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Endogenous IMF Conditionality: Theoretical and Empirical Implications

Patrick Conway
Department of Economics
Gardner Hall, CB 3305
University of North Carolina
Chapel Hill, NC 27599-3305

Patrick_Conway@unc.edu
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Abstract
The decision to participate in an IMF program is a joint decision of the IMF staff and the government of the potential participant country. Conditionality is not set independently of the decision to undertake a program, but is in fact the endogenous outcome of a bargaining process.

The first section of the paper is a theoretical exposition of this bargaining game. In the second section the theory is tested with data on IMF programs from 1993 to 2001; there is significant support for the theory that the setting of conditionality serves of facilitate IMF lending. In the third section, the implications of this insight for evaluating the impact of IMF lending on country performance are tested. Failure to consider this interdependence will lead to biased estimation results when there is a non-linearity in the reduced-form relationship between dependent and explanatory variables. The appropriate model is derived in this paper, and is estimated for IMF programs observed in the period 1979-1999. The econometric results suggest that efforts to estimate the impact of IMF programs on performance without incorporating this non-linearity will introduce bias to the estimates.

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The Articles of Agreement of the International Monetary Fund created a credit facility to provide temporary balance-of-payments support to member countries.[1] To ensure that this support will be temporary, the Articles of Agreement stipulate that countries participating in this facility must agree to conditions limiting the country's macroeconomic policies. These conditions were the "safeguards" devised by IMF staff to "correct balance of payments maladjustments" while not jeopardizing "national or international prosperity". The derivation and use of these conditions has been quite controversial over the years – some critics found the conditions to be too constraining while others found them too loose; some found them too political while others found them not political enough.[2]

The terminology of this debate persists to the present, but should be revised. It does not reflect the reality of IMF credit programs.[3] While the Articles of Agreement are written in the spirit of temporary balance-of-payments support, the practice has become that countries transit from one program directly to another. The effective length of a spell of participation in IMF facilities is for many countries many times longer than a single facility. This phenomenon has received widespread attention recently. The International Financial Institutions Advisory Commission (IFIAC) appointed by the US Congress was quite critical of the development.[4] In response, the Independent Evaluation Office (IEO) of the International Monetary Fund recently concluded a thorough investigation of the phenomenon culminating in the report "Evaluation of Prolonged Use of IMF Resources".[5]

In both of these reports, the conditionality attached to IMF programs was given a central role in the argument. The authors of IFIAC (2000) concluded that the IMF had ceased to enforce the conditionality it negotiated at the start of each agreement, thus eliminating its effectiveness. The authors of IEO (2002) concluded that those countries with prolonged access to IMF programs were subject to fewer and less onerous conditions on average, and that conditionality was for these countries poorly "prioritized", so that compliance

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[1] Article I, section v, states that one goal of the IMF is " (v) To give confidence to members by making the general resources of the Fund temporarily available to them under adequate safeguards, thus providing them with opportunity to correct maladjustments in their balance of payments without resorting to measures destructive of national or international prosperity." A copy of the Articles of Agreement is available from the IMF at http://www.imf.org/external/pubs/ft/aa/aa.pdf.

[2] Williamson (1982) is a collection of papers from the years leading up to the debt crisis, and provides evidence of both of these charges. More recently, IFIAC (2000) has charged that the conditions imposed are (a) politically motivated and (b) effective only in perpetuating the dependence of the borrowing country on the IMF. Other critics of IMF conditions include Sachs (1998) and Feldstein (1998). Rosett (1998) provides a summary of criticisms based on IMF conditions in East Asian countries. Ivanova et al. (2002) makes the case that IMF conditions do not have enough political motivation.

[3] The IMF has created a number of "facilities" for disbursing credit: these include not only the original stand-by arrangement (SBA), but also the extended fund facility (EFF), the structural adjustment facility (SAF), the extended structural adjustment facility (ESAF), the poverty reduction and growth facility (PRGF), the oil facilities, the compensatory financing facilities, and others. When an individual country approaches the IMF for credit, funds are made available from the appropriate facility. Also, conditions on country performance are specified under which funds will be disbursed. This agreement with an individual country will be called an IMF program.

[4] IFIAC (2000).

[5] IEO (2002).

with some conditions assured continued access to IMF resources while the country's most critical economic problems remained unaddressed.[6]

Both of these critiques of the phenomenon of prolonged use miss a crucial aspect of conditionality: it is a negotiated agreement between the IMF and the participating country, and is thus endogenously determined. The conditions, rather than being an independently set list of policy reforms to achieve economic growth and external balance, are the outcome of bargaining between the IMF and the participating country. These conditions are not only policy-reform components of IMF programs, but have become facilitative devices to continued use as well.

Conditionality plays a role in this transit from program to program. Countries not fulfilling the conditions of a facility will often see that facility cancelled – but another facility immediately begun.

Section I chronicles this prolonged use of IMF facilities through examination of the histories of Kenya and Pakistan in dealing with the IMF. A number of stylized facts of these relationships will be incorporated into the theoretical model that follows, including the frequent cancellation of an existing IMF program with immediate installation of a new program and the wide variety in percentage drawn down of those facilities.

While the conditions attached to IMF credit facilities are closely held by the IMF and the borrowing government, two indicators of non-fulfillment can be found: the premature cancellation of an IMF facility and the drawdown of less than 100 percent of the available credit in the facility. Section II introduces a simple model of the intertemporal bargaining process between IMF and borrowing country. It becomes clear in that model that the conditions attached to an IMF facility may in fact make additional lending possible. While the initial facility may be cancelled due to non-compliance with conditions, a new facility can be put in place immediately thereafter due to the ability of both parties to adjust the conditions. Section III provides econometric evidence in support of this model drawn from the Monitoring of Arrangements (MONA) database of the IMF. Section IV explores the implication of this model for cross-country estimation of the determinants of participation in IMF programs. Section V examines the implications for cross-country investigations of the impact of IMF programs on economic growth. Section VI concludes.

I. The Prolonged Use of IMF Credit Facilities.

In the Articles of Agreement, member use of IMF credit facilities was expected to follow the model of a credit union: periodic use of the facilities, with all members rotating between borrower and lender roles.[7] In practice, however, many borrowing countries have experienced prolonged use of IMF credit facilities. This prolonged use does not seem to be the exclusive purview of countries meeting the conditions on facilities, but rather seems concentrated among those countries for whom it is quite common that

[6] IEO (2002, p. 13)

[7] Kenen (1986) provides a detailed discussion of this analogy.

programs be cancelled or funds not drawn down in full. In this section I illustrate this point with evidence from Kenya and Pakistan.

Table 1 lays out Kenyan participation in five types of IMF credit facilities: stand-by arrangements (SBA), extended fund facilities (EFF), structural adjustment facility (SAF), extended structural adjustment facilities (ESAF) and Poverty Reduction and Growth Facilities (PRGF). These facilities were those for which conditions were necessary for disbursement.

Table 1. Kenyan Participation in IMF Facilities

Facility	Start Date	End Date	Cancellation	Percent Drawn Down
EFF	7/7/75	7/6/78	No	11
SBA	11/13/78	8/19/79	Yes	100
SBA	8/20/79	10/14/80	Yes	0
SBA	10/15/80	1/7/82	Yes	37
SBA	1/8/82	1/7/83	No	60
SBA	3/21/83	9/20/84	No	100
SBA	2/8/85	2/7/86	No	100
SBA	2/1/88	5/15/89	Yes	74
SAF	2/1/88	5/15/89	Yes	29
ESAF	5/15/89	3/31/93	No	83
ESAF	12/22/93	12/21/94	No	100
ESAF	4/26/96	4/25/99	No	17
PRGF	8/4/00	8/3/03		

Also: drawings from Oil Facility and Compensatory Facility in 1974-76, 1979 and early 1980s.
Source: IMF Annual Reports, various years.

The Kenyan experience provides examples of two phenomena observed in many member countries. First, there are many instances of non-cancelled programs that nevertheless were characterized by small percentages drawn down. For example, the 1975 EFF agreement between Kenya and the IMF ran its entire term but only 11 percent of the total funds available were disbursed. Second, there were five cancelled agreements between Kenya and the IMF during the period since 1975. The cancellation was followed immediately in each case by the introduction of a new agreement.

The low percentage drawn down is an indicator of one of two scenarios. The credit available under the IMF facility is disbursed in tranches. The tranches are disbursed according to a set timetable on the request of the borrowing country. Later tranches can only be disbursed if the country has met the conditions set in the Letter of Intent associated with the credit facility. Thus, if the country has not met the conditions, then only the first tranche will be disbursed. Alternatively, the country's external position may improve over time; if the country has no need for the credit it may choose not to request disbursement but hold the program as a credit line against future contingencies. In either case the program continues but the credit is not drawn down.

Cancellation of an agreement is in theory a more serious disciplinary step, but in practice it allows increased access to IMF credit facilities. So long as the current program is in place, its conditions govern the ability of the IMF to disburse credit. If the IMF believes that the conditions are no longer appropriate it will cancel the current program so that a new program, with new conditions, can be introduced. Cancellation is then a signal not of conflict but of cooperation, and is usually followed by immediate agreement on a new program with new conditions.

The Kenyan experience for the period 1975-1981 is described in Killick (1984, pp. 396-407). He was given access to the Letters of Intent, and thus is able to provide more insight into the role of conditions in prolonged use. The Letter of Intent from the government of Kenya to the Executive Board of the IMF enumerated two performance criteria, or conditions, for the 1975 EFF. These conditions set ceilings on the level of government borrowing from banks and on domestic credit creation. The agreement specified six drawings, at 6-month intervals, over the life of the program. Only the initial drawing was requested by the Kenyan government. The duration of the EFF coincided with an upturn in coffee prices on world markets, and led the government to exceed the performance criteria on borrowing and domestic credit creation. The EFF was not cancelled because the Kenyan government chose not to request a drawing.

The period 1979-1982 was characterized by three consecutive stand-by arrangements (SBA). The first two of these ended in cancellation. The reason for cancellation was in each case the violation of the conditions outlined in the Letters of Intent associated with each program. As Killick (1984) noted, the Kenyan government was unable to draw down the first SBA because of an inability to meet the conditions of the initial Letter of Intent. The second SBA was negotiated to replace the first SBA immediately, and the conditions outlined in the second Letter of Intent were less restrictive than those in the first. While two drawings were made on this second SBA, its conditionality also proved to be too restrictive in the face of unforeseen increases in government spending, and it was canceled as well. The Letter of Intent of the third SBA included more conditions, and more restrictive conditions, than the earlier programs. Killick (1984) attributes this to a get-tough policy by the IMF, with parts due to the desire to ensure policy reform and to the pressure from the new Reagan Administration in the US to avoid a "soft" agreement. The third SBA was only partially drawn down, but was carried to completion, as the IMF saw no reason to trigger yet another set of conditions through cancellation and renegotiation.

Pakistan has a long history as a user of IMF credit facilities as Table 2 illustrates.

Table 2. **Pakistani Participation in IMF Facilities**

Facility	Start Date	End Date	Cancellation	Percent Drawn Down
SBA	12/8/58	9/22/59	Yes	0
SBA	3/16/65	3/15/66	No	100
SBA	10/17/68	10/16/69	No	100
SBA	5/18/72	5/17/73	No	84
SBA	8/11/73	3/10/74	No	100
SBA	10/16/74	10/15/75	No	100
SBA	3/9/77	3/8/78	No	100
EFF	11/24/80	12/1/81	Yes	0
EFF	12/2/81	11/23/83	No	0
SAF	12/28/88	12/27/91	No	71
SBA	12/28/88	11/30/90	No	71
SBA	9/16/93	2/22/94	Yes	33
ESAF	2/22/94	12/13/95	Yes	28
EFF	2/22/94	12/13/95	Yes	32
SBA	12/13/95	9/30/97	No	52
EFF	10/20/97	10/19/00	No	25
ESAF	10/20/97	10/19/00	No	39
SBA	11/29/00	9/30/01	No	100
PRGF	12/7/01	12/6/04		

Also: use of Oil Facility and Commodity Finance Facility in 1970s, early 1980s and early 1990s.
Source: IMF Annual Reports, various years.

This history can be broken into two parts: the initial generation (1958-1978) of non-cancelled and nearly completely disbursed programs, and a subsequent generation (1980-2000) of programs with limited disbursement and frequent cancellation. The initial generation includes a rather rare event – a cancelled credit program in 1959 without a new program immediately negotiated. In the other instances of cancelled programs (1981, 1994, 1995) there was immediate introduction of a new program in place of the one cancelled.

