

Görg, Holger; Morrissey, Oliver; Udomkerdmongkol, Manop

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Research Paper 2007/16

*Investment and Sources of Investment Finance
in Developing Countries*

by

Holger Görg, Oliver Morrissey and Manop Udomkerdmongkol

The Authors

Holger Görg is Reader in International Economics and GEP Fellow; Oliver Morrissey is Professor in Development Economics and Director of CREDIT; Manop Udomkerdmongkol is GEP Postgraduate Research Student in School of Economics, University of Nottingham.

Contact Details: Manop Udomkerdmongkol, School of Economics, University of Nottingham, University Park, Nottingham, NG7 2RD, United Kingdom. E-mail: lexmul1@nottingham.ac.uk

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Investment and Sources of Investment Finance in Developing Countries

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Holger Görg, Oliver Morrissey and Manop Udomkerdmongkol

Abstract

This paper uses annual aggregate data for 36 low or middle income countries covering the period 1995-2001 to test the responsiveness of investment to the sources of finance under (un)favourable regimes for investment. Two sources of private investment finance are considered: private investment and FDI inflows. We use four governance measures (voice and accountability, regulatory quality, political stability and control of corruption) to distinguish between 'market-friendly' (favourable) and 'market-unfriendly' (unfavourable) regimes. The results suggest that private investment has a greater effect on total investment than FDI in unfavourable regimes whereas both are of similar importance in favourable regimes. Finally, as would be anticipated, total investment levels are higher under favourable regimes.

JEL classification: E20, F21

Keywords: Foreign direct investment, Private investment, Institutions, Developing countries

Outline

1. *Introduction*
2. *Some Theoretical Considerations*
3. *Empirical Methodology and Data*
4. *Econometric Analysis and Results*
5. *Concluding Remarks*

Non-Technical Summary

The existing empirical literature on sources of financing and level of investment has tended to focus on the effects of a particular type of investment. A specific issue addressed is whether FDI crowds-in or crowds-out domestic investment in a developing country. Agosin and Mayer (2000) investigate the FDI impact on domestic investment in Africa, Asia and Latin America, using annual data covering 1970-96. They find that there is strong crowding-in of investment by FDI in Asia and Africa, but strong crowding-out prevails in Latin America. Mišun and Tomšik (2002) discover evidence for a crowding-out effect in Poland and Hungary over 1990-2000 and Czech Republic over 1993-2000. Other studies consider the effect of foreign borrowing on investment. Borensztein (1990) finds evidence that increasing foreign debt stock leads to domestic investment falling for the Philippines over 1970-90. Cohen (1991) considers the relationship between domestic investment, foreign debt and economic growth in 81 developing countries over 1980s, and concludes that an increase in foreign debt does not necessarily reduce domestic investment.

These studies tend not to include governance variables, or at least do not have specific predictions of how governance may affect the responsiveness of investment to the sources of finance. Whilst it is clear that political uncertainty and poor governance (such as weak property rights, corruption or excessive regulation) will discourage private investment, it is not clear how the effect may vary for different sources of finance. We use Dalmazzo and Marini (2000), who develop a theoretical model for the choice of investment finance under political uncertainty, to suggest a number of hypotheses regarding the relative importance of each source of finance under different regimes. A favourable or 'market-friendly' regime is defined as one where the probability of a populist regime (one that is labour-friendly, or capital-unfriendly) coming to power is effectively zero, whereas a 'market-unfriendly' regime is defined as one where there is a positive probability of a populist regime coming to power. We proxy favourable (unfavourable) regimes as ones with high (low) voice and accountability, regulatory quality, stability and control of corruption. We then test the responsiveness of investment to the sources of finance (private investment and inward FDI) under different governance regimes using annual data for 36 low or middle income countries over 1995-2001. The hypotheses are that higher private investment and FDI inflows stimulate total investment and the investment is higher under favourable regimes.

Findings suggest that in unfavourable regimes the impact of private investment on total investment is larger than that of FDI whereas both are of similar importance in favourable regimes. These suggest the different roles of private investment and FDI in driving total investment and economic growth. In a country characterized by poor governance, its government should employ private investment as an engine of total investment and growth; but, either private investment or FDI can be utilized in a country with good governance. Due to higher investment efficiency, total investment tends to be at a higher level in market-friendly regimes. As a consequence, a host country government should provide a good investment environment for investors to achieve higher levels of total investment.

1. Introduction

A private agent in a developing country considering undertaking an investment has open to them three principal means of financing. First, they can consider domestic financing, either borrowing on domestic markets or accessing funds from family or other informal sources. Second, they can seek a foreign partner, which we consider as foreign direct investment (FDI); we will not be concerned with the foreign investor's share (except that it must exceed 10% to be FDI) or whether it is greenfield or 'merger and acquisition' (M&A) investment. Finally, they can seek to borrow abroad for foreign debt financing.

The existing empirical literature on sources of financing and the level of investment has tended to focus on the effects of a particular type of investment concern. A specific issue addressed is whether FDI crowds-in or crowds-out domestic investment in a developing country. Crowding-in means that total investment increases by more than the addition of FDI: spillovers and upgrading of domestic firms to benefit from linkages with foreign affiliates raises the efficiency of production and contributes to the diffusion of knowledge and skills from multinational enterprises to the local enterprise sector. New investment in upstream or downstream production by other foreign or domestic producers, or increases in financial intermediation, contribute to the overall effect that total investment increases by more than the amount of FDI. In contrast, crowding-out implies that total investment increases by less than the FDI, as other (private) investment is reduced. In terms of access to finance and skilled labour, the presence of foreign firms raises costs to local firms of obtaining finance or employing skilled personnel (Kumar (2003)). The adverse effects in terms of labour may also apply to levels of capital held by firms. If foreign firms have a productivity advantage over their domestic counterparts, it is likely that they will be willing to pay higher prices for capital goods. A possible result (in industries with significant foreign penetration) is that the cost of capital goods will increase in the domestic sector, and investment by domestic firms will decline (Driffield and Hughes (2003)).

