

The Determinants of IMF Loan Programs

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This paper focuses on the bargaining process underlying financial arrangements between the IMF and recipient countries. The primary aim is to investigate the relationship between the own country characteristics, both in terms of macroeconomic conditions and bargaining power, and the outcome of the agreement with the Fund. IMF lending practices respond to economic conditions but are also sensitive to other factors that reflect the importance of the country within the international financial community (measured by the bilateral trade volume between the country and the OECD countries and by debt service) and the importance of the country within the international politics (measured by the UN voting patterns between the country and the USA, the colonial past and by country share of IMF quotas). [JEL Code: O19]

1. - Introduction

In the last twenty years we have assisted to a growing participation of many developing and transitional countries in the IMF financial arrangements. Faced with recurrent imbalances of payments induced by the oil price shocks of the 1970s, pressure for currency devaluation, the debt crisis and the macroeconomic instability associated with financial crisis in Latin America, Asia and Russia, the developing nations have turned with increasing frequency to IMF credits and stabilization plans. Eventually, the

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IMF evolved from the main guardian of the macroeconomic stability of the whole economic environment to the crisis manager and development financier for developing countries.

Among the 553 financial arrangements approved by the IMF¹ in this period, there is a wide diversity in terms of loan amount and tightness of conditionality. The Fund's official claims assert that the reason of these disparities relies upon the peculiar macroeconomic situation in each recipient country. However, historical evidence² on loan programs approved in developing countries with similar structure of the economy and macroeconomic performances tend to reject this conclusion and suggest a different pattern of IMF lending based on the importance of each country bargaining power vis-à-vis the Fund.

Despite the broad existing literature on the IMF, there are still few explanations on why financial programs have been so different in terms of loan amount and tightness of conditionality. Some recent studies, as Barro and Lee (2002) and Thacker (1999), have investigated the determination of IMF financial arrangements, interpreting the Fund as a bureaucratic and political organization influenced by the power of its major shareholding countries. This paper extends these works by focusing on the bargaining process of the financial arrangement between the IMF and one recipient country with the intention of investigating the relationship between the own characteristics of one recipient country, in terms of macroeconomic condition and bargaining power, and the outcome of the loan program approved by the IMF.

With this rationale, I develop a simple model using the tools of axiomatic bargaining theory in order to capture each single class of factors which influences the outcome of the agreement, in terms of loan amount and tightness of conditionality. I then verify empirically the principal implications of the model using a sample of 170 IMF programs approved in the period 1992-1998

¹ IMF (2000, *Appendix Table*).

² The unprecedented loan amount of 688 per cent the country quota approved in Mexico in 1994 is one outstanding example. See also THACKER S.C. (1999), BORDO G. - JAMES H. (2000) and KRUEGER A. (1998) for a detailed description of these stylized facts.

and 149 countries (the total of all developing and transitional economies).

Using different econometric methodologies and exploring both a cross sectional and panel dimension for the available data, the empirical results prove the importance of three broad classes of own country factors: macroeconomic pre-conditions, the economic relevance and the geo political relevance.

IMF lending practices respond to economic conditions but are also sensitive to other factors that reflect the importance of the country within the international financial community (measured by the bilateral trade volume between the country and the OECD countries and debt service) and the importance of the country within the international politics (measured by the UN voting patterns between the country and the US, the colonial past and country share of IMF quotas).

The rest of the paper is organized as follows. Section 2 provides a theoretical framework to analyze the negotiation of a financial arrangement between the IMF and one representative recipient country. Section 3 presents the data, some methodological issues and the main empirical results of the regression analyses. Concluding observations with some implications follow in Section 4. The model is fully described in the Appendix.

2. - Theoretical Framework

2.1 The Model

The IMF (F) and the government of one recipient country (G) bargain on the main terms of a financial arrangement that will be implemented in the case of an agreement. It is convenient to express these terms by the couple (T, C) , where T is the approved loan amount and $C = C_1, C_2, \dots, C_n$ is a vector denoting the total number of conditions attached to the loan. If an agreement is achieved player G gets the following utility:

$$(1) \quad U^G = U^G(T, C, Z)$$

Where $Z = Z_1, Z_2, \dots, Z_n$ is a vector of macroeconomic variables which denotes the present and past performances of the country economy. Jointly these variables represent the country determinants of the demand for a Fund arrangement and, therefore, influence the utility that the government achieves from the agreement.

For expression (1) the following three conditions concerning the marginal effects hold³:

$$(2) \quad \frac{\partial U^G}{\partial T} > 0, \quad \frac{\partial U^G}{\partial C} < 0, \quad \frac{\partial U^G}{\partial Z} < 0$$

The first condition is trivial and assumes that the government of the recipient country is better off the higher is the loan amount approved. The second condition implies that for the government, each condition attached to the loan is welfare diminishing. This accounts for the fact that the adoption of certain policies proposed by an international institution implies a loss of independence and ownership for the sovereign government which ultimately will damage its reputation and political support⁴.

Finally, the third condition says that the better is the macroeconomic performance of the country, the less is the need for IMF financial resources and, as a consequence, the less is the utility gain for the government from the agreement.

By similar arguments, if an agreement is reached, the IMF gains the following utility:

$$(3) \quad U^F = U^F(T, C, Z)$$

and the following three symmetric marginal effect conditions hold:

$$(4) \quad \frac{\partial U^F}{\partial T} < 0, \quad \frac{\partial U^F}{\partial C} > 0, \quad \frac{\partial U^F}{\partial Z} > 0$$

These conditions state that the Fund is better off the smaller

³ In the model all functions are assumed differentiable up to the n^{th} order.

