Aid, Governance, and Private Foreign Investment: Some Puzzling Findings and a Possible Explanation

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Abstract

Does official aid pave the road for private foreign investment or does it suffocate private initiative by diverting resources towards unproductive activities? In this paper we explore this question using data for a large number of developing and emerging economies. Controlling for countries' institutional environment, we find that, evaluated at the mean, the marginal effect of aid on private foreign investment is close to zero. Surprisingly, however, the effect is strictly positive for countries in which private agents face a substantial regulatory burden. After testing the robustness of this result, we offer a theoretical model that is able to rationalize our puzzling observation.

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1 Introduction

Does official aid pave the road for private foreign investment or does it suffocate private initiative by diverting resources towards unproductive activities?

There are good reasons to believe in the first possibility: if governments lack a domestic tax base and if they do not have access to international capital markets, foreign aid can provide them with the means to offer the infrastructure and the educational system that are necessary for profitable economic activity. By closing various "gaps" (Chenery and Strout 1966), aid may thus act as a catalyst for private capital flows. Moreover, large aid flows can indicate that a government's economic policy is approved by international organiziations, and this positive signal may raise the country's attractiveness for foreign investors (Rodrik 1995). In sum, "foreign aid to a reforming government may improve the environment for private investment – both by creating confidence in the reform program and by helping ease infrastructure bottlenecks" (Dollar and Easterly 1999:22).

However, there are also good reasons to be skeptical about the benefits of foreign aid. Against the background of the rather frustrating results of foreign aid during the sixties and seventies, several authors have argued that large aid flows, instead of jump-starting economic growth in developing countries, mainly lead to a massive increase in unproductive rent-seeking activities: "Because aid accrues to the government it increases its resources, patronage, and power in relation to the rest of society. The resulting politicization of life enhances the hold of governments over their subjects and increases the stakes in the struggle for power. This result in turn encourages or even forces people to divert attention, energy, and resources from productive economic activities to concern with the outcome of political and administrative processes and decisions" (Bauer 1991:45).[1] Moreover, the easy availability of grants may prevent governments from undertaking necessary reforms. As a result, aid may deter rather than attract foreign investors.

The two countervailing forces described in the preceding paragraphs may be high-

[1] A related point was made by Milton Friedman (1958, 1970:64) who warned that aid would "almost surely retard economic development and promote the triumph of Communism". (quoted from Lensink and White 2000:48)

lighted by the following simple model. Suppose that aggregate output Y is a function of a productivity parameter Ω, physical capital K, labor L, and some publicly provided input G. More specifically,

$$Y = \Omega F(K, L, G), \tag{1}$$

with F as a strictly concave function that is increasing in all its arguments and has the cross parital derivative $F_{KG} > 0$.[2] Suppose, in addition, that G is partly financed by foreign aid A and that aid reduces total factor productivity Ω. Hence, $G = g(A)$ with $g' > 0$ and $\Omega = f(A)$ with $f' < 0$. Obviously, the total effect of raising A on the marginal productivity of physical capital is ambiguous, and it depends on the strength of the (positive) "infrastructure effect" relative to the (negative) "rent-seeking effect" whether higher aid enhances or reduces countries' attractiveness for foreign investors.

The aim of this paper is to empirically explore this issue. That is, we want to test whether the effect of official aid on private foreign investment is positive, negative, or absent. In our investigation, we are particularly interested in the role of countries' "institutional and political environment", i.e. the quality and stability of its political regime and the efficiency of its legal and regulatory system. The importance of accounting for political and institutional factors when assessing the effect of aid on *economic growth* has recently been demonstrated by Burnside and Dollar (2000, henceforth BD). Their results show that, on the one hand, the marginal effect of aid on economic growth is positive when aid flows meet a healthy policy environment. On the other hand, aid is ineffective if a country is characterized by various symptoms of government failure like high inflation, large budget deficits, and restricted trade. While the findings of BD have been subject to criticism (Hansen and Tarp 2000, 2001), they have become extremely influential, and in the meantime the view that "money matters - in a good institutional environment" (World Bank 1998) has entered conventional wisdom. This is not surprising. What makes the BD result attractive to both policymakers and academics is that it synthesizes the two seemingly contradictory points of view sketched above: by offering institutional and

[2] See Barro (1990) for a prominent paper using such a setup, Clarida (1993) for an open-economy version, and Reinikka and Svensson (2002) for recent evidence on the importance of public infrastructure for private investment.

policy characteristics as the missing link between the observed micro-effectiveness and the apparent macro-failure of aid, BD reconcile the view that foreign aid can be good for growth with the more critical attitude of the skeptics.[3]

We started our empirical investigation with the conjecture that what is good for growth should also be good for private foreign investment. Hence, we expected the negative "rent-seeking effect" of aid to dominate the positive "infrastructure effect" in countries with a bad institutional environment. To our great surprise, however, this is not what we found: instead, our results suggest that while the marginal effect of official aid on private foreign investment is close to zero for a country with average institutional characteristics, it is strictly positive in economies which hamper private activities by imposing a high regulatory burden. While this does *not* imply that crippling regulation is good for foreign investors – in fact, our empirical results show that the effect of a high regulatory burden is strongly negative – it is in striking contrast to the findings of BD. It suggests that, indeed, aid money matters for private foreign investment. But more so in a *bad* institutional environment.

While we first thought that our results might be due to an error in the econometric approach – the consequence of some misspecification or endogeneity – they turned out to be stubbornly robust across samples and specifications, and we finally started to search for a possible rationale. In terms of the framework sketched above, the explanation we offer can be summarized as follows: while a heavy regulatory burden may enhance the negative rent-seeking effect of aid, it also reinforces the positive infrastructure effect. The reason is that, if the private sector is prevented from producing nontraded inputs which are necessary in production, aid-financed public provision has a stronger effect on the marginal productivity of capital than in an environment where no such barriers exist. Again, we need to stress that this should not be (mis-)interpreted as an appraisal of heavy regulation. Instead, it is a second-best argument which states that, for given constraints on private-sector activity, aid may enable governments to do things that *nobody* would do otherwise.

[3] For a discussion of the micro- and macro-effectiveness of foreign aid see Cassen et al. (1994) and Mosley and Eeckhout (2000).

The rest of the paper is structured as follows: the next section offers a brief review of the relevant literature. In Section 3, we describe our data. Section 4 presents our econometric approach, our main results, and a series of robustness checks. In Section 5 we extend the basic framework sketched above and develop a simple model that can explain our puzzling observations. Section 6 summarizes and concludes.

2 Relevant literature

Our investigation benefits from three strands of literature: the huge number of contributions analyzing the effectiveness of foreign aid, the no less voluminous set of investigations about the determinants of foreign capital flows and, finally, a number of papers studying the relationship between aid and private investment.

Hansen and Tarp (2000) provide a recent survey of the literature on the macroeconomic effects of aid. In particular, they review "third generation studies" which control for the institutional environment when assessing the influence of aid on investment and economic growth. While Boone (1996) comes to the conclusion that there is no significant relationship, Burnside and Dollar (2000) and Svensson (1999) as well as Dollar and Easterly (1999) control for the political and institutional environment by using interactive terms. As mentioned above, their result that "money matters - in a healthy political/institutional environment" was popularized in a recent study by the World Bank (1998). However, the BD findings have not been uncontroversial. In fact, Hansen and Tarp (2000, 2001) point out that the nonlinear effect of aid may just be due to misspecification and a failure to properly account for endogeneity.

In specifying our econometric model, we have also been inspired by exisiting studies on the determinants of private foreign investment.[4] In particular, we follow a tradition to take into account political and institutional variables that was started by Schneider and Frey (1985) and Wheeler and Mody (1992). More recently, Jun and Singh (1996), Gastanaga et al. (1998), Wei (2000), Harms (2002) as well as Harms and Ursprung (2002) demonstrated the importance of the institutional and political environment for foreign direct investment

[4] See Chakrabarti (2001) for a critical survey of the recent literature.

decisions.

Finally, our study complements a number of recent contributions that explore the relationship between *official lending* and private capital flows. While Rodrik (1995) does not find a significant effect of total official lending on private capital flows, his disaggregation of the data reveals that bilateral transfers (including grants) enhance foreign direct investment, while increases in multilateral lending seem to follow declines in private capital flows. Similar to Rodrik (1995), Bird and Rowlands (1997) do not find a robust relationship between official and private lending. In contrast, Ratha (2001) points out that while the *contemporaneous* relationship between multilateral lending and private capital flows may be negative, multilateral lending can have a positive effect on *future* private capital flows. One reason why previous authors have not found a significant relationship between official flows and private foreign investment may be their neglect of political and institutional conditions in the receiving countries. Our study fills this gap, and we therefore believe that it can substantially contribute to a better understanding of the interaction between official resource flows and private capital flows.

3 Data and econometric model

3.1 Dependent variable

Our dependent variable "private foreign investment" (PFI) is the sum of *net foreign direct investment inflows* (FDI) and *portfolio equity investment inflows* as reported on the CD-Rom version of the World Bank's *World Development Indicators 2001* (World Bank 2001a; henceforth WDI2001). Both variables are measured in current US dollars. Our decision to add these two categories instead of focusing on FDI alone is motivated by the insight that, in reality, it is hard to distinguish between direct and portfolio equity investment. Thus, while the World Bank offers an official FDI definition which focuses on an investor's aim "...to acquire a lasting management interest (usually ten percent of voting stock)" in an enterprise (World Bank 2001b:xvi), countries enjoy substantial discretion in assigning a given investment to one of the two categories, and in practice it

is much harder to distinguish between the two investment modes than suggested by the official definition.[5] We therefore decided to add up the two categories. However, as we show below, our qualitative results do not change when we use only FDI as the dependent variable.

