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INSTITUT FOR ØKONOMI

AFDELING FOR NATIONALØKONOMI - AARHUS UNIVERSITET - BYGNING 322
8000 AARHUS C - ☎ 89 42 11 33 - TELEFAX 86 13 63 34

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SCHOOL OF ECONOMICS AND MANAGEMENT - UNIVERSITY OF AARHUS - BUILDING 322
8000 AARHUS C - DENMARK ☎ +45 89 42 11 33 - TELEFAX +45 86 13 63 34

Conditionality, Commitment and Investment Response in LDCs*

Mariarosaria Agostino
Department of Economics and Statistics,
University of Calabria
Ponte P. Bucci
87036 Arcavacata di Rende (CS) - Italy
E-mail: m.agostino@unical.it

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Abstract

The private investment response to structural reforms in developing countries is of paramount importance, both for the future economic growth and the survival of the reforms themselves.

By employing a sample of countries, recipients of World Bank Structural Adjustment Loans, the present paper assesses whether agreements, including policy conditionality, represent a positive signal for the private sector and translate into capital formation.

The empirical investment equation adopted is estimated using dynamic panel data econometric methods, allowing for simultaneity and country-specific effects. The main result obtained is that, while a higher propensity to commit does not seem to affect the private investment response, a higher percentage of tied funds might impact negatively on the demand of fixed investment.

Keywords: Conditional aid, policy uncertainty, investment response, dynamic panel methods.

JEL classification: C23, E22, F35.

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1 Introduction

A 1992 study from the World Bank Operation Evaluation Department points out that a temporary slowdown in private investments can be rational during an adjustment period. Indeed, "the entire path of reforms is not specified at the outset, and if it were, it would not be fully credible. This increases uncertainty and creates a high marginal return for postponing investment until the uncertainty is resolved".

Few years later, Nicholas Stern emphasizes the important role the Bank should play in helping governments spell out the reform path and in supporting the commitment to reform in the eyes of the private sector. In fact, the success or failure of an adjustment program crucially depends on the private investment response. Not only does the investment determine future economic growth, but it also contributes to current demand and employment. Thus, a positive response may make the adjustment effort socially more acceptable, increasing the probability that the reforms will be maintained.

The question, which this work tries to answer, is whether World Bank conditional loans have actually succeeded in supporting the commitment to reform of recipient countries. More precisely, the issue is whether the deal on loan conditionality translates into a positive investment response, presumably by affecting the credibility of the policy maker. Such an important and controversial issue still represents an unsolved empirical question. The existing works are not numerous and mostly confined to case studies, adopting qualitative methods.

This paper contributes to the limited empirical literature by considering the "propensity to commit" to World Bank conditionality as a signal, which the government sends to private investors in order to boost their investment response. The final result crucially depends on the positive or negative connotation that the private agents give to such a signal. Other variables are also considered in order to test the significance of other potential ambiguous signals, which the start of a structural program may generate.

The final results are obtained by employing recent data and applying dynamic panel methods in order to take into account the endogeneity of many investment determinants and the formal commitment in itself, the role of country-specific effects and the inertia characterizing yearly data.

The main findings are that the formal commitment in itself, the share of tied funds to GDP, the duration and the past history of commitment do not appear to be relevant factors in the investment decision process. By contrast, a higher proportion of conditional lending with respect to the total amount of World Bank annual financing appears to depress, on average, private investments.

The remainder of this work is organized as follow: section 2 summarizes the debate in the literature on the link between commitment to conditionality and credibility of policy reforms. Section 3 defines the "propensity to commit", and presents the probit model, which accounts for both demand and supply determinants of a conditional loan. After a description of the control variables employed, including a review of the main approaches adopted in measuring uncertainty, section 4 presents the econometric model. Section 5 describes the data and reports the results obtained. Part 6 concludes.

2 Literature review

A sizeable body of the theoretical literature investigates the credibility of economic policies in the context of structural adjustment programs. Empirical studies are less numerous and mostly confined to case studies, adopting qualitative methods.

A common theoretical prediction is that structural reforms will affect entrepreneurs' decisions only when the reforms are visible and expected to be maintained. If investors expect the government either to introduce countervailing measures or to reverse the announced reforms, they will likely hold back from investing, jeopardizing the sustainability of the program.

Opinions diverge on whether the World Bank conditionality can play the important role of a commitment technology, increasing the reliability of domestic policy makers in the eyes of the private agents.

Two main hypotheses have been formulated. According to the first one, the announcement of a structural program, envisaging structural reforms, may demonstrate the government commitment to reform and establish credibility. Because of the deal on loan conditionality, the private sector may believe that future domestic policies will be time consistent.

In the alternative view, investors do not look at the Bank's imprimatur as providing a "sufficient predictor of time consistency" (see Killick, 1998). By contrast, the commitment to policy reform, prompted by conditional aid, may jeopardize the credibility of the policy makers, and it is likely to impair supply responses. When a government agrees on reforming in return for aid, private investors may picture different possible scenarios: they either expect the reform to be implemented or not. In the former case, they may think it could be either maintained or reversed in few months. Yet, the reversal might be envisaged as hidden or evident. Such different possibilities may increase the uncertainty on future policy time-consistency and plague the desired investment response.

Boko and Lapan (2001) support the first hypothesis in exploring the credibility of trade policy reform in some African countries. They maintain that international agreements can represent a commitment mechanism, helping the public agent to build a stronger reputation. Their theoretical intuition is corroborated by their empirical findings: programmed reforms, agreed with the Bretton Woods institutions, appear to improve the private sector perception on policy maker commitment[1].

Other authors share this view, claiming that conditional aid "provides an opportunity for recipients to tie their own hands" (Dollar and Svensson, 1998). According to François (1997), negotiated external policy bindings have been employed by some developing countries in order to relieve investors' concerns on policy uncertainty. In particular, trade agreements can limit the uncertainty about future conditions of market access.

[1] In particular, they use a sample of eight African countries involved in reform programs with the Bretton Woods institutions from 1980 to 1990. They test two hypotheses: whether governments actually reformed their tariffs structure after signing adjustment plans, and whether these plans influenced the private response in terms of trade flows. While their evidence suggests that the pre-commitment tariffs did not have significant impact on actual tariffs, they claim that there exists a reaction of the private sector to announced policies. Indeed, in their trade regression, tariffs are not relevant in the period before the agreements, and become significant in the post agreement period. This can be interpreted as the result of the commitment to remove or convert in tariffs the so-called nontrade barriers.

In Ratha's (2001) view, sometimes a government may welcome conditionality as a means to implement unpopular reforms or as a signal to stimulate private investment. Conditionality may provide political cover for structural changes, which otherwise would not be carried out. The same argument is thoroughly illustrated by Vreeland (2003), who describes the logic of using IMF conditionality. He maintains that a government may desire conditions to be imposed, in order to push through its reform agenda. In fact, by entering into an IMF program, the incumbent may increase the cost of rejecting its proposals for the opponents, since "a rejection is no longer a mere rejection of an executive, but also of the IMF".

According to Collier et al. (1997), conditional aid may have several different rationales. Among the others, aid might have a "lock-in" effect on policy reforms. Indeed, donors might play the role of agencies of *restraint*, and protect governments against political pressures for reversal, as far as they attach credible penalties to policy changes. Another possible rationale for conditionality is *signalling*. Donors may aim at reducing information costs concerning government performance in order to attract investments. The agreement with conditions may become a signal of future improvement in policy.

The same authors highlight, however, that the dominant rationale of conditional aid has been *inducement*, which signals that government and donor preferences diverge. This can contaminate the credibility of a reform, because if national policy makers reform in order to comply with some donor's conditions, "private agents cannot tell whether the government is genuinely committed to liberalization, has already decided to take the aid donors for a ride or has simply welcomed the money and deferred the agony of decision" (Collier and Gunning, 1994).

Other researchers as well recognize in the bargaining process with donor agencies a destabilization source for the private expectations. In Rodrik's (1991) view, microeconomic programs and liberalization measures are the most dangerous kind of reforms in terms of the doubt that they are likely to generate as to their survival. The author models policy uncertainty as the probability that a reform will be reversed. Assuming that the investment involves sunk costs, he shows that even a small probability of collapse may make an "otherwise sensible reform" harmful. Indeed, rational investors may want to wait to see whether the government will change its plans. If this is the case, the investment resurgence necessary for the reform to be successful does not materialize. By contrast, the average firm is induced to opt for lower capacity, and this may, in turn, increase the probability of a reform collapse.

Killick (1998) considers hardcore conditionality essentially coercive. In his opinion, conditionality sounds at odds with the government identification in the program. In other words, loan conditions contradict the notion of ownership[2]. Since ownership is crucial for credibility, if conditionality jeopardizes ownership, it will also undermine the credibility of reforms.

As far as the empirical part of his study is concerned, the author assembles evidence from previous country case studies, and applies to them an analytical framework, mutuated from the agency theory, in order to investigate the

[2]Many different definitions of ownership exist in the literature. Basically, a country is said to "own" a program when it shares the objectives of the lending institution and considers the implementation of the agreement in its own interest. See Boughton and Mourmouras (2002) for a review of studies on the theme.

effectiveness of World Bank conditional loans. Among all the propositions he tests applying a qualitative method, the null hypothesis of increased credibility because of agreements with external agencies is rejected[3]. Therefore, he concludes that "investors are apparently not inclined to treat the IFI's imprimatur as providing a sufficient predictor of time consistency".

