investment, q_{it} the growth rate of real GDP, r_{it} the real interest rate, f_{it} is the inflation rate, σ_{it} the estimated macroeconomic uncertainty, s_{it} is a vector of social variables, p_{it} is a vector of political variables, pu_{it} is the real public investment, in_{it} is the estimated infrastructure index. Hence, the estimated models are of the following form[5]:

$$y_{it} = \beta_0 + \beta_1 y_{it-1} + \beta_2 q_{it} + \beta_3 r_{it} + \beta_4 f_{it} + \beta_5 \sigma_{it} + \beta_6 \sigma_{it}^2 + \beta_7 p_{it} + \beta_8 s_{it} + \beta_9 pu_{it} + \beta_{10} in_{it} + \varepsilon_{it}$$

Imposing restrictions on βs then gives us sub-models of interest and in particular:

a) $\beta_6 = \beta_7 = \beta_8 = \beta_9 = \beta_{10} = 0$, we get a purely economic model of private investment

b) $\beta_7 = \beta_8 = \beta_9 = \beta_{10} = 0$, we again get a purely economic model including the square of the macroeconomic uncertainty variable as suggested elsewhere in the literature

c) $\beta_8 = \beta_9 = \beta_{10} = 0$, we get a model with economic and political variables

d) $\beta_7 = \beta_9 = \beta_{10} = 0$, we get a model combined with economic and social variables

e) $\beta_7 = \beta_{10} = 0$, and this is a model that combines economic and political variables with the provision of public capital as measured by the real public investment

[5] We followed the same statistical procedure and calculated the inflation rate volatility to check potential effects on private investment. We estimated two broad categories: i) estimated all models with inflation volatility only (i.e., without real exchange rate volatility), ii) estimated all models including both inflation and real exchange rate volatility. In no specification did the inflation volatility (created using both the consumer price index and the GDP deflator) turn out to be significant. In contrary, the inflation rate appears to exert a negative and statistical effect in all regressions.

f) $\beta_8 = \beta_{10} = 0$ where this is a model that combines economic and social variables with the provision of public capital as measured by the real public investment

g) $\beta_8 = \beta_9 = 0$ where we have a model with economic and political variables combined with infrastructure availability

h) $\beta_7 = \beta_9 = 0$, we get model with economic and social variables combined with public provision as captured by the infrastructure index.

We need to note that we never use the two public provision measures simultaneously; they capture the same thing, so we either use the one or the other. Also, we impose additional restrictions to fine-tune the models above, or example by removing insignificant coefficients.

To estimate our models we use the two-step Arellano-Bond first-difference GMM estimator in order to overcome endogeneity problems (lagged dependent variable on the right hand side and possible endogenous regressors) and to account for heteroskedasticity and arbitrary patterns of autocorrelation within individuals – robust standard errors. GMM estimators indicate negligible finite sample biases and substantially smaller variances than those associated with simpler IV estimators of the kind introduced by Anderson and Hsiao (1981) (Arellano and Bond, 1991). The GMM estimator is consistent if there is no second-order serial correlation in the error term of the first-differenced equation; a test for the validity of the instruments (and the moment restrictions) is a test of second-order serial correlation in the residuals, m2. The most common test of the instruments is Sargan's (1958) test for over-identifying restrictions. We included at most two lags of the dependent variable (i.e., the dependent variable dated t-2 and t-3) as instruments as in all other specifications the Sargan test indicated inappropriate instruments. Finally, the Wald test statistics indicate that all explanatory variables are significant.