Mecagni (1999) provides some insight into the cancellation of the 1994 and 1995 programs. The cancellation of the ESAF and EFF in 1995 is attributed to "broad, forward-looking disagreements in macro policies and structural reforms". Performance criteria such as budget deficit ceiling, import tariff ceiling, sales tax base expansion and reduction in tax exemptions were not met. Nevertheless, the IMF immediately negotiated follow-on programs to these. According to IEO (2002, p. 171), "all but the last arrangement [in the period 1988-2000] suffered from substantial policy slippages and soon went offtrack, usually after the first or second review. … This suggests a rather poor implementation record overall."

The notion that conditionality is endogenous to the negotiation process is not a new idea, nor is it limited to these two examples. Dreher (2002) provides a very interesting compilation of the available historical evidence on conditionality and documents trends in design and implementation over time and by groups of countries.

These examples illustrate three features of the history of IMF programs that a model should replicate. First, prolonged use should be a possible outcome of the model. Second, the cancellation of an existing program and immediate negotiation of a new program should be an endogenous event in the model. Third, the partial drawdown of credit should be an endogenous outcome as well.

II. A Theoretical Analysis of Conditionality.

Participation in an IMF program is an interlocking set of decisions made over time. There are two decision-makers: the government of the country applying to participate in the program, and the staff and executive directors of the IMF. When a program is first proposed, there is an initial evaluation by both government and IMF staff as to the desirability of the program. The borrowing country weighs the costs and benefits of requesting a program, while the IMF staff examines the ability of the country to introduce the reforms that are thought to be necessary conditions for re-attaining external equilibrium. If the answer to each is "yes", then the IMF program is put in place. The participating government signs a Letter of Intent, indicating its agreement with the conditions. The first tranche of IMF funding is released.

In each period thereafter, for the life of the program, there is a re-examination of the feasibility and desirability of the program from the viewpoint of each decision-maker. When the program ends, the participating country remains a member of the IMF. It will, on a periodic basis, consult with the IMF staff about the value and conditions that would be attached to a new program.

Competing hypotheses.

I consider two competing hypotheses on conditionality.

- Hypothesis 1: conditions on IMF programs are derived by the IMF from economic fundamentals of the participating country. If conditions are not met, lending under the program is suspended. For one IMF program to follow another immediately, the conditions attached to the second program must be equal to or more restrictive than the initial program.

- Hypothesis 2: conditions on IMF programs are the outcome of bargaining between IMF staff and participating-country government. If conditions are not met, lending is suspended – but the two actors will look for ways to rewrite the conditions so as to permit disbursement. One method will be to establish an IMF program following another immediately with less restrictive conditionality. Another method will be to cancel the existing program and introduce a new program with reduced conditionality.

The two hypotheses will be addressed within a model of decision-making by IMF staff and participating-country government.

Decision-rules of actors.

IMF Staff Decision Rule. The IMF staff decision rule can be represented as follows for period t. There is an unobserved variable z^*_{Ijt} whose value measures the payoff to the IMF of a program with country j. This variable is a function of observed country-specific variables of interest to the IMF denoted Z_{Ijt} and a random error u_{Ijt}. The decision is also dependent upon the relation between conditions agreed to in any previous program negotiation (c_{jt}) and the actual value of target variables (b_{jt}). To be specific in this example, consider b_{jt} to be the government budget surplus as a percent of GDP in period t. The country is presumed to begin with a budget deficit.

If there is an existing program with the country, the IMF staff first examines whether the country has met its conditions. If the country has not met the conditions ($c_{jt} > b_{jt}$) the IMF cannot automatically disburse funds. It will either postpone disbursement or grant a waiver. Otherwise, disbursement will occur upon request of the borrowing country. If there is no existing program (or one has just been canceled), then a new program will be offered to country j if the payoff from that program is positive.

The conditionality on IMF programs to country j enters the IMF payoff function in two ways. First, the payoff to the IMF will rise with the extent to which the agreed-upon condition for next period improves upon the outcome observed this period ($c_{jt+1} - b_{jt} > 0$). Second, the payoff to the IMF will fall for countries with existing programs in proportion to the extent by which the realized value of the target falls short of the agreed-upon condition for this period ($c_{jt} - b_{jt} > 0$). The variable J_{jt} is an indicator function taking the value of one if the country were in an IMF program in the current period, and zero otherwise. The decision to implement a new program, or to cancel country j's existing program, in period t is indicated by the value of P_{Ijt}: if one, it is in the IMF interest to continue (or offer a new program), while if zero, the IMF will prefer to cancel the program (or no offer of a new program will be made). [8]

$$z^*_{Ijt} = Z_{Ijt}\,\beta_{Ij} + \delta_{I1}(c_{jt+1} - b_{jt}) - J_{jt}\,\delta_{I2}\,(c_{jt} - b_{jt}) + u_{Ijt} \qquad (1)$$

$$P_{Ijt} = \begin{cases} 1 & \text{if } z^*_{Ijt} \geq 0 \\ 0 & \text{otherwise} \end{cases} \qquad (2)$$

While there is no explicit payoff to the IMF for its lending, the decision criterion modeled here may be thought of as a weighted index of the country's eligibility for lending based upon a number of indicators. The first set of indicators ($Z_{Ijt}\,\beta_{Ij}$) will include comparable cross-country indices of macroeconomic stability, terms of trade deterioration, international indebtedness, and others. The indicators need not be strictly economic; the country's political stance or other factors could also enter this weighted index. The β_{Ij} are the weights placed on each indicator in the overall index. There are also unobserved

[8] It is possible, given the specification of (1), that a country could meet its conditions ($b_{jt} - c_{jt} > 0$) but the IMF prefer not to continue to lend at those conditions. I assume that the IMF is bound in this situation to continue with the program.

determinants (u_{Ijt}) that enter the index. For countries currently in programs, the country's ability to meet current conditions (b_{jt}–c_{jt}) enters the calculation with weight δ_{I2}. Also entering the eligibility index with weight δ_{I1} is the country's willingness to commit to restrictive conditions in the future (c_{jt+1}-b_{jt}).[9]

Government j Decision Rule for participating government j. For country j, there is an error-correction rule governing the dynamics of its policy variable b_{jt}:

$$b_{jt+1} = b_{jt} - \psi_j (b_{jt} - \tilde{b}_j) + \gamma_j (c_{jt+1} - b_{jt}) + u_{gjt} \qquad (3)$$

In the absence of an IMF program, the policy variable follows a simple error-correction process around its long-run value $\tilde{b}_j$. ψ_j represents the percent of any differential between actual and long-run value that is made up in period t+1. With an IMF program, there will in addition be adjustment toward an agreed-upon condition c_{jt+1}. The parameter γ_j indicates the degree of adjustment with its range between 0 and 1. Smaller γ_j indicates less movement toward the target c_{jt+1}, perhaps because of larger short-term political and economic losses to the government of country j from tightening b_{jt}. The zero-mean random variable u_{gjt} represents the lack of precision with which the government controls its policy.[10]

The government's decision to participate in an IMF program is assumed to be triggered by short-term welfare loss from external sources surpassing the short-term welfare loss from policy adjustments associated with participating in the IMF program. The short-term welfare loss differential is represented by the unobserved variable z^*_{gjt}. The loss from external sources is a function of observed country-specific variables Z_{gjt}. The policy-associated loss is measured by the adjustment (b_{jt-1}–b_{jt}).[11] The government's decision to request a program is indicated by P_{gjt}: its value is one if a request is made, or zero if no request is made.

$$z^*_{gjt} = Z_{gjt}\,\beta_{gj} + \psi_j(b_{jt} - \tilde{b}_j) - \gamma_j (c_{jt+1} - b_{jt}) - u_{gjt} \qquad (4)$$

$$P_{gjt} = \begin{cases} 1 & \text{if } z^*_{gjt} \geq 0 \\ 0 & \text{otherwise} \end{cases} \qquad (5)$$

Representing the joint decision. In general, the decision variables P_{Ijt} and P_{gjt} are not observed separately. The joint decision to set up a program $P_{jt} = P_{Ijt} * P_{gjt}$ is

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[9] The relative sizes of δ_{I1} and δ_{I2} will indicate whether the IMF decision depends more upon meeting conditionality or upon macroeconomic stability and external shocks. If δ_{I2} were large relative to δ_{I1}, for example, it would appear to the observer that the IMF had two sets of country-evaluation rules: one set for those countries currently in programs and one set for those not in programs.

[10] There can of course be other determinants of the evolution of policy, but these are suppressed for simplicity.

[11] The reputational cost of entering an agreement for the first time could be included easily as well.

observed. In addition, it is difficult to identify cross-country explanatory variables that belong in the IMF choice set but not in the country's choice set, and vice versa. When such exclusion restrictions are impossible, $Z_{jt} = Z_{Ijt} = Z_{gjt}$. The two decisions can then be summarized as:

$$z^*_{gjt} = Z_{jt}\,\beta_{gj} + \psi_j(b_{jt} - \tilde{b}_j) - \gamma_j\,(c_{jt+1} - b_{jt}) - u_{gjt} \qquad (6)$$

$$z^*_{Ijt} = Z_{jt}\,\beta_{Ij} + \delta_{I1}\,(c_{jt+1} - b_{jt}) - J_{jt}\,\delta_{I2}\,(c_{jt} - b_{jt}) + u_{Ijt} \qquad (7)$$

$$P_{jt} = \begin{cases} 1 & \text{if } z^*_{gjt} \geq 0 \text{ and } z^*_{Ijt} \geq 0 \\ 0 & \text{otherwise} \end{cases} \qquad (8)$$

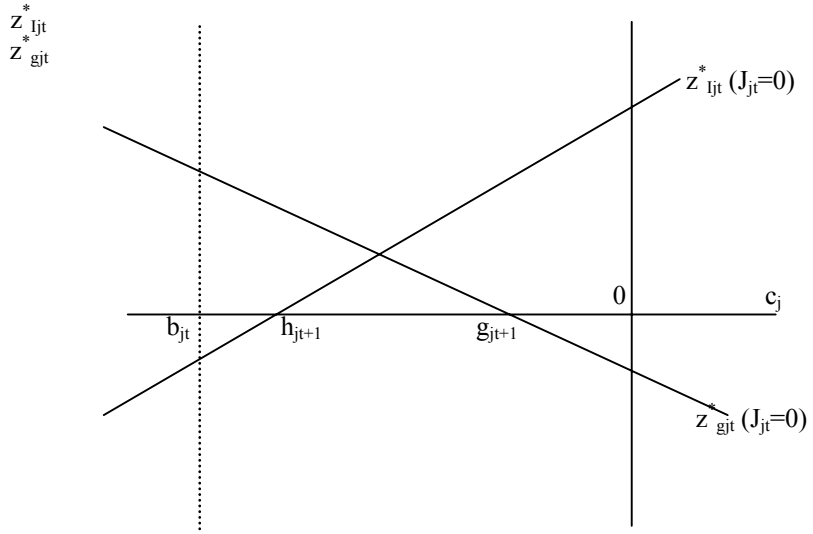
While (6) and (7) appear to be separate stochastic processes, they are linked by the importance to both actors of conditionality in the next period.

Figure 1 illustrates the interaction of payoffs z^*_{gjt} and z^*_{Ijt} as defined by (6) and (7) for a country j not in an IMF program in period t ($J_{jt} = 0$). All determinants of the payoffs are summarized in the intercepts of the two curves except for their dependence on the conditionality (c_{jt+1}) in the next period. The IMF's desire to extend a program to the country is rising in c_{jt+1}, other things equal. It is evident from the values of the payoff z^*_{Ijt} at the current level of the government budget surplus ratio (b_{jt}) that the IMF staff will recommend against participation if no condition on reducing the budget deficit is built into the agreement.

The level of conditionality h_{jt+1} in Figure 1 represents the minimal acceptable conditionality to the IMF staff. More restrictive conditionality (i.e., more positive c_{jt+1} than h_{jt+1}) will yield higher payoffs to IMF staff, but is less preferred by the participating government. The payoff schedule z^*_{Ijt} illustrates the predictions of Hypothesis 1: it is based on economic fundamentals of the participating country and it defines a level of conditionality below which disbursements do not occur. To illustrate the third part of Hypothesis 1, consider the payoff schedule with a preceding program in place ($J_{jt} = 1$). If past conditionality has not been met ($c_{jt} > b_{jt}$), then the minimal acceptable conditionality h_{jt+1} rises: ceteris paribus, another program will follow immediately on one in which conditionality is not met only if the conditionality attached to the following program is more restrictive.

Figure 1 also illustrates the government's desire to enter an IMF program. It is declining in c_{jt+1}, other things equal, because of the implied impact of increased conditions on next period's welfare. The slope of this curve is equal to (the negative of) γ_j, indicating the degree to which the government will adjust in response to participation. (If the participating government were planning simply to ignore the condition, then the curve z^*_{gjt} would be flat.) Hypothesis 2 posits that conditionality (c_{jt+1}) is an endogenous variable. It will be determined by negotiation between the IMF and the member-country government.