While we test the effect of aid on various forms of "equity investment" (i.e. FDI and portfolio equity investment), we do not consider the debt-creating component of international capital flows, such as bank loans and bonds. Hence, our dependent variable is a subset of total private capital flows that have been considered, for example, by Rodrik (1995) and Ratha (2001). There are two reasons for our decision to omit debt-creating capital flows: first, we wanted to focus on foreign investment that is, at least in principle, affected by the marginal productivity of capital in the receiving economy. While direct investment satisfies this requirement, debt-creating flows may be used for purely consumption-smoothing purposes or to finance government consumption. Moreover, recent episodes like the Asian crisis have shown that debt-creating capital flows are much more volatile than direct investment. Given the large swings in private lending on the one hand, and the rather slow changes of aid flows on the other, it is not surprising that a lot of variation in total private capital flows is unexplained by aid and that studies like Bird and Rowlands (1997) do not find a robust relationship between the two variables.

To control for country size, we divide private foreign investment by the receiving country's population. The alternative approach of dividing by some measure of national income (GDP or GNP) that has also been used in the literature is usually justified as a means to control for a country's productivity and the size of the market. However, there is a certain risk that both the numerator and the denominator of such a ratio are influenced by the same factors. Since this procedure could lead to a situation in which the total volume of private foreign investment is reacting to changes in some exogenous variable while the share of private foreign investment in GDP is not, it may convey a wrong idea about the

[5] The World Bank (2001a) acknowldeges this problem by stating that "...as a guideline, the IMF suggests that investments should account for at least 10 percent of voting stock to be counted as foreign direct investment. In practice, many countries set a higher threshold". See Harms (2000) for a discussion of this issue.

determinants of private foreign investment, and we therefore chose the per-capita normalization.

3.2 Sample

Our sample is based on countries that are classified as low-income or middle-income countries in WDI2001. We only include countries with a population above 1 million and, for lack of data and due to reliability problems, leave out ex-Soviet and ex-Yugoslav republics. Data availability is also one of the reasons why we restrict our attention to the 1990s. The other reason is that, after the "lost decade" of the 1980s, this period has been characterized by substantial private capital flows to emerging markets. Using annual data from 1988 to 1999 we smooth out cyclical fluctuations by creating three-year averages for all variables. As a result, we consider values for the four intervals 1988-90, 1991-93, 1994-96 and 1997-99, with the 1988-90 subperiod serving as an initial condition (due to the use of lags). Note that our data set makes up an unbalanced panel: not all variables are available across all time periods for each country.[6] More details on the data can be found in the data appendix that also features a table with descriptive statistics.

3.3 Regressors

3.3.1 Aid

The aid variable (A) used in our analysis also comes from WDI2001 and is refered to as "official development assistance and net official aid". It consists of international transfers of i) financial resources and ii) goods or services, including grants by official donors. It also includes loans with a grant element of at least 25% and the value of technical cooperation and assistance; deducted from this are repayments of loan principal.[7] As with private

[6] We started out with 92 countries, but due to missing data most full-sample estimates are based on between 70 and 81 countries.

[7] Chang et al. (1998) have created an alternative measure, *effective development assistance* (EDA), which only includes the grant component of concessionary loans. Since the bulk of aid during the early and mid-nineties consisted of pure grants (Hjertholm and White 2000), it is not surprising that the evolution of EDA closely follows the time path of official development assistance. Hence, while we could not use the

foreign investment, our aid variable is measured in US dollars and divided by population. We will demonstrate below that our results do not change when we replace this aid variable by pure grants or technical cooperation grants and when we separately consider bilateral and multilateral aid.

3.3.2 Governance

To control for the political and institutional environment, we use a new set of measures provided by Kaufmann et al. (1999)[8]. This data set offers six aggregate indicators of the quality of governance (Q): voice and accountability, political instability and violence, government effectiveness, regulatory burden, rule of law, and graft.

The first advantage of this new data set is that it is based on a systematic aggregation of governance indicators from different sources. Hence, while previous studies on the importance of the institutional environment may have been driven by the selection of a particular source, the Kaufmann et al. data reflect a consensus view shared by diverse institutions and enterprises. The second advantage of the new data set is that it allows to clearly distinguish between different aspects of "governance", each of which reflects a distinct component of the political and institutional environment. Hence, voice and accountability and political instability refer to the political process through which an authority is selected. Government effectiveness and regulatory burden reflect the government's capacity to implement sound policies. Finally, graft and the rule of law depend on the citizens' and the bureaucracy's respect for the official rules (Kaufmann et al., 1999:2).

The governance indicators are purely cross-sectional, and the underlying data refer to 1997 and 1998. Since there are no earlier observations, our econometric approach is based on the implicit assumption that the quality of governance did not change significantly during the 1990s and can thus be approximated by the 1997/8 value. We will later examine whether this assumption biases our results by estimating separate regressions for each time period.

Chang et al. (1998) data for lack of data availability – they are not available for the years 1996-99 – we do not expect this to be crucial for our results.

[8] The data can be downloaded at http://www.worldbank.org/wbi/governance/govdata2001.htm#1998.

The original indicators in Kaufmann et al. (1999) are centered around zero, ranging from around -2.5 to approximately 2.5, with a higher score indicating better governance. Since we will later interact the governance indicators with our measure of aid, we rebase each indicator by adding the minimum value in our sample, thus making sure that the indicators do not assume negative values. Basic descriptive statistics of the six indicators are reported in Table A1 in the data appendix. Correlation coefficients between the individual governance measures are all positive and above 50%. However, some of the indicators are more closely correlated than others. The closest correlation is between the pairs 'government effectiveness/graft' and 'rule of law/political instability and violence'. As a visual illustration, Figure A1 presents three bivariate scatter plots. All three feature regulatory burden, the governance indicator that turns out to be the most important in our econometric work.[9] The positive correlation with the other indicators is clearly visible, but there is also a great deal of variation, i.e. a given quality of governance in one direction is associated with a wide range of values in another direction. This illustrates that countries that perform well in one dimension of governance do not necessarily perform well in other dimensions.

3.3.3 Control variables

In addition to aid and governance, the estimation features a range of other control variables (from WDI2001 unless indicated otherwise). These include: the logarithm of per-capita income (in PPP adjusted US dollars) as a measure of economic development; the sum of exports and imports divided by GDP to capture openness to trade; and the logarithm of GDP (in PPP adjusted US dollars) to control for market size. These three variables are lagged by one period to reduce potential problems of endogeneity. We also include a measure of equity investment risk which reflects the likelihood of expropriation and repudiation of contracts by the host country government (commercially available from *Political Risk*

[9] The regulatory burden variable "includes measures of the incidence of market-unfriendly policies such as price controls or inadequate bank supervision, as well as perceptions imposed by excessive regulation in areas such as foreign trade and business development" (Kaufmann et al. 1999:8).

Services)[10]. Note that a higher value of this variable indicates a *lower* degree of risk for foreign investors. To capture any other unmeasured influences on the regional and global investment environment we finally used regional (from the *Global Development Network* database[11]) and period dummies. In preliminary work we also included the literacy rate as a proxy for human capital, the inflation rate as a indicator of macroeconomic stability, and the debt-service ratio as a measure of 'debt overhang', but these variables turned out to be insignificant across all specifications and were therefore removed.

3.4 Econometric model

All the econometric results presented in the next section are based on variants of

$$pfi_{it} = \alpha_t + \alpha_j + \beta_1 a_{it} + \beta_2 (Q_i \cdot a_{it}) + \beta_3 Q_i + \sum_{m=1}^{M} \gamma_m Z_{mit} + \varepsilon_{it} \qquad (2)$$

where pfi_{it} is our measure of private foreign investment and a_{it} our measure of aid (both in logarithms). Index $i = 1, ..., N$ refers to countries, index $t = 1, ..., T$ to time periods. Q_i is the indicator of the quality of governance and the Z_{mit} variables are the M other exogenous determinants of private foreign investment. The period dummies are given by α_t and the regional dummies by α_j.[12] The disturbance term ε_{it} is assumed to possess the usual desirable characteristics.

We first estimated different versions of (2) by ordinary least squares (OLS), using various ways to test for significance: with i) unadjusted standard errors, ii) heteroskedasticity-robust standard errors (White 1980) and iii) standard errors adjusted for cluster-correlations. The latter allow not only for country-specific heteroskedasticity, but also for intra-country correlation of residuals. More details on cluster-adjusted standard errors can be found in Rogers (1993) and Wooldridge (2002, Section 13.8.2).

[10] Harms (2000) provides a detailed description of these data which are regularly published in the *International Country Risk Guide*. We use the arithmetic mean of the two sub-indices, which can range from zero to ten.

[11] See http://www.worldbank.org/research/growth/GDNdata.htm.

[12] Note that we do not use country-specific dummmies. Since the governance variables do not change over time, they would simply drop out in a fixed effects regression.

However, the estimates of the various coefficients in (2) are only consistent if all the right-hand side variables are exogenous. As emphasised by Ratha (2001), there could be a negative reverse relationship between public and private capital flows if there is a tendency for official lending to rise when private flows are low. Although we are concerned with *aid* rather than *official lending*, this possibility may also arise in our context if, for instance, more aid is given during financial crises. Controlling for potential endogeneity of aid has also been a feature of recent studies on the link between aid and growth.

To be on the safe side, we therefore estimated the relationship in (2) by 2SLS (two-stage least squares) and GMM (generalised method of moments) as well. The additional instruments excluded from the private foreign investment equation were: the logarithm of population; lagged arms imports as a percentage of total imports; the lagged literacy rate; the logarithm of lagged aid per capita; a dummy for fuel exporters; a dummy indicating French legal origin; and a dummy indicating British legal origin.[13] In those specifications where aid also appears non-linearly (e.g. in the interactive term), we followed Hansen and Tarp (2001) and BD by also including squares and/or cross-products of these instruments (except for the dummies). All the additional variables used as instruments were extracted from WDI2001, except for the legal origin variables which were taken from the Global Development Network database.