Many studies have addressed this issue but results remain inconclusive. Agosin and Mayer (2000) investigate the long-run impact of FDI on domestic investment in three regions, namely Africa, Asia and Latin America, using annual data covering 1970-96. They discover that there is strong crowding-in of domestic investment by FDI in Asia and Africa, but strong crowding-out prevails in Latin America. Using Agosin and Mayer's (2000) model, Mišun and Tomšik (2002) estimate whether or not, in Czech Republic, Hungary and

Poland, FDI crowds out domestic investment over 1990-2000. They find evidence for a crowding-out effect in Poland and Hungary over 1990-2000 and Czech Republic over 1993-2000. Using time-series techniques, Kim and Seo (2003) suggest that FDI crowds-in domestic investment in South Korea for the period 1985-99.

Other studies consider the effect of debt (foreign borrowing) on investment. Borensztein (1990) finds evidence that increasing foreign debt stock leads to domestic investment falling for the Philippines over the 1970-90 period. Cohen (1991) considers the relationship between domestic investment, foreign debt and economic growth in 81 developing countries over 1980s, and concludes that an increase in foreign debt does not necessarily reduce domestic investment.

These studies tend not to include governance variables, or at least do not have specific predictions of how governance may affect the responsiveness of investment to the *sources* of finance. Whilst it is clear that political uncertainty and poor governance (such as weak property rights, corruption or excessive regulation) will discourage private investment, it is not clear how the effect may vary for different sources of finance. We use Dalmazzo and Marini (2000), who develop a theoretical model for the choice of investment finance under political uncertainty, to suggest a number of hypotheses regarding the relative importance of each source of finance under different regimes (see Section 2). A favourable or ‘market-friendly’ regime is defined as one where the probability of a populist regime (one that is labour-friendly, or capital-unfriendly) coming to power is effectively zero, whereas a ‘market-unfriendly’ regime is defined as one where there is a positive probability of a populist regime coming to power. We proxy favourable (unfavourable) regimes as ones with high (low) voice and accountability, regulatory quality, stability, and control of corruption (see Section 3). We then test the responsiveness of investment to the sources of finance under different governance regimes using annual data for 36 low or middle income countries over 1995-2001.

The paper is structured as follows. Section 2 outlines the theoretical motivation based on Dalmazzo and Marini (2000) and suggests some hypotheses, followed by Section 3 on the data used and the econometric approach. The results are presented and discussed in Section 4. The conclusions are in Section 5, where we consider ways in which the analysis could be improved.

2. Some Theoretical Considerations

Dalmazzo and Marini (2000) provide a model that generates predictions on the relative importance of three different sources of investment financing - domestic capital self-financing (DSF), FDI financing (FDI) and foreign debt financing (FDF) – under political uncertainty. As their concern is with the effect of uncertainty, they derive results under a politically unstable regime (i.e., where there is a positive probability of a populist government being in power after investment decisions are made). As we wish to suggest hypotheses regarding the importance of each source of financing under favourable and unfavourable regimes for investment, we also solve the model for politically stable regimes (i.e., where there is a zero probability of a populist government).

Dalmazzo and Marini (2000) consider a country with a representative worker, w , and capitalist, c . To emphasize the relationship between international trade and finance, they assume that the agents produce an export good and consume a good imported from abroad. The agents' utility function is

$$U(C_i) = C_i, \quad i = (w, c) \quad (1)$$

where C_i is the consumption of the imported good for agent i . The capitalist controls an investment opportunity that costs $K > 0$, requires the labor services of the worker (who always retains some bargaining power over the surplus that the project generates) and generates y units of the export good. When the investment decision is taken, there is a sunk cost of an amount K , which could have been spent on a foreign consumption good. Each unit of the export good can be traded for P units of the import good, so that aggregate consumption is $C = Py$.

Social efficiency of capitalist technology, i.e. $C - K \geq 0$, is assumed. The details of the distribution of surplus, the country's political environment, the working of sanctions and the timing in the model are summarized as follows.

Distribution: The outcome of the distribution process over C is modeled as the Nash-solution to a bargaining game with $N \geq 2$ players to determine S_i as agent i 's share of C .

Political Environment: The capitalist is subject to the risk that a populist government (type w government) comes into office when the investment cost has been

sunk. Once in office, it will aim at maximizing the worker's consumption level, C_w .¹ As a consequence, the capitalist could be excluded from the bargaining process over the returns generated by his investment. Assume that there is an exogenous probability $(1 - \rho)$ that the populist government will win the elections.

Sanctions: A foreign partner can impose sanctions whenever the country considered violates some international agreement. For this reason, entering into an agreement with a foreign investor or lender can provide some protection to domestic capitalists should a populist regime gain power.

Timing: At time $t = 0$, the decision of whether or not to invest is taken. Once investment is undertaken, the cost K is sunk. At time $t = 1$, political uncertainty is resolved with a type c government (the government that safeguards the capitalist's property rights on investment) being in office with probability ρ and a populist government with probability $(1 - \rho)$. At time $t = 2$ production takes place and trade occurs if actions leading to sanctions have not been taken (in the case of a type w government).

Domestic Capitalist's Self-financing (DSF)

Using own funds or domestic sources, the capitalist incurs the investment cost at $t = 0$. Depending on the outcome at $t = 1$, the capitalist will either remain in control of his assets with probability ρ , or will be excluded from the division of the surplus C with probability $1 - \rho$. In the first case, the capitalist retains the power to deny the worker access to physical capital. Because the agents need to reach an agreement to produce at $t = 2$, there is bilateral bargaining over C generating equilibrium payoffs equal to $S_w = S_c = \frac{1}{2} C$.

Assuming risk-neutrality and common knowledge of ρ , the agents' expected shares at $t = 0$ are, respectively

$$ES_w = \rho(C/2) + (1 - \rho)C = [1 - (\rho/2)]C \quad (2)$$

and

$$ES_c = \rho(C/2) + (1 - \rho)0 = \rho(C/2). \quad (3)$$

¹ Such an adverse attitude towards the capitalist's share can take several forms: a hostile government can opt for outright expropriation of the capitalist's assets, or it can impose rules (regulatory burden) which limit the capitalist's right to manage his assets. The income from capital can also be heavily taxed, so as to redistribute surplus in favour of workers (Dalmazzo and Marini (2000)).