Figure 1. **Conditionality as Program-Facilitation Device**



The negotiation process between the two actors can be derived in the terms of Figure 1. While h_{jt+1} is the minimally acceptable conditionality from the IMF perspective, g_{jt+1} is the maximum conditionality acceptable to the participating country. The participating country will benefit from a program so long as the conditionality on the budget allows ratios less than g_{jt+1}, and the IMF staff will favor a program for any conditionality on the budget surplus ratio less negative than h_{jt+1}. For economies in which $g_{jt+1} \geq h_{jt+1}$ there is scope for bargaining over conditionality to reach a cooperative equilibrium c^o_{jt+1}. For economies in which $g_{jt+1} < h_{jt+1}$ the model predicts no cooperative equilibrium and no IMF programs.

The information from Figure 1 relevant to the cooperative equilibrium can be summarized in certainty-equivalent reservation values (CERV) of the budget surplus ratio. Setting z^*_{gjt} and z^*_{Ijt} equal to zero in (6) and (7) for $u_{Ijt} = u_{gjt} = 0$ defines g_{jt+1} for the participating country and h_{jt+1} for the IMF.[12] Inserting the CERV conditionality pair (g_{jt+1}, h_{jt+1}) into the payoff definitions (6) and (7) defines a matrix of certainty-equivalence payoffs for the government and IMF. The values z^o_{Ijt} and z^o_{gjt} are linked through the equality $z^o_{Ijt} = (\gamma_j/\delta_{I1})\, z^o_{gjt}$.

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[12] $g_{jt+1} = b_{jt} + (1/\gamma_j)[Z_{jt}\,\beta_{gj} - (1-\psi_j)(b_{jt} - \tilde{b}_j)]$

$h_{jt+1} = b_{jt} - (1/\delta_{I1})[Z_{jt}\,\beta_{Ij} - J_{jt}\,\delta_{I2}\,(b_{jt} - c_{jt})]$

	$c_{jt+1} = g_{jt+1}$	$c_{jt+1} = h_{jt+1}$
z^*_{gjt}	0	$z^o_{gjt} = Z_{jt}\,[\beta_{gj} + (\gamma_j/\delta_{I1})\beta_{Ij}] - (1-\psi_j)(b_{jt} - \tilde{b}_j)$ $+ J_{jt}(\gamma_j/\delta_{I1})\delta_{I2}\,(b_{jt} - c_{it}) > 0$
z^*_{Ijt}	$z^o_{Ijt} = Z_{jt}\,[\beta_{Ij} + (\delta_{I1}/\gamma_j)\,\beta_{gj}]$ $-(\delta_{I1}/\gamma_j)(1-\psi_j)(b_{jt} - \tilde{b}_j)$ $+ J_{jt}\,\delta_{I2}\,(b_{jt} - c_{jt}) > 0$	0

These certainty-equivalent payoffs have three components. The first is the impact of external variables on the payoffs. The third is the impact of satisfying the conditionality of the existing program ($b_{jt} - c_{jt}$); note that when conditions are not satisfied the certainty-equivalent payoffs are reduced for both actors. These components are observable, and thus will be included in the negotiation between the IMF and country government. The second component is the error-correction impact of deviations from long-run policy value: as current policy becomes more restrictive than its long-run value, the certainty-equivalent payoffs are reduced. While the current policy variable (b_{jt}) is observed, the long-run value ($\tilde{b}_j$) is not observed by the IMF.

Bargaining over conditionality. The negotiation between participating government and IMF staff over conditionality can be represented as a generalized Nash cooperative equilibrium (see, e.g., Friedman (1990, ch. 6) and Svejnar (1986)). This equilibrium is illustrated in Figure 2. The "threat point" defined by the bargain is then the origin, while the payoff frontier is defined by varying c_{jt+1} between the CERV values (g_{jt+1},h_{jt+1}).

Consider first the outcome if $\tilde{b}_j$ were observed by both actors. The relative bargaining power of the IMF and country j government is represented by the bargaining weights τ_j and $(1-\tau_j)$ respectively.[13] τ_j is bounded by 0 and 1, and lower values indicate relatively less bargaining power for the IMF in setting conditionality. At the extreme, $\tau_j = 1$ indicates that the IMF can impose its preferred conditionality γ_{jt+1}, while $\tau_j = 0$ leads to the government's preferred outcome from the feasible set g_{jt+1}. The equilibrium conditionality $c^o_{jt+1} = \tau_j\, h_{jt+1} + (1-\tau_j)g_{jt+1}$. When appropriate substitutions are made,

$$c^o_{jt+1} = b_{jt} + Z_{jt}[\delta_{I1}(1-\tau_j)\beta_{gj} - \gamma_j\,\tau_j\,\beta_{Ij}]/(\gamma_j\delta_{I1}) + J_{jt}\tau_j\,(\delta_{I2}/\delta_{I1})(c_{jt} - b_{jt})$$

$$- (1-\tau_j)(1-\psi_j)(b_{jt} - \tilde{b}_j)/\gamma_j \qquad (9)$$

The equilibrium level of conditionality is based on the observed level of the policy variable in period t. It is adjusted for the impact of observable external events, with the

[13] The value of τ_j is assumed set exogenously for each country.

weights assigned to those external events determined by the relative bargaining power of the IMF and the participating government. Equilibrium conditionality is adjusted upward by the extent to which the country fell short of its conditionality in the preceding period. Finally, conditionality is adjusted downwards by the extent to which the current policy stance is more restrictive than its long-run value.

When this equilibrium value of conditionality is introduced into the definitions for the payoffs to IMF and government actors (6) and (7):

$$z^{*}_{gjt} = \tau_j \left[Z_{jt} (\beta_{gj} + \beta_{Ij} (\gamma_j/\delta_{I1})) - (1-\psi_j)(b_{jt}-\tilde{b}_j)/\gamma_j + \gamma_j J_{jt} (\delta_{I2} /\delta_{I1})(b_{jt} - c_{jt}) \right] - u_{gjt} \qquad (6')$$

$$z^{*}_{Ijt} = (1-\tau_j)[Z_{jt} (\beta_{Ij} + \beta_{gj}\delta_{I1}/\gamma_j) - (1-\psi_j)(b_{jt}-\tilde{b}_j)/\gamma_j + J_{jt}\, \delta_{I2}\, (b_{jt} - c_{jt})] + u_{Ijt} \qquad (7')$$

There are a number of interesting implications of this "reduced form". First, the coefficients on the external variables Z_{jt} are now a combination of the coefficients found in the two payoff functions. Second, while in the original form only the IMF payoff depended upon satisfying conditionality, in this reduced form both payoffs now depend upon the degree to which conditions were met. Third, one payoff function is a multiple of the other except for the random error. Estimating either one in this form will provide consistent estimates of these reduced-form coefficients. Fourth, so long as $g_{jt+1} < h_{jt+1}$ it will be in both actors' interest to have a continuing cooperative relationship in any period t. Programs will be signed sequentially, with conditionality adjusted so as to distribute the benefits from the program between the two actors.

Behavior within the IMF program. Conditionality as represented by c^{o}_{jt+1} is set at the beginning of each program. During the lifetime of a program, the participating country can terminate the program. The IMF will not unilaterally terminate the program, but has the right to deny drawings by the participating country if the country does not satisfy the agreed-upon conditionality.

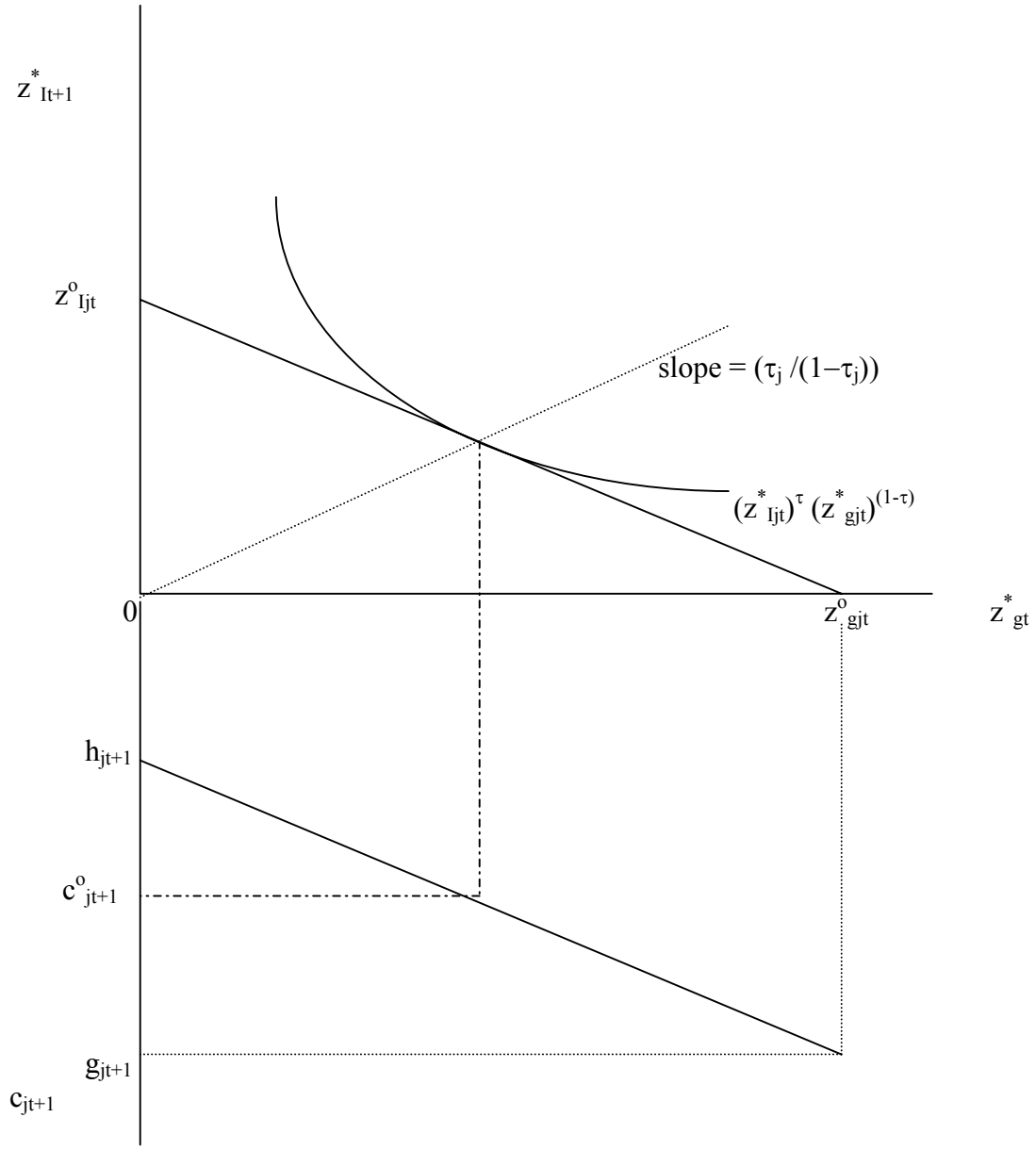
Why might the conditionality not be satisfied? The condition ($b_{jt+1} > c_{jt+1}$) will ensure that conditionality is satisfied in period t+1. Using the policy evolution equation (3):

$$(b_{jt+1} > c_{jt+1}) \rightarrow b_{jt} (1-\psi_j -\gamma_j) + \psi_j \tilde{b}_j + u_{gjt} > (1-\gamma_j)c_{jt+1} \qquad (10)$$

Consider the case with $\tau_j = 1$, with the IMF having all bargaining power. Substituting in from (9), we derive a condition under which conditionality is not met:

$$u_{gjt} > \psi_j (b_{jt} - \tilde{b}_j) + (1-\gamma_j)\{ J_{jt}\delta_{I2}(c_{jt} - b_{jt}) - Z_{jt}\beta_{Ij})\}/\delta_{I1} \qquad (11)$$

Figure 2: **The Nash Bargaining Solution under Certainty Equivalence**



This will also be the condition under which the IMF is unable to disburse funds. The probability that disbursement does not occur in any period t+1 is

$$\text{Prob}(c_{jt+1} > b_{jt+1}) = \text{Prob}(u_{gjt} > \psi_j(b_{jt} - \tilde{b}_j) + (1-\gamma_j)\{ J_{jt}\delta_{I2}(c_{jt} - b_{jt}) - Z_{jt}\beta_{Ij})\}/\delta_{I1})$$

$$= 1-\Phi(\psi_j(b_{jt} - \tilde{b}_j) + ((1-\gamma_j) /\delta_{I1})\{ J_{jt}\delta_{I2}(c_{jt} - b_{jt}) - Z_{jt}\beta_{Ij})\}) \qquad (12)$$

with Φ the cumulative normal density function.