In common with BD, we find that – on the basis of Durbin-Wu-Hausman-type tests – we cannot reject the null hypothesis that aid is exogenous for private foreign investment. Since standard OLS provides consistent estimates in this case, we decided to present mostly those estimates, but using standard-errors adjusted for cluster-correlations (as described above) for inference.[14] However, as we demonstrate below, our key findings are robust – and in many cases even reinforced – if we apply alternative estimation techniques.

[13] In our choice of instruments we followed BD, Alesina and Dollar (2000), Alesina and Weder (2002), Hansen and Tarp (2001), Knack (2001), and Ratha (2001).

[14] White-tests, as well as Pagan-Hall-tests (Pagan and Hall 1983) that are robust to potential endogeneity lead us to reject the hypothesis of homoskedastic errors.

4 Results

4.1 Puzzling results

We started by estimating various bivariate and multivariate versions of (2), in which we did not include the governance variable (Q_i) and the interactive term ($Q_i \cdot a_{it}$). The resulting estimates of β_1 proved to be either significant but negative (in the bivariate case), or insignificant (when the other control variables were included). While we do not report these estimates here, we mention them to emphasise that there is no obvious positive influence of foreign aid on private foreign investment.[15]

We then proceeded to include the quality of governance as an additional explanatory variable, though still excluding the interactive term. The corresponding results are presented in Table 1. Two results stand out: first, even when we control for the institutional and political environment, there is still no statistically significant relationship between aid and private foreign investment.

The second important result emerging from Table 1 is that all the governance variables are highly significant and, in all cases, a better institutional and/or political environment has a positive effect on private capital inflows. This also holds – though is not reported in the table – when we use the first principal component of the six individual governance indicators as an aggregate measure. There are some differences with respect to the size of the estimates, though. Less regulatory burden, more effective rule of law and a low level of graft appear to matter quantitatively more than a higher level of voice and accountability or less political instability and violence.

In addition, we find that private foreign investment is positively and significantly correlated with lagged per capita income, with the openness of an economy (as measured by the lagged ratio of trade to GDP), with market size (proxied by the logarithm of lagged GDP) and with a less risky business environment.[16]

The point estimates of the period dummies rise over time – possibly reflecting the rising

[15] Details are available on request. Note that these findings mirror the results of Boone (1996) and BD with respect to economic growth and other macroeconomic variables.

[16] Recall that a higher value of the investor risk variable reflects *less* risk.

emerging-markets frenzy that characterized the 1990s before the Asian crisis – though the differences to 1991-93 are not statistically significant in the majority of cases. The estimates of the region effects reveal that the excluded region – Latin America and the Caribbean – received more foreign capital on average than any of the other regions in our sample. Moreoever, most of the regional differences are statistically significant.

The explanatory power of this regression specification is fairly high, ranging from 68% to nearly 74%, depending on which governance indicator is used. We also include the results of Durbin-Wu-Hausman (DWH) tests for exogeneity of ln(*aid per capita*), using either ln(*aid per capita*) lagged as the only instrument (IV_1) or a larger set of instruments (IV_2).[17] The DWH-tests are based on a comparison of the OLS and 2SLS estimates of our specification, though we do not report the latter explicitly (again, details are available on request). As the results clearly suggest that there is no evidence of an endogeneity problem, we focus on OLS results in this and the subsequent tables.

Since the validity of the DWH exogeneity tests depends on an appropriate choice of instruments, we also checked that the instruments are sufficiently correlated with ln(*aid per capita*) and that our exclusion restrictions are warranted. As the partial R^2's for the excluded instruments were always in excess of 40% and highly signficant, the first criterion is clearly satisfied here. To test the exclusion restrictions, Table 1 reports Sargan-test results based on 2SLS estimates. They clearly indicate that these restrictions are supported by the data. In addition, we estimated our model by GMM (see Table 3) and correponding J-tests confirmed these results. To be on the safe side, we also i) tested the orthogonality assumption for each excluded instrument individually[18] and ii) included them in our regression to check whether we had not accidentally omitted them. Since these tests did not indicate any problems either, we are confident that our instruments possess the desirable characteristics and that our exogeneity test results are reliable.

To further explore the relationship between private foreign investment, aid and gov-

[17] The large instrument set includes ln(*aid per capita*) lagged, ln(*population*), *arms imports* (lagged), *literacy rate* (lagged), a dummy for *fuel exporters*, a *French legal origin* dummy and a *British legal origin* dummy.

[18] See Baum et al. (2003) for an excellent discussion of this method.

ernance, we added the product of governance and aid to estimate the model exactly as given in (2). The results are presented in Table 2, again for all six governance indicators. To focus attention on the important variables, we no longer report the estimates of the period and regional dummies (though details are available). At first glance, adding the interactive term does not seem to make a big difference: the coefficients of the aid variable turn positive in many cases, but in most specifications the isolated effect is not significant. There is one important exception, though: column 2.4 shows that if we use the indicator of regulatory burden to control for the institutional environment, the direct effect of aid on private foreign investment is positive and significant. However, and this is most surprising, the coefficient of the interactive term ($Q_i \cdot a_{it}$) is significant and has a *negative* sign.

The key implication of this finding is that the marginal effect of aid on private capital flows, $\partial pfi_{it}/\partial a_{it} = 1.173 - 0.473 \cdot Q_i$, can be positive or negative, depending on the value of Q_i. Evaluated at the mean value of the regulatory burden variable (2.44) in this sample, the marginal effect is close to zero (0.02) and insignificant. This suggests that, for the country with an "average regulatory burden", there is no impact of foreign aid on private foreign investment and explains why we did not find a significant effect of aid when we did not include the interactive term (Recall column 1.4 in Table 1). Surprisingly, however, the effect of aid becomes strongly positive in countries with a low value for the regulatory-burden variable, i.e. where firms have to cope with substantial restrictions on their activities.

Figure 1 offers a stylized illustration of this result: for countries that are characterized by a favorable regulatory environment (Q_i high), increasing aid flows have a negative effect on private foreign investment. On the other hand, foreign investment is increasing in aid if firms face a heavy regulatory burden (Q_i low). This pattern is reflected in Figure 2, where we plot the logarithm of aid per capita against the predicted value $\widehat{pfi}_{it} = 1.173 \cdot a_{it} + 2.567 \cdot Q_i - 0.473 \cdot Q_i \cdot a_{it}$. For the left panel we used the observations with the highest values of the regulatory burden variable. As in Figure 1, the predicted value of private foreign investment is decreasing in the value of aid for countries characterized by a very favorable regulatory environment. By contrast, the right panel shows predicted values

for the countries that fall into the lowest quartile of the regulatory burden distribution. In this case, larger aid flows imply greater foreign investments. Note, finally, that the marginal effect of the regulatory burden variable is *never* negative.[19] Hence, even the country that receives the maximum amount of aid would benefit in terms of higher private foreign investment if it offered a better regulatory environment.

The basic direction of the relationship between foreign private capital inflows, aid and governance that we have found for the regulatory burden variable also applies to the other five governance variables. However, the relationship is only significant – and much stronger in terms of the size of the estimated coefficients – for regulatory burden. This underlines that there are fundamental conceptual distinctions between the various concepts of governance. We now extend our analysis by examining whether our puzzling result is robust to changes in estimation method, regression specification, and choice of variables.

4.2 Robustness checks

Table 3 presents the results obtained when we applied alternative estimation techniques. We only report the estimates of (2) for regulatory burden, but the fact that the relationship is neither as strong nor significant for the other five governance indicators is not affected by the use of alternative estimators (details are available). The other estimators are 2SLS, HOLS[20] and GMM. We also report results for different instrument sets and different ways of calculating standard errors (and GMM weighting schemes). Scanning across the columns of Table 3 reveals that our puzzling finding is not driven by a particular esti-

[19] The marginal effect of regulatory burden on private foreign investment in column 2.4 is $\partial pfi_{it}/\partial Q_i = 2.567 - 0.473 \cdot a_{it}$. Even at the maximum value of a_{it} in the sample (5.097; see Table A1), the marginal effect is positive.

[20] This is an estimator due to Cragg (1983) – refered to as 'heteroskedastic OLS (HOLS)' by Baum et al. (2003) – which is asymptotically more efficient than OLS in the presence of heteroskedasticity. HOLS is basically a two-step GMM estimator exploiting the additional moment conditions when there are excluded exogenous instruments.

mation method:[21] a higher degree of regulation increases the effect of aid on private foreign investment. The marginal effects evaluated at the mean vary somewhat, but never differ significantly from zero. Hence, our result is neither driven by our exogeneity/endogeneity decision as discussed earlier nor by the particular choice of instruments (simple or large, i.e. IV_1 or IV_2). And it should be noted that the t-ratios of the OLS results with cluster-adjusted standard errors reported in Table 2 (and replicated in column 3.3 of Table 3) are fairly conservative in comparison with most others reported in the table.[22]

Having found that our results are robust with respect to estimation techniques, we wanted to test whether, as suggested by Hansen and Tarp (2001) in relation to the BD study, the significance of the interactive term just reflects a non-linear influence of aid on private foreign investment. Table 4 contains a variety of specifications to address this and other possibilities. To permit comparisons, column 4.1 replicates the baseline estimates containing our 'puzzling result'. The second column addresses the possibility that aid may have a non-linear effect on private foreign investment. Hansen and Tarp (2001) found that, when they included such a term in a regression explaining growth, the interactive term stressed by BD was no longer significant. In our case, however, adding ln(*aid per capita*) squared does not alter the basic results, while the coefficient of the squared term is insignificant.