The debate sketched above appears lively, but still lacking of convincing empirical evidence. The present work is intended to provide some evidence on the theme, focusing on the effects of a formal commitment, prompted by World Bank adjustment programs, on private fixed investments.

Before describing the investment model, it is worth clarifying the assumptions underlying this investigation and how the concept of credibility can be related to the measure of formal commitment employed.

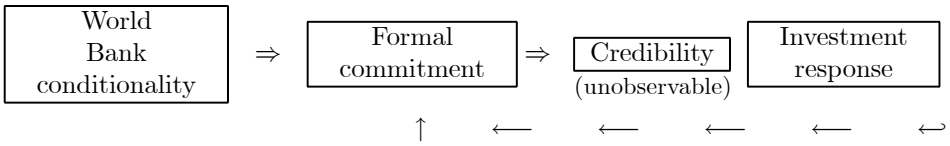
3 Defining and measuring formal commitment

Structural adjustment loans represent a peculiar type of World Bank lending instruments, designed to support policy and institutional reforms. Therefore, any country who signs a SAL or SECAL agreement has to commit to implement the policy "menu" of reforms suggested by the donor and mutually agreed as necessary to achieve the program targets[4].

The question analysed in this empirical study is not whether conditional aid has been successful in fostering efficient and/or sustainable reforms in the past decades, and through that, in promoting investment and growth.

Rather the question is whether the fact that a government signals to the private sector that is embarking on structural reforms may have a positive or negative impact on its reputation, and ultimately influence the investment response in the country.

Figure 1 briefly summarizes the issue under investigation: does a formal commitment to the World Bank conditionality cause a negative or a positive investment response by impacting on policy makers' credibility?



Notice that in answering to this question the important issue of "joint endogeneity" has to be addressed. Indeed, commitment might impact on investment and, vice versa, the latter might affect the decision to commit.

Moreover, the change in credibility induced by a structural loan poses major measurement problems since it is unobservable. Formal commitment could either compromise or establish credibility.

[3]The proposition is the following: "agreeing an IFI adjustment programme, through its pre-commitment effect, raises the credibility of the governement's own policies, and private sector responses to these". The author highlights that this was a difficult hypothesis to test, and only for seven countries could he find unambigous indications, but in none of them the existence of a IFI program seems relevant.

[4]SAL stands for Structural Adjustment Loan and SECAL for Sector Adjustment Loan.

In the following subsection, a probit model is employed to retrieve predicted measures of formal commitment. Whether the commitment significantly affects private investments is the empirical question addressed in section 4.

3.1 A model of commitment

The credibility of economic policies is unobservable, and the same measurement problem characterizes the *real* degree of commitment of the government. What it is possible to observe is the occurrence of a formal commitment, and this appears quite relevant for the purpose of the present analysis. Indeed, the question under discussion is whether or not the *formal* agreement places a burden on investors, presumably by altering the perception of policy uncertainty, causing a negative investment response.

Since the occurrence of a formal commitment is a discrete phenomenon, a limited dependent variable approach is applied.

In this model there is a latent *propensity to commit*, denoted as f^*,which is generated by the following process:

$$f_i^* = \beta^{'} x_i + \eta_i$$

where the error term is normally distributed, with zero mean and variance σ_η^2. The x variables represent the determinant of a commitment prompted by a World Bank structural adjustment program.

When $f_{it}^* > 0$, a formal commitment is observed; when $f_{it}^* \leq 0$, no commitment materializes. If φ_{it} is an indicator function, such that

$$\varphi_i = 1 \text{ if } f_i^* > 0$$

$$\varphi_i = 0 \text{ if } f_i^* \leq 0$$

the probability of commitment is:

$$P(\varphi_i = 1) = P(f_i^* > 0) = P(\eta_i > -\beta^{'} x_i) = 1 - F(-\beta^{'} x_i)$$

where F is the cumulative distribution function of η_i.

As $\eta_i's$ are iid $N(0, \sigma_\eta^2)$, a probit model is estimated in order to retrieve the predicted probability of a formal commitment to reform.

3.1.1 Supply and demand determinants of a formal commitment

The probit regression includes both demand and supply side potential determinants of an agreement between the Bank and the recipient country. Indeed, in modeling the probability of a formal commitment, it would not be sufficient to consider only variables that drive the government demand for World Bank loans. It appears also important to include some country characteristics, which influence the agreement of the lending institution. As a matter of fact, the final commitment on specific reforms is the result of the negotiation process between the two parties.

Some recent studies on the IMF financial arrangements explicitly account for both types of determinants. According to them, the approval of a program

is the joint outcome of both the country's desire to enter a program and the Fund's decision to approve one.

Knight and Santaella (1997) employ a bivariate probit with partial observability to model the fact that two decisions are simultaneously taken and they are interrelated[5].

Vreeland (2003) uses a dynamic bivariate probit with partial observability, as he argues that participation evolves over time, and he wants to distinguish between the decision of entering an agreement and the decision to continue an agreement.

Barro and Lee (2002) prefer to adopt a reduced form model, reflecting both demand and supply determinants. They apply a univariate probit to panel data, allowing for within country correlation of the error terms over time. Indeed, they argue that if the decision of the Fund in one period is driven also by unobserved country specific factors, then the same unexplained factors may be at work in other periods.

In the light of these studies and the consideration of the econometric limitations posed by a bivariate probit, the present work adopts the following reduced form model:

$$f_i^* = \theta_0 + \theta_1 D_i + \theta_2 S_i + \eta_i \qquad \text{(a)}$$

$$\varphi_i = 1 \text{ if } f_i^* > 0$$

$$\varphi_i = 0 \text{ if } f_i^* \leq 0$$

where the vectors D and S include respectively the demand and supply determinants, described below. The dependent variable φ_i takes on the value of one each year the country has signed a SAL or a SECAL (i.e. the country has formally committed to reform), and zero otherwise.

Model (a) is estimated by two different approaches: a univariate pooled probit and a panel probit model allowing for within group correlation.

3.1.2 Variables and Data Description

As far as the World Bank is concerned, on the demand side, a study by Ratha (2001) finds that the external financing gap is an important factor influencing the request of a loan. In particular, "the demand is positively related to an increase in debt service payments and inversely related to a borrowing country's level of reserves".

On the supply side, Fleck and Kilby (2001) examine the geographic distribution of World Bank lending from 1968 to 1992. Their empirical study controls for country characteristics expected to affect the distribution of lending according to the Bank's stated apolitical allocation mechanisms. Together with these variables, some other regressors are considered, reflecting US interests. Thus,

[5] In order to make their maximum likelihood estimates converge, though, they have to maintain the assumption that the error terms are independent, thus they don't account for the possibility of common shocks to the two decision processes. Moreover, the bivariate model fails to predict sufficient approvals, since it implies a very stringent criterion for the prediction of an agreement. It predicts an approval only when both the supply and demand determinants point towards an arrangement. Therefore, they end up relying more on univariate probit estimates.

the explanatory variables belong to two groups. The first reflects recipient needs and includes variables such as population share, population growth, real GDP per capita and index of openness. The second group comprehends financial and trade flows with US and US bilateral aid.

Following these works, the probit model adopted in the present study includes the variables listed below.

Supply factors	
Population share	percentage with respect to the total population in all recipient countries
GDP_pc	real GDP per capita
GDP_pc growth	annual percentage growth rate of GDP per capita
Openness	import plus export, as a share of GDP
Trade with US	country imports from US plus exports to US as a share of US total trade flows
Demand factors	
International reserves	months of imports, which could be paid for
Debt service	debt repayments as percentage of exports

A quadratic term is also included for both population share and real GDP per capita[6].

To estimate (a), an unbalanced panel data set is employed. The sample countries have obtained at least one SAL or SECAL between 1980 and 2001, thus they have the status of recipients. The initial date coincides with the introduction of the first adjustment program. Due to limited data availability, 28 recipient countries from the initial sample were dropped. The sample left includes 78 countries and spans the years 1982-2001[7].

Two main databases are employed: the World Bank online New Projects Database, and World Bank Development Indicators 2003. Only one variable, trade flows with US, is drawn from COMTRADE statistics.

Appendix 3 shows the number of SALs and SECALs for each sample country. The average number is about 5. Ghana is the nation, whith the highest number of agreements, while ten countries receive just one of these kinds of loan[8]. As far as the explanatory variables are concerned, no particular problem of potential outliers is detected when considering as outliers the observations for which any of the variables lies beyond 10 standard deviations away from the mean[9]. Therefore, no observation is dropped.

3.1.3 Empirical Results

Table 1 summarizes the results obtained using pooled and panel data. As far as the pooled estimation is concerned, the same specification is run at two different

[6] Appendix 1 contains a detailed variables description, with their relative sources.

[7] Both the original and final lists of countries are reported in Appendix 2.

[8] Namely: Azerbajian, China, Comoros, Dominica, Equatorial Guinea, Guatemala, Latvia, Malaysia, Sri Lanka and Trinidad and Tobago.

[9] Servèn (2002) applies the same criterion.

levels of aggregation: the sample level and the area level[10].

In all five cases, the Wald test strongly rejects the null hypothesis of all coefficients equal to zero. Moreover, most regressors are individually significant and have the expected sign. In particular, the demand determinants of a commitment are almost always significant, and their sign is consistent with the findings in Ratha (2001). Namely, the frequency of a commitment is positively related to the debt service payments and inversely related to the level of reserves.