⁴ With respect to the concept of *ownership* the literature is extensive. See for example BOUGHTON J. - MOURMOURAS A. (2002).

is the loan amount disbursed and the higher is the number of conditions approved in the program. This means that IMF seeks to approve a program which is efficient, leading to the best macroeconomic outcome through the minimum financial effort. Finally, the third condition claims that the better are the macroeconomic performances of the recipient country, the higher is the likelihood that the economy will succeed in achieving the program's target and respectively the utility that the Fund will gain from the agreement.

On the other hand, if the two players fail in attaining an agreement on the main terms of the program, the status quo utility is given by:

$$(5) \quad \overline{U^G} = \overline{U^G}(X)$$

$$(6) \quad \overline{U^F} = \overline{U^F}(X)$$

Where $X = X_1, X_2, \dots, X_n$ is a vector of bargaining variables which reflect the own country characteristics that mirror its economic and geopolitical importance, in terms of its connections with the major shareholders of the Fund. For this utility pair, the following conditions upon the marginal effects hold:

$$(7) \quad \frac{\partial \overline{U^G}}{\partial X} > 0, \quad \frac{\partial \overline{U^F}}{\partial X} < 0$$

The marginal effects in (7) imply that, if an agreement between the two players is not reached, the country can exploit its strategic and geopolitical weight and rely on influential donor countries for obtaining bilateral channels of financial resources⁵. On the other hand, the Fund is worse off because of the missed

⁵ ALESINA A. - DOLLAR D. (2000) studied the determinants of bilateral aid from major donors (United States, Japan, France and Germany) to receiving countries. Despite of substantial differences among donors, the authors found considerable evidence that the direction of foreign aid is dictated by political and strategic considerations, much more than by the economic needs and policy performance of the recipients. Japan's aid is particularly related to the UN voting pattern: a country that voted relatively often with Japan in the UN receives 177 percent more aid. Similarly, the United States pattern of aid giving is vastly influenced by that country's interest in the Middle East: Egypt and Israel receives much more aid than other countries.

opportunity to get involved as a creditor with respect to a strategically relevant country.

Given the equation set up and assumptions above, it is now possible to express the negotiation dynamic of a financial arrangement between the IMF and one country by the following Nash bargaining optimization problem⁶:

$$(8) \quad \max_{T,C} (U^G - \bar{U}^G)(U^F - \bar{U}^F)$$

and compute the relative Nash solution, which gives a bargaining outcome (T^*, C^*) that satisfies the following equilibrium condition:

$$(9) \quad \frac{\partial U^G / \partial C}{\partial U^G / \partial T} = \frac{\partial U^F / \partial C}{\partial U^F / \partial T}$$

This condition says that player G and F will accept an arrangement such that the respective marginal rate of substitution between the enhancement of new financial resources and the imposition of policy conditions are equal.

It is noteworthy that the outcome of the bargaining process will crucially depend on the marginal impact of the two exogenous variables (Z and X) with respect to the equilibrium outcome (T^*, C^*) . Algebraic computations are shown in the appendix, in this context, it is useful noting that the marginal impact of the macroeconomic variables Z on the equilibrium outcome depends on the marginal impact of Z on the marginal utilities that each player gains from the agreement, in particular:

$$(10) \quad \frac{\partial^2 U^G}{\partial T \partial Z} < 0, \quad \frac{\partial^2 U^F}{\partial T \partial Z} > 0, \quad \frac{\partial^2 U^G}{\partial C \partial Z} < 0, \quad \frac{\partial^2 U^F}{\partial C \partial Z} > 0$$

These conditions imply that for player G the marginal benefit of the loan and the marginal cost of conditionality are decreasing with respect to Z , while for player F the marginal benefit of

⁶ Full algebraic computations of the model including the comparative static results are shown in the appendix.

conditionality and the marginal cost of the loan are increasing with respect to Z .

The ultimate effect of Z on the equilibrium outcome depends on the magnitude of the marginal effects shown in (10). In particular, if the effect of Z on the marginal benefit of the loan for G is relatively large and the effect of Z on the marginal benefit of conditionality for F is relatively small it results that the impact of Z is negative both on T and on C ⁷.

Finally, the impact of X on the bargaining outcome simply depends whether the marginal effects shown in (7) are positive or negative. In particular, each own country characteristic which raises the relative bargaining power of the country with respect to the IMF impacts positively on T and negatively on C .

2.2 Interpretation and Predictions of the Model

Within this framework, the equilibrium outcome of the bargaining process between the Fund and one recipient country depends on two main relations: the interaction between the country demand and the Fund supply of financial resources and the availability of reciprocal alternatives in the case an agreement is not reached. From these main relations it is possible to distinguish two broad classes of underlying factors which influence the program outcome. Macroeconomic factors which induce the government to seek and the Fund to offer financial help and economic and geo-political factors that connect the recipient country to the major IMF shareholders.

With respect to the macroeconomic determinants (vector Z in the model), this analysis extends and confirms both the Fund official claims and the existing literature. Previous studies⁸ had in fact focused on the economic determinants of IMF lending, evaluating all the possible factors which affect the Fund participation in a recipient country. Despite of the fact that the approach

⁷ See *Appendix A* for a more detailed and formal explanation.

⁸ CONWAY P. (1994); KNIGHT M. - SANTAELLA J. (1997); SANTAELLA J. (1995).

presented here is slightly different — it focuses on the bargaining dynamics of a financial arrangement and its consequences in terms of the program outcome — the relevance of typical macro-economic factors, as GDP per capita, the growth rate of GDP, the level of investments and the inflation rate, emerges as a robust empirical regularity in IMF lending patterns.