Column 4.3 extends the Hansen-Tarp idea to also include squares of the other four explanatory variables. There is some evidence that openness may have a non-linear influence on private foreign investment, but our basic results relating to aid and regulatory burden are unaffected by this alteration. We also checked whether our result is driven by differences in incomes: the negative sign of the interactive term might just reflect the fact that per-capita income is positively correlated with the quality of the regulatory environment and that the influence of aid on foreign investment is weaker in richer economies. In

[21] Due to varying data availability for the instruments used, the sample size may differ across estimation methods.

[22] In the presence of heterogeneity, GMM is more efficient than 2SLS. However, due to the problematic properties of the GMM estimator in small samples, the associated t-statistics should be interpreted with caution (see Hayashi 2000 and Baum et al. 2003).

this case, aid interacted with income should have a negative coefficient and the negative effect of the original interaction term should disappear. Column 4.4 shows that this is not the case: the interaction term with relative income per capita is positive and weakly significant, while the product of aid and the regulatory burden measure is still negative. Finally, we checked whether the regulatory burden variable just picks up the effect of equity investment risk. We felt that this might be important since – as indicated by Table 2 – both the coefficient (in absolute value) and the level of significance of the risk indicator decreased substantially when regulatory burden was used, compared to the other governance variables. However, as shown by column 4.5, adding an interaction term of aid and equity investment risk does not affect our basic result.

Next we examined the robustness of our key finding across different subperiods, country groups and frequencies. Table 5 reports the corresponding results. Distinguishing between time-periods is useful since one limitation of the Kaufmann et al. (1999) governance indicators is that they refer to 1997-98, while we consider foreign aid and investment flows for an entire decade. The results in columns 5.1-5.3 of Table 5 reveal that our result is stronger during the mid- and late-1990s than during the beginning of the decade, where the key coefficients point in the same direction as before, but are insignificant. The reason for this finding may be that during the first time interval, capital movements were still restricted in many economies, and that private foreign investment was therefore less sensitive to the economic and institutional environment. This possible explanation is supported by the fact that, according to the estimated marginal effects (evaluated at the mean), the positive impact of aid was rising during the decade.

Running separate regressions for different country groups is another way of examing the structural stability of our results. Columns 5.4 and 5.5 demonstrate that our key result still holds when we consider low- and middle-income countries separately. This is particularly important since one difference between regulatory burden and the other governance variables is that it has a distribution which is more skewed to the left and more heavily peaked (see Table A1). Hence, a lot of observations are amassed in the immediate neighborhood of the mean, and it could be that our result is driven by some countries with

a very low rating. The lowest ratings apply to Zaire, Guinea Bissau, and Sierra Leone – all low-income countries. The fact that our result still holds when we focus on middle-income countries demonstrates that it is not driven by a few extreme observations.

In columns 5.6-5.7 we examine whether our choice of three-year averages could have biased our results. Column 5.6 reports results for annual data[23] – i.e. no averaging at all – while column 5.7 reports the results we got when we averaged across the entire period from 1991-99. Again, there is no fundamental change in our key results: the effect of aid on private foreign investment is greater when the degree of regulation is high. Similarly, the marginal effect of aid on private foreign investment remains insignificant when evaluated at the mean.

Table 6 finally demonstrates that our qualitative findings are not affected by i) our choice of aid variable and ii) the aggregation of FDI and portfolio equity investment into a composite measure of foreign private investment. In columns 6.1 and 6.2 we removed the loan component of aid and focused purely on *grants* and *technical cooperation grants*.[24] In columns 6.3 and 6.4 we distinguish between *bilateral* and *multilateral aid*. In columns 6.5 and 6.6 we finally estimate separate regressions for the two components of private foreign equity investment per capita.[25]

5 A tentative explanation

5.1 A simple model

In this section, we extend the framework presented in the introduction and develop a simple model that is able to replicate the puzzling finding reported above – that is, the negative

[23] We can only use data up to 1997 since the *investor risk* variable is not available for 1998 and 1999.

[24] According to the World Bank (2001b), the defining feature of grants (as part of official development assistance) is that there is no repayment requirement. Technical cooperation grants "...include free-standing technical cooperation grants, which are intended to finance the transfer of technical or managerial skills or of technology", and "...investment-related technical cooperation grants which are provided to strengthen the capacity to execute specific investment projects" (World Bank 2001b).

[25] The additional data series are again taken from WDI2001, except for bilateral and multilateral aid which comes from the OECD's *International Development Statistics 2001* CD-Rom.

sign of the interactive term, which suggests that the positive effect of aid on private foreign investment is stronger in economies where agents face a high regulatory burden. We start by showing why larger frictions may reinforce the positive "infrastructure effect" of foreign aid. This model will later be modified to also allow for a negative marginal effect resulting from counter-productive rent-seeking.

Our model economy is populated by a continuum of households who inelastically supply one unit of labor in every time period. Perfectly competitive firms produce a homogeneous traded good whose price is given by world markets and normalized to one. The technology used for production is given by

$$Y^T = (K^T)^\alpha (L^T)^\beta (X)^{1-\alpha-\beta}, \tag{3}$$

where K^T and L^T denote the amounts of physical capital and labor used in the production of the traded good Y^T, and X represents a nontraded input. We assume that all capital is owned by foreign firms and that capital completely depreciates in every period. This allows us to identify the capital stock K^T with the volume of private foreign investment which, for simplicity, we henceforth call FDI.

Part of the nontraded input which we interpret as the country's *infrastructure* is provided free of charge by the government.[26] We assume that the amount of the nontraded input provided by the government, G, is proportional to the volume of foreign aid.[27]

If firms desire to use more of the nontraded input than provided by the government, they can employ labor to increase X. We assume that firms will always find it desirable to produce some amount of the nontraded input themselves, i.e. we impose

Assumption 1 *The amount of the nontraded input provided by the government, G, is*

[26] What we have in mind is a fairly wide definition of infrastructure, encompassing roads, telephone lines and electricity as well as less measurable items like education or a reliable and well-functioning bureaucracy.

[27] Note that we do not make any assumption about the *fungibility* of aid. It is a well-established fact that a given amount of foreign transfers earmarked for specific purposes does not raise government spending on these purposes by the same amount – either because funds are diverted or because domestically financed government spending is reduced (Feyzioglu et al. 1998). However, all we need for our model is that *some* share of foreign aid received by the government is used productively.

smaller than the optimal amount used by firms in the absence of government provision, X^*.

The productivity of labor in producing the nontraded input depends on the *institutional environment*: the more frictions firms face in forms of regulatory barriers, corruption etc., the greater the amount of labor they have to employ to produce a given volume of this input. We denote the intensity of such frictions by the parameter $\mu > 0$ and write the total amount of the nontraded input as follows:

$$X = \frac{L^X}{\mu} + G, \tag{4}$$

where L^X represents labor devoted to the (private) production of the nontraded input.

When deciding how much labor to employ in the production of the traded good and the nontraded input, respectively, firms make sure that the marginal productivity of labor in both uses is equalized. Given the production function in (3), this implies

$$\beta \frac{Y^T}{L^T} = (1 - \alpha - \beta) \frac{Y^T}{\mu X}. \tag{5}$$

Using (4), (5), and the fact that total employment in the economy is normalized to one, i.e. $L^X = 1 - L^T$, we compute the amount of labor devoted to traded goods production:

$$L^T = \frac{\beta}{1 - \alpha}(1 + \mu G). \tag{6}$$

This result has a straightforward interpretation: first, a poor regulatory environment – reflected by a high value of μ – reduces the productivity of labor in the production of the nontraded input and therefore induces firms to shift more labor to the production of the traded good. Second, if the government provides a large amount of the nontraded input – i.e. if G is high – this also reduces the marginal productivity of labor in the production of the nontraded input and raises L^T. Put differently: the greater the amount provided by the government and the worse the regulatory environment (reflected by a high value of μ), the lower the amount of labor firms devote to the production of the nontraded input.

5.2 Comparative static analysis

Having determined the allocation of the labor force, we can now compute the optimal capital stock, which – due to our assumptions on the rate of depreciation and the owner-

ship structure – we identify with the level of FDI. In every period, the marginal product of capital has to be equal to the exogenous world interest rate r plus one (the rate of depreciation). Combined with (6), this implies

$$K^T = \left(\frac{\Psi}{1+r}\right)^{1/(1-\alpha)} \left(\frac{1}{\mu}\right)^{(1-\alpha-\beta)/(1-\alpha)} (1+\mu G), \tag{7}$$

with $\Psi \equiv \alpha \left(\frac{\beta}{1-\alpha}\right)^{\beta} \left(\frac{1-\alpha-\beta}{1-\alpha}\right)^{(1-\alpha-\beta)}$. This expression can be used to derive our key comparative static results, which we summarize in the following lemma:

Lemma 1 *The level of FDI, K^T, is increasing in the volume of foreign aid, G, and decreasing in the regulatory burden μ. The positive effect of G is stronger the higher the regulatory burden.*

Proof. *The first result follows directly from taking the first derivative of K^T with respect to G. For the second result we need Assumption 1. The first derivative of K^T with respect to μ is negative iff $G < (1-\alpha-\beta)/(\beta\mu)$. Comparing this with the optimal level of private input in the absence of government provision $X^* = (1-\alpha-\beta)/[(1-\alpha)\mu]$, it is easy to show that $G < X^*$ (Assumption 1) implies $G < (1-\alpha-\beta)/(\beta\mu)$. The third result follows directly from taking the appropriate cross derivative.* ■

Our simple model thus suggests that a higher level of aid-financed infrastructure attracts more FDI. This is due to the fact that raising G lowers the amount of labor that is devoted to the production of non-traded inputs and thus increases L^T. A higher level of L^T, in turn, has a positive effect on the marginal productivity of capital and thus on optimal investment. The beneficial effect of foreign aid is stronger if the regulatory environment is *bad*, i.e. if the private sector is hampered in its production of the nontraded input: if μ is high, firms provide a low level of X since production is costly. However, starting from a low level, increasing X has a strong effect on the marginal productivity of capital and thus on FDI. Put differently: the greater the impediments for the private sector to produce the necessary nontraded input, the more important it is that the government is able to finance at least *some* amount of this input. Since, by assumption, government spending is proportional to foreign aid, this mechanism explains the negative effect of the

interactive term in our regressions.[28]

This does not mean, of course, that regulation is good for FDI. Quite on the contrary, as both our comparative static results and our empirical findings show: the direct effect of a bad institutional environment on foreign direct investment is negative. Even if the government offers a certain level of infrastructure, high regulation introduces a distortion and thus lowers the level of X, which reduces the economy's attractiveness for foreign investors.