5. RESULTS AND DISCUSSION

Estimation results are summarized in Table 2. Starting with the baseline economic model, all variables turn out according to expectations and in accordance with related

literature: the lagged private investment and the growth rate of real GDP is positive and highly significant. The real interest rate is negatively significant at the 10% level, the inflation rate is negative and significant at the 5% level and our variable of interest, i.e., the real exchange rate volatility measuring macroeconomic imbalances is strongly negative at the 1% level. Model 2 includes in the baseline regression the square of the real exchange rate volatility to capture any non-linearities indicated elsewhere in the literature, nevertheless, its effect is negligible, thus we removed this variable. Models 3 and 4 include political variables and in particular the type of regime and major constitutional changes which both come out strongly negative at the 1% level. Model 5 estimates the model with the economic variables and the social unrest variables. Of these, the number of riots in a country exerts a statistically significant and negative effect on private investment. Model 6 combines the economic variables with both the political and social instability; all variables have the anticipated signs and are strongly significant except for the real interest rate which is significant at the 10% level and the social instability variable captured by the riots which is significant at the 10% level too. It is noteworthy also that the coefficient of riots is very small contrary to the type of regime and the constitutional changes. One may infer that the latter two are more important for private investors compared to social unrest. This is no surprising however since the type of regime and constitutions determine the framework in which the economy operates, i.e., whether they favor private investments with let's say tax motives or investment subsidies etc.

Model 7 includes in the baseline model the effect of public provision on private investment as captured by the public investment expenditure. The coefficient is negative and highly statistically significant with a quite large coefficient in absolute magnitude. This result may indicates that one hand more public investment does not necessarily imply more efficient public provision and on the other hand that public investment crowds out private investment most probably due to the competition of the two in financing resources. When we alternatively use the output measures of public investment in the regression, i.e., the index composed by infrastructure availability, results are qualitatively identical (model 10); the coefficient of the index is positive, yet the index is negatively correlated with the individual variables. The magnitude of the coefficient though is much smaller than its public investment counterpart. All other models estimated are combinations of economic and social or political unrest variables with the public provision variables used interchangeably.

Overall, results suggest the detrimental effect of macroeconomic imbalances on private investment. They moreover suggest that both political and social instability influence negatively the undertaking of private investment in developing countries though more crucial turns out to be the political one and in particular the type of regime and the major constitutional changes. In addition, the results point to negative effects of public provision on private investment both when this is measured as amount of public investment and with particular infrastructure variables.

6. CONCLUSIONS ANS POLICY IMPLICATIONS

In this study we empirically investigate the link between macroeconomic instability as captured by the real exchange rate volatility, sociopolitical unrest, public investment and private investment for n extensive set of developing countries over the period 1970-2000. While previous papers study the link between private investment and one of the above factors, there is no work to the best of our knowledge that systematically examines the relative importance of these factors in the presence of each other. This work we believe fills the gap in the political economy literature if private investment. Our results lend support to the hypothesis that not only standard economic determinants of private investment (such as GDP growth rates and real interest rates) but macroeconomic and sociopolitical uncertainty are jointly significant in explaining the variability of private investment. On top of that, it emerges that between social and political factors, it is the latter that are most significant and particularly the type of regime and major constitutional changes. Our results further establish a detrimental effect of public investment measured both as amount of money and as physical infrastructure on private investment in these countries. This result may be indicative of the following two explanations: the first is that it is rather the quality of public investment that matters. The second is that the weak effect of public capital on private investment may reflect the fact that the complementarity effect, while potentially important, may not “kick in” because of an unfavorable environment for private sector activity.

What policy suggestions could one draw from these results? First, policies that reduce the level and/or the duration of real exchange rate uncertainty appear to be highly beneficial in promoting private investment. Though particular considerations may vary from country to country, priorities should be placed to domestic price and exchange rate stability. Second, political stability emerges crucial for private

investors' decisions as the type of political regime and continuous changes of institution may signal unfavorable investment conditions. Third, policies that reduce social tensions and improve the good-will among various competing groups would also enhance the private investment climate. Fourth, it may be more important, in some countries, to improve the *quality* of the existing infrastructure than to engage in further investment. Reducing unproductive public capital expenditure and improving quality must be accompanied by policy reforms aimed at limiting investment to infrastructure capital that crowds in the private sector and/or corrects for fundamental market failures. On top of that, a key policy conclusion is that while public capital (in the form of the provision of critical telecommunications and transportation) is important, other improvements in the environment are crucial. These include, *inter alia*, the need for a secure economic, political and social environment as evidenced in this study above.