The model prediction in terms of the approved program's outcome is that these factors are negatively correlated with both the loan amount and the number of conditions. As long as the macro-economic performances get better for one country, the need for financial resources becomes less binding and the government is more sensitive to a marginal increase in the imposition of conditional policies in exchange of a marginal increase in the loan amount.

Alternatively, the bargaining determinants (vector X in the model) can be interpreted as a sort of own country endowment which raises its weight and relevance with respect to the international financial and political community. It is worth to split this class of factors into the two more specific dimensions of economic and geo-political factors. The formers are own country characteristics that reflect its importance in the economic system as a whole and in particular its economic connections with IMF major shareholders, as the extent of bilateral trade with OECD countries, the outstanding level of external debt and its service, the amount of FDI, the endowment of strategic natural resources and the amount of bilateral foreign aid. All these factors raise the economic bargaining power of the country with respect to the most powerful IMF member countries. For example, debt service constitutes a heavy burden on country economic development: the higher negative interests on external debt, the less the probability of total or partial repayment for the country in arrears. In this situation, the threat of western banks seizure of the tradable goods exported from the country becomes more binding and IMF will intervene in debt renegotiation to preserve the economic interests of import countries⁹. Counter intuitively, countries in arrears

⁹ The literature on debt renegotiation is extensive. See BULOW J. - ROGOFF K. (1986); BULOW J. - ROGOFF K. (1990); WELLS R. (1993) for enlightening discussions on this topic.

increase their bargaining power with respect to the IMF and debt service becomes a “double-edged weapon” for western countries.

The geo-political factors reflect the country importance in the international politics and in particular its political relations with IMF major shareholders, as the United Nations General Assembly (UNGA) voting patterns between the country and the US, the colonial and political past and the country share of IMF quotas. These factors influence the country relevance in the international political system and consequently in the IMF executive board. For example if a country was a colony during the 20th century, it can exploit its privileged diplomatic relations to obtain bilateral financial aid¹⁰. This valuable outside option raises the former colony’s bargaining power in the negotiation of a financial arrangement with the IMF.

The model predicts that these factors raise the bargaining power of the country with respect to the IMF and induce a better program outcome for the country, in terms of higher loan amount approved and less binding imposition of conditional policies, apart from its macroeconomic performances.

All these a priori predictions upon the main directions of correlation between the own country factors and the approved program outcome need an empirical counterpart which can investigate the validation and the real fit of the model.

3. - Empirical Evidence

3.1 Data Description and Methodology

I have data on IMF arrangements from the database MONA (Monitoring of IMF Arrangements), compiled by the Fund’s staff from 1992 and containing all financial programs approved from the beginning of that year¹¹. The analysis is restricted to the period

¹⁰ See the determinants of the pattern of allocation of foreign aid in ALESINA A. - DOLLAR D. (2000).

¹¹ The database is nevertheless missing 18 programs approved in 1992. These data are available to the author thanks to the kind concession of Anna Ivanova (IMF research staff).

1992-1998, in which 170 programs have been approved with respect to 85 developing and transitional countries. In order to avoid the sample selection bias in the estimation results, I have included the remaining 64 developing and transitional countries which did not participate in a Fund supported program during the time period under consideration; this control group should not differ systematically in the own country characteristics from the program group¹².

I measure the program outcome using the loan amount approved in USD millions as a fraction of the country's GDP¹³ and the number of structural conditions attached to the loan. This latter variable seeks to catch the tightness of the imposition of conditional policies and the resulting loss of ownership in the government policies due to IMF intervention¹⁴.

All the macroeconomic time series and the bargaining economic variables for the period 1992-1998 are accessible from the WDI and IFS databases. Data on historical records of UNGA voting alignments between the US and each UN member country are available on the web site of the US Department of State. I express the political connections between the US and sample countries in two ways. The first is the yearly average fraction of votes in which one country voted along the US and measures the static political proximity, the second is the first difference of this variable and picks up the dynamics of the political movement toward or away from

¹² A full list of the 149 countries (program and control) is shown in *Appendix B*.

¹³ Other normalizations of the loan amount might be reasonable, as for example the balance of payment. Given the existing empirical literature, see for example BARRO R. - LEE J.W. (2002), I have adopted GDP for controlling for the economic size of the country.

¹⁴ In order to measure quantitatively the degree of imposition of the conditional policies one would need to evaluate the potential spread between the policies that the government commits to implement after the loan negotiation and the policies that the government would have anyway implemented without IMF intervention. Because of the lack of availability of specific data on each IMF program and relative condition imposed, I have opted for an alternative methodology that consists in considering which type of condition affects more the government ownership in the policies. Given the existing literature on policy ownership, see for example BOUGHTON J. - MOURMOURAS A. (2002), structural conditions seem the natural candidate.

the US position. The remaining geo-political variables — i.e. colonial and political past *dummies* — have been constructed by the author¹⁵.

I have panel data for 149 countries and 7 years which results in a total of 1043 observations for the explanatory variables representing the own country factors and only 170 observations for the dependent variables representing the program outcome. To overcome this missing observation problem, I have considered two alternative strategies. The first consists of compressing the time series dimension of the panel data by computing 1992-1998 period averages for both the explanatory and dependent variables, this operation leads to a conventional cross-section dataset. The second strategy aims to exploit the informative value of the time variation of the explanatory variables by smoothing the values of loan amount and number of structural conditions into the expected number of program years.