5.3 Including the rent-seeking effect

In contrast to our empirical results, the model so far predicts a strictly positive marginal effect of G (foreign aid) on K^T (private foreign investment), regardless of μ. We can easily modify our setup to include a counter-productive "rent-seeking effect" such that the composite impact of aid on FDI may turn negative. We follow the structure sketched in the introduction by making productivity dependent on the level of foreign aid G and on the friction parameter μ. More specifically, total factor productivity is lowered by (aid-financed) government spending, and this effect is reinforced by a high value of μ. The modified production function looks as follows:

$$Y^T = (1 + \mu^\gamma G)^{(\alpha-1)} (K^T)^\alpha (L^T)^\beta (X)^{(1-\alpha-\beta)}, \tag{8}$$

with $0 < \gamma < 1$. It is easy to show that, for a given volume of aid, private foreign investment is

$$K^T = \left(\frac{\Psi}{1+r}\right)^{1/(1-\alpha)} \left(\frac{1}{\mu}\right)^{(1-\alpha-\beta)/(1-\alpha)} \left(\frac{1+\mu G}{1+\mu^\gamma G}\right). \tag{9}$$

Taking the first derivative of K^T with respect to G reveals that K^T is *decreasing* in the volume of foreign aid if $\mu < 1$ and *increasing* if $\mu > 1$. Hence, if firms face a serious regulatory burden ($\mu > 1$), the negative rent-seeking effect of aid is dominated by the positive infrastructure effect while it is the other way round if $\mu < 1$. Finally, the second result from Lemma 1 still holds: regulation *per se* has a negative effect on FDI.

[28] Recall that the Kaufmann et al. (1999) indicator of the regulatory burden *increases* in the quality of the regulatory environment.

6 Summary and conclusions

When we started out to explore the empirical effect of aid on private foreign investment, we expected to find an open-economy version of the Burnside and Dollar (2000) result: that aid enhances private foreign investment in a good regulatory and political environment, while it is ineffective or even detrimental if the institutional environment is poor. Surprisingly, the relationship turned out to be much more complex: on average, higher aid has no effect on private foreign investment, but the effect is strictly *positive* if investors face a substantial regulatory burden.

The first conclusion we can draw from this finding is, once more, that it is crucial to account for institutional and political factors when assessing the effect of aid on economic activity. If we had neglected the role of the institutional environment, we would have ended up with a result similar to Boone's (1996) finding that aid is essentially ineffective.

As we have emphasized repeatedly, the fact that the positive impact of aid is stronger in countries with a *bad* institutional environment does not imply that countries should further turn the regulatory screw to attract foreign firms. The opposite is the case: as our empirical results show, removing institutional frictions is still the best way to increase the volume of foreign investment. In this respect, our findings are in line with conventional wisdom. Where they differ is in their implication that, in a bad regulatory environment, aid need not be wasteful or even counterproductive.

The purpose of our simple model was to illustrate why this might be the case. The bottom line of the model was that foreign aid can be beneficial by replacing suppressed private initiative. Of course, this need not be the only explanation, and one might speculate about alternative mechanisms that could have generated our empirical result. In this sense, our paper should rather be read as an invitation for further research than as a definitive statement on the relationship between official aid and private foreign investment.

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Data Appendix

We employ data from the following sources: the CD-Rom version of the *World Development Indicators 2001* (World Bank 2001a), Global Development Finance (World Bank, 2001b), Kaufmann et al. (1999), Global Developmemt Network (GDN) database, Political Risk Services and the OECD's *International Development Statistics 2001* on CD-Rom. The variables are defined as follows:

- *Net foreign direct investment inflows*: Net inflows of investment to acquire a lasting management interest (10 percent or more of voting stock) in an enterprise operating in an economy other than that of the investor (sum of equity capital, reinvestment of earnings, other long-term capital, and short-term capital as shown in the balance of payments) (current U.S. dollars). Source: World Bank (2001a).
- *Portfolio equity investment inflows* (net): Non-debt-creating portfolio equity flows (the sum of country funds, depository receipts, and direct purchases of shares by foreign investors) (current U.S. dollars). Source: World Bank (2001a).
- *Private foreign investment:* Sum of *net foreign direct investment inflows* and *portfolio equity investment inflows* (current US dollars). Source: World Bank (2001a).
- *Population*: Total population. Source: World Bank (2001a).
- *Aid*: Official development assistance and net official aid (current US dollars). Source: World Bank (2001a).
- *Grants*: Legally binding commitments that obligate a specific value of funds available for disbursement for which there is no repayment requirement, excluding technical cooperation grants (current US dollars). Source: World Bank (2001b).
- *Technical cooperation grants*: Free-standing technical cooperation grants, which are intended to finance the transfer of technical or managerial skills or of technology, and investment-related technical cooperation grants which are provided to strengthen the capacity to execute specific investment projects (current US dollars). Source: World Bank (2001b).
- *Multilateral aid*: Net aid flows from DAC donors and Arab donors (current US dollars). Source: OECD (2001).
- *Bilateral aid*: Total net aid flows less *multilateral aid* (current US dollars). Source: OECD (2001).
- *GDP*: Gross domestic product (current international dollars), PPP basis. Source: World Bank (2001a).
- *Income per capita*: *GDP* divided by population.
- *Relative income per capita* = *income per capita* divided by period-specific means.
- *Openness*: Exports plus imports (as a % of GDP). Source: World Bank (2001a).
- *Literacy rate*: 100 - adult total illiteracy rate (% of people ages 15 and above). Source: Illiteracy rate data is from World Bank (2001a).
- *Arms imports*: Arms imports (as % of GDP). Source: World Bank (2001a).
- *Investor risk*: Mean of two indicators (likelihood of expropriation, repudiation of contracts). Source: Political Risk Services.

- *Voice and accountability*: Based on up to six sources of indicators relating to the political process, civil liberties and political rights. Source: Kaufmann et al. (1999).
- *Political instability and violence*: Based on up to seven sources of indicators relating to the likelihood that a government will be destabilised or overthrown unconstitutionally and/or violently. Source: Kaufmann et al. (1999).
- *Government effectiveness*: Based on up to eight sources of indicators relating to the quality of the bureaucracy and public services, the competence and independence of civil servants, and government credibility. Source: Kaufmann et al. (1999).
- *Regulatory burden*: Based on up to seven sources of indicators relating to market-unfriendly policies and excessive regulation on business and trade. Source: Kaufmann et al. (1999).
- *Rule of law*: Based on up to ten sources of indicators relating to crime, the quality of the judiciary and the enforceability of contracts. Source: Kaufmann et al. (1999).
- *Graft*: Based on up to ten sources of indicators relating to the perception of corruption. Source: Kaufmann et al. (1999).
- *French legal origin*: Dummy variable equal to one when the legal origin is French. Source: GDN.
- *British legal origin*: Dummy variable equal to one when the legal origin is British. Source: GDN.
- *Fuel exporter*: Dummy variable equal to one for all countries where fuel makes up at least 25% of exports. Source: fuel as % of exports data are from World Bank (2001a).
- Regional dummies: Dummy variables equal to one if country belongs to a specific region (*Latin America and Caribbean*, *East Asia and Pacific*, *East Europe and Central Asia*, *Middle East and North Africa*, *South Asia*, *Sub-Saharan Africa*). Source: GDN.
- Time dummies: Dummy variables equal to one for the specific period (1994-96, 1997-99).

The countries in the sample were chosen as follows. Initially, we selected all 157 countries classified as low-income countries or middle-income countries in the WDI2001. We then deleted countries with a population below 1 million, countries without any data on either both or one of the components of *private foreign investment* (as defined above), and countries either not featured in the Kaufmann et al. data set, or without data on *regulatory burden*. In addition, Ethiopia and the Republic of Yemen were left out since their borders changed during the sample period (earlier data refer to a different geographical area). This left the following 92 countries in the sample, classified by income according to the classification in GDN:

- *Low income countries*: Angola, Bangladesh, (Benin), Burkina Faso, (Burundi), (Cambodia), Cameroon, (Chad), China, Congo (Dem. Rep.), Congo (Rep.), Cote d'Ivoire*, Gambia, Ghana, Guinea, Guinea-Bissau*, Haiti*, Honduras, India, Indonesia, Kenya, (Lao PDR), (Lesotho), (Liberia), Madagascar, Malawi*, Mali*, (Mauritania), Mongolia, Mozambique, (Myanmar), (Nepal), Nicaragua, Niger, Nigeria, Pakistan, (Rwanda), Senegal, Sierra Leone*, (Somalia), (Sudan), Tanzania, Togo*, Uganda, Vietnam, Zambia, Zimbabwe.
- *Lower middle-income countries*: Algeria, Bolivia, Bulgaria, Colombia, Costa Rica, Dominican Republic, Ecuador, Egypt, El Salvador, Guatemala, Iran*, Jamaica, Jordan*, Morocco, Papua New Guinea, Paraguay, Peru, Philippines, Romania, South Africa*, Sri Lanka, (Swaziland), Syrian Arab Republic, Thailand, Tunisia.