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Table 1. List of countries and regions

A. Latin America and the Caribbean 1. Argentina 2. Barbados 3. Belize 4. Bolivia 5. Brazil 6. Chile 7. Colombia 8. Costa Rica 9. Dominica 10. Dominican Republic 11. Ecuador 12. El Salvador 13. Grenada 14. Guyana 15. Haiti 16. Mexico 17. Panama 18. Paraguay 19. Peru 20. Trinidad and Toboggo 21. Uruguay 22. Venezuela **B. Asia** 23.Bangladesh 24. Pakistan 25. Cambodia 26. China 27. Indonesia 28. Malaysia 29. Papua New Guinea 30. Philippines 31. Thailand	**C. SSAFR** 32. Benin 33. Cote d'Ivoire 34. Guinea-Bissau 35. Kenya 36. Madagascar 37. Malawi 38. Mauritania 39. Mauritius 40. Seychelles 41. South Africa **D. MENA** 42. Egypt 43. Iran 44. Morocco 45. Tunisia **E. ECA** 46. Bulgaria 47. Estonia 48. Poland 49. Romania 50. Turkey

Table 2. The impact of macroeconomic uncertainty, socio-political uncertainty and public provision on private investment in developing countries
Dynamic Panel Estimation, Twostep Difference GMM, Dependent variable: log of private investment as a share to GDP

	(1)	(2)	(3)	(4)	(5)	(6)	(7)
PRINV	0.9063***	0.8977***	0.8803***	0.8715***	0.8806***	0.8978***	0.9027***
	(18.61)	(17.47)	(24.88)	(18.97)	(16.21)	(15.59)	(24.27)
GR	0.0107***	0.0105***	0.0107***	0.0096***	0.0103***	0.0114***	0.0065***
	(7.63)	(7.12)	(7.41)	(6.45)	(6.46)	(6.78)	(3.30)
RIR	-0.0021*	-0.0021*	-0.0023**	-0.001	-0.0027**	-0.0022*	-0.0011
	(-1.86)	(-1.92)	(-2.40)	(-0.96)	(-2.39)	(-1.91)	(-1.36)
INFL	-0.000032**	-0.000032***	-0.0000334***	-0.0000148	-0.000036**	-0.0000319***	-0.000027**
	(-2.30)	(-2.54)	(-3.78)	(-1.22)	(-2.51)	(-2.73)	(-2.01)
RERV	-0.0193***	-0.0188***	-0.0183***		-0.0146***	-0.0175***	-0.016**
	(-3.13)	(-3.65)	(-3.57)		(-2.57)	(-4.06)	(-2.53)
RERVSQ		-0.00015					
		(-0.34)					
REGIME			-0.0834***	-0.1002***		-0.0739**	
			(-2.58)	(-5.51)		(-2.51)	
CONSTI			-0.1524***	-0.1447***		-0.1519***	
			(-11.56)	(-10.68)		(-13.07)	
RIOTS					-0.0069***	-0.0044	
					(-3.14)	(-1.61)*	
PUINV							-0.1858***
							(-6.89)
INFRA							
Constant	0.00671***	0.001477***	0.0042***	-0.0022	0.0072***	0.0037**	0.0037**
	(4.35)	(4.63)	(2.72)	(-0.193)	(5.91)	(2.44)	(2.31)
N	532	532	532	563	530	530	532
S-Test	Chi2(27)=28.14	Chi2(27)=28.07	Chi2(27)=28.73	Chi2(28)=26.80=	Chi2(27)=29.49	Chi2(27)=28.76	Chi2(27)=23.11

Table 2 (continued). The impact of macroeconomic uncertainty, socio-political uncertainty and public provision on private investment in developing countries
Dynamic Panel Estimation, Twostep Difference GMM, Dependent variable: log of private investment as a share to GDP

