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## Do IMF-Supported Programs Help Make Fiscal Adjustment More Durable?

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## IMF Working Paper

Policy Development and Review Department

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#### Abstract

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This paper investigates fiscal developments in 112 countries during the 1990s. It finds that, while the overall fiscal balance improved in most of them, the composition of this improvement differed. In nonprogram countries, revenues increased modestly and expenditure declined sharply, while in program countries both revenue and expenditure declined. However, in countries with programs that included structural conditions the adjustment was effected primarily through sharp expenditure compression. We did not find evidence of a statistically significant impact of IMF conditionality. Moreover, fiscal improvements are strongly influenced by cyclical factors

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## I. INTRODUCTION

What determines the composition of fiscal adjustment and does it differ between countries with IMF-supported programs and those without such arrangements? Does participation in IMF-supported programs lower the overall cost of adjustment? Moreover, how effective is IMF conditionality? This paper attempts to answer these questions by investigating fiscal developments in 112 countries during the 1990s, some with and some without IMF-supported programs.

A central objective of IMF-supported programs has typically been to reduce external imbalances.<sup>2</sup> The cornerstone of most IMF-supported programs has in most cases been fiscal adjustment: first, current account deficits are often caused by fiscal profligacy and, second, even if the initial budgetary position is sustainable, additional fiscal tightening may be needed if the domestic currency comes under pressure (International Monetary Fund, 1996 and Ghosh *et al.*, 2002). This adjustment has been part of broader medium-term macroeconomic programs that also encompass selected supply-side-oriented structural reforms relevant for external stability.

This paper examines the medium-term pattern of fiscal adjustment in countries with and without an IMF-supported program. It finds significant differences in the composition of adjustment between these two groups of countries as well as large differences among program countries. In nonprogram countries, revenue increased modestly and expenditure declined sharply, while in program countries both revenue and expenditure declined. Moreover, in IMF-supported programs that included structural conditions, the adjustment was effected primarily through sharp expenditure compression in order to offset revenue declines. We did not find any evidence that revenue-related structural conditions improved revenue performance after the end of the program. However, the structural content of an IMF-supported program is not exogenous; the choice of structural conditions generally reflects the underlying macroeconomic and structural weaknesses in the country in question, and these factors also influence the fiscal outcome. Moreover, fiscal developments were strongly affected by the business cycle.

The paper is organized as follows. First, we review the stylized facts and define the sample. Second, we describe the techniques used in our estimations. Third, we present and discuss our results. The fourth section concludes.

## II. IMF PROGRAMS AND FISCAL DEVELOPMENTS

### A. How to Measure the Impact of IMF-Supported Programs?

What is the impact of IMF-supported programs on fiscal adjustment? In the literature, three different influences have been construed. One view is that those programs provide external

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<sup>2</sup> International Monetary Fund (1998) provides a summary of the IMF's lending arrangements.

resources in countries with financing needs possibly going beyond the financing provided by the IMF itself to the extent that they have a catalytic effect—thus permitting needed adjustments to take place at lower costs than in the absence of such an arrangement. This description is close to the official IMF view of its role.<sup>3</sup> A second view is that, those programs prescribe faster (according to the writers, too fast) adjustment on developing countries than would take place in their absence, by uniformly requiring monetary tightening, expenditure cuts, and higher taxes, hurting both the poor and businesses in the process. A third view is that IMF-supported programs permit countries to postpone wider adjustments, merely treating the symptoms of financing needs by repeated lending to crisis-prone and structurally unstable countries (see, for example, Bird, 1996).

Which view is the closest to reality? Empirical assessments of the impact of IMF-supported programs are notoriously complex. Countries' macroeconomic performance is influenced by secular forces, external shocks, structural reforms (with or without the involvement of the IMF), and temporary availability of IMF-linked financing. The initial conditions and exogenous shocks need to be separated from the effects of IMF-supported arrangements, because countries that do not undertake such programs are not an appropriate control group for IMF-program countries (Krueger, 1998).<sup>4</sup> An appropriate technique is the General Evaluation Estimator (GEE), due to Goldstein and Montiel (1988), which constructs the counterfactual of economic policies first and then tests the importance of IMF-supported programs. This approach has been successfully tested, *inter alia*, by Khan (1990), Conway (1994), and Dicks-Mireaux *et al.* (2000).