Another interesting result is the significance of the two variables reflecting the intensity of trade with the world in general and with the US in particular. Meanwhile, a more open economy seems less likely to enter a SAP, an increase in trade flows with US appears to make the approval of a conditional loan more likely. This confirms previous findings in both the World Bank and the Fund related empirical literature. According to them, geopolitical determinants play an important role in the Fund's provision of loans (Barro and Lee, 2003), and US interests appear to impact on the geographic distribution of World Bank loans (Fleck and Kilby, 2001).

Finally, at higher level of GDP per capita, an increase in per capita income seems to make a conditional loan more likely, and vice versa at a lower level of the variable. However, the square term coefficient is always rather small.

Table 1 - Probit Estimates
(dependent variable: dummy equal to one each year a new SAP is approved)

	Pooled data				Panel data
	all	EAsia	LAC	MeAfrica	all
	1	2	3	4	5
Constant	-.3372 .1511**	-.1253 .3950	-.6335 .4312	-.7521 .2445***	-.3762 .2444
Population share	-.0021 .0547	.0528 .0780	.3254 .5573	1.083 .4724**	.0006 .0539
Population share^2	-.0015 .0021	-.0029 .0031	-.1276 .1366	-.4734 .1955**	-.0017 .0019
l.Gdp_pc	-.0003 .0001***	-.0005 .0003*	-.0002 .0002	-.0002 .0003	-.0003 .00007***
l.Gdp_pc^2	4.59e-08 1.50e-08***	9.85e-08 5.11e-08*	2.89e-08 2.21e-08	3.46e-09 6.24e-08	4.63e-08 9.71e-09***
l.Gdp_pc growth	.0010 .0069	-.0220 .0155	.0296 .0199	-.0026 .0085	-.0017 .0075
l.Openess	-.0033 .0013***	-.0051 .0032	-.0033 .0027	.0009 .0020	-.0037 .0013***
l.Trade with US	.1462 .0393***	-.1647 .2154	.1477 .0749**	-.3276 .5286	.1494 .0326***
l.International Reserves	-.0453 .0215**	-.0591 .0652	-.0306 .0398	-.0550 .0294*	-.0507 .0302*
l.Debt Service	.0099 .0027***	.0063 .0085	.0108 .0052**	.0085 .0037**	.0086 .0028***
Wald test (p value)	0.000	0.008	0.000	0.000	0.000
Num. obs.(countries)	1300 (78)	333(26)	362(19)	605(33)	1300 (78)

Note: regressions 1 and 5 include geographical area dummies. Regression 5 comprises also year dummies. Standard errors are heteroskedasticity consistent.
One, two, three stars denote statistical significance at the 10%, 5% and 1% critical level respectively. The operator l. indicates that the lagged value has been considered.

[10] When considering the geographical location, I run separate regressions for three macro areas: East Europe & Asia (EAsia), Latin America (LAC), and Middle East & Africa (MeAfrica). As only few Eastern European and Middle East countries are in the sample, it was not possible to run a separate regression for them, maintaining the same specification adopted for the entire sample and the other areas.

The fitted probabilities from equation 1 to 5 provide three estimated frequencies of commitment and will be considered as a key regressor in an investment dynamic panel equation along with some investment determinants, as described in detail in the following section. An alternative measure employed will be the actual frequency of a formal commitment.

Notice that to check the robustness of the final result to the specification chosen, different specifications of the probit were employed, and none of them implied a different result in the panel regression[11].

Furthermore, as Cukierman et al. (1992) highlight when they use the fitted probability of a change in government as an index of political instability, the predicted probabilities incorporate more information than is available to the negotiating parties each year. Therefore, to deal with the possibility of measurement errors the fitted probabilities will be treated as endogenous variables within the context of the GMM instrumental variable procedure adopted in section 4.

Finally, the estimated frequencies will represent "generated regressors" in the panel investment regression, where they will be included, and this may be problematic for the inference. However, as Pagan (1884) points out, under the null hypothesis that the generated regressor coefficient is zero, the standard errors are unbiased, then it is possible to test the null hypothesis that the generated regressor coefficient is zero. The same caveat will be taken into account when considering other kinds of generated regressors as measures of uncertainty.

4 The regression model

4.1 An investment equation

The basic investment response equation, adopted in this work, presents the following specification:

$$PFI_{it} = \alpha PFI_{i(t-1)} + x'_{it}\beta + \eta_i + v_{it} \tag{1}$$

Where indices i and t refer to individual and time period, respectively.

On the right hand side, the acronym PFI stands for the ratio of private fixed investments to GDP.

The row vector x'_{it} comprehends some control variables, which are intended to capture not only the conventional accelerator effect and the cost of capital goods, but also some other factors that are likely to affect the investment decision process in less developed countries.

The group of conventional private investment determinants includes: the current and lagged values of the real GDP growth, the real interest rate and the relative price of capital goods. The latter is measured as the (log of the) ratio of the investment deflator to the GDP deflator.

[11] For instance, I estimated regressions on pooled data including individual dummies and time dummies, obtaining similar results. Moreover, the most parsimonious specification was selected through a general-to-simple approach, by dropping the most insignificant regressor at each stage, and ending up with a set of variables significant at least at the 5% level. Using the relative fitted probabilities in the investment equation confirms the results presented below.

The second group takes into account other factors, which the literature on private investment considers as specific to developing countries. Rama (1993) summarizes such specific determinants in the following four categories.

4.1.1 Credit Rationing

In a less developed economy, firms do not enjoy an unlimited supply of credit at a given interest rate. By contrast, the pervasive role of administered interest rates and direct allocation of credit to some firms may render observed interest rates uninformative as to the true marginal cost of funds. The domestic credit to the private sector variable (as a share of GDP) is usually considered in order to take into account the so-called "overall tightness of credit markets".

4.1.2 Foreign exchange shortage

The variable international reserves in months of imports is added to the regressor set to consider the possibility of a rationing for the demand of capital goods. Indeed, many developing countries have to import a considerable proportion of the machineries and equipment that they employ in their production. Thus, a shortage of foreign reserves is equivalent to a quantity rationing for capital goods, which usually do not have domestic substitutes.

4.1.3 Lack of infrastructure

In developed countries, public investment is expected to "crowd out" private investment through an increase in the interest rate. In economies where inadequate infrastructure represents one of the most severe obstacles facing firms, public investment in roads, telecommunication, power and the like may be complementary to private investment. Therefore the overall impact of changes in public investment (i.e. whether the positive externality dominates the negative crowding out effect) remains an empirical question.

4.1.4 Economic instability

In any country, the quantity and quality of private investment depends on the expected returns and the uncertainties around those returns.

In the last decade, a major thrust of the investment theoretical literature has been the development of models to represent investment decisions under uncertainty. Dixit and Pindyck (1994) emphasize two crucial features of most fixed investment expenditures: their irreversible nature and the possibility to postpone the investment decision in order to gain more information about costs, price and, in general, all market conditions relevant for the profitability of a new project. Once these two factors are taken into account, the standard net present value rule, employed to decide whether to invest in a project, is rejected. Indeed, this rule does not take into account the opportunity cost, which an irreversible investment expenditure always implies. Such an opportunity cost consists in giving up the chance of waiting for new information, and it can be better understood looking at an irreversible investment decision as a financial call option[12].

[12] A firm owning an investment opportunity has the option to invest, and it can be compared

As in the financial options case, the option to invest has a value in itself, which increases when the uncertainty relative to the underlying asset increases. When a firm invests, it exercises the option, and the value of the lost option represents an opportunity cost, which has to be added to the other costs of the investment. This opportunity cost will increase as the uncertainty over the future value of the project increases.

In the light of this analysis, worse economic conditions increasing the perceived riskiness of future cash flows can have a large negative impact on investments[13].

The degree of economic and political instability represents an important factor, which shapes investors' expectations, and developing economies are on average characterized by higher variability in both macroeconomic and political variables, affecting the investment climate. Therefore, the set of control variables would not be complete if uncertainty were neglected.

Uncertainty indicators The vector x_{it} includes measures capturing the volatility of two macroeconomic variables: growth of real GDP and inflation rate. Moreover, it includes the level of inflation, as both inflation and its volatility are considered indicia of economic instability[14].

The rather difficult task in studying the relationship between economic instability and aggregate investment is to identify the appropriate way to proxy uncertainty in the investment equation. Three main approaches exist in the literature, and none of them can be said to provide the true measure of uncertainty.

A strand of the empirical works employs measures of sample variability, such as sample standard deviations, as indicators of economic volatility[15].

Another approach aims at separating uncertainty from sample variability. Indeed variability is not necessarily equivalent to uncertainty, except when events are unpredictable. Consequently, more accurate measures of uncertainty would be provided by the dispersion of the innovations to the variables of interest. In other words, sample variation might overstate uncertainty, since it includes both unpredictable components and movements, which can be pre-

to the owner of a financial call option, who has the right, for a specified period of time, to pay a fixed price (exercise price) if he decides to buy an asset. If the value of the underlying asset (for instance machinery or a project) decreases, the firm will not undertake the investment and will lose just what it spent to get the investment option.