Note that non-disbursement is autocorrelated: if conditions were not met in period t, there is a greater probability that conditions will not be met in period t+1. There is also a greater probability of non-disbursement for higher values of $\tilde{b}_j$.[14] This can be important in the context of negotiations because $\tilde{b}_j$ is not observed by the IMF, and the government can be expected to report a value less than the actual so as to reduce its own welfare loss from participation in an IMF program. This effect occurs through the equilibrium value of c^o_{jt+1}; this value will fall as the long-run value is reduced.

There are thus four potential reasons for policy performance to fall short of conditionality.

- A negative shock u_{gjt} to policy performance.
- A long-run value of the policy variable less than the period-t realization.
- Falling short of the conditionality target in a preceding period.
- A negative external shock Z_{jt}.

The negative shock u_{gjt} and a temporary negative external shock Z_{jt} will lead to temporary non-disbursement. Too-restrictive conditionality or an inappropriately high prediction of the long-run value $\tilde{b}_j$ will lead to a greater probability of non-disbursement throughout the IMF program. Non-disbursement is not welfare-improving for either actor. It will be in both actors' interest to cancel the non-disbursing program with its strict conditionality and replace it with a program with less-strict conditionality. The bargaining model is then the basis for the predictions of Hypothesis 2.

III. Evaluating the competing hypotheses of conditionality.

The two hypotheses provide two models of the determination of conditionality. Hypothesis 1 will serve as the null hypothesis: conditionality is determined by the fundamentals of the participating country. IMF programs can follow one another, but if conditionality is not met in one program then the subsequent program will have more restrictive conditionality. Hypothesis 2 is the alternative hypothesis, and predicts three potentially observable features. First, there is no reason for programs to be once-off activities; ceteris paribus, programs will be approved in sequence for the same country so long as $g_{jt+1} > h_{jt+1}$. Second, conditionality on the programs will be endogenously adjusted to reflect the bargaining power and initial conditions of the participating country

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[14] In the general case of $0 < \tau_j < 1$, $\text{Prob}(c_{jt+1} > b_{jt+1}) = \text{Prob}(u_{gjt} > (\psi_j - ((1-\gamma_j)(1-\tau_j)(1-\psi_j)/\gamma_j))(b_{jt} - \tilde{b}_j) + (1-\gamma_j)\{ J_{jt}\delta_{I2}(c_{jt} - b_{jt})\tau_j + Z_{jt}((1-\tau_j)\beta_g \delta_{I1} - \tau_j \gamma_j\beta_{Ij})\}/(\gamma_j\delta_{I1}))$. The increased government bargaining power relative to the case in the text makes conditionality less strict – but the factors noted in the text will still in the general case lead to a country failure to meet its conditions.

and the government, including the ability of the participating country to satisfy previous conditionality. If conditions were not satisfied in the previous period, then ceteris paribus the newly bargained conditionality will be less restrictive. Third, program cancellation is a natural course of events, and will in most cases be followed immediately by a new program with reduced conditionality.

These implications are difficult to test for two reasons. First, the conditions associated with specific IMF programs have not generally been made public. Second, there are often many interlinked conditions for which there is no single sufficient statistic. There are, however, two ways to deduce the conditionality associated with IMF programs indirectly. The first uses information on the percentage drawn down of funds made available in IMF programs. The mechanics of IMF lending ensure that a program not meeting its conditions will be characterized by a smaller percentage drawn down of the loan amount. This feature can be used to derive a proxy for conditionality from the observed percentage drawn down. I derive this proxy in what follows using data from IMF programs between 1993 and 2001. The second uses information on macroeconomic forecasts associated with each IMF program implemented. These macroeconomic forecasts are created simultaneously with the conditionality of the IMF program and reflect the conditionality agreed upon in the program. A proxy for conditionality can be derived from the observed difference between forecast and actual, and I do so for the same 1993-2001 time period.

Evidence from the percent drawn down. The IMF policy on disbursements ensures that the percent drawn down of a program will reflect the strictness of conditionality. The funds available under an IMF program are drawn down in tranches. The first tranche can be drawn down upon signing the agreement, but for subsequent tranches the IMF staff must either certify that the country has fulfilled the conditions of the Letter of Intent or must waive the conditions in that instance due to extraordinary events subsequent to signing that make the conditions unobtainable.

The linkage between percent drawn down and violation of conditionality is not exact. The percent drawn down will depend as well upon the country government's desire to use its credit line with the IMF. It may choose not to draw down the resources, either because the country desires the IMF agreement for reasons (e.g., HIPC consideration) unrelated to the availability of funds, because it has entered the agreement on precautionary grounds or because events subsequent to signing the agreement make it unnecessary to use those funds. This possibility must be incorporated in the derivation procedure.

The percent drawn down for any IMF program will be represented as:

$$P_{jt} = \beta_j + \beta_t - \beta_{10} \Delta Z_{jt} - \beta_{11} \Delta Z_{jt-1} - \beta_2 Z_{jt-1} + \beta_3 (b_{jt} - c_{jt}) + \varepsilon_{jt} \qquad (13)$$

The IMF decision to allow funds to be drawn down is based upon the relation of realized policy variables to the conditions written into the Letter of Intent ($b_{jt} - c_{jt}$).[15] Once the IMF has decided, then the program country government decides upon the percent drawn down. I hypothesize that this decision will have both country-specific effects (β_j) and time-specific effects (β_t): the country may be one to use IMF programs as precautionary lines of credit or may be interested in the IMF program for other reasons than funding; the year may matter because world credit market conditions make alternative credit sources more attractive to all IMF program recipients. Positive shocks to policy variables (ΔZ_{jt}) will reduce the desired percent drawn down, and negative shocks will work conversely. The country's initial macroeconomic situation (Z_{jt-1}) will also affect the desired percent drawn down. I consider two macroeconomic variables Z_{jt}: the ratio of current account surplus to GDP (b_{jt}) and the ratio of government budget surplus to GDP (g_{jt}). Each can be thought of as a policy variable, and thus will have conditions attached. Positive shocks to each should reduce the percent drawn down, while ratios in the previous period that were less negative than average should reduce the percent drawn down as well. If a country outperforms its conditionality (c_{jt}) then it should be able to draw down more of its IMF funds, other things equal. Since I do not observe the government's decision rule with certainty, there will also be an error term (ε_{jt}) associated with the predicted rule.

$$P_{jt} - \beta_j - \beta_t + \beta_{10}\,\Delta Z_{jt} + \beta_{11}\,\Delta Z_{jt-1} + (\beta_2 - \beta_3)\,Z_{jt-1} = -\beta_3\,c_{jt-1} + \varepsilon_{jt} \qquad (14)$$

Under either the null or alternative hypothesis, the residual ($-\beta_3\,c_{jt-1} + \varepsilon_{jt}$) will be an indicator of conditionality. As conditionality falls, the percent drawn down not attributed to other factors should be larger.

The programs of special interest to the endogenous-conditionality argument are those that follow immediately upon another IMF program: these will be called "continuation" programs. A specific instance of a continuation program is one that follows immediately on a canceled program: these will be called "post-cancellation" programs. Under the null hypothesis, these programs should be characterized by stricter conditionality than those that they follow. Under the alternative hypothesis, these programs should be characterized by weaker conditionality than those they follow. These hypotheses will be tested using the empirical estimate of the residual ($-\beta_3\,c_{jt-1} + \varepsilon_{jt}$).

I investigate this hypothesis in two steps. In the first step I estimate (13) for the 175 IMF programs between 1992 and 2001 for which I have information. The data on percent drawn down by IMF program are taken from various IMF Annual Reports, while the data on the current-account and fiscal ratios are taken from the World Economic Outlook (WEO) prepared by the IMF. I calculate the estimated value of ($-\beta_3\,c_{jt-1} + \varepsilon_{jt}$), denoted

[15] If this IMF decision was a once-for-all choice in each program, it would be more appropriate to model the percent drawn down as a sequential choice: 0 if the IMF said no, and some positive amount if the IMF said yes. Since for each program there will be at least four determinations based on conditionality, I approximate this IMF "veto power" by the negative linear effect represented in the equation.

$\hat{e}_{jt}$, from the first regression. In the second step, I create two dummy variables. The variable d_{xa} takes the value of one for those IMF programs that are not preceded immediately by another program for that country but are followed immediately by another program, and 0 otherwise.[16] The variable d_{xp} takes the value of one for those IMF programs that follow immediately another IMF program for the same country, and zero otherwise.[17] In addition, those programs ending in cancellation are represented by the binary variable can_{xa}, and those following immediately upon a cancelled program are presented by the binary variable can_{xp}. For nearly all observations, $can_{xp} = 1$ is a subset of $d_{xp} = 1$, and similarly for can_{xa} and d_{xa}.[18] The theory of the text predicts that the conditionality associated with the first program in the series will be less than that associated with subsequent programs. This effect will be heightened in the case of cancellation and immediate adoption of a new program, so that for those countries the net effect on the percent drawn down will be $d_{xa} + can_{xa}$ or $d_{xp} + can_{xp}$.

The first regression, with statistics reported in column (1) of the first part of Table 3, replicated (1) exactly with 75 country fixed effects, 9 yearly fixed effects, and regressors Δb_{jt}, Δg_{jt}, Δb_{jt-1}, Δg_{jt-1},Δb_{jt-2}, Δg_{jt-2}, b_{jt-1} and g_{jt-1}. While the explanatory power of the regression is quite high, with $R^2 = 0.91$, the explanation apparently comes largely through the time and country-specific dummy variables. When the conditionality component $\hat{e}_{jt}$ is examined in the second part of Table 33, the signs associated with the coefficients for d_{xa} and can_{xa} are negative, as expected, while the coefficients for d_{xp} and can_{xp} are positive. The difference between the conditionality imposed on the first program and the subsequent programs is significant at the 93 percent level of significance for post-cancellation programs, but at a lesser level for continuation programs in general.

While the country fixed effects contributed significantly to the regression, it was clear in examining the significance of individual coefficients that only a subset of these country effects were important. When insignificant country-specific effects were eliminated, the regression resulted in column (2) of Table 3. Those country effects remaining in the regression included those for Costa Rica, Croatia, Egypt, El Salvador, Estonia, Hungary, Latvia, Nigeria, and Slovak Republic. The coefficients on these country effects were all strongly negative, indicating that for these countries the drawdown percentage is much closer to zero.[19] The hypothesis that the specification in column (1) is significantly different from column (2) is rejected, as shown by the F test in the final row of the first part of the table. When the conditionality residual from this regression is carried to the lower part of the table, it is once again the case that the coefficients on d_{xa} and can_{xa} are

[16] I define "immediately" here as occurring within a two-month window. In other words, if one program ends on 1 March and another begins on 15 April, then by my definition one follows the other immediately.

[17] There are 22 observations for which $d_{xa} = 1$, and 35 observations for which $d_{xp} = 1$. The remaining programs are "stand alone", and have 0 for both these variables. There are more observations for d_{xp} because there are a number of countries in which three or more programs follow immediately upon one another. In those cases the first program has $d_{xa} = 1$, while the following programs all have $d_{xp} = 1$.

[18] There are 13 observations for which $can_{xa} = 1$ and 11 observations for which $can_{xp} = 1$. For the two programs in the sample for which cancellation did not lead to a new program, $can_{xa} = 1$ but $d_{xa}=0$.

[19] Why these countries? There is potentially a group of countries in the sample that will not draw down the funds from an IMF program because it has entered the program for precautionary purposes or for benefits other than the availability of funds. One indicator of this type of country will be evidence of zero percent drawdown on IMF programs.

negative. The coefficient on can_{xp} is positive, as expected, while the coefficient on d_{xp} differs insignificantly from the implied effect on stand-alone programs. The test that the coefficients on d_{xa} and d_{xp} are equal is rejected by the data.

When all country-specific effects are excluded, as in column (3), the story is quite similar. The initial regression has a similar structure. In the second-step regression the coefficients on d_{xa} and can_{xa} are negative, as expected, while the coefficients for d_{xp} and can_{xp} are positive. Differences in coefficients are significantly different from zero at around the 95 percent level of confidence.

*Examining forecasts for evidence of conditionality***.** Consider the following as a model of the IMF projection for a macroeconomic variable y_{jt}:

$$\hat{y}_{jt} = Y(Z_{jt-1}, \alpha_j, \gamma_t, c_{jt}) \qquad (15)$$

$\hat{y}_{jt}$ is the IMF projection for y_{jt}. It is derived based upon initial conditions Z_{jt-1} for the program country, a country-specific effect γ_j, and a time-specific effect α_t due to world demand conditions or developing-country contagion. It is also a function of the agreed-upon conditionality of the IMF program.[20]

Since 1992, the IMF has compiled a database of forecast macroeconomic outcomes associated with IMF programs. This Monitoring of Arrangements (MONA) database includes one-period-ahead forecasts of current-account balance and fiscal balance as a share of GDP, consumer price inflation and exchange-rate depreciation for countries entering IMF programs.