The major problem in the GEE studies is how to control for political economy and conditionality effects that are difficult to quantify and yet may be crucial for macroeconomic adjustment. First, the eventual success of IMF-supported programs may be determined by domestic political economy conditions that influence society's willingness to reform (Ivanova *et al.*, 2003; Khan and Sharma, 2001; or Boughton and Mourmouras, 2002) as opposed to the technical design of the program or the amount of money borrowed. Intuitively, IMF-supported programs tend to be more successful in countries where they augment home-grown reform than in countries where the Fund (and other donors) try to impose reform on unwilling authorities. Second, it is possible that the effectiveness of IMF conditionality, and structural conditionality in particular, affects the success of individual programs. For example, some authors have argued that the impact of Fund conditionality is governed by a "Laffer-curve" relationship, whereby a few, well-targeted conditions have a

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<sup>3</sup> See, for example, Dhonte (1997) and for a critical assessment Bird (2002).

<sup>4</sup> One can ask the following question: would, say, Zambia be better off without long-term IMF and World Bank involvement and would Korea fail if it had had a succession of IMF-supported programs during the 1970s and 1980s? Indeed, program countries, or at least some of them, must be different from nonprogram countries—why would they come to the IMF in the first place, rather than adjusting on their own, if they were subject to identical shocks as the nonprogram countries? At the same time, the frequently observed reluctance to access IMF financing indicates that participation in a Fund program is not considered to be costless by the country authorities.

positive impact on economic performance under the program, but too many or too intrusive conditions may hinder such performance (Collier *et al.*, 1997 and Goldstein, 2000). Both effects are difficult to measure and, until recently, limited data have been available to test their impact empirically (see International Monetary Fund, 2001).

### **B. What Is IMF Conditionality?**

Conditionality is an explicit link between the approval (or continuation) of the Fund's financing and the implementation of certain aspects of the authorities' policy program (Gutián, 1981). The conditions may be either quantitative (say, a limit on reserve money growth) or structural (say, the introduction of a value-added tax).<sup>5</sup> In general, conditionality is designed to encompass policy measures that are critical to program objectives or key internal data targets that sound warning bells if policies veer off track. Whereas in the mid-1980s structural conditionality in IMF-supported arrangements was rare, by the mid-1990s most programs included some structural conditions. In quantitative terms, the average number of structural conditions per program year increased from two in 1987 to more than 16 in 1997.<sup>6</sup>

These developments were the result of several forces. First, the IMF has over time placed more emphasis on economic growth and supply-side reforms as compared to demand management. Second, the IMF's involvement in low-income and transition countries focused the overall policy package on the alleviation of the structural imbalances and rigidities prevalent in these economies. Finally, the past experience with monetary and fiscal policies indicates that their success depends critically on structural conditions. Indeed, the need to underpin macroeconomic policies is reflected in the fact that most structural conditions have been in the core area of IMF expertise.

In this paper, we focus on three main types of structural conditions (Table A1-2): (i) *prior actions*, which are stipulated as preconditions to an IMF-supported program (Thomas, forthcoming), (ii) *structural performance criteria*, fulfillment of which is a formal precondition for program continuation, and (iii) *structural benchmarks*, which are agreed with the authorities and monitored by the IMF staff, but are not a formal precondition for program continuation. However, if donor-favored structural benchmarks had not been observed, they were in some cases upgraded into either prior action or performance criteria in

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<sup>5</sup> In IMF-supported programs fiscal policies have been traditionally constrained through the overall program design, that is, by limiting domestic financing of the budget or net domestic assets, and targeting a certain level of international reserves, as opposed to setting quantitative fiscal performance criteria. In only a few countries the programs stipulated quantitative fiscal conditions in terms of, say, the primary fiscal balance or domestic fiscal revenue.

<sup>6</sup> See International Monetary Fund (2001) for a quantitative assessment of structural conditionality and Boughton (2001) for the historical background.

the subsequent program reviews.<sup>7</sup> In some sense, the extent of structural conditionality was determined endogenously—countries with a history of poor performance tended to get more conditions. Quantitatively, the majority of structural conditions were structural benchmarks, while structural performance criteria were the least numerous conditions.