The capitalist's expected consumption is

$$EC_c = C - ES_w - K = \rho(C/2) - K. \quad (4)$$

Given the social efficiency in capitalist technology assumption, EC_c is at least as great as zero, implying that domestic investment is not greater than $\rho(C/2)$ if there is a possibility of a populist government. In the situation that we define as political stability (certainty of no populist government, so $\rho = 1$) it is easy to see that domestic investment is not greater than $C/2$ for domestic self-financing.

Foreign Direct Investment Financing (FDI)

Suppose that now the capitalist sells his project to a foreign investor. Once the foreign investor has sunk the investment cost, he faces the risk that a hostile government will come into office. However, he can demand the application of trade sanctions against the country. When sanctions can be imposed, the expected worker's and foreign investor's shares are again $S_w = S_c = \frac{1}{2}C$.

If a type c government comes into office, the agents will agree on a partition giving each of them half of C . On the other hand, when a type w government expropriates the investment, the application of sanctions enables the foreign investor to block the country's international trade. That leads to a bargaining over C under the worker's interest. After an agreement is reached, the foreign investor lifts sanctions and trade occurs. In equilibrium, each agent obtains $\frac{1}{2}C$. Thus, the sanctions guarantee foreign investors half of the surplus.

The capitalist's expected consumption is

$$EC_c = C - S_w - K = (C/2) - K. \quad (5)$$

Given the assumption of social efficiency in the capitalist technology, domestic investment is not greater than $C/2$ and this result prevails irrespective of which type of government is in power.

Foreign Debt Financing (FDF)

Now assume the capitalist may borrow abroad to finance the project. Any attempted repudiation of the outstanding debt obligations makes the country's exports liable to the application of sanctions. The foreign creditor gains bargaining power over the surplus C , as the sanctions will be lifted only when an agreement between the foreign lender and capitalist is reached. Denote the amount borrowed abroad and the repayment prescribed by

the debt contract by X and D that are greater than zero. At $t = 0$, the investment is implemented and debt is contracted with a foreign lender. At $t = 1$, political uncertainty is resolved. The capitalist remains in full control of his project (with probability ρ). Instead, if the type w government came into office (with probability $1 - \rho$), the capitalist would be excluded from the bargaining process over C . At $t = 2$, production and trade are ready to take place. At this stage, the party having the right to manage may decide to default on the foreign debt.

When the capitalist retains control, he may decide to repudiate to maximize his share, S_c . However, when the capitalist loses control, the populist government may default to maximize the worker's share, S_w . When repudiation does not occur the parties will bargain over $C - D$ and the lender will be repaid D . If repudiation occurs, the application of sanctions will enable the lender to participate in the bargaining game over C . Once an agreement is reached among the parties, trade and consumption will take place.

After repudiation, the number of agents taking part in the negotiation depends on the political outcome at $t = 1$. As the worker is required to produce the export good, repudiation implies that there will be a two-party game over C between the foreign lender and domestic government whenever the type w government is in office. Suppose that a type w government prevailed at $t = 1$. At $t = 2$, the decision whether to repudiate is taken by the type w government. If the contractual amount D is paid back, the capitalist, the worker and the lender obtain, respectively, θ , $C - D$ and D . However, under repudiation, sanctions will force the type w government to bargain with the foreign lender. A two-party bargaining over C occurs, the worker and the lender obtain $\frac{1}{2}C$. Thus, repudiation occurs when $C - D < \frac{1}{2}C$ or $D > \frac{1}{2}C$.

The worker's expected share at $t = 0$ can be written as a decreasing function of D :

$$\begin{aligned}
 ES_w(D) &= \rho[(C - D)/2] + (1 - \rho)(C - D), \text{ if } D \leq C/3 \\
 &= \rho C/3 + (1 - \rho)(C - D), \text{ if } C/3 < D < C/2 \\
 &= \rho C/3 + (1 - \rho)C/2, \text{ if } D > C/2
 \end{aligned} \tag{6}$$

The capitalist's expected consumption is

$$EC_c = C - ES_w - K \tag{7}$$

The capitalist invests in the country to receive the highest expected consumption, when ES_w has the lowest value, which is when D has the highest value (i.e. external sanctions protect the domestic capitalist). Thus, he makes a contract requiring $D > C/2$ with the external lender. Therefore,

$$EC_c = C - \rho C/3 - (1 - \rho)C/2 - K \quad (8)$$

Given the assumption of social efficiency in capitalist technology, domestic investment is not greater than $(1/2 + \rho/6)C$.

However, under the type c government, repudiation entails a three-party game between the capitalist, the worker and the lender. Suppose that a type c government prevailed at $t = 1$. At $t = 2$, the decision to repudiate is taken by the capitalist controlling the project. If the contractual amount D is paid back, the capitalist, the worker and the lender obtain, respectively, $\frac{1}{2}(C - D)$, $\frac{1}{2}(C - D)$ and D . However, if the capitalist chooses repudiation, the foreign lender can apply sanctions: a three-party bargaining over C occurs, each player (the capitalist, the worker and the lender) obtains $C/3$. Therefore, the capitalist will default on foreign debt when D is greater than $C/3$.

The worker's expected share at $t = 0$ is

$$\begin{aligned} ES_w(D) &= (C - D)/2, \text{ if } D \leq C/3 \\ &= C/3, \text{ if } D > C/3 \end{aligned} \quad (9)$$

The capitalist's expected consumption is

$$EC_c = C - ES_w - K. \quad (10)$$

To maximise the expected consumption, he makes a contract requiring $D > C/3$ with the foreign lender (ES_w is decreasing in D). Therefore, $EC_c = 2/3C - K$. Domestic investment is not greater than $2/3C$, given the assumption of social efficiency in capitalist technology,

Table 1: Implied hypotheses

Source of Financing	Domestic Investment (K)	
	Politically Unstable Regime	Politically Stable Regime
Domestic Self-financing (DSF)	$K \leq \rho(C/2)$	$K \leq C/2$
FDI Financing (FDI)	$K \leq C/2$	$K \leq C/2$

Foreign Debt Financing (FDF)	$K \leq C/2 + \rho(C/6)$	$K \leq 2/3C$
Prediction (relative effect on K)	FDF > FDI > DSF	FDF > FDI = DSF

Table 1 provides a summary of the predicted ‘ranking’ of sources of finance under each regime, in terms of the relative impact on the level of private investment. Note that comparing predictions for stable versus unstable regimes, DSF and FDF are hypothesized to imply higher levels of K whereas FDI implies the same level under each regime. In a politically stable regime, foreign debt financing provides domestic investment greater than that generated by FDI or domestic capitalist’s self-financing. In addition, owing to the bargaining game, FDI and DSF yield the same amount of domestic investment. In a politically unstable regime, both FDF and FDI yield domestic investment greater than that generated by DSF. Moreover, due to the structure of the bargaining game, FDF yields total investment greater than that generated by FDI.