- *Upper middle-income countries*: Argentina, Botswana*, Brazil, Chile, Czech Republic*, Gabon*, Hungary, Korea* (Rep.), Lebanon, Malaysia*, (Mauritius), Mexico, (Oman), Panama, Poland, Slovak Republic, Trinidad and Tobago, Turkey*, Uruguay, Venezuela.

The baseline regressions with 76 countries and 210 observations in Table 2 did not include the countries in parentheses. An asterisk (*) indicates that one or two observations are missing for a given country.

	Mean	Min.	Max.	Std. Dev.	Skewness	Kurtosis
ln(*foreign private investment p.c.*)	2.592	-3.876	6.418	1.972	-0.544	3.080
ln(*aid p.c.*)	2.954	-2.446	5.097	1.265	-1.025	4.359
Voice and accountability	1.610	0.124	3.093	0.716	0.035	2.239
Political instability and violence	2.283	0.000	3.832	0.775	-0.662	3.421
Government effectiveness	1.481	0.000	2.935	0.580	-0.092	2.892
Regulatory burden	2.436	0.000	3.573	0.622	-1.208	5.399
Rule of law	1.830	0.000	3.238	0.648	-0.131	2.731
Graft	1.197	0.000	2.596	0.499	0.310	3.320
ln(*income p.c.*) (lagged)	7.825	6.087	9.423	0.817	-0.179	1.991
Openness (lagged)	31.153	7.460	92.298	14.152	1.063	4.673
ln(*GDP*) (lagged)	24.281	20.481	28.795	1.628	0.343	2.690
Investor risk	7.611	2.883	10.000	1.601	-0.753	2.905
1994-96	0.348	0.000	1.000			
1997-99	0.352	0.000	1.000			
East Asia and Pacific	0.114	0.000	1.000			
East Europe and Central Asia	0.090	0.000	1.000			
Middle East and North Africa	0.105	0.000	1.000			
South Asia	0.057	0.000	1.000			
Sub-Saharan Africa	0.338	0.000	1.000			

Correlation Coefficients

	ln(*aid p.c.*)	*Regul. burden*	ln(*aid p.c.*) * *reg. burden*	ln(*income p.c.*) (lagged)	*Openness* lagged)	ln(*GDP*) (lagged)	*Investor risk*
ln(*foreign private investment p.c.*)	-0.220	0.678	0.096	0.682	0.287	0.271	0.633
ln(*aid p.c.*)		-0.018	0.851	-0.375	0.261	-0.726	-0.313
Regulatory burden			0.466	0.501	0.088	0.148	0.492
ln(*aid p.c.*)**reg. Burden*				-0.080	0.255	-0.520	-0.033
ln(*income p.c.*) (lagged)					0.126	0.481	0.669
Openness (lagged)						-0.379	0.169
ln(*GDP*) (lagged)							0.511

Table A1. Descriptive statistics (for the sample in column 2.4, Table 2, with 210 observations).

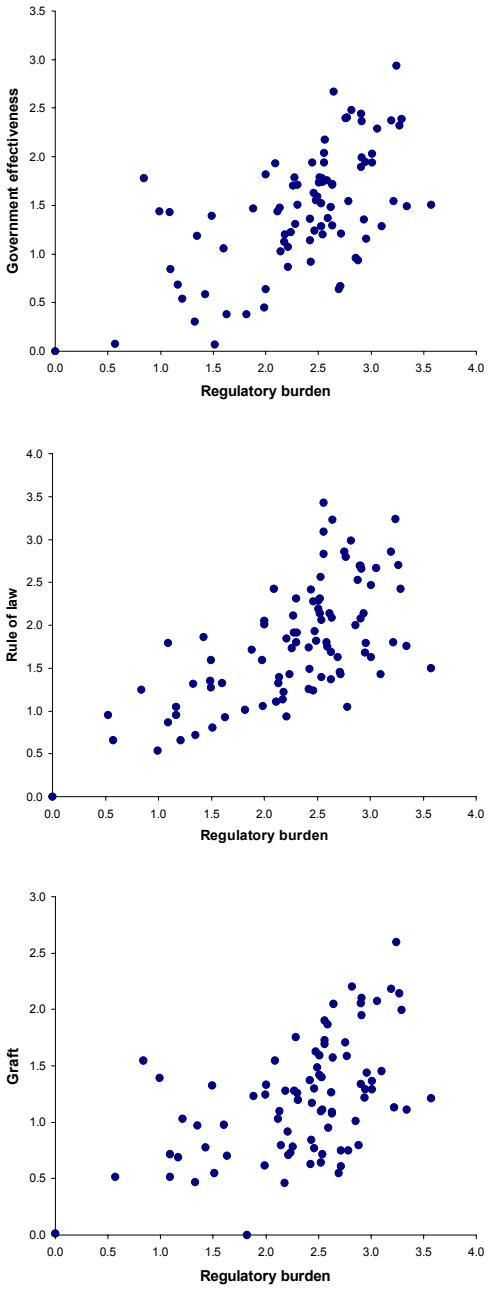

Figure A1. Scatterplots of governance variables: some examples.

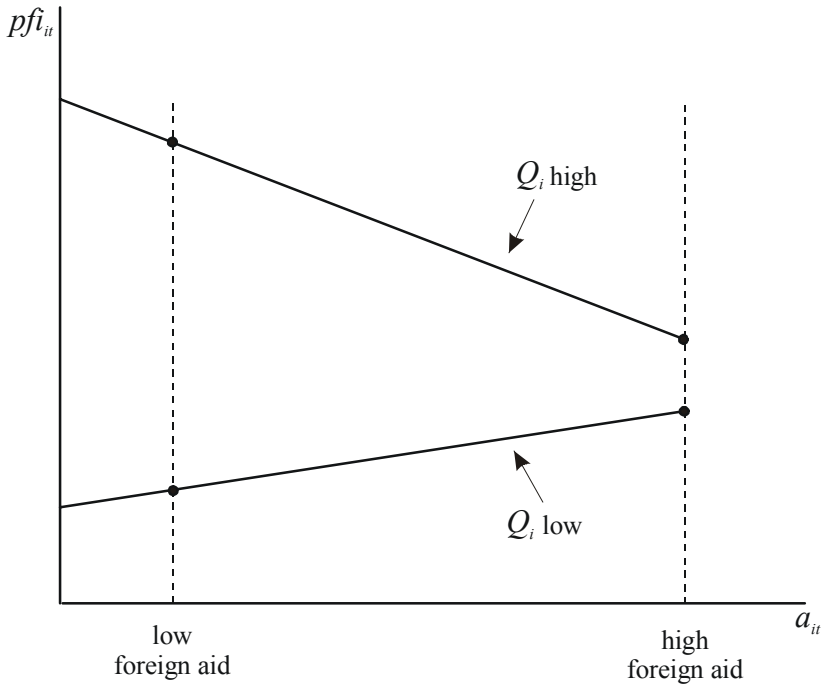

Figure 1: The 'puzzling' result: stylized representation.

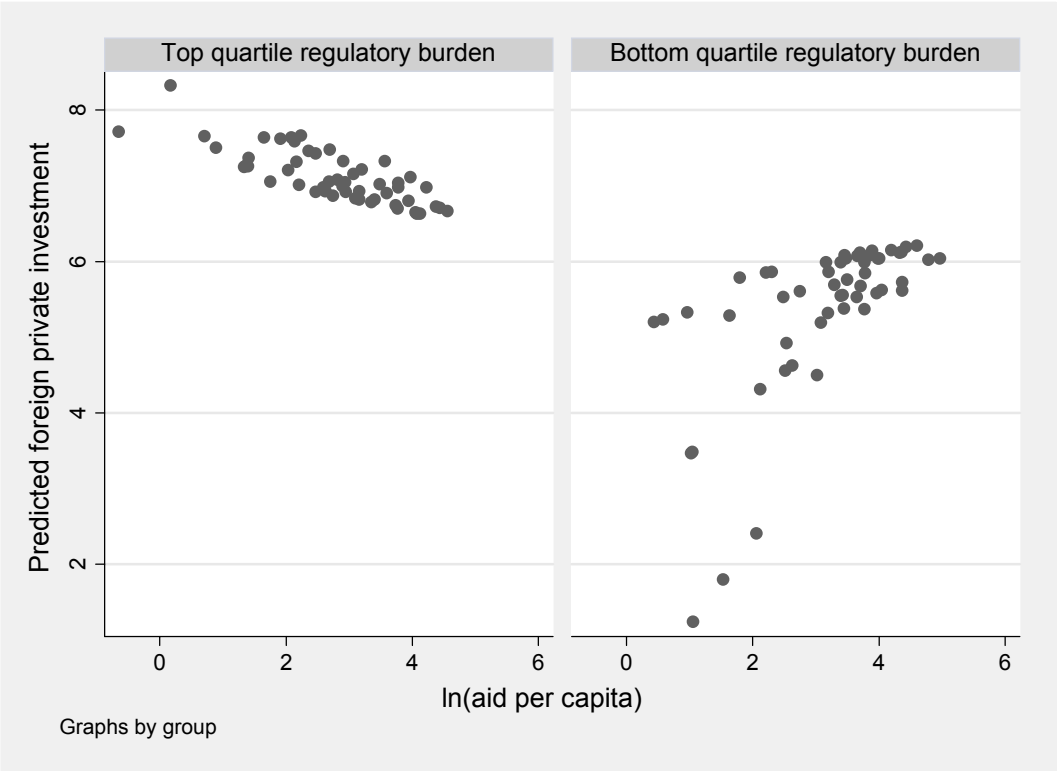

Figure 2: Predicted foreign private investment due to aid, regulatory burden and interactive term.