All but two IMF-supported programs with structural conditionality contained at least one condition in the fiscal area. Indeed, fiscal structural conditionality has been the most frequent area of IMF structural conditionality (International Monetary Fund, 2001). Narrowly defined, fiscal structural conditions comprised about 30 percent of all structural conditions in 1987-99, but their share rose to more than 50 percent when they were defined more broadly as all structural measures with revenue or expenditure implications. Typically, the frequency of fiscal structural conditionality was highly correlated with overall structural conditionality. While many fiscal structural conditions were designed as neutral vis-à-vis the overall fiscal balance, most conditions—both narrowly and broadly defined—were geared toward higher revenue or lower expenditure. We classify all those measures according to their expected revenue or expenditure impact and present their summary in Table 1.<sup>8</sup>

### C. Some Stylized Facts About the Fiscal Developments in the 1990s

The fiscal stance is affected by the business cycle, debt sustainability, and political economy factors. First, the overall balance is influenced by cyclical conditions, namely falls and rises in revenue and expenditure during in economic contractions and expansions.<sup>9</sup> Second, the choice of the fiscal stance is bounded: it may not be possible to finance the deficit preferred by the public or the impact of the revenue/expenditure mix may have side effects that would render the balance unsustainable (Tanzi and Schuknecht, 1995). Third, the components of the overall fiscal balance are public choice variables and voters decide how much tax they want to pay and how they want the proceeds to be spent (Drazen, 2000).

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<sup>7</sup> Typically, IMF-supported arrangements are disbursed in quarterly or semiannual tranches, following a successful review of the quantitative and structural conditions specified for the preceding 3 to 6 months.

<sup>8</sup> For example, the “introduction of *ad valorem* excise duties on petroleum products” was classified as a revenue-increasing condition; a “reduction in number of civil service positions by 4,000” was classified as an expenditure-lowering condition; and the “adoption of accounting system of the Treasury” was classified as a fiscally neutral condition.

<sup>9</sup> The sample real GDP grew on average by 1.5 percent in 1993-94 and the rate increased to almost 4 percent in 1997-99.

Table 1. Distribution of Structural Fiscal Conditionality

	Fiscal sector conditionality 1/			Fiscal-related conditionality 2/		
	Simple count	Adjusted Count 3/	Implementation ratio 4/	Simple count	Adjusted count 3/	Implementation ratio 4/
<b>All conditions</b>						
Average	6.000	0.170	0.769	9.364	0.258	0.777
Median	5.000	0.167	0.900	9.000	0.214	0.800
Standard deviation	4.191	0.125	0.314	7.092	0.191	0.191
<b>Revenue conditions 5/</b>						
Average	0.848	0.022	0.590	3.879	0.108	0.828
Median	0.000	0.000	1.000	3.000	0.077	1.000
Standard deviation	1.326	0.040	0.494	4.037	0.122	0.242
<b>Expenditure conditions 5/</b>						
Average	1.333	0.042	0.825	0.424	0.015	0.778
Median	1.000	0.022	1.000	0.000	0.000	1.000
Standard deviation	1.362	0.063	0.336	0.792	0.044	0.363
<b>Neutral conditions 6/</b>						
Average	3.818	0.105	0.668	4.909	0.132	0.751
Median	3.000	0.075	0.857	4.000	0.125	0.800
Standard deviation	3.486	0.100	0.411	3.548	0.087	0.275

Source: MONA; authors' calculations. See Table A1-2 for the sample countries and areas.

1/ Only fiscal sector conditions as classified by MONA and International Monetary Fund (2001).

2/ Conditions with a clear fiscal impact (tariff reform, privatization, enterprise reform, and so on).

3/ Adjusted for the length of the program.

4/ Implemented conditions/total conditions.

5/ Conditions with an identified impact on the overall balance.

6/ Revenue and expenditure conditions without a clear impact on the overall balance.