It is not our aim to test the theory (as we cannot observe the bargaining game on which it is based), nor its predictions (as these are specific to the model). Rather, we use the predictions to suggest a number of hypotheses that can be explored in our empirical analysis.

Hypothesis 1: Foreign debt financing would be the major source of private investment finance irrespective of the political regime, although the impact on K should be higher under favourable regimes (i.e. good governance).

Hypothesis 2: Domestic capital self-financing (DSF) would be

- (a) the least important source for private investment in unfavourable regimes.
- (b) of similar importance to FDI financing in favourable regimes.

Hypothesis 3: FDI financing would be

- (a) between foreign debt financing and domestic capital self-financing in unfavourable regimes.
- (b) of similar importance to domestic capital self-financing in favourable regimes.

Hypothesis 4: Total (private) investment (K) will be higher under favourable regimes as both DSF and FDF tend to induce higher K under favourable regimes. In other words, good governance encourages (private) investment (as would be expected).

We recognize that alternative theoretical models will yield different hypotheses. For example, Neumann (2003) considers the relation between domestic investment and FDI taking into account international debt. She argues that owing to information asymmetry, domestic investors cannot costlessly and credibly reveal the level of first-period investment to international creditors. Thus, they choose to incur self-monitoring costs to increase capital flows. As an alternative to international borrowing, they may sell some ownership to foreign investors. Once equity claims convey information, equity trade is preferred to foreign borrowing; domestic investment with FDI and portfolio equity financing is greater than that if financed by international borrowing. In our terms, Hypothesis 1 does not hold as FDI at least is preferable to FDF (so H3(a) would also be altered). In addition, FDI, portfolio investment and foreign debt crowd-in domestic investment. Whilst our analysis does not test either theory, we can assess our findings against the implied hypotheses to see if one model finds more empirical support than the other.

3. Empirical Methodology and Data

To analyse the responsiveness of total investment (*GCF*) to the sources of finance under different governance regimes, we start from the identity that

$$\text{total investment} = \text{private investment} + \text{net FDI} + \text{public investment}. \quad (11)$$

As we focus on sources for private investment and do not want to estimate an identity, we omit public investment. We measure the sources of finance as follows. Private investment (*PV*) is calculated from

$$PV = GCF - \text{net FDI} - \text{public investment}. \quad (12)$$

Note that *PV* is the total however financed, and it was not possible to distinguish domestic and foreign finance. Furthermore, the debt data did not provide a measure of *new* foreign private borrowing, so we could not obtain a proxy for FDF. Net FDI inflows (*FDI*) are a measure of FDI financing (a standard measure in the literature).

The econometric model to be estimated is specified as follows:

$$\ln GCF_{i,t} = \beta_0 + \beta_1 \ln PV_{i,t-1} + \beta_2 \ln FDI_{i,t-1} + \beta_3 X_{i,t-1} + \beta_4 DUM + \beta_5 DUM * \ln PV_{i,t-1} + \beta_6 DUM * \ln FDI_{i,t-1} + \mu_i + \varepsilon_{i,t} \quad (13)$$

where $GCF_{i,t}$ is gross fixed capital formation, $PV_{i,t-1}$ is private investment, $FDI_{i,t-1}$ is FDI inflows, $X_{i,t-1}$ is a vector capturing other country level determinants of total investment, DUM is a dummy variable equal to 1 if the country has a *high* value of governance measure and 0 otherwise. μ_i is a country specific time invariant effect as $\varepsilon_{i,t}$ is the remaining white noise error. All variables are in logs and explanatory variables are lagged one period (year).²

We control for other factors that could determine a decision of an entrepreneur to invest in the country, as identified in the previous empirical literature. Specifically, the variables are the following.

- Change in private external debt. It can be used to capture the adverse effect of debt burdens; if private (foreign) debt is increasing it may be more difficult to borrow abroad in the future, whereas if it is decreasing (being repaid) then access is good and investment should be higher.
- Labour costs. An issue examined in the literature is the effect of labour costs on domestic investment in the country. One would expect that, *ceteris paribus*, high labour costs would reduce total investment. Cohen (1991) reports a negative relationship of labour costs and domestic investment in 81 less-developed countries.
- Real GDP growth. Many scholars (Agosin and Mayor (2000), Mišun and Tomšik (2002)) affirm the positive impact of domestic demand on domestic investment.

In estimating (13), we expect positive coefficients on private investment and FDI but are especially interested in how the relative values are affected by the inclusion of governance indicators. Of the control variables, the coefficient on GDP growth (GGDP) should be positive whereas that on per capita GDP (PGDP) is expected to be negative (if it captures labour costs). The coefficient on change in private external debt (NPD) should be negative (if it captures the adverse effect of debt burdens). As all variables are in logs the coefficients are elasticities.

² This serves a number of purposes: partially accounts for potential endogeneity, allows for sources of financing taking time to affect domestic investment (behaviour) and avoids implicitly estimating a partial identity (as the only omitted component of total investment is public investment).

We collect annual aggregate data for the variables to be used in our estimation. The data covering 1995-2001 for 36 low or middle income countries³ (see Appendix) are chosen on the basis of data availability; however, this limitation may cause sample selection bias problem (see Appendix). The period of analysis starts from 1995 as the governance data used (see below) is not available for earlier years. The sample is limited to 36 countries because of difficulty in obtaining data on private external debt.

The relationship between governance or institutions and investment has received a lot of attention from either a theoretical or empirical standpoint. Many scholars, including Svensson (1998) and Gyimah-Brempong *et al* (1999), investigate the effects of political instability on domestic investment, and discover that political instability has a negative and statistically significant impact on domestic investment in developing countries. Dawson (1998) also suggests that freedom – whether political, civil, or economic freedom – has a significantly positive influence on (domestic) investment and growth. A presumption can be made regarding the effect of corruption on investment efficiency. Bribes increase the costs of production and therefore output price, so decrease market demand, and eventually reduce investment and growth (Sarkar and Hasan (2001)). Mauro (1995) and Campos *et al* (1999) support the claim that lower corruption stimulates investment. Thus, it is appropriate to include measures of governance, including corruption, in our analysis.