This last approach seems to fit better with the available data because it allows catching the unobservable heterogeneity of each country left unexplained by the regressors by the use of an effects model. Although, given the censored nature of both dependent variables, this modelling framework is fraught with difficulties and unconventional estimation problems¹⁶. Estimation of the random effects model requires no correlation between the country heterogeneity and the explanatory variables, which is a very strong assumption in this setting given the endogenous nature of most regressors; the fixed effects model encounters an incidental parameters problem that renders the maximum likelihood estimator inconsistent¹⁷.

For these reasons, it is useful to evaluate the estimation results of both strategies and compare them in order to verify their robustness and validation.

In considering the cross section setting, using the average size

¹⁵ A full list of variables used in the analyses with some descriptive statistics is shown in *Appendix C*.

¹⁶ See GREENE W.H. (2003), chapter 21.

¹⁷ The only efficient way to estimate a fixed effects Tobit model is to adopt the Generalized Method of Moments (GMM) by using the dynamic model condition proposed by HONORÉ E. (1992). The resulting estimates are semi-parametric, in the sense that no particular assumptions relative to the error terms are required.

of IMF loans as a fraction of country's GDP and the average number of structural conditions approved as dependent variables, I specify the following Tobit model to take to account of the censoring of both the dependent variables at zero:

$$(11) \quad Y_i^* = \alpha + \beta Z_i + \gamma X_i + \delta \Omega_i + \varepsilon_i, \quad i = 1, \dots, 149$$

$$(12) \quad Y_i = Y_i^* \text{ if } Y_i^* > 0$$

$$(13) \quad Y_i = 0 \text{ if } Y_i^* \leq 0$$

where the dependent variable, Y_i , indicates alternatively the average loan amount and number of structural conditions approved for country i during the period 1992-1998, $Y_i = 0$ corresponds to countries for which no program has been approved in the period, while for all program countries a positive value is observed. Vector Z_i denotes the relevant own country macroeconomic variables that influence the country and the Fund marginal utility of the agreement and includes the period averages of GDP¹⁸, GDP per capita, the level of investments and the amount of multilateral financial resources apart IMF ones. Vector X_i denotes the bargaining economic variables that affect the economic relevance of the country with respect to IMF major shareholders and includes the period average of the intensity of trade with the OECD countries and the debt service. Finally, vector Ω_i denotes the bargaining geopolitical variables that influence the political and strategic importance of the country with respect to IMF major shareholders and includes the period averages of the UN voting alignment with the US, UN voting movement toward the US, the colonial past dummy and the share of IMF quotas. The variable ε_i is a random error term. To minimize reverse-causality problems, all explanatory variables are measured as lagged averages computed in the period 1991-1997.

¹⁸ This variable has been included to control for the country economic size and to be sure that the IMF quota variable is not just a proxy for the scale of an economy, see BARRO R. - LEE J.W. (2002).

For the panel data set analysis, two alternative econometric methodologies are appropriate. The first approach, named “fixed effects”, assumes that the unobservable differences between countries can be captured in differences in the constant and time-invariant term, which is treated as an unknown parameter to be estimated. The fixed effects Tobit model relative to the panel data set under consideration can be expressed by the following equations:

$$(14) \quad Y_{it}^* = \alpha_i d_{it} + \beta Z_{i,t-1} + \gamma X_{i,t-1} + \delta \Omega_{i,t-1} + \varepsilon_{it}$$

$$i = 1, \dots, 149, \quad t = 1992, \dots, 1998$$

$$(15) \quad Y_{it} = Y_{it}^* \text{ if } Y_{it}^* > 0$$

$$(16) \quad Y_{it} = 0 \text{ if } Y_{it}^* \leq 0$$

Where d_{it} is a dummy variable which assumes the value of one for country i and zero otherwise and all the other symbols correspond to the previous and already explained variables. Because of the potential endogenous nature of the regressors, all the explanatory variables enter as their one period lagged value.

This estimation methodology allows the unobservable own country factors to be correlated with the error term, on the other hand, apart from the incidental parameter problem mentioned above, the main drawback of this setting is that it does not permit to specify the observable and time-invariant variables, as country share of quotas and the colonial past dummy.

The second approach, named “random effects”, models the unobservable differences between countries as randomly distributed within the whole sample. In other words, these unobservable factors are treated as parametric shifts of the regression function and the underlying model can be viewed as a traditional regression model with a random constant term. The random effects model relative to the panel data set under consideration can be expressed by the following equations:

$$(17) \quad Y_{it}^* = \beta Z_{it-1} + \gamma X_{i,t-1} + \delta \Omega_{i,t-1} + \varepsilon_{it} + u_i$$

$$i = 1, \dots, 149, \quad t = 1992, \dots, 1998$$

$$(18) \quad Y_{it} = Y_{it}^* \text{ if } Y_{it}^* > 0$$

$$(19) \quad Y_{it} = 0 \text{ if } Y_{it}^* \leq 0$$

Where u_i is an independently distributed random variable which reflects the heterogeneity component relative to each country.

This approach allows including among the explanatory variables also the time-invariant observable factors, which seem crucial in the context of this analysis. The major model drawback is instead the hypothesis of orthogonality between the random term u_i and the explanatory variables.

3.2 *Estimation Results. The Determinants of IMF Programs Outcome*

I have tried various functional forms for the Tobit specified above and selected the one which delivered the best goodness-of-fit. It turns out that GDP, UN voting alignment, UN voting movement and the share of IMF quotas enter as their log values.