I use a linear model based on (15) to represent the forecast-creation process.

$$\hat{y}_{jt} = \alpha_j + \gamma_t + \alpha_1 b_{jt-1} + \alpha_2 g_{jt-1} + \alpha_{xp} * d_{xp} + \alpha_{canp} * can_{xp} + \alpha_{1xp} d_{xp} * b_{jt-1}$$

$$+ \alpha_{2xp} d_{xp} * g_{jt-1} + \alpha_{1canp} can_{xp} * b_{jt-1} + \alpha_{2canp} can_{xp} * g_{jt-1} + \varepsilon_{jt} \qquad (15')$$

Time- and country-specific dummies are included in the regression to capture any components of the program forecast that were due to idiosyncratic features of the country or of the year. The ratio of current-account surplus to GDP in the previous year (b_{jt-1}) and the ratio of government budget surplus to GDP in the previous year (g_{jt-1}) are included as elements that will trigger a common response across countries in the forecast variable.

[20] I maintain the hypothesis that the forecast is monotonically increasing (or decreasing) in the degree of conditionality.

Table 3: **Estimating the effect of continuing programs on conditionality**

Step 1: Deriving an explanatory equation for the percent drawn down.

	(1)		(2)		(3)	
	P_{jt}		P_{it}		P_{it}	
Δb_{it}	-0.02	0.87	-0.22	0.61	-0.32	0.68
Δg_{it}	0.61	1.36	0.65	0.89	-0.22	1.03
Δb_{it-1}	-0.40	0.65	-0.31	0.43	0.31	0.48
Δg_{it-1}	1.59	1.25	1.25	0.86	1.60 *	0.98
Δb_{it-2}	0.39	0.54	0.70 *	0.40	1.00 **	0.46
Δg_{it-2}	0.21	1.00	-0.25	0.67	0.30	0.78
b_{it-1}	0.92	1.01	0.48	0.34	0.09	0.39
g_{it-1}	-2.61	1.78	-2.33 **	0.82	-3.64 **	0.93
T93	82.67 **	20.60	64.90 **	8.46	40.46 **	9.23
T94	75.10 **	21.65	68.72 **	7.56	56.71 **	8.48
T95	76.49 **	21.88	64.31 **	7.17	48.70 **	7.95
T96	63.67 **	21.49	53.67 **	8.02	38.62 **	8.97
T97	71.68 **	20.26	59.16 **	8.13	38.96 **	8.67
T98	69.37 **	21.66	62.98 **	7.79	52.71 **	8.93
T99	44.03 **	21.38	40.84 **	7.28	31.82 **	8.36
T00	66.71 **	21.85	45.42 **	7.28	35.88 **	8.22
T01	33.36 **	21.06	12.84	10.70	2.77 **	12.37
N	174		174		174	
R^2	0.91		0.84		0.76	
Fixed Effects	75 countries, 9 years		9 countries, 9 years		0 countries, 9 years	
F test for excluded variables			F(66,82) = 0.58		F(9,157) = 2.83 **	

Step 2: Checking the conditionality portion of P_{jt} for sensitivity to nature of program.

	(1)		(2)		(3)	
	$\hat{e}_{it}$		$\hat{e}_{it}$		$\hat{e}_{it}$	
Intercept	-0.22	1.80	2.15	2.43	1.83	2.94
d_{xa}	-4.86	4.68	-12.08 *	6.31	-17.94 **	7.63
d_{xp}	3.51	3.96	-0.69	5.34	0.64	6.46
can_{xa}	-3.22	6.51	-14.01 *	8.78	-3.57	10.62
can_{xp}	6.05	6.48	4.23	8.73	7.37	10.56
N	174		174		174	
R^2	0.02		0.04		0.04	
Test: $d_{xa} = d_{xp}$ F(1,171) stat	2.19	(0.14)	5.08 **	(0.02)	4.07 **	(0.04)
Test: $d_{xa} + can_{xa} = d_{xp} + can_{xp}$	3.28 *	(0.07)	2.24	(0.14)	3.45 *	(0.06)

Standard errors in right-hand column. Coefficients significantly different from zero at the 95 percent confidence level marked with **, and at the 90 percent confidence interval with *. P value in right-hand column for F tests.

The conditionality of the average program is captured by the size of α_1 and α_2 – it is the reaction embodied in the forecast to a change in the initial conditions. The final terms are based upon two indicator variables: d_{xp} for programs that are immediate successors to preceding programs, and can_{xp} for those programs that follow immediately on a cancelled IMF program. If α_{xp} or α_{canp} are significant, then the forecasts for these "continuation" programs are adjusted upwards or downwards significantly for these programs when compared to non-continuation programs. If α_{1xp}, α_{2xp}, α_{1canp} or α_{2canp} are significant, then the "continuation" programs demonstrate conditionality significantly different from that of the non-continuation programs.

The MONA data provide sufficient information from 171 IMF programs signed between 1993 and 2001 to estimate (15'). Table 4 reports the results of ordinary least squares estimation of (15') for projections of real depreciation, real current-account adjustment and real fiscal adjustment.[21] Each section of the table reports two regressions. The first assumes that the continuation programs are statistically identical in projection to the non-continuation programs, while the second includes the variables of (15') to measure the differential projections in continuation programs.

The first column of Table 4 reports the simple projection equation for real exchange rate changes within IMF programs. There is no significant effect of past current-account imbalances on projected real depreciation. However, an increase in the fiscal deficit has a significant effect in triggering a real depreciation in the projected real exchange rate. This coefficient (-2.56) represents the interaction of market forces and conditionality that the IMF staff projects on average in response to a previous-period fiscal imbalance. When d_{xa} is introduced, those continuation programs are demonstrated to have significantly smaller projected real depreciations, evidence of less conditionality. There is as well evidence of tightened conditionality in the significant coefficient on g_{jt-1} in continuation countries. With programs immediately following canceled programs (can_{xa}), the coefficient on past current-account imbalances is significantly positive at 5.71 – a reduction in the conditionality that will imply that larger current-account deficits should lead to greater real depreciation. For these programs as well, the real depreciation to follow an increased fiscal deficit is increased.

When the projected changes in the current account ratio are derived (reported in the third column of Table 4), the conditionality of the average IMF program shows through clearly. The change in the current-account ratio is found to make up 38 percent of any projected imbalance in this period, while an increase in the fiscal deficit in the previous period leads to a projected increase in private saving (and current-account surplus) over the current period. There is evidence that "continuation" and post-cancellation programs differ significantly from others. For continuation programs, the projected adjustment to previous-period imbalances is significantly less at 22 percent (0.38-0.16=0.22) while the

[21] Time- and country-specific dummy variables were included in estimation, exhausting 86 degrees of freedom. The coefficients of these variables are excluded from the table for brevity, but are available from the author on demand. These regressions were redone excluding the dummies and including each set of dummies separately; the coefficients in Table 4 were little changed in absolute size. With all dummies excluded, the coefficients α_2 in the inflation forecast regressions were significantly different from zero.

assumed adjustment through private saving is significantly greater. For post-cancellation programs there is a large (though insignificant) reduction in the forecast current-account ratio. The adjustment to previous-period current-account imbalances is 90 percent, and is thus more stringent. The projected adjustment to previous fiscal imbalances is lessened.

The equations for the fiscal-balance forecast indicate that on average there is insignificant effect of past current-account imbalance on the projected change in the fiscal surplus, but that there is a large and significant projected adjustment to past fiscal imbalances. On average, 54 percent of previous-period imbalances are projected to be made up in the current period. There is little reduction in projection error when the continuation and post-cancellation programs are singled out; the F test of the joint significance of these variables is rejected.

Thus, on the projections of fiscal balance, the continuation and post-cancellation programs do not seem to have significantly different determinants. By contrast, the projected real depreciation and change in current-account ratio for these programs are significantly different from that for non-continuation programs.

Conclusions on the endogeneity of conditionality. Since conditionality is not observed directly, all inference must be indirect. The evidence from the percentage drawn down in IMF programs and from projections of economic activity in IMF program countries indicates that there are significant differences between continuation and post-cancellation countries on the one hand and other programs on the other. These significant differences are consistent with the predictions of the alternative hypothesis and run counter to the predictions of the null.

It will be important in future work to examine the possibility that there are other hypotheses on the behavior of the percentage drawn down or of the projected economic performance in IMF programs that will generate these significant differences without relying upon the conditionality link featured here.

IV. Implication for estimation of the determinants of IMF program participation.
The evidence cited in the previous section suggests that conditionality is in fact endogenously determined in a manner consistent with the theoretical model. If so, this becomes an important fact to consider when considering the determinants of participation in IMF programs.

There has been substantial empirical work in identifying the determinants of IMF program participation in the last decade: examples include Joyce (1992), Edwards and Santaella (1993), Conway (1994), Bird (1995), Knight and Santaella (1997), Thacker (1999), Przeworski and Vreeland (2000), Bird and Rowlands (2000), and Dreher and Vaubel (2001). The typical approach used is to specify a probit equation. The binary dependent variable indicates participation or non-participation in an IMF program; the independent variables included have been chosen to reflect both economic and political factors.

Table 4: **Projected Changes in Continuation and Post-cancellation Programs**

	Change in real exchange rate		**Change in current account ratio**		**Change in fiscal balance ratio**	
	$d_{jt} = 0$	d_{jt} positive	$d_{jt} = 0$	d_{jt} positive	$d_{jt} = 0$	d_{jt} positive
α_1	0.25	0.10	-0.38 **	-0.38 **	-0.02	-0.02 **
	(0.46)	(0.48)	(0.04)	(0.04)	(0.02)	(0.02)
α_2	-2.56 **	-1.44 *	-0.19 **	-0.16 **	-0.54 **	- 0.51 **
	(0.69)	(0.74)	(0.05)	(0.06)	(0.04)	(0.04)
α_{xp}		-24.90 **		-0.58		-0.52
		(11.23)		(0.77)		(0.60)
α_{1xp}		-0.81		0.16 *		-0.01
		(1.32)		(0.09)		(0.07)
α_{2xp}		-3.42 *		-0.34 **		-0.18 *
		(1.75)		(0.12)		(0.09)
α_{canp}		24.32		-0.98		0.93
		(20.38)		(1.43)		(1.07)
α_{1canp}		5.71 **		-0.68 **		0.14
		(2.70)		(0.20)		(0.14)
α_{2canp}		-4.79 *		0.21		0.12
		(2.88)		(0.20)		(0.15)
R^2	0.34	0.43	0.64	0.69	0.73	0.74
N	170	170	171	171	171	171

Time- and country-specific dummy variables were included in the regression, but the coefficients are not reported; these are available on request from the author. Standard errors in right-hand column. Coefficients significantly different from zero at the 95 percent confidence level marked with **, and at the 90 percent confidence interval with *.

The authors have recognized that the decision to participate is jointly determined, but they have typically relied upon a "reduced form" estimation of (1) and (2) without explicit modeling of conditionality's role in the equations. Knight and Santaella (1997) and Przeworski and Vreeland (2000) went beyond this "reduced form" approach to estimate separately "structural" equations (5), (6) and (7). Their ability to do so hinged upon their willingness to assign elements of the independent variable matrix Z_{jt} to affect only the government or only the IMF decision. These exclusion restrictions are difficult to justify on a priori grounds. As Dreher and Vaubel (2001) comment about this approach,

> "the distinction between demand and supply effects is increasingly blurred. Almost all the additional regressors can be interpreted at the same time as determinants of the government's credit demand and as criteria by which the Fund judges the creditworthiness of its applicants. Thus a meaningful simultaneous or two-state estimation is not feasible. However, for our purpose, … a reduced-form estimate is sufficient". (Dreher and Vaubel, 2001, pp. 7-8)

While this criticism is valid, the reduced-form estimation approach also has its dangers. In these papers, the authors have appealed to a "reduced form" without stating the endogenous variable that links supply and demand decisions in a reduced form. Without such an endogenous variable, a "reduced form" estimation strategy is potentially biased: the appendix provides an illustration of this bias.[22] In this paper I identify explicitly the endogenous variable as conditionality: this has surprising implications for the "reduced form" estimating equation.