	(8)	(9)	(10)	(11)	(12)	(13)
PRINV	0.8942***	0.918***	0.849***	0.8526***	0.8786***	0.8842***
	(20.35)	(20.81)	(17.99)	(16.81)	(21.47)	(17.20)
GR	0.0076***	0.0077***	0.0077***	0.0081***	0.0084***	0.0088***
	(4.63)	(4.20)	(3.85)	(3.78)	(5.14)	(4.59)
RIR	-0.00042	-0.00092	-0.0019**	-0.0021**	-0.0012*	-0.0012
	(-0.44)	(-0.93)	(-2.35)	(-2.34)	(-1.75)	(-1.37)
INFL	-0.00002	-0.000024*	-0.000032***	-0.000032***	-0.0000219***	-0.0000216**
	(-1.58)	(-1.67))	(-2.90)	(-2.76)	(-3.27)	(-2.37)
RERV	-0.01279**	-0.0182***	-0.0186***	-0.0172***	-0.014***	-0.0135***
	(-2.47)	(-2.88)	(-3.60)	(-3.19)	(-2.98)	(-2.91)
RERVSQ						
REGIME	-0.1014***				-0.0882***	-0.081***
	(-2.59)				(-3.23)	(-2.99)
CONSTI	-0.1323***				-0.1479***	-0.147***
	(-6.40)				(-10.89)	(-13.65)
RIOTS		-0.0031		-0.0049**		-0.0027
		(-1.35)		(-2.53)		(-1.10)
PUINV	-0.2075***	-0.1913***				
	(12.60)	(-6.68)				
INFRA			0.0681***	0.06613**	0.0731***	0.0709***
			(4.65)	(3.86)	(5.05)	(4.24)
Constant	0.00024	0.0032**	0.0131***	0.0129***	0.0095***	0.009***
	(0.15)	(2.11)	(7.13)	(7.02)	(4.04)	(3.79)
N	532	530	503	501	503	501
S-Test	Chi2(27)=21.56	Chi2(27)=23.41	Chi2(27)=26.39	Chi2(27)=27.12	Chi2(27)=25.95	Chi2(27)=25.99