	1.1 Voice and accoun-tability	1.2 Political instability and violence	1.3 Government effectiveness	1.4 Regulatory burden	1.5 Rule of law	1.6 Graft
ln(*aid per capita*)	0.126	0.148	0.103	-0.023	0.147	0.137
	[1.05]	[1.21]	[0.86]	[0.25]	[1.26]	[1.20]
Governance	0.430	0.635	0.715	1.215	0.973	0.848
	[2.06]*	[3.01]**	[2.86]**	[4.29]**	[4.11]**	[3.09]**
ln(*income per capita*) (lagged)	0.643	0.830	0.633	0.681	0.556	0.555
	[2.48]*	[3.48]**	[2.42]*	[3.13]**	[2.02]*	[1.99]+
Openness (lagged)	0.035	0.033	0.037	0.033	0.032	0.033
	[3.37]**	[3.07]**	[3.27]**	[3.08]**	[2.92]**	[3.08]**
ln(*GDP*) (lagged)	0.245	0.248	0.217	0.179	0.251	0.233
	[1.68]+	[1.69]+	[1.49]	[1.22]	[1.69]+	[1.62]
Investor risk	0.368	0.254	0.337	0.151	0.233	0.339
	[2.16]*	[1.73]+	[2.21]*	[1.40]	[1.67]+	[2.16]*
1994-96	0.076	0.201	0.122	0.376	0.288	0.116
	[0.33]	[0.94]	[0.59]	[2.15]*	[1.44]	[0.54]
1997-99	0.188	0.343	0.225	0.566	0.470	0.242
	[0.70]	[1.37]	[0.92]	[2.80]**	[2.01]*	[0.95]
East Asia and Pacific	-0.747	-0.962	-0.975	-0.250	-1.160	-0.945
	[1.43]	[2.00]*	[1.92]+	[0.52]	[2.33]*	[1.85]+
East Europe and Central Asia	-1.273	-1.514	-1.140	-0.753	-1.465	-1.261
	[3.46]**	[4.14]**	[3.67]**	[2.27]*	[4.44]**	[4.11]**
Middle East and North Africa	-2.079	-2.337	-2.441	-1.317	-2.811	-2.400
	[3.49]**	[4.71]**	[4.57]**	[3.67]**	[5.67]**	[4.46]**
South Asia	-2.093	-1.732	-1.891	-1.599	-2.183	-2.219
	[3.49]**	[2.48]*	[3.21]**	[3.04]**	[3.70]**	[3.54]**
Sub-Saharan Africa	-0.755	-0.710	-0.874	-0.366	-1.098	-1.020
	[2.31]*	[2.22]*	[2.62]*	[1.37]	[3.16]**	[2.76]**
Observations	210	210	210	210	210	210
R-squared	0.682	0.709	0.703	0.737	0.728	0.701
R-squared adj.	0.661	0.690	0.683	0.719	0.710	0.681
DWH χ^2-test (p-value) (IV_1)	0.423	0.316	0.592	0.890	0.471	0.453
DWH χ^2-test (p-value) (IV_2)	0.486	0.470	0.654	0.885	0.633	0.569
Sargan test (p-value) (IV_2)	0.833	0.344	0.198	0.573	0.517	0.702

Table 1. Private foreign investment, aid and governance: basic estimates.

Notes: The dependent variable is ln(*private foreign investment per capita*). All regressions were estimated by OLS and also included a constant (not reported). The numbers in brackets are the estimated t-ratios (absolute values), based on cluster-adjusted standard errors. The symbols '+', '*' and '**' denote significance at the 10%, 5% and 1% levels, respectively. DWH refers to the Durbin-Wu-Hausman test for exogeneity of ln(*aid per capita*), based on a comparison of OLS and 2SLS estimates (not shown). The excluded instruments used for the 2SLS estimates are: IV_1: ln(*aid per capita*) (lagged); IV_2: ln(*aid per capita*) (lagged), ln(*population*), *arms imports* (lagged), *literacy rate* (lagged), *fuel exporter* dummy, *French legal origin* dummy, *British legal origin* dummy. The Sargan-test for overidentification refers to IV_2. See text for further details.

	2.1 Voice and accoun-tability	2.2 Political instability and violence	2.3 Government effectiveness	2.4 Regulatory burden	2.5 Rule of law	2.6 Graft
ln(*aid p.c.*)	0.492	0.724	0.321	1.173	0.342	0.466
	[1.11]	[1.58]	[0.72]	[3.49]**	[0.83]	[1.19]
Governance	0.921	1.287	1.108	2.567	1.236	1.559
	[1.70]+	[2.44]*	[1.49]	[7.16]**	[2.25]*	[1.98]+
ln(*aid p.c.*)**governance*	-0.187	-0.239	-0.140	-0.473	-0.095	-0.252
	[1.05]	[1.43]	[0.61]	[3.79]**	[0.58]	[1.08]
ln(*income p.c.*) (lagged)	0.558	0.772	0.594	0.628	0.542	0.536
	[1.97]+	[3.20]**	[2.24]*	[2.97]**	[1.97]+	[1.93]+
Openness (lagged)	0.038	0.035	0.038	0.036	0.034	0.034
	[3.68]**	[3.34]**	[3.31]**	[3.62]**	[3.02]**	[3.05]**
ln(*GDP*) (lagged)	0.312	0.295	0.242	0.292	0.281	0.271
	[2.02]*	[2.15]*	[1.63]	[2.25]*	[1.79]+	[1.91]+
Investor risk	0.346	0.264	0.322	0.102	0.226	0.315
	[2.27]*	[2.02]*	[2.27]*	[1.06]	[1.73]+	[2.23]*
Marginal effect of ln(*aid p.c.*), evaluated at the mean	0.191	0.178	0.114	0.020	0.168	0.163
(*p*-value)	(0.275)	(0.189)	(0.406)	(0.848)	(0.246)	(0.235)
Observations	210	210	210	210	210	210
R-squared	0.687	0.719	0.705	0.766	0.730	0.706
R-squared adj.	0.665	0.699	0.683	0.749	0.710	0.685

Table 2. Private foreign investment, aid and governance: including an interactive term.

Notes: The dependent variable is ln(*private foreign investment per capita*). All regressions were estimated by OLS and also included a constant, as well as the same period and regional dummies as in Table 1 (but not reported). The numbers in brackets are the estimated t-ratios (absolute values), based on cluster-adjusted standard errors. The symbols '+', '*' and '**' denote significance at the 10%, 5% and 1% levels, respectively.

	3.1	3.2	3.3	3.4	3.5	3.6	3.7	3.8	3.9	3.10	3.11	3.12	3.13
Estimation method:	OLS	OLS	OLS	HOLS	HOLS	2SLS	2SLS	2SLS	2SLS	GMM	GMM	GMM	GMM
Standard errors/weighting:		robust	cluster	robust	cluster			robust	cluster	robust	cluster	robust	cluster
IV set:				IV_1	IV_1	IV_1	IV_2	IV_2	IV_2	IV_1	IV_1	IV_2	IV_2
ln(*aid p.c.*)	1.173	1.173	1.173	1.261	1.256	1.361	1.356	1.356	1.356	1.361	1.361	1.444	1.475
	[4.52]**	[4.53]**	[3.49]**	[5.04]**	[3.89]**	[4.55]**	[4.65]**	[4.97]**	[4.01]**	[4.80]**	[3.79]**	[5.61]**	[4.86]**
Regulatory burden	2.567	2.567	2.567	2.716	2.661	2.960	3.130	3.130	3.130	2.960	2.960	3.252	3.147
	[8.03]**	[8.76]**	[7.16]**	[9.40]**	[7.43]**	[7.80]**	[8.38]**	[9.42]**	[7.88]**	[8.42]**	[6.92]**	10.39]**	[8.35]**
ln(*aid p.c.*)**regul. burden*	-0.473	-0.473	-0.473	-0.514	-0.501	-0.586	-0.612	-0.612	-0.612	-0.586	-0.586	-0.645	-0.629
	[4.90]**	[4.76]**	[3.79]**	[5.24]**	[4.01]**	[5.08]**	[5.39]**	[5.59]**	[4.64]**	[5.16]**	[4.18]**	[6.19]**	[5.08]**
ln(*income p.c.*) (lagged)	0.628	0.628	0.628	0.641	0.614	0.620	0.506	0.506	0.506	0.620	0.620	0.541	0.663
	[3.71]**	[4.04]**	[2.97]**	[4.23]**	[3.02]**	[3.65]**	[2.77]**	[3.27]**	[2.36]*	[4.02]**	[3.01]**	[3.64]**	[3.47]**
Openness (lagged)	0.036	0.036	0.036	0.042	0.043	0.042	0.038	0.038	0.038	0.042	0.042	0.039	0.035
	[5.15]**	[4.22]**	[3.62]**	[5.81]**	[4.62]**	[5.76]**	[4.37]**	[4.18]**	[3.39]**	[5.81]**	[4.57]**	[4.44]**	[3.33]**
ln(*GDP*) (lagged)	0.292	0.292	0.292	0.348	0.382	0.301	0.241	0.241	0.241	0.301	0.301	0.250	0.253
	[2.95]**	[3.11]**	[2.25]*	[4.01]**	[3.34]**	[2.58]*	[1.97]*	[1.89]+	[1.41]	[2.59]*	[1.90]+	[2.09]*	[1.75]+
Investor risk	0.102	0.102	0.102	0.052	0.049	0.056	0.076	0.076	0.076	0.056	0.056	0.084	0.109
	[1.22]	[1.19]	[1.06]	[0.64]	[0.53]	[0.67]	[0.89]	[0.92]	[0.82]	[0.68]	[0.59]	[1.02]	[1.23]
Marginal effect of ln(*aid p.c.*), evaluated at the mean	0.020	0.020	0.020	0.009	0.036	-0.065	-0.140	-0.140	-0.140	-0.065	-0.065	-0.132	-0.062
(*p*-value)	(0.825)	(0.789)	(0.848)	(0.907)	(0.925)	(0.387)	(0.287)	(0.317)	(0.442)	(0.416)	(0.725)	(0.311)	(0.692)
Observations	210	210	210	209	209	209	195	195	195	209	209	195	195
R-squared	0.766	0.766	0.766	0.772	0.771	0.771	0.775	0.775	0.775	0.771	0.771	0.772	0.772
R-squared adj.	0.749	0.749	0.749	0.755	0.755	0.754	0.757	0.757	0.757	0.754	0.754	0.755	0.755

Table 3. Private foreign investment, aid and regulatory burden: different estimation methods.