Rewriting equilibrium conditionality. The equilibrium conditionality for an IMF program at any point in time can be represented as in equation (9). If we define as Δ_{jt} the current economic status of the participating country,

$$\Delta_{jt} = b_{jt}\,(1- J_{jt}\tau_j\,(\delta_{I2}/\delta_{I1})) + Z_{jt}[\delta_{I1}(1-\tau_j)\beta_{gj} - \gamma_j\,\tau_j\,\beta_{Ij}]/(\gamma_j\delta_{I1}) - (1-\tau_j)(1-\psi_j)(b_{jt}-\tilde{b}_j)/\gamma_j$$

$$+ J_{jt}\tau_j\,(\delta_{I2}/\delta_{I1})(c_{jt} - c^o_{jt}) \qquad (16)$$

so that

[22] If the determination of conditionality were orthogonal to the participation decision, then the estimation of a "reduced form" probit of the participation decision could lead to biased coefficient estimates. The Annex provides an example of the rather common case where conditions are placed on a policy variable that enters both country and IMF choice functions, but with opposite sign. In that case, the relation between participation and the policy variable is non-linear: estimation using the linear probit technique will lead to bias and imprecision.

$$c^{o}_{jt+1} = \Delta_{jt} + J_{jt}\tau_j\,(\delta_{I2}/\delta_{I1})\,c^{o}_{jt} \qquad (9')$$

then the equilibrium conditionality for the coming period can be represented as the weighted average of current and past economic status.[23] Past economic status matters in future conditionality when the country has been continuously participating in IMF programs and when the IMF has positive weight ($\tau_j > 0$) in the bargaining over conditionality.

$$c^{o}_{jt+1} = \Delta_{jt} + \Sigma^{t}_{s=1}\ \tau_j(\delta_{I2}/\delta_{I1})^{s}\,\Delta_{jt-s}\ \Pi^{s}_{k=1}\,J_{jt-k} \qquad (17)$$

The true reduced-form estimation system. This can be inserted in the government payoff function to define a true reduced-form estimating equation for the participation decision.

$$z^{*}_{gjt} = \tau_j Z_{jt}\,[\beta_{gj} + (\gamma_j/\delta_{I1})\,\beta_{Ij}] + \gamma_j\,J_{jt}\tau_j\,(\delta_{I2}/\delta_{I1})\,b_{jt} + (b_{jt} - \tilde{b}_j)[1 - \tau_j + \tau_j\psi_j]$$

$$- (\Sigma^{t}_{s=1}\tau_j(\delta_{I2}/\delta_{I1})^{s}\Delta_{jt-s}\,(\Pi^{s}_{k=1}\,J_{jt-k})) + v_{gjt} \qquad (18)$$

$$P_{jt} = \begin{cases} 1 & \text{if } z^{*}_{gjt} \geq 0 \\ 0 & \text{otherwise} \end{cases} \qquad (19)$$

where v_{gjt} is a random error including the random nature of policy as well as the random deviation of the equilibrium conditionality in period t+1 from the initial program conditionality.

An estimation technique exploiting the available panel data on IMF programs can be derived under the assumptions that the vectors $\beta_{gj} = \beta_g$, $\beta_{Ij} = \beta_I$, $\gamma_j = \gamma$, $\tau_j = \tau$ and $\psi_j = \psi$ for all j. With this and the assumption of normality of errors, equations (18) and (19) define a univariate probit system of equations. The coefficients on the exogenous variables Z_{jt} is a weighted sum of the coefficients of the IMF and government payoff functions, with the relative weight defined by the ratio of the marginal cost of tightened conditions to the government (γ) to the marginal benefit to the IMF (δ_{I1}). The entire effect is weighted by the bargaining power of the government in setting conditionality. The variables for which conditionality is defined enter twice in contemporaneous form: once as a deviation from long-run value ($b_{jt} - \tilde{b}_j$), and once through the impact of conditions carried over from an existing program ($\gamma\ J_{jt}\tau\,(\delta_{I2}/\delta_{I1})$). If the country participates in an IMF program in the previous period there will be an increase in the

[23] The last element of Δ_{jt} represents the degree to which, in multi-period programs, the equilibrium conditionality from the bargaining game for that period will deviate from the initial conditionality.

payoff of continued participation to the extent that the country's target variable b_{jt} improves. There is a term providing the summation of lagged exogenous and target-variable effects for countries that have participated in multi-period spells. These latter two terms affect the probability of observing a program through their effects on the choice of conditionality.

Hypothesis testing. The simplest test implied by the reduced-form derived here takes the null hypothesis that conditionality is not a determinant of either IMF staff or country-government participation decisions. The model is that of (5), (6) and (7), with $\gamma = \delta_{I1} = \delta_{I2} = 0$. In that case, the two payoffs define a bivariate probit with partial observability similar to that posited by Przeworski and Vreeland (2000). Identification of the coefficients β_I and β_g will be possible in theory through the assumption of joint normality of the errors. The first panel of Table 5 reports the results from such a bivariate probit for annual data on IMF program participation for the period 1991-1999.

Lagged regressors were used as proxies for contemporaneous variables to avoid the simultaneity bias in the participation decision and these macroeconomic variables. The payoff equations correspond to (5) and (6). For the variables of the Z_{jt} matrix I include a number of variables found to be significant in published explanations of participations in IMF programs: the ratio of foreign-exchange reserves to imports ($resimp_{jt-1}$), the external debt/GDP ratio ($debt_{jt-1}$), the domestic credit/GDP ratio (cr_{jt-1}) and the government consumption/GDP ratio ($cons_{jt-1}$) all enter significantly and with the expected sign. The intercept indicates the country bias, other things equal, against participation. In the IMF payoff the current account/GDP ratio (b_{jt-1}), the government budget surplus/GDP ratio (g_{jt-1}), the government consumption/GDP ratio ($cons_{jt-1}$) and the debt ratio ($debt_{jt-1}$) all enter in a fashion consistent with reported IMF preferences.

The intercept indicates a bias toward program approval, other things equal.[24] Year-specific dummy variables were included to control for the influence of shared world economic conditions, but are not reported.

The hypothesis of this paper suggests that conditionality is endogenous, and simultaneously determined with the participation decision. A complete test of the implied parameter restrictions is left for future work, but here I test a few simple predictions of the endogenous conditionality model.

The first test is of the simplest implication: that payoffs in the current period will be dependent on the participation (or non-participation) in the previous period. When binary variables indicating participation (p_{jt-1}) and non-participation (np_{jt-1}) in the previous period are added to the partial-observability probit, the results (reported in the second panel of Table 5) evidence a significant improvement in explanatory power. Comparison of the log-likelihood scores in the two panels indicates this improvement.

[24] The identification of the two coefficients in the two probit equations is made econometrically. It is based in part on the curvature of the normal distribution. In this instance it was impossible to identify the two equations separately without imposing a restriction a priori. The lagged credit ratio was included in one set of regressors and not the other to provide this minimal condition for identification.

Table 5. **Partial observability bivariate probit**

Number of obs = 744, period 1991-1999

Null hypothesis. Log likelihood = -401.83582

	Coef.	Std. Err.	z	P>|z|	[95% Conf.	Interval]
Country payoff						
$Resimp_{jt-1}$	-.7123183	.286285	-2.49	0.013	-1.273427	-.1512099
$Debt_{jt-1}$	1.673108	.2717943	6.16	0.000	1.140401	2.205815
b_{jt-1}	-.0839689	.9983769	-0.08	0.933	-2.040752	1.872814
cr_{jt-1}	-1.20489	.2420015	-4.98	0.000	-1.679204	-.7305759
g_{jt-1}	-.4831243	1.670006	-0.29	0.772	-3.756275	2.790026
$cons_{jt-1}$	4.383435	1.28136	3.42	0.001	1.872017	6.894854
intercept	-.5744157	.3212888	-1.79	0.074	-1.20413	.0552987
IMF payoff						
$Resimp_{jt-1}$	-.2741052	.4240685	-0.65	0.518	-1.105264	.5570538
$Debt_{jt-1}$	.2483909	.0911809	2.72	0.006	.0696796	.4271021
b_{jt-1}	1.954319	.7810386	2.50	0.012	.4235114	3.485127
g_{jt-1}	6.416493	1.500435	4.28	0.000	3.475695	9.357291
$cons_{jt-1}$	-1.906969	1.056481	-1.81	0.071	-3.977634	.163696
intercept	1.199174	.310273	3.86	0.000	.5910505	1.807298
/athrho	8.497726	40.6601	0.21	0.834	-71.19461	88.19006

Likelihood ratio test of rho=0: chi2(1) = 36.639 Prob > chi2 = 0.0000

Including prior participation Log likelihood = -295.66815

	Coef.	Std. Err.	z	P>|z|	[95% Conf.	Interval]
Country payoff						
$Resimp_{jt-1}$	-1.517844	.5649597	-2.69	0.007	-2.625145	-.4105434
$Debt_{jt-1}$	1.326795	.5611555	2.36	0.018	.2269508	2.42664
b_{jt-1}	1.309269	1.825359	0.72	0.473	-2.268368	4.886907
g_{jt-1}	-5.779201	2.931293	-1.97	0.049	-11.52443	-.0339715
$Cons_{jt-1}$	.5316611	1.83319	0.29	0.772	-3.061325	4.124647
P_{jt-1}	4.077631	.7155976	5.70	0.000	2.675085	5.480176
Intercept	-1.731183	.5292383	-3.27	0.001	-2.768471	-.6938946
IMF payoff						
$Resimp_{jt-1}$	-.5858117	.3510087	-1.67	0.095	-1.273776	.1021527
$Debt_{jt-1}$	.2515033	.0965517	2.60	0.009	.0622655	.4407411
b_{jt-1}	1.482325	.7467524	1.99	0.047	.0187173	2.945933
Cr_{jt-1}	-.1797429	.230774	-0.78	0.436	-.6320516	.2725657
g_{jt-1}	3.748824	1.616723	2.32	0.020	.5801054	6.917542
$Cons_{jt-1}$	-.1852839	.9439403	-0.20	0.844	-2.035373	1.664805
Np_{jt-1}	-1.079258	.1832365	-5.89	0.000	-1.438395	-.7201215
Intercept	1.426598	.3024094	4.72	0.000	.8338866	2.01931
/athrho	10.4124	34.49228	0.30	0.763	-57.19124	78.01603

Likelihood ratio test of rho=0: chi2(1) = 1.67028 Prob > chi2=.1962

Time-specific dummy variables d91-d98 were included in both equations but their coefficients are excluded from the table. Those results are available on demand.

Table 6. **Partial observability bivariate probit**

Number of obs = 644, **period from 1981 and 1990**

Null hypothesis. Log likelihood = -350.577

	Coef.	Std. Err.	z	P>|z|	[95% Conf.	Interval]
Country payoff						
$Resimp_{jt-1}$	-.9098332	.3880425	-2.34	0.019	-1.670382	-.1492839
$Debt_{jt-1}$	2.525902	.2716579	9.30	0.000	1.993462	3.058342
b_{jt-1}	-3.445711	1.166361	-2.95	0.003	-5.731736	-1.159687
g_{jt-1}	-.9377586	1.27907	-0.73	0.463	-3.444691	1.569173
$Cons_{jt-1}$	-2.446376	.7183754	-3.41	0.001	-3.854366	-1.038386
Intercept	-.3853633	.2455954	-1.57	0.117	-.8667215	.0959949
IMF payoff						
$Resimp_{jt-1}$	-1.749999	1.017755	-1.72	0.086	-3.744763	.2447639
$Debt_{jt-1}$	-.5908905	.3060993	-1.93	0.054	-1.190834	.0090531
b_{jt-1}	-1.133561	1.757444	-0.65	0.519	-4.578088	2.310967
cr_{jt-1}	-1.556225	.5129869	-3.03	0.002	-2.56166	-.5507887
g_{jt-1}	10.43575	2.473042	4.22	0.000	5.588678	15.28283
$cons_{jt-1}$	3.75882	1.535564	2.45	0.014	.7491706	6.76847
Intercept	2.870959	.6758989	4.25	0.000	1.546222	4.195697
/athrho	12.69297	44.6526	0.28	0.776	-74.82452	100.2105

Likelihood ratio test of rho=0: chi2(1) = 5.12982 Prob > chi2 = 0.0235

Including Prior Participation. Log likelihood = -231.03291

	Coef.	Std. Err.	z	P>|z|	[95% Conf.	Interval]
Country payoff						
$Resimp_{jt-1}$	.1699899	.7201027	0.24	0.813	-1.241385	1.581365
$Debt_{jt-1}$	1.099345	.3844946	2.86	0.004	.3457495	1.852941
b_{jt-1}	-12.86132	2.488516	-5.17	0.000	-17.73872	-7.983913
cr_{jt-1}	.3455534	.3635967	0.95	0.342	-.3670831	1.05819
g_{jt-1}	-.1249559	1.95168	-0.06	0.949	-3.950178	3.700266
$cons_{jt-1}$	-3.59139	1.202291	-2.99	0.003	-5.947836	-1.234943
p_{jt-1}	1.872306	.2780693	6.73	0.000	1.3273	2.417312
Intercept	-.0851865	.485749	-0.18	0.861	-1.037237	.866864
IMF payoff						
$Resimp_{jt-1}$	-1.761086	.783409	-2.25	0.025	-3.296539	-.2256325
$Debt_{jt-1}$	-.3734943	.2209274	-1.69	0.091	-.806504	.0595155
b_{jt-1}	1.887935	1.77297	1.06	0.287	-1.587024	5.362893
g_{jt-1}	-.0669136	2.00447	-0.03	0.973	-3.995602	3.861775
$cons_{jt-1}$	.6758687	1.223097	0.55	0.581	-1.721358	3.073096
np_{jt-1}	-1.46744	.2541659	-5.77	0.000	-1.965596	-.9692838
Intercept	2.256165	.4194891	5.38	0.000	1.433981	3.078348
/athrho	-8.171273	81.94353	-0.10	0.921	-168.7776	152.4351

Likelihood ratio test of rho=0: chi2(1) = 6.63954 Prob > chi2 = 0.0100

Time-specific dummy variables were included in each probit, but coefficients are not reported.