[13] This conclusion is at odds with the earlier works by Hartman (1972) and Abel (1983), which claim that higher uncertainty may raise investment in a competitive market. Such a positive impact follows from the assumptions of risk neutrality and that on the relationship between the marginal product of capital and the uncertain variable: the output price. If the marginal product is convex in price, Jensen's inequality implies that a mean preserving increase in price variance raises the expected profitability of capital, thereby increasing the demand of capital goods.

[14] The volatility of the inflation rate is often considered an "economic risk index": an indicator of overall macroeconomic uncertainty. The volatility of GDP growth represents the unpredictability of demand. Pindyck and Solimano (1993) consider inflation and its volatility as the major indicia of economic instability. Other three macroeconomic variables considered by the literature are: real interest rate, real exchange rate and terms of trade. They are not employed in the present work as their uncertainty measures are usually strongly correlated with GDP growth and inflation uncertainty measures. Indeed, they contain common information (see for instance Servén, 1998).

[15] Pindyck and Solimano's (1993) inflation volatility measure, for instance, is computed as the sample standard deviation of each year's monthly observations of inflation.

dictable based on past history. In the light of these considerations, this approach uses two main measures of uncertainty: one is represented by the conditional variance of a ARCH or GARCH model; the other is based on the 1-step ahead forecast errors of univariate auto-regressive models, including one or two lags of the dependent variable[16].

Finally, some authors dismiss the backward looking measures of uncertainty and employ the risk premium implicit in the term structure of interest rate[17].

In the present work, all the measures outlined above are tested for significance, except the risk premium, due to lack of data. The final panel regression, however, includes the one which, for not being a generated regressor, does not compromise inference on the remaining variables. Appendix 4 describes the computational procedures followed to retrieve these measures.

4.2 The final specification

The fitted probabilities of a formal commitment are named Propensity to Commit (PC) and considered a regressor in an investment dynamic panel equation, along with the investment determinants described in the previous subsection. Equation (1) becomes:

$$PFI_{it} = \alpha PFI_{i(t-1)} + x_{it}^{'}\beta + \delta_1 PC_{it} + \eta_i + v_{it} \tag{2}$$

where η_i summarizes unobserved country characteristics, and v_{it} captures idiosyncratic shocks to private investments. These shocks can also influence the probability of negotiating a structural program, therefore it appears necessary to control for the endogeneity of PC. The same applies to most of the other regressors included in the vector x.

4.3 Estimation method

Equation (2) poses a dynamic panel model, combining the possibility of analyzing dynamic adjustment with the control over specific individual effects.

As in any panel data application, two crucial issues have to be initially addressed. The first involves the possible correlation between η_i and x_i. The second concerns the strict exogeneity assumption, which ensures the consistency of all most popular methods employed in a static panel data setting (random effects, fixed effects and first differencing).

In the present case, it seems reasonable to allow the unobserved individual effects η_i to be correlated with the observed explanatory variables. Indeed, the $\eta_i^{'}s$ contain unobserved country characteristics (such as technological and institutional factors), which can be considered both roughly constant over time and likely correlated with variables such as GDP growth and uncertainty measures.

The correlation between η_i and x_i would make fixed effects or first differencing appropriate methods for estimating equation (2) if no endogenous variables were included in its right hand side.

[16] Examples of fitted conditional variances from a (G)ARCH model, used as volatility measure in aggregate investment equations are Huizinga (1993), Price (1995, 1996), Servén (1998).

[17] Ferderer (1993), Ferderer and Zalewski (1994).

Here comes the second crucial question mentioned above: the strict exogeneity issue. A strictly exogenous variable is uncorrelated with past, present and future values of the error term. Formally:

$\mathrm{E}[v_{it} \mid x_{i1}, ..., x_{iT}, \eta_i] = 0$

Within the dynamic context, the presence of a lagged dependent variable in the regressor set makes this assumption fail. Therefore, fixed effects and first difference estimators are inconsistent.

Moreover, in many applications, the assumption that the $x's$ are strictly exogenous sounds unrealistic. Therefore, it can be more reasonable to assume that the explanatory variables are endogenous or predetermined. The latter type of variables are potentially correlated with past values of the idiosyncratic error, but are not correlated to its present and future values. In equation (2), if it appears implausible that the current value of a regressor is not influenced by past shocks to private investments, that variable is treated as predetermined. When a variable (such as GDP growth and uncertainty measures) is likely to be determined simultaneously along with PFI, it is treated as endogenous.

A general approach for estimating equation (2) consists of two steps. First the data are transformed in order to eliminate the unobserved individual effects, and then valid instrumental variables are employed in order to cope with the endogeneity problem.

After first differencing, equation (2) becomes

$$\Delta PFI_{it} = \alpha \Delta PFI_{i(t-1)} + \Delta x_{it}^{'} \beta + \Delta v_{it} \tag{2-D}$$

To deal with simpler notation, the vector x now comprehends all the regressors, except the lag dependent variable. Let $PFI_{it} = y_{it}$ and $x_{it}^{*} = \left(y_{i(t-1)}\ x_{it}^{'}\right)^{'}$ be the $k \times 1$ vector of explanatory variables, so that (2D) reduces to

$$\Delta y_{it} = \Delta x_{it}^{*\prime} \theta + \Delta v_{it}$$

Arellano and Bond (1991) propose estimating (2D) by a GMM procedure, exploiting the entire set of internal instruments, which the model generates, under the assumption of white noise errors[18].

Formally, if the $x's$ variables are predetermined:

$$\begin{aligned} E\left[x_{it}^{\prime} v_{is}\right] &= 0 \quad for \quad s \geq t \\ E\left[y_{i(t-1)}^{\prime} v_{is}\right] &= 0 \quad for \quad s \geq t-1 \end{aligned}$$

which implies the following orthogonality conditions:

$$\begin{aligned} E\left[x_{it}^{\prime} \Delta v_{is}\right] &= 0 \quad for \quad t = 1, 2, ...s-1 \\ E\left[y_{i(t-1)}^{\prime} \Delta v_{is}\right] &= 0 \quad for \quad (t-1) = 1, 2, ...s-2 \end{aligned} \tag{2-O}$$

[18] In what follows, both difference and system GMM estimates are obtained by using a subset of the available instruments. This is because, as Altonji and Segal (1994) point out, the use of all instruments implies small-sample downward bias of the coefficients and their standard errors.

Applying the Analogy Principle, the estimation of $\theta = (\alpha\ \beta)'$ is based on the sample counterparts of the population moment conditions.

The Arellano and Bond estimator is usually referred to as the *difference* GMM estimator. Its major drawback is that lagged level may results in poor instruments, when the explanatory variables are persistent over time. Therefore, in what follows, as a robustness check when a key variable is significant using the difference estimator, an alternative approach is employed: the so-called *system* GMM estimator of Arellano and Bover (1995) and Blundell and Bond (1998). This estimator combines the basic moments (2-O) with extra orthogonality conditions. It uses the lagged differences of the regressors as instruments for the equation in levels. The main assumption underlying the use of moment restrictions in levels is that the unobserved country effects are not correlated with changes in the error term.

Since both these GMM estimators rely on the assumption of white noise errors, it is crucial to perform a test for second order serial correlation, in the first difference residuals. In fact, if the errors in level are characterized by lack of serial correlation, the error in differences are expected to display first order autocorrelation and to be uncorrelated at all other lags. Arellano and Bond (1991) propose a test statistic which is normally distributed under the null hypothesis of no second order serial correlation, $E\left(\Delta v_{it}\Delta v_{i(t-2)}\right) = 0$. Moreover, for both estimators, it is appropriate to test the overidentifying restrictions through a Sargan test of orthogonality between the extra instruments and the residuals.

5 Data and Empirical Results

To estimate equation (2), the present work employs an unbalanced panel data set, including 40 developing countries and spanning the years 1977 to 2000[19].

The sample selection follows the same status criterion, described in section 2, for the probit estimation, where all sample countries have the status of SAL and/or SECAL recipients. In this case, however, the data availability leads to an even more dramatic loss of observations. It is evident that a larger sample would allow more reliable conclusions on the relationship between investment and formal commitment to reform. Unfortunately, the data limitation is severe and has to be taken into account when analyzing the results.

The same databases mentioned in section 2 are employed and outliers - the observations for which any of the variables lies beyond 10 standard deviations from the mean - are dropped.

Using these data, four separate regressions are run, since four alternative measures of propensity to commit are tested, one at time, conditioning on the set of control variables.

As the construction of the estimated measures of formal commitment uses past as well as future information, it does not appear appropriate to instrument these variables by using their lagged levels. Indeed, the lagged values might be correlated with the idiosyncratic error. Therefore, the country *polity score* is employed as a valid external instrument, to deal with both simultaneity bias and measurement errors[20].

[19] See Appendix 5 for the sample list.

[20] The polity score ranges from -10 to +10 for strongly autocratic and democratic systems respectively. In my sample this indicator has a strong negative correlation with all the alter-

Table 2 (Appendix 6) shows the results obtained by employing the difference GMM estimator. Column 1 includes the actual frequency of a commitment; column 2 the fitted probabilities, obtained from the pooled data; column 3 those obtained by running a separate regression for three different geographical areas; finally, column 4 considers the fitted probabilities retrieved from the panel model.

As far as the diagnostic statistics are concerned, in all the regressions, the autocorrelation tests signal a strong first order correlation in the differenced residuals, but no higher order autocorrelation. This supports the assumption of lack of autocorrelation in the errors in levels, underlying the Arellano-Bond estimator. Moreover, the Hansen test of over-identifying restrictions cannot reject the hypothesis of validity of the instruments.