Table 1 below presents the maximum likelihood estimation results for model (11)-(13). Dependent variables are the period averages of loan amount as a fraction of country's GDP (Loan amount) and of the number of structural conditions (Structural conditions) approved for each country.

In considering the macroeconomic variables, most of the estimated coefficients are significant and all of them appear negatively correlated with both loan-GDP ratio and conditionality. This result confirms the model predictions with respect to the interaction between the demand and supply of financial resources.

TABLE 1

DETERMINANTS OF IMF PROGRAMS OUTCOME
(CROSS SECTION ANALYSES)

Variable	Loan amount		Structural conditions	
	Coefficient	<i>T-stat</i>	Coefficient	<i>T-stat</i>
Log(GDP)	-0.263***	-3.37	-2.832**	-2.59
GDP <i>per capita</i>	-0.076**	-2.62	-1.699***	-3.97
investments	-0.010**	-2.10	-0.079	-1.12
Other multilateral aid	-0.002	-1.19	-0.033	-1.29
Trade with OECD countries	0.002**	2.50	-1.595*	-1.97
Debt service	0.017**	2.03	-0.039*	-1.71
Log (UN voting alignment with US)	0.059	-0.46	-3.482	-0.70
Log (UN voting movement toward US)	0.175***	3.06	-1.219	-0.09
Colonial past <i>dummy</i>	-0.474***	-4.78	-6.786***	-4.34
Log (share of country's quota)	0.287***	3.19	3.407**	2.57
_cons	1.901***	5.53	22.008***	4.03
<i>R</i> square	0.439		0.091	
N° obs	99		109	

* 10 per cent confidence level

** 5 per cent confidence level

*** 1 per cent confidence level

As long as the macroeconomic performance gets worse, the recipient country government is more willing to accept the IMF program terms and the Fund reluctance to disburse financial resources is compensated by tighter imposition of conditional policies.

Both the estimated coefficients of the bargaining economic variables result statistically significant, positively correlated with the loan amount and negatively correlated with the number of structural condition. A one standard deviation increase in the intensity of bilateral trade with OECD countries is estimated to

raise the ratio of loan to GDP by 5.8 per cent and to decrease the number of structural conditions by 3.47 per cent. A one standard deviation increase in the debt service is estimated to increase the ratio of loan to GDP by 6.9 per cent and to decrease the number of structural condition by 0.15 per cent. These results confirm the importance of the bargaining economic power of recipient countries in IMF lending decision: the more the country's economy is connected with the international financial and economic community, the better is the negotiation outcome of the IMF program.

Among the geo-political variables, a one standard deviation increase in the movement toward the US position, measured by the UNGA voting patterns, induces an increase of the ratio of loan to GDP by 11.8 per cent; the impact of this variable on the number of structural conditions, though negative (as expected), is not significant. A 1.58 increase in the share of IMF quotas (the variable standard deviation) is estimated to raise the ratio of loan to GDP by 45 per cent. The coefficient of colonial past dummy is estimated to decrease both the ratio of loan to GDP and the number of structural conditions. Although this last result is not completely in accordance with the model's prediction, the overall estimated coefficients of this group of variables seem to prove the relevance of high politics in IMF lending practices.

Table 2 below presents the maximum likelihood estimation results for the Tobit fixed and random effects model expressed in (14)-(16) and (17)-(19). Given the estimation difficulties associated with this framework, I show and comment jointly the results of these alternative methodologies and compare them with the cross section empirical regularities exposed in Table 1.

The main difference between the two alternative specifications of the unobservable country heterogeneity is the exclusion in the fixed effects model of the time-invariant geo-political variables, in order to avoid collinearity problems with respect to the country dummies.

Despite some variations with regards to the cross section analysis, a number of empirical regularities confirm the robustness of the main estimation results.

First, macroeconomic variables are again jointly significant

TABLE 2

THE DETERMINANTS OF IMF PROGRAMS OUTCOME
(PANEL DATA ANALYSES)

Variable	Random effects				Fixed effects			
	Loan amount		Structural conditions		Loan amount		Structural conditions	
	Coeff	T-stat	Coeff	T-stat	Coeff	T-stat	Coeff	T-stat
Log (GDP)	-0.022**	-2.50	-3.259	-1.22	-0.034*	-1.74	1.471**	2.00
GDP per capita investments	-0.012***	-3.03	-4.913***	-3.95	0.017	0.50	1.303	0.18
Other multilateral aid	-0.001***	-2.87	-0.363**	-1.99	-0.001*	-1.68	-0.539*	-1.78
Trade with OECD countries	0.002*	1.75	0.612	1.52	0.001	1.16	0.490	1.41
Debt service	-0.000*	-1.89	-2.624	-1.32	-0.002	-0.25	-0.167*	-1.90
Log (UN voting alignment with US)	0.002***	3.30	0.113	0.61	0.001**	2.16	-0.119*	-1.66
Log (UN voting movement toward US)	0.035	1.15	1.624***	4.01	0.041	0.74	0.658	0.04
Colonial past dummy	0.064**	2.44	-0.290***	-2.82	0.062**	2.10	13.232	1.25
Log (share of country quota)	-0.042	-3.56	-8.832**	-2.50				
_cons	0.019*	1.73	4.246	1.27				
	0.130***	3.34	35.318***	2.85				
N° obs	604		607		305		397	

* 10 per cent confidence level

** 5 per cent confidence level

*** 1 per cent confidence level

and present the expected signs in explaining the relation between the macroeconomic performance of recipient countries and the approved outcome of IMF program.