Notes: The dependent variable is ln(*private foreign investment per capita*). The numbers in brackets are the estimated t-ratios (absolute values). The symbols '+', '*' and '**' denote significance at the 10%, 5% and 1% levels, respectively. The estimation methods are ordinary least squares (OLS), heteroskedasticity-OLS (HOLS), two-stage least squares (2SLS) and generalised method of moments (GMM). See Baum et al. (2003) for a description of these estimators.

	4.1	4.2	4.3	4.4	4.5
ln(*aid p.c.*)	1.1732	1.1454	1.2107	1.3850	0.8396
	[3.49]**	[3.01]**	[3.01]**	[4.04]**	[2.08]*
Regulatory burden	2.5670	2.5630	2.5454	2.9031	2.9549
	[7.16]**	[7.12]**	[6.38]**	[7.38]**	[6.48]**
ln(*aid p.c.*)**regul. Burden*	-0.4734	-0.4715	-0.4782	-0.5968	-0.5960
	[3.79]**	[3.70]**	[3.31]**	[4.11]**	[3.88]**
ln(*income p.c.*) (lagged)	0.6283	0.6292	-1.5696	0.1188	0.6442
	[2.97]**	[2.97]**	[0.60]	[0.34]	[3.15]**
Openness (lagged)	0.0361	0.0360	0.0973	0.0322	0.0344
	[3.62]**	[3.61]**	[3.65]**	[3.40]**	[3.52]**
ln(*GDP*) (lagged)	0.2923	0.2946	-0.4960	0.2352	0.3008
	[2.25]*	[2.25]*	[0.34]	[1.81]+	[2.30]*
Investor risk	0.1016	0.1002	0.1322	0.1124	-0.1520
	[1.06]	[1.04]	[0.39]	[1.17]	[0.77]
ln(*aid p.c.*) squared		0.0055	0.0033		
		[0.19]	[0.11]		
ln(*aid p.c.*)**relative income p.c.*				0.1847	
				[1.74]+	
ln(*aid p.c.*)**investor risk*					0.0801
					[1.47]
ln(*income p.c.*) (lagged) squared			0.1435		
			[0.84]		
Openness (lagged) squared			-0.0007		
			[2.54]*		
ln(*GDP*) (lagged) squared			-0.0056		
			[0.22]		
Investor risk squared			0.018		
			[0.62]		
Marginal effect of ln(*aid p.c.*),					
evaluated at the mean	0.02	0.013	0.055	-0.055	-0.003
(*p*-value)	(0.848)	(0.789)	(0.546)	(0.423)	(0.812)
Observations	210	210	210	210	210
R-squared	0.766	0.766	0.776	0.772	0.769
R-squared adj.	0.749	0.747	0.754	0.754	0.751

Table 4. Private foreign investment, aid and regulatory burden: various specifications.

Notes: The dependent variable is ln(*private foreign investment per capita*). All regressions were estimated by OLS and also included a constant, as well as the same period and regional dummies as in Table 1 (but not reported). The numbers in brackets are the estimated t-ratios (absolute values), based on cluster-adjusted standard errors. The symbols '+', '*' and '**' denote significance at the 10%, 5% and 1% levels, respectively.

	5.1	5.2	5.3	5.4	5.5	5.6	5.7
	1991-93	1994-96	1997-99	Low-income countries	Middle-income countries	Annual data (1991-97)	Cross-section (1991-99)
ln(*aid p.c.*)	0.929	1.437	1.275	1.354	2.086	1.074	1.246
	[1.25]	[3.62]**	[3.42]**	[3.63]**	[3.46]**	[3.43]**	[3.85]**
Regulatory burden	2.416	3.094	2.280	3.211	3.145	2.540	2.495
	[2.88]**	[6.25]**	[6.09]**	[6.57]**	[5.24]**	[7.50]**	[6.50]**
ln(*aid p.c.*)**regul. burden*	-0.408	-0.614	-0.412	-0.662	-0.765	-0.478	-0.522
	[1.49]	[3.74]**	[3.17]**	[4.10]**	[3.44]**	[4.21]**	[4.40]**
ln(*income p.c.*) (lagged)	0.634	0.500	0.801	0.384	0.630	0.672	0.769
	[1.40]	[2.36]*	[3.20]**	[1.01]	[1.16]	[2.85]**	[3.09]**
Openness (lagged)	0.054	0.043	0.031	0.058	0.017	0.034	0.032
	[2.98]**	[3.12]**	[2.96]**	[5.67]**	[1.36]	[4.02]**	[3.05]**
ln(*GDP*) (lagged)	0.403	0.396	0.293	0.371	0.128	0.187	0.156
	[2.15]*	[2.02]*	[2.14]*	[2.16]*	[0.73]	[1.46]	[1.04]
Investor risk	0.055	0.109	0.069	-0.074	0.342	0.182	0.196
	[0.26]	[0.63]	[0.64]	[0.60]	[2.41]*	[2.33]*	[1.75]+
Marginal effect of ln(*aid p.c.*),							
evaluated at the mean	-0.085	-0.054	0.284	-0.015	-0.006	-0.092	0.054
(*p*-value)	(0.578)	(0.528)	(0.084)	(0.937)	(0.960)	(0.458)	(0.738)
Observations	63	73	74	94	116	459	76
R-squared	0.736	0.774	0.826	0.641	0.709	0.716	0.839
R-squared adj.	0.673	0.729	0.791	0.588	0.669	0.704	0.809

Table 5. Private foreign investment, aid and regulatory burden: different time periods, country groups and frequencies.

Notes: The dependent variable is ln(*private foreign investment per capita*). All regressions were estimated by OLS and also included a constant, as well as regional dummies. Regressions 5.4-5.6 also included period dummies. The numbers in brackets are the estimated t-ratios (absolute values), based on cluster-adjusted standard errors except for regression 5.7 where heteroskedasticity-consistent standard errors were used. The symbols '+', '*' and '**' denote significance at the 10%, 5% and 1% levels, respectively.

	6.1	6.2	6.3	6.4	6.5	6.6
Dependent variable: (p.c., in logarithms)	Private foreign investment	Private foreign investment	Private foreign investment	Private foreign investment	FDI	Private equity flows
Aid variable: (p.c., in logarithms)	Grants	Technical cooperation grants	Bilateral aid	Multilateral aid	Aid	Aid
Aid variable	0.975	1.001	1.068	1.180	1.056	2.920
	[2.69]**	[3.15]**	[3.34]**	[3.39]**	[2.98]**	[2.20]*
Regulatory burden	2.051	2.281	2.294	1.769	2.341	3.768
	[6.03]**	[8.35]**	[7.20]**	[6.90]**	[6.33]**	[2.51]*
Aid variable**regul. burden*	-0.399	-0.548	-0.433	-0.431	-0.421	-1.025
	[3.03]**	[4.23]**	[3.59]**	[3.33]**	[3.28]**	[2.03]*
ln(*income p.c.*) (lagged)	0.596	0.773	0.563	0.669	0.519	0.617
	[2.77]**	[3.83]**	[2.66]**	[3.01]**	[2.19]*	[1.05]
Openness (lagged)	0.035	0.035	0.036	0.037	0.038	0.009
	[3.58]**	[3.71]**	[3.68]**	[3.91]**	[3.85]**	[0.49]
ln(*GDP*) (lagged)	0.254	0.067	0.313	0.338	0.225	0.466
	[1.80]+	[0.41]	[2.48]*	[2.73]**	[1.66]	[1.46]
Investor risk	0.144	0.095	0.107	0.146	0.084	0.228
	[1.51]	[1.02]	[1.12]	[1.53]	[0.85]	[1.30]
Marginal effect of aid variable, evaluated at the mean	0.001	-0.338	0.018	0.136	0.03	0.232
(*p*-value)	(0.995)	(0.071)	(0.815)	(0.105)	(0.790)	(0.321)
Observations	214	214	206	208	211	99
R-squared	0.765	0.777	0.758	0.761	0.729	0.479
R-squared adj.	0.749	0.761	0.740	0.744	0.709	0.392

Table 6. Private foreign investment, aid and regulatory burden: different aid and dependent variables.

Notes: The dependent and aid variables used in each regression are defined at the top of the table. All regressions were estimated by OLS and also included a constant, as well as the same period and regional dummies. The numbers in brackets are the estimated t-ratios (absolute values), based on cluster-adjusted standard errors. The symbols '+', '*' and '**' denote significance at the 10%, 5% and 1% levels, respectively.