As regards the control variables, they show an important degree of inertia in the dependent variable, as the coefficient of the lagged ratio of investment to GDP is relatively large (about 0.65). Moreover, as expected, GDP growth has a positive effect, whereas the uncertainty concerning the same variable affects the investment response negatively. Finally, the negative effect of the interest rate appears always significant, while the variables intended to capture the overall tightness of credit markets, the foreign exchange shortage and the lack of infrastructure are never statistically different from zero.

Turning to the alternative measures of the propensity to commit, all the fitted probabilities display a positive coefficient, while the actual frequency coefficient shows a negative sign, but none of them is statistically significant at any conventional level.

According to these results, World Bank backed commitment to reform does not appear to affect the investment decision process. The Bank's involvement does not seem to raise investors' confidence, at least in the short run. This result holds no matter which measure of commitment is employed.

As already argued, a relatively quick positive response is crucial for the success of any adjustment program, since it may make the reforming effort socially more acceptable, and increase the probability that the reforms will be maintained. The Bank's seal of approval does not appear to be a relevant factor, and changes in the investment to GDP ratio do not seem to materialize as a reflection of higher credibility and perceived future policy stability. Possibly, even when an improvement can be anticipated, such an improvement is not sufficient to enhance credibility enough to affect capital formation.

On the other hand, it could be argued that the expectations on the future survival of structural reforms may be dependent on other factors. The formal commitment in itself does not seem to affect the investment response, but other signalling, in the context of a structural program, might influence private investments by affecting the policy maker's credibility. This hypothesis is empirically investigated in the following two subsections. The first focuses on the influence the number of other "committed" countries may have on the impact of the domestic commitment. The second considers some variables, involving amount and duration of adjustment lending.

native measures of commitment, even after netting out the other exogenous variables in the equation (namely the time dummies).

5.1 Other ambiguous signals

5.1.1 Other countries' commitment

An interesting question is whether the number of other countries under a World Bank adjustment program may affect the domestic commitment impact on investment. In other words, the impact of the government commitment may depend on the number of other economies in the world and/or in the region also embarking on structural reforms.

Vreeland (2003) argues that when many other countries are under an IMF program, it is easier for a government both to enter an agreement and to continue it. This positive effect on participation is due to the fact that the *sovereignty costs*, which an agreement implies, decrease as the number of other countries "surrendering" to the IMF conditionality increases[21].

Simmons (2000) maintains that the compliance with IMF article VIII is more likely as more countries comply with it[22].

In the present analysis, these reasonings lead to the following argument: if the other countries' behaviour might condition the participation and compliance of a single country, private investors could in turn be affected by this sort of contagion. They could judge the domestic commitment to reform differently according to the number of other countries currently committing to reform. As the number of other countries under an arrangement increases, they could expect compliance to be more likely. Therefore, the commitment of the executive could be more credible, and a positive investment response could materialize.

On the other hand, investors could be concerned by a general requirement of external funding, as this could be interpreted as a downturn in the area or the world economy. Therefore, an increasing number of recipients could generate perverse effects on the investment decisions.

To shed light on this issue, the number of other economies in the world entering World Bank adjustment programs in the same year as the domestic country is interacted with the propensity to commit and added to the final specification (2)[23].

When the number of other committed countries in the world is considered, both the interaction term and the propensity coefficients are almost always positive, but never individually significant, independently of the measure of commitment employed and the estimator adopted (i.e. difference or system GMM). Moreover, propensity to commit, number of other countries and their interaction term are never jointly significant, except in one single case, when using the system GMM estimator and the fitted probabilities from pooled data as measure of commitment[24].

The results are slightly different if only countries within the same geographical area are considered. Table 3a shows that, in this case, the positive interaction

[21] The sovereignty costs are political costs, which the executive may face in approaching the IMF. Indeed the opposition may always accuse the government of bowing to "the forces of international capitalism or selling out". The magnitude of such costs depends on both the behaviour of past governments and that of other countries. When few other countries enter agreements, or when past executives have never approached the Fund, this kind of costs may represent an important obstacle to participation.

[22] This article requires countries to "keep their current account free from restriction".

[23] Both the propensity to commit and the interaction term are instrumented using the lagged value of the actual frequency of a commitment and the polity score, respectively.

[24] For the sake of simplicity, these estimates are not reported and are available upon request.

term coefficient becomes significant when the actual frequency is employed (column 1). The same coefficient remains positive, but turns insignificant when the fitted measures are considered. This loss of significance could be attributed to the fact that the sample size reduces when the fitted values are included. The system GMM estimates, however, do not confirm the results obtained by difference GMM. In table 3b, the interaction term coefficient is always positive, but never individually significant. Moreover, the three variables under analysis are jointly significant at the 10% level in column 1, table 3a, but the validity of the test is affected by the interaction term significance. In table 3b, the F test becomes insignificant in column 1, whereas is significant in columns 2 and 4.

To summarize, the number of other "committing" countries in the world does not appear to matter, while there is some weak evidence that the number of other "committing" countries within the same geographical area may make the domestic propensity to commit a positive determinant of the investment ratio. Regarding this final point, the data constraint could play an important role, and a larger sample size would likely provide more conclusive evidence.

5.1.2 Tied funds, duration and past history of commitment

The empirical analysis here shifts from the propensity to commit to other possible channels through which the start of a structural program may impact on credibility.

The first variable considered here is the share of "tied funds" to the total amount of financing that a country receives during a year from both IDA and IBRD (TF_TotF). The annual amount of "tied funds" is the sum of all SAL and SECAL financing the sample countries receive in a certain year. The question that it is meant to address is whether the relative importance of conditional assistance with respect to the total funds given by the Bank may affect private investment response. The focus is not on the amount of conditional assistance in itself, rather on the signal that the private sector could receive by a higher similar ratio. In other words, is a high share of tied financing a negative or a positive signal for the investors, being interpreted either as a symptom of World Bank distrust or as a seal of strong commitment?

Another variable is the share of tied funds to GDP (TF_GDP). Once again, the "message" the private sector could receive is ambiguous. On one hand, a high proportion of adjustment lending with respect to GDP might back up the reforms against pressures of reversal. Indeed, in case of reversal, the loss due to the cessation of aid would be remarkable. Therefore, a high ratio could be seen as a beneficial restraint, increasing the credibility of the borrower government. On the other hand, a high ratio may be interpreted as a means of "inducement" for a reluctant policy maker, thus translating into a negative impact on government credibility.

Finally, the duration months of each loan (D) and the number of previous SALs or SECALs (PL) a country has signed before the current year are included, since they may be also ambiguously interpreted by the private sector. In fact, a short period may generate concerns of time-inconsistency (Collier et al., 1997) or enhance the policy maker's credibility, as the opposition to reforms does not have time to organize. A high number of previous loans may be interpreted either as a symptom of strong commitment or a signal of problems in carrying out reforms.

To investigate the final impact on the investment ratio, the following specification is employed:

$$PFI_{it} = \alpha PFI_{i(t-1)} + x'_{it}\beta + + \delta_1 TF\_TotF_{it} + \delta_2 TF\_GDP_{it} + \delta_3 D_{it} + \delta_4 PL + u_{it}$$

where $u_{it} = \eta_i + v_{it}$. The vector x includes the set of control variables, while the extra regressors are the variables under investigation, which are all treated as endogenous, except the number of previous loans, which is considered predetermined[25].

Table 4 (Appendix 8), column 1, reports the results obtained by using the difference GMM estimator. The share of tied funds and the duration coefficients are positive, but statistically insignificant. The number of previous loans coefficient is negative, but also insignificant. The amount of tied funds relative to the total amount of IDA and IBRD funds presents a negative coefficient, and it is statistically significant at the 10% level.

To test the robustness of this result, in column 2 the same regression is run by using the system GMM estimator. The system estimates confirm the significance of the share of tied funds, which actually becomes significant at the 5% level.

According to this output, none of the variables under analysis appear to be relevant factors in the investment decision process, except the proportion of conditional lending. In fact, there is evidence that a higher share of tied funds may, on average, depress the private investment response.

6 Conclusion

Adjustment lending is meant to support policy and institutional reforms, which the World Bank considers necessary for a sustainable and equitable growth in the recipient countries.

When a conditional loan contract is signed, the desired private response becomes strongly dependent on the degree of policy uncertainty perceived by private agents. The importance of the expectations for the reforms survival draws attention to commitment mechanisms, which could increase policy maker credibility in the eyes of the private sector.

The present work investigates whether the Bank's imprimatur to policy reforms might affect the credibility of the incumbent government and impact on private fixed investment in recipient countries, providing some evidence to the theoretical debate.

Such an investigation adopts a new perspective on the effectiveness of foreign aid: it does not focus on the relationship between aid levels and investment rates. Instead, it addresses the possible link between the beginning of a structural reforms period and investor confidence, which ultimately translates into capital formation. In other words, the question addressed is whether the formal commitment to reform, backed up by a conditional loan, provides the government with a positive or a negative signal for the private sector.

[25] Moreover a time dummy variable is included to capture possible aggregate differences before and after the introduction of the first SAL. In effect, it assumes the value of one after 1980, and zero otherwise. All the regressors are described in detail in Appendix 1.

Two types of World Bank loans are considered: SALs and SECALs, as they condition the financing to the implementation of specific reforms. A policy maker who signs this kind of agreement automatically commits to follow the "policy instructions" underlying the financing.