We use the World Bank's governance indicators (Kaufmann *et al.* (2005)) covering 1996, 1998, 2000, 2002 and 2004 (see Appendix) to capture features of the political regimes for investment. We employ four governance measures – voice and accountability (VA), political stability and absence of violence (PS), regulatory quality (RQ), and control of corruption (CC) – to sort the countries into different 'good' (high value of governance) and 'bad' (low) regimes. In effect, we are positing that high VA, PS, RQ or CC all correspond to, or are indicators of, favourable investment regimes.

Spearman's rank correlation can be utilised to test the direction and strength of the relationship among the four governance measures. We find that there is positive correlation among the measures, and this is lowest for PS and RQ (Table 2).

³ The World Bank defines low or middle income countries as developing countries with 1995 per capita incomes of less than \$765 (low) and \$9,385 (middle) respectively (Neumann (2003)).

Table 2: Spearman's rank correlation for governance measures

Governance Indicator	Spearman's Rank Correlation	Interpretation
VA and PS	0.76	strong positive correlation
VA and RQ	0.68	strong positive correlation
VA and CC	0.73	strong positive correlation
PS and RQ	0.56	moderate positive correlation
PS and CC	0.64	strong positive correlation
RQ and CC	0.68	strong positive correlation

To clarify the difference between *high* and *low* countries, a two-sample *t*-test with different population variances is used. The tests are of the null hypotheses of no difference between means of PV and FDI (all measured as ratios of GDP) in the two sub-samples, against the alternative that the means are different. The results in Table 3 suggest that the levels of PV and FDI are, on average, different under the two regimes.

Table 3: Testing hypotheses about difference between means

Governance Indicator	PV/GDP			FDI/GDP		
	\bar{X}	S.D.	<i>t</i>	\bar{X}	S.D.	<i>t</i>
<i>high</i> VA	15.72	5.44	2.54*	3.93	3.04	5.45*
<i>low</i> VA	14.09	4.66		2.15	2.13	
<i>high</i> PS	16.01	5.26	3.93*	3.49	3.01	2.20*
<i>low</i> PS	13.51	4.69		2.72	2.48	
<i>high</i> RQ	15.74	5.17	3.35*	3.71	2.94	5.15*
<i>low</i> RQ	13.46	4.86		2.01	2.13	
<i>high</i> CC	16.91	4.36	5.24*	3.48	2.71	1.69**
<i>low</i> CC	13.7	5.32		2.97	1.63	

Notes: In the table, \bar{X} indicates the mean value, S.D. is standard deviation and *t* is the value of the *t*-test for significance of differences in means, where * and ** indicate significant at 5 and 10 percent level, respectively (two-tailed test).

Tables 4-5 provide descriptive statistics and the correlation of those variables.

Table 4: Descriptive statistics

Sample: 36 countries and 1995-2001

Variable	Mean	Max	Min	S.D.
GCF/GDP	22.41	42.09	8.12	5.61
PV/GDP	15.04	34.42	3.66	5.18
FDI/GDP	3.19	12.88	-2.76	2.83
NPD/GDP	-1.25	18.25	-52.01	7.01
PGDP	2650.87	8234.93	227.14	1859.16
GGDP	3.15	10.63	-13.12	3.71

Source: World Development Indicators 2004, IMF, and the author's computation

Table 5: Correlation matrix

Sample: 36 countries and 1995-2001

	GCF/GDP	PV/GDP	FDI/GDP	NPD/GDP	PGDP	GGDP
GCF/GDP	1					
PV/GDP	0.70	1				
FDI/GDP	0.15	-0.34	1			
NPD/GDP	0.31	0.12	0.14	1		
PGDP	0.15	0.16	0.25	0.14	1	
GGDP	0.26	0.20	-0.05	0.22	-0.04	1

Source: World Development Indicators 2004, IMF, and the author's computation.

4. Econometric Analysis and Results

We initially used (within-groups) fixed (FE) and random effects (RE) estimations to estimate equation (13) and allow for unobserved country-specific factors (results available

on request). The Hausman test generally favoured the fixed effects model. However, the Koenker-Bassett test revealed the presence of heteroscedasticity and the LM test revealed (first-order) autocorrelation, implying that the error terms are not independent and identically distributed; so, FE estimators are consistent but inefficient (Beck and Katz (1995)). To address this we utilize the Prais-Winsten model with panel-corrected standard errors estimation⁴ (Batagi and Li (1991)). Consequently, we only report the results using the Prais-Winsten model.

Table 6 presents estimation results using the Prais-Winsten model for the sample of 36 low or middle income countries over 1996-2001. We find evidence (first column in Table 6) of highly significant positive impacts of private investment, FDI and market potential on total investment. A 10% increase in private investment raises the investment by 1.5% (relative to GDP), whilst a 10% increase in FDI increases the investment by 0.6 %. A 10% increase in the GDP growth rate also increases the investment by 0.6%. The other explanatory variables are statistically insignificant.

To test the importance of political factors, we add the political dummy variable ($DUM = VA, PS, RQ, CC$) to the regression. Based on Prais-Winsten estimation (see columns 2-5 in Table 6), the results suggest that the governance indicators themselves do not affect the level of investment (each dummy is not statistically significant). The significance of private investment, FDI inflows, and market size in stimulating total investment persists, with coefficients largely unchanged. Although the intercept appears unaffected by the governance variables the slope (responsiveness) with respect to sources of finance may be. We test for this using interactive dummy variables.

The results in columns 6-9 in Table 6 confirm the importance of market size with the same coefficient. For the VA dummy, the estimate of the extent of extra (total) investment in *high* voice and accountability countries compared to *low* voice and accountability countries is 0.1 (column 6).⁵ In *low* voice and accountability countries, an increase in private investment by one percent raises total investment by 0.17 percent (β_I), while each extra

⁴ It can be implemented in STATA.