Furthermore, among the economic bargaining variables, only the debt service resists the robustness check; presenting a significant and positive estimated coefficient for the ratio of loan to GDP and a negative estimated coefficient for the number of structural conditions. The estimated coefficient relative to the intensity of trade variable appears significant with the expected negative sign in explaining the number of conditions only in the fixed effects model.

Finally, the estimated coefficients of the geo-political variables result jointly significant in explaining the outcome of IMF programs and with the expected signs. Movement toward US position in UNGA decisions, being a colony in the 20th century and having a higher share of IMF quotas imply a favoured treatment in IMF programs, in terms of higher ratio of loan to GDP and lower number of structural conditions approved.

3.3 *Empirical Results. The Determinants of IMF Participation*

As I mentioned earlier, the few previous studies¹⁹ which have investigated the extra-economic determinants of IMF financial arrangements, have focused on the Fund's participation. In this paragraph, I extend the previous result on the importance of the bargaining variables in IMF lending decision by testing statistically the relations between the country bargaining power (measured by the same variables that appear robust in the previous analysis) and IMF participation.

I specify two alternative regression models, which respectively employ as dependent variable the expected IMF program duration (in years) and the probability of a program approval and as explanatory variables the same three groups of country characteristics which appear in the rest of this paper. The first dependent variable has the same characteristics of the previous ones — it is

¹⁹ BARRO R. - LEE J.W. (2002); THACKER S.C. (1999).

censored at zero —, therefore a Tobit model is again suitable. The second variable is instead binary and needs a Probit model. The major shortcoming of this setting is that it is not possible to smooth the values of the dependent variables in the program's year; indeed only the cross section estimation strategy is appropriate to overcome the missing values problem.

TABLE 3

THE DETERMINANTS OF IMF PARTICIPATION

Variable	Prob (Program)			Expected duration	
	Coefficient	<i>T-stat</i>	Marginal effect =dx/dy	Coefficient	<i>T-stat</i>
Log (GDP)	-1.188**	-1.96	-0.370	-1.095**	-2.60
GDP <i>per capita</i>	-0.315**	-2.49	-0.098	-0.340***	-2.72
Inflation rate	-0.003**	-2.22	-0.001	-0.010	-0.53
Other multilateral aid	-0.008*	-1.69	-0.002	-0.010	-1.50
Trade with OECD countries	-0.536*	-1.86	-0.166	-0.486*	-1.88
Debt service	0.072*	1.66	0.022	0.069*	1.69
Log (UN voting alignment with US)	1.045*	1.68	0.325	0.613	1.07
Log (UN voting movement toward US)	0.394*	1.90	0.122	0.482**	2.03
Colonial past <i>dummy</i>	-1.284**	-2.44	-0.399	-0.579	-1.38
Log (share of country quota)	0.636	1.27	0.198	0.663*	1.71
_cons	11.978***	3.06		1.107***	3.75
<i>R</i> quadro	0.279			0.09	
N° obs	99			99	

* 10 per cent confidence level

** 5 per cent confidence level

*** 1 per cent confidence level

Standard errors not shown and corrected for heteroscedasticity.

Table 3 presents the maximum likelihood estimation results for the Tobit and Probit models. Dependent variables are the period average of the expected program duration (expected duration) and a dummy variable (program) which takes the value of one if at least one IMF has been approved for a country during period 1992-1998 and zero otherwise. Given the non-linear nature of the Probit model, for a more direct interpretation of the estimated coefficient, I calculate the relative marginal effects computed at the sample averages of the explanatory variables.

The only difference in these specifications with respect to tables 1 and 2 is that I employ the inflation rate and the level of investments as alternative macroeconomic variables.

The estimated coefficients confirm the main intuition on the importance of recipient countries bargaining power in IMF lending practices. The same direction of correlation found earlier on programs outcome, appear statistically significant and with the expected signs with regards to IMF participation.

The same bargaining factors that cause a favoured treatment for recipient countries by the IMF, in terms of loan and conditions approved in a program, induce a higher probability of program approval and a longer IMF participation in it.

4. - Concluding Remarks

The IMF represents the major international financial institution within the world economic system and is currently particularly involved with respect to the developing nations. Given the existing historical disparities in the main terms of approved financial program, the main goal of this paper was analyzing the relationships between the own recipient country characteristics and the outcome of an IMF financial arrangement.

In the theoretical framework I modelled the negotiation dynamic between the Fund and one recipient country as a Nash bargaining game. The principal model predictions guided the specifications of the following regression analysis which aimed to

find empirical evidence on the relevance of recipient countries bargaining power in IMF lending decisions.

The main empirical results, which broadly confirm the model implications, prove the statistical significance and the robustness of the relation between variables employed as proxies for a country bargaining power and the outcome of an IMF program negotiation. More strategically influent countries receives a favoured treatment in IMF loan programs, in terms of higher loan amount, lower number of structural conditions, higher probability of program approval and longer program duration. In particular, bargaining economic variables which reflect the connections between the country's economy and IMF major shareholders economies (measured by the intensity of trade with OECD countries and the debt service) and bargaining geo-political variables relative to the international policies alliances among recipient country and IMF major shareholders (measured by UN voting patterns, colonial past and country share of IMF quotas) appear significant and robust determinants of an IMF program outcome and of IMF participation.

These findings lead two broad implications. First, recent failures of IMF programs in achieving the expected macroeconomic results could mirror the Fund willingness to help allied countries instead of countries in effective economic difficulties. Second, the IMF appears as a bureaucratic and political organization in which the more powerful member states are able to drive lending policies as effective instruments of national foreign policies. In this context, The United States and other powerful industrialized nations constrain much of the behaviour of one of the most important multilateral organization of the post-hegemonic global economy.