In order to combine the possibility of analyzing dynamic adjustment with control over specific country effects, a dynamic panel model is estimated. The main results can be summarized as follows. The formal commitment in itself does not appear to be a relevant determinant of the investment decision process. Indeed, none of the alternative measures of the propensity to commit is statistically significant in the investment equation adopted. By contrast, a greater share of conditional funds - relative to the total amount of IDA and IBRD funds - may affect the investment response negatively. Finally, a larger number of neighbour "committing" countries in the context of World Bank adjustment programs might make the domestic government's propensity to commit a positive factor in the private investment equation. This result, however, is not robust across the measure of commitment employed and the estimators adopted.

According to these findings, World Bank backed commitment to reform does not appear to encourage a relatively quick positive investment response, which is crucial for the success of any adjustment program. The Bank's seal of approval does not seem to play a relevant role, and changes in the investment to GDP ratio do not materialize as a reflection of higher credibility and perceived future political stability. Possibly, even when an improvement can be anticipated, such an improvement is not sufficient to enhance credibility enough to affect capital formation.

On the other hand, higher proportions of conditional lending may result in a perverse signal of World Bank distrust, which can negatively affect the investment response. Considered with due caution, this finding may appear to support Collier et al.'s (1997) critique of the so-called "short-leash" lending. Such an approach is seen as an attempt by the lending institutions to overcome the past ineffectiveness of conditionality, and it is characterized by a detailed specification of policy reforms and by a shorter period for which contracts apply. The rationale of this design is to "price" reforms individually. In the authors' view, short-leash lending exacerbates the problem of limited ownership. The private sector cannot be confident about "a policy environment, which has been purchased by donors". The credibility of policy reform may be compromised, and this in turn may impair the supply response.

This intuition seems to be consistent with the present evidence, even though this work does not employ a measure of the "extent" of conditionality, that is able to distinguish between more and less detailed conditionality. Nevertheless, the private sector could interpret a higher proportion of conditional lending as a signal of the Bank's distrust towards the recipient government. They might think the Bank is trying to "purchase" a specific menu of reforms. Thus, they could hold back in their investment decisions.

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Appendix 1: Variables Description

Variables employed in the probit model

Approval of a new SAL or SECAL (*Sapa*)**:** dummy variable coded 1 each year when a World Bank conditional loan (SAL and/or SECAL) is approved, 0 otherwise. Source: World Bank online New Projects Database.

Debt service: total debt service (% of exports of goods and services). It is the sum of principal repayments and interest actually paid in foreign currency, goods, or services on long-term debt, interest paid on short-term debt, and repayments (repurchases and charges) to the IMF. Exports of goods and services includes income and workers' remittances. Source: World Development Indicators on CD-ROM 2003.

Geographical areas: set of dummy variables, individuating 6 different areas: Africa, Europe and Central Asia, East Asia and Pacific, Latin America, Middle East and North Africa, South Asia. Source: classification adopted on the World Bank online New Projects Database.

GDP per capita: gross domestic product, in constant U.S dollars, divided by midyear population. Source: World Development Indicators on CD-ROM 2003.

GDP per capita growth: annual percentage growth rate of GDP per capita. Source: World Development Indicators on CD-ROM 2003.

International reserves: gross international reserves expressed in terms of the number of months of imports of goods and services which could be paid for. Source: World Development Indicators on CD-ROM 2003.

Population share: population of country i in year t, divided by the total population in all recipient countries in year t. Derived from: World Development Indicators on CD-ROM 2003.

Trade flows with US: country imports from US plus exports to US, as a percentage share of the US total trade flows. Derived from: COMTRADE statistics.

Trade openness: import plus export of goods and services, as a share of GDP. Derived from: World Development Indicators on CD-ROM 2003.

Variables employed in the dynamic panel model

Committed neighbours: number of other countries, belonging to the same geographical area, which agree on a SAP in the same year t.as the recipient

country i. The areas are individuated according the World Bank classification described above. Derived from: World Bank online New Projects Database.

Committed countries: number of other countries in the world, which agree on a SAP in the same year t.as the recipient country i.Derived from: World Bank online New Projects Database.

Domestic credit to the private. sector: financial resources (% of GDP) provided to the private sector, such as through loans, purchases of non equity securities, and trade credits and other accounts receivable, that establish a claim for repayment. Source: World Development Indicators on CD-ROM 2003.

Duration: number of months a loan lasts. Derived from: World Bank online New Projects Database.

GDP growth: annual percentage growth rate of GDP at market prices based on constant local currency. Aggregates are based on constant 1995 U.S. dollars. Source: World Development Indicators on CD-ROM 2003.

GDP growth uncertainty: see Appendix 2 on uncertainty indicators.

Inflation: GDP deflator (annual %). Inflation as measured by the annual growth rate of the GDP implicit deflator shows the rate of price change in the economy as a whole. The GDP implicit deflator is the ratio of GDP in current local currency to GDP in constant local currency. Source: World Development Indicators on CD-ROM 2003.

Inflation uncertainty: see Appendix 2 on uncertainty indicators.

International reserves: gross international reserves expressed in terms of the number of months of imports of goods and services which could be paid for. Source: World Development Indicators on CD-ROM 2003.

Polity : score ranging from -10 to +10, for strongly autocratic and democratic systems respectively. Source: Rose (2003), who takes it from the Polity IV dataset, available at http://www.cidcm.umd.edu/inscr/polity/.

Previous loans: number of past SAL or SECAL loans for each country i, each year when a new World Bank conditional loan is approved. Derived from: World Bank online New Projects Database.

Private Fixed Investment: gross outlays by the private sector (including private nonprofit agencies) on additions to its fixed domestic assets. The variable is expressed as percentage share of GDP. Source: World Development Indicators on CD-ROM 2002.

Propensities to commit: generated regressors, retrieved from the estimation of different probit models (see section 2).

Public Fixed Investment: difference between Gross Domestic Fixed Investment (gross fixed capital formation), and Private Fixed Investment. Gross domestic fixed investment combines PFI to similar outlays by the public sector. Indeed, it includes land improvements (fences, ditches, drains, and so on); plant, machinery, and equipment purchases; and the construction of roads, railways, and the like, including schools, offices, hospitals, private residential dwellings, and commercial and industrial buildings. The variable is expressed as percentage share of GDP. Derived from: World Development Indicators on CD-ROM 2002.

Real interest rate: lending interest rate adjusted for inflation as measured by the GDP deflator. Source: World Development Indicators on CD-ROM 2003.

Relative price of capital goods: (log of the) ratio of the investment deflator to the GDP deflator. Derived from: World Development Indicators on CD-ROM 2003.

Tied Funds: annual amount of all Sal and Secal financing, which country i receives in year t. The variable is expressed as percentage share of GDP. Derived from: World Bank online New Projects Database.

Tied Funds/(IBRD+IDA) Funds: percentage share of tied funds to the total amount of financing that country i receives during year t from both IDA and IBRD. Derived from: World Bank online New Projects Database and World Development Indicators on CD-ROM 2003.

Appendix 2

Countries recipient of at least one SAL and/or SECAL between 1980 and 2001

Albania, Algeria, Argentina, Armenia, Azerbaijan, Bangladesh, Benin, Bolivia, Bosnia and Herzegovina, Brazil, Bulgaria, Burkina Faso, Burundi, Cambodia, Cameroon, Cape Verde, Central African Republic, Chad, Chile, China, Colombia, Comoros, Congo, Dem. Rep., Congo, Rep., Costa Rica, Cote d'Ivoire, Croatia, Czech Republic, Djibouti, Dominica, Ecuador, Egypt, Arab Rep., El Salvador, Equatorial Guinea, Ethiopia, Gabon, Gambia, The, Georgia, Ghana, Guatemala, Guinea, Guinea-Bissau, Guyana, Honduras, Hungary, India, Indonesia, Jamaica, Jordan, Kazakhstan, Kenya, Korea, Rep., Kyrgyz Republic, Lao PDR, Latvia, Lithuania, Macedonia, FYR, Madagascar, Malawi, Malaysia, Mali, Mauritania, Mauritius, Mexico, Moldova, Mongolia, Morocco, Mozambique, Nepal, Nicaragua, Niger, Nigeria, Pakistan, Panama, Papua New Guinea, Peru, Philippines, Poland, Romania, Russian Federation, Rwanda, Sao Tome and Principe, Senegal, Sierra Leone, Slovak Republic, Slovenia, Solomon Islands, Somalia, Sri Lanka, Sudan, Tajikistan, Tanzania, Thailand, Togo, Trinidad and Tobago, Tunisia, Turkey, Uganda, Ukraine, Uruguay, Venezuela, RB, Vietnam, Yemen, Rep., Yugoslavia, Fed. Rep., Zambia, Zimbabwe.

Countries in the probit sample

Albania, Algeria, Argentina, Armenia, Azerbaijan, Bangladesh, Benin, Bolivia, Brazil, Bulgaria, Burkina Faso, Burundi, Cambodia, Cameroon, Cape Verde, Chad, Chile, China, Colombia, Comoros, Costa Rica, Croatia, Dominica, Ecuador, El Salvador, Equatorial Guinea, Ethiopia, Gabon, Georgia, Ghana, Guatemala, Guinea, Guinea-Bissau, Guyana, Honduras, Hungary, India, Indonesia, Jamaica, Jordan, Kazakhstan, Kenya, Latvia, Lithuania, Madagascar, Malawi, Malaysia, Mali, Mauritania, Mauritius, Mexico, Morocco, Mozambique, Nicaragua, Niger, Nigeria, Pakistan, Panama, Papua New Guinea, Peru, Philippines, Poland, Romania, Russian Federation, Rwanda, Senegal, Sierra Leone, Sri Lanka, Thailand, Togo, Trinidad and Tobago, Tunisia, Turkey, Uganda, Ukraine, Uruguay, Zambia, Zimbabwe.