⁵ $\frac{\partial FDI}{\partial VA} = \beta_0 + \beta_{10} \ln PV + \beta_{11} \ln FDI$, evaluated at mean values of variables.

percent of FDI inflows encourages the investment by 0.06 percent (β_2). As a result, the impact of private investment is greater than the FDI effect in such countries.⁶

⁶ The Chi-squared test rejects the null hypothesis of no difference in effects of PV and FDI on investment in *low* voice and accountability countries.

Table 6: Effects of sources of investment finance on total investment: 1996-2001

Dependent variable: GCF/GDP (log)

<i>VARIABLES</i>	<i>PRAIS-WINSTEN</i>				
		VA	PS	RQ	CC
Lagged PV/GDP (log, β_1)	0.15(0.01)	0.18(0.00)	0.15(0.01)	0.17(0.01)	0.15(0.01)
Lagged FDI/GDP (log, β_2)	0.06(0.04)	0.05(0.10)	0.05(0.08)	0.04(0.10)	0.04(0.06)
Lagged NPD/GDP (log, β_3)	-0.02(0.62)	-0.02(0.66)	-0.02(0.64)	-0.02(0.61)	-0.02(0.61)
Lagged PGDP (log, β_4)	0.03(0.13)	0.04(0.07)	0.02(0.45)	0.06(0.06)	0.03(0.02)
Lagged GGDP (log, β_5)	0.06(0.01)	0.06(0.01)	0.06(0.01)	0.06(0.01)	0.06(0.01)
Constant	2.24(0.00)	2.12(0.00)	2.32(0.00)	2.01(0.00)	2.26(0.00)
VA (β_6)		-0.04(0.34)			
PS (β_7)			-0.05(0.28)		
RQ (β_8)				-0.08(0.23)	
CC (β_9)					0.01(0.68)
Coefficient of determination	0.88	0.88	0.88	0.87	0.88
Number of observations	216	216	216	216	216

Note: The figures in parentheses are P-values.

Table 6 (contd): Effects of sources of investment finance on total investment: 1996-2001

Dependent variable: GCF/GDP (log)

<i>VARIABLES</i>	<i>PRAIS-WINSTEN</i>			
	VA	PS	RQ	CC
Lagged PV/GDP (log, β_1)	0.17(0.02)	0.15(0.04)	0.10(0.04)	0.18(0.01)
Lagged FDI/GDP (log, β_2)	0.06(0.04)	0.06(0.04)	0.03(0.08)	0.03(0.07)
Lagged NPD/GDP (log, β_3)	-0.02(0.56)	-0.01(0.59)	-0.01(0.57)	-0.01(0.72)
Lagged PGDP (log, β_4)	0.03(0.22)	0.01(0.80)	0.04(0.20)	0.15(0.48)
Lagged GGDP (log, β_5)	0.06(0.01)	0.06(0.01)	0.06(0.01)	0.06(0.01)
Constant	2.30(0.00)	2.44(0.00)	1.42(0.09)	2.3(0.00)
VA (β_6)	-0.78(0.01)			
PS (β_7)		-0.82(0.01)		
RQ (β_8)			-0.62(0.01)	
CC (β_9)				-0.34(0.03)
DUM * Lagged PV/GDP ($\beta_{10}, \beta_{12}, \beta_{14}, \beta_{16}$)	0.17(0.10)	0.17(0.08)	0.22(0.00)	0.13(0.03)
DUM * Lagged FDI/GDP ($\beta_{11}, \beta_{13}, \beta_{15}, \beta_{17}$)	0.26(0.00)	0.27(0.00)	0.30(0.00)	0.29(0.01)
Chi-squared test: $H_0: \beta_1 = \beta_2$	5.01(0.03)	4.40(0.04)	4.89(0.01)	6.04(0.01)
Chi-squared test: $H_0: \beta_1 + \beta_{10} = \beta_2 + \beta_{11}$	0.84(0.36)			
Chi-squared test: $H_0: \beta_1 + \beta_{12} = \beta_2 + \beta_{13}$		0.40(0.53)		
Chi-squared test: $H_0: \beta_1 + \beta_{14} = \beta_2 + \beta_{15}$			0.92(0.34)	
Chi-squared test: $H_0: \beta_1 + \beta_{16} = \beta_2 + \beta_{17}$				0.51(0.46)
Coefficient of determination	0.86	0.87	0.89	0.85
Number of observations	216	216	216	216

Note: The figures in parentheses are P-values (significant coefficients in **bold**).

In *high* voice and accountability countries, a 10% increase in private investment stimulates the investment by 3.4% (i.e., $\beta_1 + \beta_{10} = 0.17 + 0.17$), as a 10% increase in FDI inflows encourages the investment by 3.2% ($\beta_2 + \beta_{11} = 0.06 + 0.26$). The Chi-squared test supports the assumption of equal effects of private investment and FDI on total investment in the countries. The other independent variables are statistically insignificant.

Columns 7-9 are analogous tests for the other governance measures – political stability, regulatory quality, and control of corruption – and the results are consistent in general. Interestingly, the estimated coefficients on private investment and FDI in ‘favourable’ regimes for investment are remarkably similar for each governance measure, in the range 0.31 to 0.34 in all cases. By contrast, the coefficients on private investment and FDI in ‘unfavourable’ regimes vary depending on which governance measure is used, but it is always the case that $\beta_1 > \beta_2$. It appears that both impacts are similar in countries with good quality governance, but in countries having weak property rights, high corruption, political uncertainty, and excessive regulation, the effect of private investment is greater than the FDI impact. In all cases the coefficients on change in private external debt and per capita GDP are always insignificant. Finally, there is support for hypothesis that good governance or institutions encourage total investment in developing countries: coefficients (evaluated at mean values of variables) are consistently higher for favourable compared to unfavourable regimes. These suggest that total investment levels are higher under favourable (market-friendly) regimes for investment.

Regional Effects on Total Investment

We test the hypothesis that level of total investment may vary across regions given governance and institutions development. A region consisting of countries with good quality of governance or high national income (e.g. Europe) should have total investment (level) higher than regions comprising countries characterized by political uncertainty and poor governance or low national income (e.g. Africa). To test this hypothesis, the econometric model to be estimated is specified as follows:

$$\ln GCF_{i,t} = \beta_0 + \beta_1 \ln PV_{i,t-1} + \beta_2 \ln FDI_{i,t-1} + \beta_3 X_{i,t-1} + \beta_4 ASIA + \beta_5 AFRICA + \beta_6 EUROPE + \mu_i + \varepsilon_{i,t} \quad (14)$$

where *ASIA* is a dummy variable that is 1 for Asian countries and 0 otherwise. *AFRICA* is a dummy variable that is 1 for African countries and 0 otherwise. *EUROPE* is a dummy variable that is 1 for European countries and 0 otherwise.⁷

Table 7: Regression results: are there any regional impacts?