Figure 1. Relationship between Private Investment and Real Exchange Uncertainty

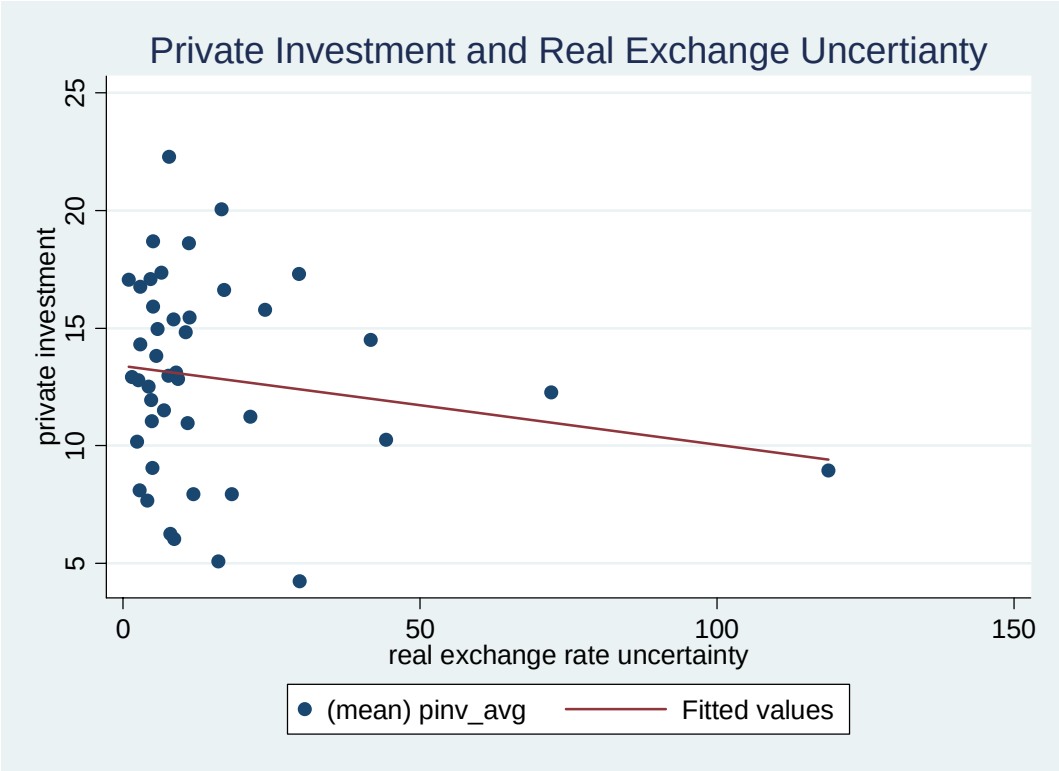

Table: Descriptions of Social, Political and Infrastructure Variables

Social Variables	
Assassinations (ASSA)	Any politically motivated murder or attempted murder of a high government official or politician.
General Strikes (STR)	Any strike of 1,000 or more workers that involves more than one employer and that is aimed at national government policies or authority.
Guerilla Warfare (WAR)	Any armed activity, sabotage, or bombings carried on by independent bands of citizens aimed at the overthrow of the present regime.
Purges (PUR)	Any systematic elimination by jailing or execution of political Opposition.
Riots (RIOT)	Any violent demonstration or clash of more than 100 citizens.
Revolutions (REV)	Any illegal or forced change in the top governmental elite.
Political Variables	
Government Crises (GOV)	Any rapidly developing situation that threatens to bring the downfall of the present regime.
Anti-gov. demonstrations (DEM)	Any peaceful public gathering of at least 100 people for the primary purpose of displaying opposition to government policies.
Type of regime (REG)	Civilian, Military-Civilian, Military or other.
Coup d'etat (COUP)	Number of "coups" in a year.
Infrastructure Variables	
Passenger Cars (per capita)	Passenger cars per capita with scaling: 0.00001
Telephones (per capita)	Telephones per capita with scaling: 0.00001
Radios (per capita)	Radios per capita with scaling: 0.0001
Television sets (per capita)	Television sets per capita with scaling: 0.00001

Table: Correlation between Social Variables

	ASSA	*STR*	*WAR*	*PUR*	*RIOT*	*REV*
ASSA	1.0000					
STR	0.1129	1.0000				
WAR	0.2839	0.1159	1.0000			
PUR	0.0839	0.0468	0.2728	1.0000		
RIOT	0.1313	0.2178	0.1322	0.1277	1.0000	
REV	0.2808	0.0703	0.3581	0.1377	0.0886	1.0000

Table: Correlation between Political Variables

	GOV	*DEM*	*REG*	*COUP*
GOV	1.0000			
DEM	0.2223	1.0000		
REG	0.0490	0.0725	1.0000	
COUP	0.2114	0.0072	0.2577	1.0000

Table: Correlation between Infrastructure Variables

	PCARS	*TEL*	*TV*	*RAD*
PCARS	1.000000			
TEL	0.848343	1.000000		
TV	0.684334	0.729534	1.000000	
RAD	0.706563	0.746000	0.675001	1.000000

Table: Descriptive Statistics of variables used in the Multivariate analysis

Variable	*Mean*	*St. Dev*	*Min*	*Max*
Pinv	13.17363	5.34208	0.3	41
GR	3.94016	4.695151	-28.09998	22.17389
RIR	9.21161	13.08753	-46.63328	77.6843
INF	48.48142	295.0312	-23.47888	6836.88
RER VOL	46.76729	286.2431	2.18e-08	7319.909
REGIME	1.231068	.6020743	1	4
CONSTI	0.0737864	.2652396	0	2
RIOTS	0.6326531	1.790361	0	23
PUINV	7.976901	4.36131	0.1	37.2
INFRA	-0.1459556	1.835345	-7.786536	1.980258
Defl vol	237065.8	2053369	.0002131	4.54e+07