Appendix 3: number of SALs and SECALs for each sample country

Country	No of SAL / SECAL
Albania	4
Algeria	4
Argentina	10
Armenia	4
Azerbaijan	1
Bangladesh	8
Benin	4
Bolivia	6
Brazil	4
Bulgaria	6
Burkina Faso	5
Burundi	4
Cambodia	2
Cameroon	4
Cape Verde	2
Chad	6
Chile	3
China	1
Colombia	6
Comoros	1
Costa Rica	4
Croatia	2
Dominica	1
Ecuador	4
El Salvador	2
Equatorial Guinea	1
Ethiopia	2
Gabon	2
Georgia	3
Ghana	16
Guatemala	1
Guinea	6
Guinea-Bissau	3
Guyana	2
Honduras	5
Hungary	7
India	3
Indonesia	6
Jamaica	8
Jordan	6
Kazakhstan	4
Kenya	7

Country	No of SAL / SECAL
Latvia	1
Lithuania	2
Madagascar	7
Malawi	8
Malaysia	1
Mali	7
Mauritania	7
Mauritius	2
Mexico	13
Morocco	11
Mozambique	5
Nicaragua	3
Niger	7
Nigeria	4
Pakistan	9
Panama	4
Papua New Guinea	3
Peru	5
Philippines	7
Poland	5
Romania	4
Russian Federation	3
Rwanda	2
Senegal	8
Sierra Leone	5
Sri Lanka	1
Thailand	5
Togo	6
Trinidad and Tobag	1
Tunisia	8
Turkey	8
Uganda	10
Ukraine	2
Uruguay	5
Zambia	11
Zimbabwe	3
TOTAL	373
min	1
max	16
mean	4.782
stdev	3.044

Appendix 4: Uncertainty indicators

Measures of sample variability

The first measure of uncertainty, which I compute consists of the 3 year rolling standard deviation of each variable, in each country.

Measures based on the 1-step ahead forecast errors of univariate auto-regressive models

The following auto-regressive model of order 1 is recursively estimated, for each variable and for each country:

$$y_{it} = \alpha^{\tau} + \beta^{\tau} y_{i(t-1)} + v_{it}; \qquad t = 1, ...\tau; \qquad \tau = T_0, ...T$$

The symbol τ indicates that the sample size changes in the recursive estimation.The initial length of the series (T_0) is set at 10, thus the recursive estimation involves running (T-10) regressions for each country, in order to compute the 1-step ahead forecast errors, and then construct the uncertainty measure as the time varying standard deviation of the forecast errors. This procedure evidently requires the estimation of a very large number of regressions, and it ensures that no future information is employed in forecasting. Moreover, it provides annual observations on the uncertainty measures.

The standard deviation is computed over the last three years.

Measures from a Garch (1,1) model

For each variable and for each country, a standard GARCH (1,1) model is estimated. This is made of two specifications, one for the conditional mean and one for the conditional variance:

$$y_{it} = \alpha + \beta y_{i(t-1)} + v_{it}$$

$$\sigma^2_{it} = \gamma_i + \delta_i v^2_{i(t-1)} + \theta_i \sigma^2_{i(t-1)} + v_{it}$$

The conditional variance, σ^2_{it} , is the one-period ahead forecast variance based on past information.

It is a function of a long term average (γ), the last period's forecast variance $\sigma^2_{i(t-1)}$ and news about volatility from the previous period (measured by $v^2_{i(t-1)}$, from the mean equation).

The fitted values of σ^2_{it} are considered measures of uncertainty in y_{it}.

Some caveats are in order. Often the literature, using the last two kinds of uncertainty measures just described, implicitly assumes, rather than testing, both stationarity and the presence of (G)ARCH effects[1].

[1] The fitted values of the conditional variance will be biased if the model is misspecified. For a deeper discussion about the problem of model misspecification in (G)ARCH-based measures of uncertainty, see Carruth et al. (1998).

In this work, the series have been first differenced, in order to avoid potential problems of unit root and the Engle Lagrange Multiplier test for ARCH disturbances has been implemented, following the steps described in Enders (2003).

According to the test results, very few countries display ARCH effects. Tthis causes a dramatic loss of data in the panel equation, thus this kind of measure has to be discarded.

Moreover, both the measures from a Garch (1,1) model and those based on the 1-step ahead forecast errors are generated regressors. If their coefficients result significant, the t statistics of the remaining variables are not reliable, and it would be appropriate to correct them.This problematic feature makes desirable computing another uncertainty measure, as follows.

Measures based on the 1-step ahead forecast errors of random walk models

If one is willing to assume that economic agents develop forecasts of future economic variables based on past actual rates

$$E\left[y_{it+1}\right] = y_{it}$$

since

$$y_{it} = y_{i(t-1)} + v_{it}; \qquad t = 1, ...T$$

the forecast errors are of the form

$$y_{it+1} - E\left[y_{it+1}\right] = y_{it+1} - y_{it}$$

By using the (3 year) stardard deviations of them as a measure of uncertainty, the generated regressor issue is overcome.

Appendix 5
Countries in the dynamic panel sample

1	Argentina
2	Bangladesh
3	Benin
4	Bolivia
5	Brazil
6	Bulgaria
7	Chad
8	Chile
9	China
10	Colombia
11	Costa Rica
12	Cote d'Ivoire
13	Ecuador
14	Egypt, Arab Rep.
15	El Salvador
16	Gambia, The
17	Guatemala
18	Guinea-Bissau
19	Guyana
20	India
21	Indonesia
22	Kenya
23	Korea, Rep.
24	Madagascar
25	Malawi
26	Malaysia
27	Mauritania
28	Mauritius
29	Mexico
30	Morocco
31	Nicaragua
32	Panama
33	Papua New Guinea
34	Peru
35	Philippines
36	Thailand
37	Trinidad and Tobago
38	Tunisia
39	Uruguay
40	Venezuela, RB

Table 2 - Private Fixed Investment and Propensity to Commit
(dependent variable: ratio of Private Fixed Investment to GDP)

	difference GMM estimates			
	(1)	(2)	(3)	(4)
l. Private Fixed Investment (a)	0.668	0.645	0.642	0.644
	*(0.049)***	*(0.050)***	*(0.051)***	*(0.051)***
Gdp Growth	0.184	0.168	0.166	0.170
	*(0.046)***	*(0.058)***	*(0.057)***	*(0.058)***
l.Gdp Growth (a)	0.080	0.068	0.068	0.069
	*(0.040)**	*(0.043)*	*(0.043)*	*(0.043)*
Real Interest Rate	-0.026	-0.031	-0.032	-0.032
	*(0.013)**	*(0.016)**	*(0.016)***	*(0.016)***
Domestic Credit	0.016	0.014	0.014	0.015
	(0.013)	*(0.013)*	*(0.016)*	*(0.014)*
Relative Price of Capital Goods (b)	-0.259	0.003	0.002	0.005
	(0.282)	*(0.231)*	*(0.233)*	*(0.229)*
International Reserves (b)	-0.107	-0.223	-0.308	-0.241
	(0352)	*(0.401)*	*(0.379)*	*(0.384)*
GDP Growth Uncertainty	-0.188	-0.225	-0.222	-0.225
	*(0.056)****	*(0.061)****	*(0.063)****	*(0.062)****
Inflation Uncertainty	0.000	0.000	0.000	0.000
	(0.001)	*(0.001)*	*(0.0005)*	*(0.0005)*
Inflation	0.000	0.000	0.000	0.000
	(0.001)	*(0.001)*	*(0.001)*	*(0.001)*
Public Fixed Investment	-0.038	0.096	0.093	0.102
	(0.049)	*(0.112)*	*(0.111)*	*(0.116)*
Propensity to Commit (c)	-0.930	3.846	0.907	4.501
	(1.187)	*(5.897)*	*(4.181)*	*(4.576)*
Dafter1980	2.295	0.269	0.348	0.858
	*(0.975)**	*(1.042)*	*(0.983)*	*(1.029)*
F test	3704.28***	533.65***	533.65***	434.76***
1st-order autocorrel. (z-value)	-2.87***	-2.74***	-2.73***	-2.75***
2nd-order autocorrel. (z-value)	-0.320	0.610	0.610	0.600
Hansen test (Chi2 df)	9.23 (407)	9.81(352)	11.52 (352)	9.07 (352)
Number of obs. (countries)	522 (40)	410 (35)	410 (35)	410 (35)

Notes: all regressions include year dummies. Standard errors are heteroskedasticity consistent.
(*), (**), (***) denote statistical significance at the 10%, 5% and 1% critical level, respectively.
The Hansen J statistic of Overid. Restr. is robust to heteroskedasticity and autocorrelation.
Instrumental variable for the Propensity to Commit is the Polity Score.
a. l. indicates lagged variables
b. Expressed in log
c. Column (1) includes the actual frequency of a commitment;
column (2) the fitted probabilities, obtained from the pooled data;
column (3) those obtained by running a separate regression for three different geographical areas;
column (4) considers the fitted probabilities retrieved from the panel model.