Dependent variable: GCF/GDP (log)

<i>VARIABLES</i>	<i>PRAIS-WINSTEN</i>	<i>FIXED EFFECTS</i>	<i>RANDOM EFFECTS</i>
Lagged PV/GDP (log, β_1)	0.09(0.02)	0.06(0.08)	0.11(0.01)
Lagged FDI/GDP (log, β_2)	0.04(0.09)	0.03(0.09)	0.04(0.03)
Lagged NPD/GDP (log, β_3)	0.01(0.93)	-0.01(0.65)	-0.01(0.98)
Lagged PGDP (log, β_4)	0.17(0.00)	0.09(0.42)	0.09(0.02)
Lagged GGDP (log, β_5)	0.10(0.00)	0.10(0.00)	0.10(0.00)
Constant	1.12(0.00)	-	1.72(0.00)
ASIA (β_6)	0.08(0.10)	-	0.15(0.03)
AFRICA (β_7)	0.12(0.12)	-	0.01(0.92)
EUROPE (β_8)	0.34(0.00)	-	0.22(0.02)
Hausman test statistic		79.37(0.00)	
LM test (Chi-squared) statistic		108.31	
Koenker-Bassett test statistic		-0.03(0.04)	
Coefficient of determination	0.86	0.86	0.86
Number of observations	216	216	216

Notes: The figures in parentheses are P-values (significant coefficients in **bold**); the 5% critical value of Chi-squared distribution with 1 degree of freedom is 3.84.

Table 7 provides estimation results using (within) FE, RE, and Prais-Winsten estimations for the sample period 1996-2001. Using FE estimation⁸, the model suffers from heteroscedasticity and (first-order) autocorrelation. The Prais-Winsten estimation is used to remedy the problems. The coefficients on change in private external debt, per capita GDP,

⁷ Latin America is treated as a reference region.

⁸ The Hausman test statistic suggests that FE estimation is more appropriate than RE estimation for this data set.

and *AFRICA* are not statistically significant. On the other hand, we find evidence of positive effects of private investment, FDI, and market size on total investment. A 10% increase in private investment encourages the investment by 0.9% (relative to GDP), as a 10% increase in FDI stimulates the investment by 0.4%. A 10% increase in GDP growth encourages the investment by 1%. In addition, the estimates of the extent of extra investment to Asia and Europe compared to Latin America are 0.08 and 0.34, respectively. Total investment in Europe is higher than that in Asia and Latin America. For Asia, it is between Europe and Latin America. The investment equates in Latin America and Africa. These provide evidence in support of the hypothesis: level of total investment differs across regions given governance and institutions development.

5. Concluding Remarks

Using the World Bank's governance indicators and annual aggregate data over the period 1995-2001 from 36 low or middle income countries, our empirical investigation is to test the responsiveness of total investment to sources of finance under favourable and unfavourable regimes for investment in developing countries. The hypotheses are that higher private investment and FDI stimulate total investment; total investment is higher under favourable regimes.

Our findings can be summarised as follows:

1. In unfavourable regimes, the impact of private investment on total investment is greater than the FDI effect.
2. In favourable regimes, private investment and FDI encourage total investment to a similar extent. These results hold for all four measures of regime for investment used.
3. Total investment tends to be at a higher level in market-friendly regimes. Governments that provide a business-friendly environment for investors do appear to achieve higher levels of the investment, as might be expected.

The results suggest some questions to be addressed for further research. An important issue would be to find data to provide a measure of *new* private foreign borrowing. It would be desirable to use longer or broader data series and other governance measures as robustness checks, as the impact may differ given individual country characteristics. An extension

could be to use data at lower levels of aggregation (industry and firm level) to explore the relative importance of sources of financing for total investment. Another possibility would be to try and incorporate public investment, which may itself affect and be affected by sources of financing private investment. One possibility for future research would be a simultaneous equation model including determination of private and public investment and interactions between the two.

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APPENDIX

Appendix 1: Data definitions and sources

The countries consist of 13 Latin American and Caribbean countries (Argentina, Bolivia, Chile, Costa Rica, El Salvador, Guatemala, Jamaica, Mexico, Panama, Paraguay, Peru, Uruguay, and Venezuela), 8 countries from Asia (Indonesia, India, Iran, Kyrgyz Republic, Pakistan, the Philippines, Sri Lanka, and Thailand), 10 countries from Europe (Bulgaria, Croatia, Czech Republic, Estonia, Hungary, Moldova, Poland, Romania, Slovak Republic, and Turkey) and 5 African countries (Cote d'Ivoire, Mauritius, Senegal, South Africa, and Tunisia).

The economic variables are constructed as:

1. Gross fixed capital formation as a share of GDP (constant 2000, US dollar) from World Development Indicators 2004. It is treated as the dependent variable (see Agosin and Mayer (2000); Mišun and Tomšik (2002)).
2. Private investment (current, US dollar) is calculated from gross fixed capital formation (current, US dollar) minus net inflows of FDI (current, US dollar), and public investment (current, local currency unit) divided by exchange rate (local currency unit against US dollar). This is adjusted by GDP (current, US dollar) to obtain the PV/GDP ratio.
3. Data on gross fixed capital formation, exchange rates, and net inflows of FDI are from World Development Indicators 2004. Public investment data are from Government Finance Statistics, International Monetary Fund.
4. Net private external debt flows is change in private non-guaranteed long term external debt (current, US dollar) adjusted by CPI (2000 = 100) and GDP (constant 2000, US dollar). The data are from World Development Indicators (2004).
5. GDP per capita (constant 2000, US dollar) is from World Development Indicators (2004).
6. Data on GDP growth (constant 2000, US dollar) is from World Development Indicators (2004).