The simple model is rejected in favor of the model including p_{jt-1} and np_{jt-1}. In Table 6 the experiment is redone for observations in the period 1981-1990. The hypothesis of the paper cannot be rejected in that case either.

While the endogenous conditionality model of this paper predicts this result, other explanations of participation will do so as well.[25] A more precise test of the endogenous-conditionality model in the system (18) and (19) will interact the coefficients on the policy variables subject to conditionality with whether the country participated in a program in the previous period. In Tables 7 and 8 I perform such a test, with the variables subject to conditionality posited to be the current-account rate (b_{jt-1}), government budget ratio (g_{jt-1}), the growth of domestic credit (cr_{jt-1}) and the government consumption ratio ($cons_{jt-1}$). The first panel of each table is the hypothesis that conditionality does not matter; the second panel reports the specification consistent with the endogenous-conditionality model. Significant coefficients on the interacted variables provide evidence to reject the exogenous conditionality model in favor of the endogenous conditionality model.

Table 7 reports the results of such a test. The upper panel of the table reports a specification derived under the assumption that $\gamma = \delta_{I1} = \delta_{I2} = 0$. The variables included are those of the analysis above; other variables (e.g., the terms of trade or the level of per capita income) were introduced but made an insignificant contribution in all cases. If the expected results were those associated with the country's payoff function, the estimates raise a number of questions. An increased reserves/import ratio tends to reduce the probability of participation while the increased external debt ratio increases the probability, as expected. However, the probability of participation is rising significantly in the current account and government budget surplus ratios, and declining significantly in the credit ratio: each of these is counter to expectations of government motivation, but consistent with motivations often attributed to IMF staff.

In the lower panel of Table 7, five additional variables are included to model more precisely the variables of (10). The variable np_{jt-1} is added to capture the initial hurdle effect for the country government; its coefficient should be negative and significant to represent the initial cost to the government of entering an IMF program. The variables $p_{jt-1}*b_{jt-1}$, $p_{jt-1}*cr_{jt-1}$, $p_{jt-1}*g_{jt-1}$ and $p_{jt-1}*cons_{jt-1}$ interact the binary variable indicating participation in the previous year with the policy variables subject to conditionality. Their coefficients should be positive and significant, representing $\tau\gamma(\delta_{I2}/\delta_{I1})$, if conditionality has indeed played a facilitative role in establishing programs.

[25] Even if conditionality were not endogenous, one could posit that the participating country pays a fixed cost in terms of popular support for participating in an IMF program. If this cost is less, or non-existent, for subsequent programs the participating country's probit would respond as in Table 5. Similarly, the IMF staff may be more comfortable lending to a country with a "track record"; that will also generate the results of Table 5.

Table 7: **Probit Estimates of the Consolidated System (18)-(19)**
744 observations for the period 1991-1999

Ignoring conditionality
Log likelihood = -430.21027
Pseudo R^2 = 0.0760

p	Coef.	Robust Std. Err.	z	P>|z|	[95% Conf.	Interval]
$resimp_{jt-1}$	-.7763446	.256989	-3.02	0.003	-1.280034	-.2726554
$debt_{jt-1}$	.547324	.1021725	5.36	0.000	.3470695	.7475784
b_{jt-1}	1.464338	.5794414	2.53	0.011	.3286538	2.600022
cr_{jt-1}	-.6791865	.1753448	-3.87	0.000	-1.022856	-.335517
g_{jt-1}	2.966095	1.105671	2.68	0.007	.79902	5.133171
$cons_{jt-1}$	.4165522	.8253528	0.50	0.614	-1.20111	2.034214
intercept	.4861461	.2136475	2.28	0.023	.0674046	.9048876

Introducing conditionality
Log likelihood = -307.98984
Pseudo R^2 = 0.3385

p	Coef.	Robust Std. Err.	z	P>|z|	[95% Conf.	Interval]
$resimp_{jt-1}$	-.857682	.2834114	-3.03	0.002	-1.413158	-.302206
$debt_{jt-1}$	.3340659	.0966258	3.46	0.001	.1446829	.523449
b_{jt-1}	1.517508	1.200692	1.26	0.206	-.8358057	3.870822
cr_{jt-1}	-.3162638	.4291718	-0.74	0.461	-1.157425	.5248976
g_{jt-1}	-.9565922	1.534015	-0.62	0.533	-3.963206	2.050022
$cons_{jt-1}$	.4463161	.8915358	0.50	0.617	-1.301062	2.193694
$p_{jt-1}*b_{jt-1}$	.066715	1.361984	0.05	0.961	-2.602726	2.736156
$p_{jt-1}*cr_{jt-1}$	.0435416	.4916683	0.09	0.929	-.9201106	1.007194
$p_{jt-1}*g_{jt-1}$	4.700078	2.259803	2.08	0.038	.2709453	9.129212
$p_{jt-1}*cons_{jt-1}$	-.1163092	1.60515	-0.07	0.942	-3.262344	3.029726
np_{jt-1}	-1.966722	.3255462	-6.04	0.000	-2.604781	-1.328663
intercept	1.242429	.2744285	4.53	0.000	.7045595	1.780299

Time-specific dummy variables were included, but not reported here. These are available on demand.

Table 8: **Probit Estimates of the Consolidated System (18)-(19)**
644 Observations for the period 1981-1990

Ignoring conditionality
Log likelihood = -415.41957
Pseudo R^2 = 0.0572

p	Coef.	Robust Std. Err.	z	P>|z|	[95% Conf.	Interval]
$resimp_{jt-1}$	-1.281937	.3353817	-3.82	0.000	-1.939273	-.6246005
$debt_{jt-1}$	.1584005	.1859935	0.85	0.394	-.2061401	.5229411
b_{jt-1}	-2.097992	1.015663	-2.07	0.039	-4.088654	-.107329
cr_{jt-1}	-.2607243	.2354399	-1.11	0.268	-.7221781	.2007294
g_{jt-1}	.1946734	.9938892	0.20	0.845	-1.753314	2.14266
$cons_{jt-1}$	-1.697353	.5666716	-3.00	0.003	-2.808009	-.586697
Intercept	.7994718	.2215956	3.61	0.000	.3651524	1.233791

Incorporating conditionality
Log likelihood = -253.6806
Pseudo R^2 = 0.4243

p	Coef.	Robust Std. Err.	z	P>|z|	[95% Conf.	Interval]
$resimp_{jt-1}$	-1.333377	.411809	-3.24	0.001	-2.140508	-.5262464
$debt_{jt-1}$	-.1638239	.1238909	-1.32	0.186	-.4066457	.0789978
b_{jt-1}	-5.101272	1.603209	-3.18	0.001	-8.243504	-1.959041
cr_{jt-1}	.1366009	.3556707	0.38	0.701	-.5605009	.8337027
g_{jt-1}	-2.889306	1.613659	-1.79	0.073	-6.05202	.2734081
$cons_{jt-1}$	-3.955995	1.713386	-2.31	0.021	-7.314171	-.5978194
np_{jt-1}	-2.16676	.3608943	-6.00	0.000	-2.874099	-1.45942
$p_{jt-1}*b_{jt-1}$	2.711456	2.496077	1.09	0.277	-2.180766	7.603677
$p_{jt-1}*cr_{jt-1}$	-.5898496	.5202717	-1.13	0.257	-1.609563	.4298642
$p_{jt-1}*g_{jt-1}$	5.216886	2.562407	2.04	0.042	.1946611	10.23911
$p_{jt-1}*cons_{jt-1}$	4.452506	2.195552	2.03	0.043	.1493029	8.755709
Intercept	1.971578	.3485465	5.66	0.000	1.28844	2.654717

Time specific dummy variables were also included in each consolidated payoff function. Coefficients are excluded from table, but are available on demand.

The results from this specification are more in accord with theory. Once the current account, credit, government budget and consumption ratios are introduced as target variables for conditionality, the significant paradoxical results of the top panel are eliminated. The estimate of initial entry is negative and significant, as expected. The coefficients on the target variables provide some support to this hypothesis, primarily through the coefficient on $p_{jt-1}*g_{jt-1}$. As the government budget surplus improves for countries in IMF programs, the probability of continuing the program is increased.

Table 8 reports the results from incorporating conditionality in the form suggested by (18) and (19) for the period 1981-1990. Once again, the variables take on values consistent with the underlying payoff functions. The impact of current-account deficits in inducing initial participation in IMF programs is more pronounced in this period, while the external debt of the potential participants is less important. The variables introduced to pick up the impact of conditionality have the correct sign in four of five cases.

The estimate of the initial cost to the government of participating in a program is negative and significant, as expected. The four target variables are the current-account ratio, the domestic credit ratio, the government budget surplus ratio and the government consumption ratio. A reduction in the credit ratio or government consumption ratio will be in line with IMF targets, while an increase in the current account or government budget surplus ratios will be consistent. Correct signs are observed for the coefficients of $p_{jt-1}*b_{jt-1}$, $p_{jt-1}*cr_{jt-1}$ and $p_{jt-1}*g_{jt-1}$, and the last coefficient is significantly different from zero. The coefficient on $p_{jt-1}*cons_{jt-1}$ takes the opposite sign and is significant as well.

Unobserved heterogeneity. The preceding regressions were unsatisfactory in that they ignored the impact of the long-run policy value on the cost of the IMF program to the participating government. While this is unobserved, its impact can be controlled for in this instance by regressions that correct for unobserved heterogeneity. Ignoring these effects can lead to spurious causation if unobserved heterogeneity in country preferences for IMF programs leads to systematic differences in participation. While it is possible that the heterogeneity is due to consistent policy choice rather than to differences in long-run values, the analysis in this section errs on the side of caution by removing all country-specific variation in the data before testing the endogenous-conditionality hypothesis.

Table 9 reports the results of four equations designed to test the endogenous-conditionality hypothesis. There are 735 country/years for which complete data are available, drawn from 88 countries. The variables used include those of the previous section, and a normalized index of the real effective exchange rate lagged one period (rn_{jt-1}).[26] Columns 1 and 3 represent the null hypothesis that conditionality does not facilitate agreement on IMF programs, while columns 2 and 4 incorporate the feedback through target variables associated with the model of (18) and (19). The difference between columns 1 and 2, on the one hand, and 3 and 4 on the other is the inclusion of country-specific dummy variables in the estimation underlying columns 3 and 4. This controls for any country-specific heterogeneity. While some of this heterogeneity may be

[26] As in the previous section, both terms-of-trade indices and gross domestic product per capita in purchasing-power terms were included. Both were insignificant throughout and were thus excluded.

program-related, some will not be: the estimation results of columns 3 and 4 thus represent a very conservative test for the endogenous-conditionality hypothesis.

There is significant evidence for the overall hypothesis, although many of the individual coefficient estimates are insignificantly different from zero. The $\chi^2(5)$ statistics reported at the bottom of columns 1 and 3 report the results of the likelihood ratio test that the additional variables associated with the endogenous-conditionality hypothesis are jointly significant: in both instances, the statistic is significantly different from zero at usual confidence levels. The coefficients on the variable np_{jt-1} represent the estimate of an initial hurdle cost to participation, and these are significantly different from zero in both cases. The individual coefficient estimates of $\tau\gamma(\delta_{I2}/\delta_{I1})$ all take the expected signs: increases in the current account ratio and the government budget surplus ratio, reduction in the government consumption ratio, and depreciation of the real effective exchange rate all have the effect for a country currently in a program of increasing the likelihood that the program will continue. In each set of estimates only one of these is individually significantly different from zero.

Among the other results from estimation are two robust findings: a larger external debt to GDP ratio is associated with a greater likelihood of an IMF program in the next period, and a larger reserves to imports ratio is associated with a reduced likelihood of an IMF program in the following period.