This last implication underscores the practical limits of multilateralism and confirms the essential need for reforming the Fund current quota allocation within member countries and the subsequent voting power of each shareholder.

From a theoretical viewpoint, this paper provides many hints for future studies. It is worth noting that there could be many other sources of bargaining power beyond the ones explored in

this analysis. In particular, considering and testing other country economic and geopolitical characteristics, such as the extent of foreign direct investment and the export of strategic natural resources, the political history of the country and the relative geographical and political distance with former socialist or communist countries may increase the understanding of the determinants of IMF lending.

Finally, this paper represents the first stage of a more comprehensive research project that aims to assess the impact of IMF programs on the macroeconomic performances of recipient countries. In this view, the estimated bargaining variables can be interpreted as instrumental variables to assess the effects of IMF lending on a country economic performances. Using economic and geo-political variables as proxies of IMF participation one can overcome the econometric problem of the endogenous nature of Fund participation in evaluating whether IMF programs were associated with better or worse economic outcomes than would otherwise have occurred.

APPENDIX A**Algebraic Computations of the Model**1. *The Nash Bargaining Model*

Nash problem is defined by the following optimization problem:

$$\max_{T,C} (U^G - \bar{U}^G) (U^F - \bar{U}^F)$$

We assume that the function $F(T, C, Z, X) = (U^G - \bar{U}^G) (U^F - \bar{U}^F)$, defined over a compact and convex set S which represents all the possible agreement utilities, is strictly quasi-concave in T and C . More formally, the following conditions must hold:

$$\frac{\partial^2 F}{\partial^2 T} < 0, \quad \left(\frac{\partial^2 F}{\partial^2 T} \right) \left(\frac{\partial^2 F}{\partial^2 C} \right) > \left(\frac{\partial^2 F}{\partial T \partial C} \right)^2$$

It is now possible to compute the following first order conditions (FOC), which, under the above assumptions, are necessary and sufficient conditions for the uniqueness of a maximum point²⁰:

$$\frac{\partial F}{\partial T} = 0 \longrightarrow \frac{\partial U^G}{\partial T} (U^F - \bar{U}^F) + \frac{\partial U^F}{\partial T} (U^G - \bar{U}^G) = 0$$

$$\frac{\partial F}{\partial C} = 0 \longrightarrow \frac{\partial U^G}{\partial C} (U^F - \bar{U}^F) + \frac{\partial U^F}{\partial C} (U^G - \bar{U}^G) = 0$$

²⁰ Under these assumptions, the Hessian matrix of F is semi-negative, this condition is necessary and sufficient for the existence of one and only one maximum point.

Solving the equation system above, we obtain the equilibrium condition (9), shown and explained in section two:

$$\frac{\partial U^G / \partial C}{\partial U^G / \partial T} = \frac{\partial U^F / \partial C}{\partial U^F / \partial T}$$

2. Comparative Static

It is crucial to assume another property for function F , which is the super-modularity with respect to T and C . Under this hypotheses, the Nash solution (T^*, C^*) will be monotonic increasing or decreasing with respect to the parameter Z and X , depending on the signs of the relative cross-derivative with respect to the FOC computed above²¹. In order to determine these signs, we first calculate the cross-derivatives of the FOC with respect to Z :

$$\begin{aligned} \frac{\partial^2 F}{\partial T \partial Z} &= \frac{\partial^2 U^G}{\partial T \partial Z} (U^F - \bar{U}^F) + \frac{\partial U^G}{\partial T} \frac{\partial U^F}{\partial Z} + \frac{\partial^2 U^F}{\partial T \partial Z} (U^G - \bar{U}^G) + \frac{\partial U^F}{\partial T} \frac{\partial U^G}{\partial Z} \\ \frac{\partial^2 F}{\partial C \partial Z} &= \frac{\partial^2 U^G}{\partial C \partial Z} (U^F - \bar{U}^F) + \frac{\partial U^G}{\partial C} \frac{\partial U^F}{\partial Z} + \frac{\partial^2 U^F}{\partial C \partial Z} (U^G - \bar{U}^G) + \frac{\partial U^F}{\partial C} \frac{\partial U^G}{\partial Z} \end{aligned}$$

Given conditions (10) relative to the marginal effects of Z on the agreement marginal utilities for the players, conditions (2) and (4) relative to the signs of these marginal utilities and assumptions on the magnitude of these marginal effects explained in section two, the following inequalities hold:

$$\begin{aligned} \frac{\partial^2 U^G}{\partial T \partial Z} (U^F - \bar{U}^F) &> \frac{\partial^2 U^F}{\partial T \partial Z} (U^G - \bar{U}^G) + \frac{\partial U^F}{\partial T} \frac{\partial U^G}{\partial Z} + \\ &+ \frac{\partial U^G}{\partial T} \frac{\partial U^F}{\partial Z} \rightarrow \frac{\partial^2 F}{\partial T \partial Z} < 0 \rightarrow \frac{\partial T^*}{\partial Z} < 0 \end{aligned}$$

²¹ VIVES X. (1999).

$$\begin{aligned} \frac{\partial^2 U^F}{\partial C \partial Z} (U^F - \bar{U}^F) &< \frac{\partial^2 U^G}{\partial C \partial Z} (U^G - \bar{U}^G) + \frac{\partial U^F}{\partial C} \frac{\partial U^G}{\partial Z} + \\ &+ \frac{\partial U^G}{\partial C} \frac{\partial U^F}{\partial Z} \rightarrow \frac{\partial^2 F}{\partial C \partial Z} < 0 \rightarrow \frac{\partial C^*}{\partial Z} < 0 \end{aligned}$$