Appendix 2: The World Bank's governance indicators

The four governance variables are obtained from the World Bank (accessed in late 2005 at <http://www.worldbank.org/wbi/governance/govdata>) and classified by average percentile rank (1996-2002) of the governance measures, where 'High' is those above the 50th percentile rank and 'Low' is those below:

Voice and Accountability

High: Argentina, Bolivia, Bulgaria, Chile, Costa Rica, Czech Republic, El Salvador, Estonia, Hungary, India, Jamaica, Mauritius, Mexico, Panama, Philippines, Poland, Romania, Slovak Republic, South Africa, Thailand, Uruguay

Low: Cote d'Ivoire, Croatia, Guatemala, Indonesia, Iran, Kyrgyz Republic, Moldova, Pakistan, Paraguay, Peru, Senegal, Sri Lanka, Tunisia, Turkey, Venezuela

Political Stability

High: Argentina, Bulgaria, Chile, Costa Rica, Croatia, Czech Republic, El Salvador, Estonia, Hungary, Jamaica, Kyrgyz Republic, Mauritius, Panama, Poland, Romania, Slovak Republic, Thailand, Tunisia, Uruguay

Low: Bolivia, Cote d'Ivoire, Guatemala, India, Indonesia, Iran, Mexico, Moldova, Pakistan, Paraguay, Peru, Philippines, Senegal, South Africa, Sri Lanka, Venezuela, Turkey

Regulatory Quality

High: Argentina, Bolivia, Chile, Costa Rica, Croatia, Czech Republic, El Salvador, Estonia, Guatemala, Hungary, Jamaica, Mauritius, Mexico, Panama, Peru, Philippines, Poland, Slovak Republic, South Africa, Sri Lanka, Thailand, Tunisia, Turkey, Uruguay

Low: Bulgaria, Cote d'Ivoire, India, Indonesia, Kyrgyz Republic, Moldova, Pakistan, Paraguay, Romania, Senegal, Venezuela, Iran

Control of Corruption

High: Chile, Costa Rica, Croatia, Czech Republic, Estonia, Hungary, Mauritius, Peru, Poland, Slovak Republic, South Africa, Sri Lanka, Tunisia, Turkey, Uruguay

Low: Argentina, Bolivia, Bulgaria, Cote d'Ivoire, El Salvador, Guatemala, India, Indonesia, Iran, Jamaica, Kyrgyz Republic, Mexico, Moldova, Pakistan, Panama, Paraguay, Philippines, Romania, Senegal, Thailand, Venezuela

According to Kaufman *et al.* (2005), the World Bank's governance indicators measure the following six dimensions of governance:

voice and accountability – measuring the extent to which citizens of a country are able to participate in the selection of governments, and the independence of the media, which serves a significant role in monitoring those in authority and holding them accountable for their actions

political instability and violence – measuring perceptions of the likelihood that the government in power will be destabilised or overthrown by possibly unconstitutional and/or violent means, including domestic violence and terrorism

government effectiveness – focusing on inputs required for the government to be able to produce and implement good policies (the quality of the bureaucracy, the credibility of the government's commitment to policies, for example) and deliver public goods

regulatory quality – measuring the incidence of market-friendly policies in areas such as foreign trade and business development

rule of law – measuring the extent to which agents have confidence in and abide by the rules of society and the extent to which property rights are protected. These include perceptions of the incidence of crime, the effectiveness and predictability of the judiciary, and the enforceability of contracts.

control of corruption – measuring the exercise of public power for private gain, including both grand corruption and state capture

The governance data cover 209 countries and territories for 1996, 1998, 2000, 2002 and 2004. They are based on several hundred individual variables measuring perceptions of governance, drawn from 37 separate data sources constructed by 31 different organizations such as Freedom House, World Economic Forum, European Bank for Reconstruction and Development.

An unobserved components model – providing estimates of governance for each country and measures of the precision of these estimates for every country, indicator and year – is employed to construct the six aggregate governance indicators in each period. The governance estimates are normally distributed with a mean of zero and a standard deviation of one in each period. This implies that virtually all scores lie between -2.5 and 2.5 , with

higher scores corresponding to better outcomes (Kaufman *et al.* (2005) also shows the point estimates in percentile rank).

Changes in the estimates in most countries are relatively small over the seven-year period. Yet, they change substantially for some countries in some periods. For example, from 1996 to 2002, Croatia and Peru show substantial improvements in, among others, voice and accountability measure, contrasting Cote d'Ivoire deteriorates on it. Cote d'Ivoire, Kyrgyz Republic, and Argentina largely decline on political stability and absence of violence measure. Cote d'Ivoire, Argentina, and Indonesia considerably deteriorate on government effectiveness measure. The changes (in the estimates) also show significant deterioration on regulatory quality measure in Argentina, Paraguay, Indonesia and Bolivia. Argentina and Cote d'Ivoire show substantial declination on rule of law and control of corruption, respectively (Kaufman *et al.* (2005)).

Appendix 3: Sample selection bias

This appendix presents some analysis of the proportions of our sample in high/low governance that are middle/low income as compared to the respective proportions in population of countries with governance data. The sample has more medium income countries but few low income countries, compared to the population. Middle income countries, specifically for ‘high’ governance countries, are over-represented in the sample. On the other hand, low income countries are under-represented, especially for ‘low’ governance countries.

Voice and Accountability

	Kaufman <i>et al</i> (2005)		Sample	
	‘High’	‘Low’	‘High’	‘Low’
Middle income country	34.7%	30.7%	55.6%	30.6%
Low income country	5.3%	29.3%	2.8%	11%

Political Stability and Absence of Violence

	Kaufman <i>et al</i> (2005)		Sample	
	‘High’	‘Low’	‘High’	‘Low’
Middle income country	27.7%	35.8%	50%	36.1%
Low income country	3.4%	33.1%	2.8%	11.1%

Regulatory Quality

	Kaufman <i>et al</i> (2005)		Sample	
	‘High’	‘Low’	‘High’	‘Low’
Middle income country	28.9%	36.9%	66.7%	19.4%
Low income country	0.7%	33.5%	0%	13.9%

Control of Corruption

	Kaufman <i>et al</i> (2005)		Sample	
	‘High’	‘Low’	‘High’	‘Low’
Middle income country	24.2%	41.6%	41.7%	44.4%
Low income country	1.3%	32.9%	0%	13.9%