V. Implications for Program Evaluation.

While the results above are interesting in and of themselves, they are also important to the statistical evaluation of the effectiveness of IMF programs. Given that the decision to participate in an IMF program is potentially contemporaneously determined with typical indicators of economic performance, there is a possibility of selection bias in the determination of the program's effect on performance. Two methods of correcting for this bias have been used in the literature. One is based on the "propensity score" for participation, while the other introduces the inverse Mills ratio as a correction for the potential bias. Both will be biased if they do not consider this difference in determinants of participation.

I demonstrate in Table 10 the potential for divergent results through use of data on economic growth rates observed for countries participating and not participating in IMF programs over the preceding period. The average economic growth rate for the 688 country/years in the sample is 5.2 percent. In the 476 periods characterized by participation, the average growth rate was 5.19 percent while for the 212 periods of non-participation, the average growth rate was 5.24 percent. Clearly, the unconditional difference is approximately zero; the question at hand is whether the near equality masks the offsetting effects of more adverse conditions and positive effects of IMF programs (or vice versa).

Table 9: **Testing the Endogenous-Conditionality Hypothesis: 1991-2000**

	1. No Conditionality		**2. Conditionality**		**3. No conditionality – U.H.**		**4. Conditionality – U.H.**	
	Coefficient	Std. Error	Coefficient	Std. Error	Coefficient	Std. Error	Coefficient	Std. Error
rn_{jt-1}	-0.00	0.07	0.10	0.14	-0.16	0.13	0.19	0.19
b_{jt-1}	1.15 *	0.63	1.26	1.32	3.65 **	1.61	2.84	2.12
$resimp_{jt-1}$	-0.87 **	0.25	-0.89 **	0.29	-0.33	0.64	-1.17 *	0.69
g_{jt-1}	2.58 **	1.17	-1.15	1.61	11.03**	2.58	6.95 **	3.07
$debt_{jt-1}$	0.49 **	0.10	0.30 **	0.10	1.22 **	0.41	1.17 **	0.44
$cons_{jt-1}$	1.20	0.96	1.90	1.67	-2.77	2.95	-0.26	3.72
np_{jt-1}			-2.20 **	0.34			-1.64 **	0.44
$p_{jt-1}*b_{jt-1}$			0.10	1.49			1.24	1.93
$p_{jt-1}*g_{jt-1}$			4.84 *	2.44			2.87	3.76
$p_{jt-1}*rn_{jt-1}$			-0.16	0.16			-0.42 **	0.22
$p_{jt-1}*cons_{jt-1}$			-1.98	2.17			-3.55	2.73
N	735		735		735		735	
C	88		88		88		88	
Log Likelihood	-429.1		-304.4		-249.3		-219.2	
$\chi^2(5)$	249.4 **				60.2 **			
Degrees of freedom	16		21		102		107	

All coefficients estimated using probit. All estimation results included year-specific dummy variables. The U.H. analyses also included a country-specific country variable for each of the 88 countries for which complete data were available.
Asterisk indicates significance at 90 percent confidence level. Double asterisk indicates significance at 95 percent confidence level.
The critical value at the 95 percent confidence interval for the $\chi^2(5) = 11.07$.

The propensity score (ps_{jt}) is calculated as the predicted probability of participation based upon the first-stage probit estimations above. Under the null hypothesis, the appropriate propensity score is generated by the probit estimation over the complete sample. Under the alternative hypothesis, the appropriate predicted probability of participation will be drawn from the appropriate sub-sample – either participating last period or not. The standard errors are corrected for the two-stage nature of the estimation procedure.

The results of Table 10 demonstrate that use of the appropriate propensity score changes the estimates of the impact substantially. The coefficients on the other explanatory variables change only slightly, but those on IMF-participation variables ps_{jt} and p_{jt-1} are significantly different in the two formulations. Use of the correct propensity score leads to significantly larger estimates of the impact of participation – and lagged participation – on economic growth.

VI. Conclusions.

This paper began with the observation that participation in an IMF program is a joint decision of participating governments and IMF staff. With that maintained hypothesis, and with the hypothesis of linear decision functions for both actors, I derived the implied estimating equation for observing participation in equilibrium. The endogenous determination of conditionality and the ability to cancel an IMF program to introduce another prove to be crucial to this participation equation. This endogeneity of conditionality to the creation – and recreation – of IMF programs is the.

Data on percentages of IMF programs drawn down and on projections of IMF staff provide indirect measures of the endogenous conditionality hypothesis, and these measures indicate behavior consistent with the theoretical construct.

The endogeneity of conditionality has important implications for research on the determinants of IMF participation, and through them on the estimation of the impact of IMF programs on participating-country economic performance. The "endogenous conditionality" model implies a number of exclusionary restrictions for probit estimation of an IMF participation equation, and these are not rejected by the data. Use of this estimating structure in addition corrects a number of anomalies in the typical reduced-form estimation of the participation equation. Finally, I demonstrate that proper estimation of the equation yields significantly different estimates of program impact on economic growth.

This work remains preliminary, with a number of extensions advisable. I plan to address these in future work.

- The hypothesis tests so far are derived against the null that the conditionality on target variables is uncorrelated with the other determinants of the participation decision. Alternative hypotheses may exist to explain the dynamic features of the data observed here.
- I have not used the information on cancellation of programs in the empirical work as yet. The decision to cancel a program is endogenous, and should also be predicted by the model I estimate.

Table 10
Program Evaluation: Impact of IMF Programs on Economic Growth

	Single-probit first stage			**Segmented-sample first stage**		
	Coefficient	Standard Error	T Statistic	Coefficient	Standard Error	T Statistic
Ps_{jt}	-0.03876	0.01219	-3.18	-0.07169	0.01699	-4.22
Gy_{jt-1}	0.31067	0.03315	9.37	0.30269	0.03306	9.16
B_{jt-1}	-0.16529	0.02341	-7.06	-0.16108	0.02331	-6.91
Inf_{jt-1}	-0.00051	0.0004	-1.17	-0.00044	0.000426	-1.03
$Cons_{jt-1}$	-0.07957	0.0344	-2.31	-0.07474	0.03423	-2.18
$Nfig_{jt-1}$	-0.05033	0.03336	-1.51	-0.05865	0.03328	-1.76
Ttn_{jt}	0.03869	0.22906	0.17	0.12371	0.22979	0.54
P_{jt-1}	0.02129	0.00528	4.03	0.05422	0.01102	4.92
D91	0.05472	0.01123	4.87	0.05279	0.01014	5.2
D92	0.04278	0.01127	3.79	0.04521	0.01054	4.29
D93	0.06118	0.01092	5.6	0.06091	0.00993	6.13
D94	0.05776	0.01115	5.18	0.06004	0.01036	5.8
D95	0.06492	0.01107	5.86	0.06694	0.01022	6.55
D96	0.06369	0.01125	5.66	0.06523	0.01027	6.35
D97	0.05724	0.01082	5.29	0.05657	0.00971	5.83
D98	0.03661	0.01041	3.52	0.03536	0.00939	3.77
D99	0.04544	0.0099	4.59	0.04409	0.00899	4.91
N			688			688
F			59.12			60.23
R2			0.6			0.6

Ps_{jt} is the estimated probability of participation drawn from the first-stage probit analysis. The first three columns were estimated under the null, while the last three were estimated under the alternative hypothesis of differing behavior in the two periods.

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Annex: Use of the reduced-form probit

With bivariate normal errors, and with at least one regressor in Z_{gjt} but not in Z_{Ijt} and vice versa, bivariate probit can in theory be used to estimate β_{Ij} , β_{gj} and the correlation coefficient between u_{Ijt} and u_{gjt}.

When the joint decision-making process modeled as a probit is only partially observed, a single "reduced-form" probit can be estimated. The coefficients estimated in this reduced-form probit are in general weighted averages of the two individual probit coefficients.

I created a data set with five exogenous variables (x_1,x_2,x_3,ε_z,ε_y) and 100 observations indexed by t. Each variable was created as a random standard normal variable within STATA. The unobserved decision equations were defined as follows.

$$z^*_{jt} = a_z + x_{1t} + x_{2t} + x_{3t} + \varepsilon_{zt}$$
$$y^*_{jt} = a_y + 3x_{1t} - 5x_{2t} + 7\,x_{3t} + \varepsilon_{yt}$$

The binary probit variables were defined P_z and P_y, and were equal to one if z^*_{jt} and y^*_{jt}, respectively, are greater than zero. They were equal to zero otherwise. The intercepts a_z and a_y were set equal to zero for the initial estimation results. The binary variable $P = P_z * P_y$ was defined as the observed probability.

When P_z and P_y are observed, probit estimation yields solid results for each equation.

	P_z			P_y		
	Coefficient	Std. Error	Z stat	Coefficient	Std. Error	Z stat
Intercept	0.108	.166	0.65	0.215	0.348	0.62
X_1	0.943	.208	4.54	3.953	1.233	3.21
X_2	1.249	.210	5.95	-5.568	1.756	3.17
X_3	1.057	.238	4.45	7.228	2.074	3.49
Pseudo R^2	0.48			0.88		
N	100			100		

That the underlying parameters are those used to create the variables will not be rejected in either of these equations.

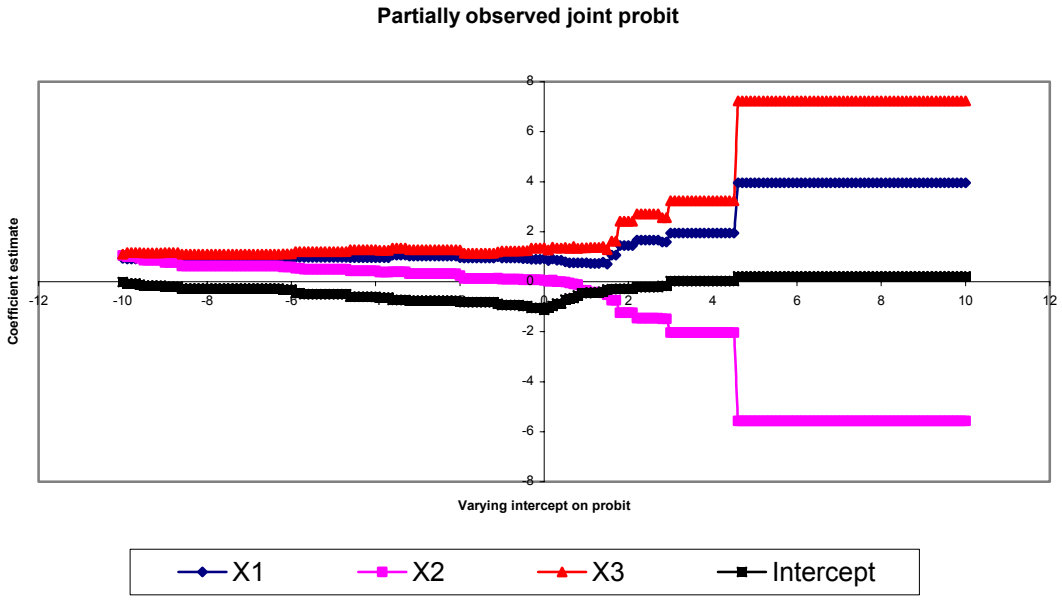
A probit estimation of the joint probability P with respect to the three exogenous variables yields an odd average of the two:

	P		
	Coefficient	Standard Error	Z statistic
Intercept	-1.122	0.210	5.35
X_1	0.927	0.259	3.58
X_2	0.053	0.170	0.31
X_3	1.352	0.244	5.53

Pseudo R^2	0.416		
N	100		

In the case of the intercept and x_2, we will reject the true parameter from either sample. For x_1 and x_3, the parameters from the z^*_{jt} equation will not be rejected while the parameters from the y^*_{jt} equation will be rejected.

I examine the proposition that this single probit on the joint probability is a weighted average of the two underlying equations through a further simulation exercise. First, I recalculated P for values of the intercept a_z from zero to 10 in increments of .10. Second, I recalculated P for values of the intercept a_y from zero to 10 in increments of .10. In each instance, after the recalculation, I estimated the single probit on the new joint probability. The following diagram indicates the parameter estimates derived from each of these.[27]



As is evident from the coefficient values illustrated in the figure, it is the case that as the intercept of each individual equation rises above five, the estimated coefficients are those of a probit on the other equation. This is sensible, as the increasing intercept makes it increasingly likely that the binary variable calculated from that equation will be one always – and thus the joint probability is determined by the probability from the other equation. It is also evident that for small values of the intercepts the reduced-form coefficients do not bear a recognizable relation to either of the two individual equations. Thus, it will be important in practice to utilize any information available to disentangle these two effects.

[27] The horizontal axis provides a numeration of the simulations results. For values to the right of zero, each point represents a simulation for a different value of a_y between zero and 10 (and with a_z equal to zero). For each point to the left of zero, the simulation results are indexed by the negative of the value of a_z (with a_y equal to zero).