Table 3a - Private Fixed Investment and Other Countries Commitment
(dependent variable: ratio of Private Fixed Investment to GDP)

	difference GMM			
	(1)	(2)	(3)	(4)
l. Private Fixed Investment (a)	0.587	0.527	0.523	0.525
	*(0.056)***	*(0.069)***	*(0.072)***	*(0.072)***
Gdp Growth	0.155	0.159	0.158	0.163
	*(0.050)***	*(0.062)***	*(0.061)***	*(0.062)***
l.Gdp Growth (a)	0.093	0.114	0.116	0.118
	*(0.047)**	*(0.044)***	*(0.048)***	*(0.046)***
Real Interest Rate	-0.033	-0.035	-0.037	-0.035
	*(0.016)***	*(0.021)*	*(0.022)*	*(0.020)**
Domestic Credit	0.004	0.020	0.024	0.022
	(0.028)	*(0.030)*	*(0.031)*	*(0.030)*
Relative Price of Capital Goods (b)	-0.202	-0.016	-0.030	-0.015
	(0.386)	*(0.360)*	*(0.356)*	*(0.355)*
International Reserves (b)	-0.225	-0.198	-0.290	-0.220
	(0.577)	*(0.708)*	*(0.650)*	*(0.671)*
GDP Growth Uncertainty	-0.194	-0.213	-0.211	-0.212
	*(0.058)****	*(0.079)***	*(0.081)***	*(0.079)***
Inflation Uncertainty	0.000	0.000	0.000	0.000
	(0.001)	*(0.001)*	*(0.001)*	*(0.001)*
Inflation	-0.001	0.000	0.000	0.000
	(0.001)	*(0.001)*	*(0.001)*	*(0.001)*
Public Fixed Investment	-0.010	0.156	0.164	0.166
	(0.061)	*(0.131)*	*(0.126)*	*(0.138)*
Propensity to Commit (c)	-0.242	5.173	-0.154	6.072
	(1.883)	*(10.717)*	*(6.299)*	*(8.012)*
Interaction Term	1.590	0.629	0.966	0.530
	*(0.645)***	*(1.066)*	*(0.775)*	*(0.854)*
Nr Committing Neighbours	-0.549	-0.248	-0.367	-0.239
	*(0.260)***	*(0.280)*	*(0.256)*	*(0.254)*
F test	295***	1642***	1493***	480***
F test (d)	2.37*	0.670	0.740	0.800
1st-order autocorrel. (z-value)	-3.05***	-2.98***	-2.97***	-2.96***
2nd-order autocorrel. (z-value)	-0.660	0.570	0.570	0.600
Hansen test (Chi2 df)	5.83(244)	1.21(201)	2.05(201)	2.38(201)
Number of obs. (countries)	522(40)	410(35)	410(35)	410(35)

Notes: all regressions include year dummies. Standard errors are heteroskedasticity consistent.
(*), (**), (***) denote statistical significance at the 10%, 5% and 1% critical level, respectively.
The Hansen J statistic of Overid. Restr. is robust to heteroskedasticity and autocorrelation.
Instrumental variable for the Propensity to Commit is the Polity Score.
a. l. indicates lagged variables
b. Expressed in log
c. Column (1) includes the actual frequency of a commitment;
column (2) the fitted probabilities, obtained from the pooled data;
column (3) those obtained by running a separate regression for three different geographical areas;
column (4) considers the fitted probabilities retrieved from the panel model.
d. Test of joint significance of Prop. to Comm., Nr of Comm. Countries and Interaction Term.

Table 3b - Private Fixed Investment and Other Countries Commitment
(dependent variable: ratio of Private Fixed Investment to GDP)

	system GMM			
	(1)	(2)	(3)	(4)
l. Private Fixed Investment (a)	0.818	0.806	0.806	0.807
	*(0,029)***	*(0,028)***	*(0,029)***	*(0,029)***
Gdp Growth	0.191	0.193	0.192	0.193
	*(0,051)***	*(0,054)***	*(0,054)***	*(0,055)***
l.Gdp Growth (a)	0.066	0.061	0.058	0.062
	*(0,028)***	*(0,033)**	*(0,032)**	*(0,033)**
Real Interest Rate	-0.017	-0.008	-0.008	-0.008
	*(0.009)**	*(0.009)*	*(0.009)*	*(0.009)*
Domestic Credit	0.007	0.011	0.011	0.011
	(0.004)	*(0.005)***	*(0.005)***	*(0.005)***
Relative Price of Capital Goods (b)	-0.152	-0.148	-0.152	-0.149
	(0.111)	*(0.136)*	*(0.132)*	*(0.135)*
International Reserves (b)	-0.165	-0.366	-0.384	-0.367
	(0.185)	*(0.174)***	*(0.178)***	*(0.178)***
GDP Growth Uncertainty	-0.115	-0.154	-0.154	-0.153
	*(0.032)****	*(0.034)****	*(0.036)****	*(0.034)****
Inflation Uncertainty	0.001	0.000	0.001	0.000
	(0.001)	*(0.001)*	*(0.001)*	*(0.001)*
Inflation	0.000	0.000	0.000	0.000
	(0.001)	*(0.001)*	*(0.001)*	*(0.001)*
Public Fixed Investment	-0.083	-0.099	-0.095	-0.096
	*(0.028)****	*(0.038)***	*(0.036)***	*(0.038)***
Propensity to Commit (c)	0.046	1.254	1.046	1.440
	(0.789)	*(1.426)*	*(1.318)*	*(1.285)*
Interaction Term	0.411	0.709	0.606	0.499
	(0.399)	*(0.649)*	*(0.527)*	*(0.561)*
Nr Committing Neighbours	-0.170	-0.217	-0.207	-0.179
	(0.147)	*(0.169)*	*(0.166)*	*(0.168)*
constant	0.267	3.719	3.730	3.874
	(0.831)	*(0.842)****	*(0.780)****	*(0.913)****
F test	1070***	475***	378***	1033***
F test (d)	0.470	3.21**	1.720	2.72*
1st-order autocorrel. (z-value)	-2.97***	-2.81***	-2.80***	-2.77***
2nd-order autocorrel. (z-value)	-0.440	0.460	0.460	0.490
Hansen test (Chi2 df)	2.24(516)	5.39(427)	2.65(427)	3.36(427)
Number of obs. (countries)	570 (40)	452 (35)	452 (35)	452 (35)

Notes: all regressions include year dummies. Standard errors are heteroskedasticity consistent.
(*), (**), (***) denote statistical significance at the 10%, 5% and 1% critical level, respectively.
The Hansen J statistic of Overid. Restr. is robust to heteroskedasticity and autocorrelation.
Instrumental variable for the Propensity to Commit is the Polity Score.
a. l. indicates lagged variables
b. Expressed in log
c. Column (1) includes the actual frequency of a commitment;
column (2) the fitted probabilities, obtained from the pooled data;
column (3) those obtained by running a separate regression for three different geographical areas;
column (4) considers the fitted probabilities retrieved from the panel model.
d. Test of joint significance of Prop. to Comm., Nr of Comm. Countries and Interaction Term.

Table 4 - Private Fixed Investment and other Ambiguous Signals
(dependent variable: ratio of Private Fixed Investment to GDP)

	difference GMM	system GMM
l. Private Fixed Investment (a)	0.683	0.705
	*(0,045)***	*(0,033)***
Gdp Growth	0.179	0.178
	*(0,050)***	*(0,064)***
l.Gdp Growth (a)	0.080	0.076
	*(0,037)**	*(0,036)**
Real Interest Rate	-0.023	0.019
	*(0.013)**	*(0.026)*
Domestic Credit	0.017	0.025
	*(0.009)**	*(0.009)***
Relative Price of Capital Goods (b)	-0.076	-0.380
	(0.160)	*(0.224)**
International Reserves (b)	-0.031	-0.230
	(0.298)	*(0.385)*
GDP Growth Uncertainty	-0.190	-0.136
	*(0.047)***	*(0.037)***
Inflation Uncertainty	0.000	-0.002
	(0.001)	*(0.001)*
Inflation	0.000	0.003
	(0.001)	*(0.002)*
Public Fixed Investment	-0.030	-0.085
	(0.037)	*(0.120)*
TiedFunds/GDP	0.084	-0.038
	(0.152)	*(0.154)*
TiedFunds/(IBRD+IDA)funds	-0.029	-0.040
	*(0.017)**	*(0.017)**
Duration	0.002	0.005
	(0.007)	*(0.010)*
No of previous loans	-0.042	0.053
	(0.088)	*(0.094)*
Dafter1980	2.396	1.443
	*(0.824)***	*(0.482)***
F test	1637232***	2261.54***
1st-order autocorrel. (p-value)	-2.8***	-3.03***
2nd-order autocorrel. (p-value)	-0.430	-0.610
Hansen test (Chi2 df)	5.61 (467)	0.00 (215)
Number of obs. (countries)	522 (40)	570 (40)

Note: all regressions include year dummies.Standard errors are heteroskedasticity consistent.
(*), (**), (***) denote statistical significance at the 10%, 5% and 1% critical level, respectively.
The Hansen J statistic of overid. restr. is robust to heteroskedasticity and autocorrelation.
a. l. indicates lagged variables
b. Expressed in log.

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