By similar arguments, the cross-derivatives of the FOC with respect to X are:

$$\begin{aligned} \frac{\partial^2 F}{\partial T \partial X} &= - \frac{\partial U^G}{\partial T} \frac{\partial \bar{U}^F}{\partial X} - \frac{\partial U^F}{\partial T} \frac{\partial \bar{U}^G}{\partial X} \\ \frac{\partial^2 F}{\partial C \partial X} &= - \frac{\partial U^G}{\partial C} \frac{\partial \bar{U}^F}{\partial X} - \frac{\partial U^F}{\partial C} \frac{\partial \bar{U}^G}{\partial X} \end{aligned}$$

The respective signs which determine the impact of X on the program outcome are:

$$\begin{aligned} \frac{\partial \bar{U}^G}{\partial X} > 0, \frac{\partial \bar{U}^F}{\partial X} < 0 \rightarrow \frac{\partial^2 F}{\partial T \partial X} > 0 \rightarrow \frac{\partial T^*}{\partial X} > 0 \\ \frac{\partial \bar{U}^G}{\partial X} > 0, \frac{\partial \bar{U}^F}{\partial X} < 0 \rightarrow \frac{\partial^2 F}{\partial C \partial X} < 0 \rightarrow \frac{\partial C^*}{\partial X} < 0 \end{aligned}$$

APPENDIX B**Countries Used in the Analyses**

Albania*	Djibouti*	Liberia	Senegal*
Algeria*	Dominica	Libya	Seychelles
Angola	Dominican	Lithuania*	Sierra Leone*
Antigua and	Republic*	Macedonia, FYR*	Slovak Republic*
Barbuda	Ecuador*	Madagascar*	Slovenia
Argentina*	Egypt, Arab Rep.*	Malawi*	Solomon Islands
Armenia*	El Salvador*	Malaysia	Somalia
Azerbaijan*	Equatorial	Maldives	South Africa
Bahamas, The	Guinea*	Mali*	Sri Lanka
Bahrain	Eritrea	Malta	St. Kitts and Nevis
Bangladesh	Estonia*	Mauritania*	St. Lucia
Barbados	Ethiopia*	Mauritius	St. Vincent and
Belarus*	Fiji	Mexico*	the Grenadines
Belize	Gabon*	Moldova*	Sudan
Benin*	Gambia, The*	Mongolia*	Suriname
Bhutan	Georgia*	Morocco	Swaziland
Bolivia*	Ghana*	Mozambique*	Syrian Arab
Bosnia and	Grenada	Myanmar	Republic
Herzegovina*	Guatemala	Namibia	Tajikistan*
Botswana	Guinea*	Nepal*	Tanzania*
Brazil*	Guinea-Bissau*	Nicaragua*	Thailand*
Bulgaria*	Guyana*	Niger*	Togo*
Burkina Faso*	Haiti*	Nigeria	Tonga
Burundi	Honduras*	Oman	Trinidad and
Cambodia*	Hungary*	Pakistan*	Tobago
Cameroon*	India	Panama*	Tunisia
Cape Verde*	Indonesia*	Papua New	Turkey*
Central African	Iran, Islamic Rep,	Guinea*	Turkmenistan
Republic*	Iraq	Paraguay*	Uganda*
Chad*	Israel	Peru*	Ukraine*
Chile	Jamaica*	Philippines*	United Arab
China	Jordan*	Poland*	Emirates
Colombia	Kazakhstan*	Qatar	Uruguay*
Comoros	Kenya*	Romania*	Uzbekistan*
Congo, Dem, Rep,*	Kuwait	Russian	Vanuatu
Congo, Rep,	Kyrgyz Republic*	federation*	Venezuela*
Costa Rica*	Lao PDR*	Rwanda*	Vietnam*
Cote d'Ivoire*	Latvia*	Sao Tome and	Yemen, Rep,*
Croatia*	Lebanon	Principe	Zambia*
Czech Republic*	Lesotho*	Saudi Arabia	Zimbabwe*

* Program country.

APPENDIX C**List of Variables and Descriptive Statistics**

Variable	N° of observations	Mean	Standard deviation	Min	Max	Source
Loan amount	149	0,539	0,935	0,000	4,888	MONA
Structural conditions program	149	3,460	6,120	0,000	42,40	MONA
Expected duration	149	0,570	0,497	0,000	1,000	MONA
Log(GDP)	143	8,624	1,946	3,861	13,24	WDI
GDP <i>per capita</i>	141	2,258	3,063	0,100	18,55	WDI
Investments	144	23,23	8,498	6,906	57,531	WDI
Inflation rate	131	106,0	356,89	0,579	3385,2	IFS
Other multilateral aid	133	10,95	24,939	-36,753	196,95	WDI
Trade with OECD countries	134	-5,404	-4,031	-13,300	-1,645	Easterly
Debt service	145	5,414	3,612	0,504	21,229	WDI
Log(UN voting alignment with US)	146	-0,920	0,326	-1,972	-0,061	USA department of State
Log(UN voting movement toward US)	137	-2,867	0,685	-5,204	-0,901	USA department of State
Colonial past <i>dummy</i>	146	0,596	0,492	0,000	1,000	Banks et al. (2000)
Log(share of country quota)	148	5,135	1,577	1,841	8,852	IMF

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