The fiscal position improved in the 1990s across the board. Although the motivation for fiscal consolidation differed across countries—in some the improvement was cyclical in nature, in others it was stimulated by crowding out of the private sector, and in a few it was the result of unsustainable debt levels—the overall fiscal balance improved markedly during a seven-year period between the early and late 1990s. The magnitude of the fiscal adjustment was not uniform and nonprogram countries improved their fiscal balances by more than those with IMF-supported programs.<sup>10</sup>

<sup>10</sup> We are aware of potential measurement problems. First, it would be more appropriate to work with structural fiscal balances. However, owing to data limitations, all fiscal balances are actual, cyclically nonadjusted observations. As a result, the structural fiscal adjustment in program countries may be bigger than the actual balances suggest, because those countries



On average, the actual overall balance improved between 1993 and 1999 by almost 2 percentage points of GDP (Table 2 and Figures 1 and 2).<sup>11</sup> Although the improvement was much larger in nonprogram countries than in countries with IMF-supported programs (3 percentage points and  $\frac{1}{2}$  of a percentage point, respectively), large differences prevailed among program countries. For example, program countries without any structural measures worsened their balances by some 2 percentage points, while those with structural conditionality improved it by more than 3 percentage points (Table 2). Transition countries, which were evenly split between structural and nonstructural programs, show surprisingly little change in their fiscal balances. All these findings are robust to the choice of the end-period observation: our results change little whether we assess them one, two, or three years after the end of the program.

How was the fiscal adjustment effected? First, we find that revenue adjustment was typically much weaker than expenditure adjustment. Second, the expenditure adjustment was very strong in structural program countries, while in nonstructural program countries expenditure actually expanded after the programs had ended.

Revenue and grants, taking the sample as a whole, declined by about  $\frac{1}{4}$  percentage point of GDP, remained unchanged in nonprogram countries, and declined by 1 percentage point of GDP in program countries. The decline was more pronounced in structural conditionality countries than in program countries without those conditions: being 2 percentage points of GDP and  $\frac{1}{3}$  percentage point of GDP, respectively.<sup>12</sup> The difference could be partly explained by a decline in aid receipts, because aid as a percentage of GDP declined in those countries by some 5 percentage points and 3 percentage points, respectively. This is not likely to be the complete explanation, however: grants, which are here counted as a part of revenue, are typically one-third of total aid in aid recipient countries (see Bulir and Hamann, forthcoming). Hence, the decline in total aid would imply a grant contribution to the revenue decline of only 2 percentage points of GDP and 1 percentage point of GDP, respectively.

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went typically through a period of low growth during the early stages of their programs. Hence, direct comparisons of IMF projections and actual outturns are largely meaningless. Second, in recognition of the underlying reporting weaknesses, IMF-supported programs often involve broadening of the definition of the fiscal balance, such as the inclusion of extrabudgetary expenditures or contingent liabilities, invariably implying a worsening of the headline fiscal balance. In turn, if a complete adjustment of the historic series for the new definition is not possible, the eventual fiscal adjustment could be underestimated, because the initial observation was based on the old definition.

<sup>11</sup> See Tables A-1 and A2 for the list of countries.

<sup>12</sup> We can rule out one intuitive candidate for the explanation of the revenue decline: the lowering of trade taxes. Although many programs included commitments to lower trade barriers, we did not find any links between trade taxes and domestic revenue. Indeed, for those countries where the detailed tax data are available—about two-fifths of the sample—we found that lower trade taxes were associated with marginally higher revenue and lower deficits.

Expenditure and net lending, taking the sample as a whole, declined by 2 percentage points of GDP—the figure being rather higher in nonprogram countries and somewhat lower in program countries. As before, we found large differences in the latter group. Expenditure and net lending increased in nonstructural program countries by more than 1½ percentage point of GDP, while it declined by about 5 percentage points in structural conditionality countries. The latter result seems consistent with the hypothesis that the initial level of spending in structural conditionality countries was too high and its decline brought it to a more appropriate level (Gupta *et al.*, 2002).

Some of the above results are puzzling and suggest that we need to control for exogenous and program-specific factors. First, the initial overall deficits in nonstructural program countries were smaller than those in structural program countries and presumably did not pose such a threat to macroeconomic stability. Second, the sample contains several transition countries, whose fiscal situation worsened in the mid- and late-1990s, and countries that were hit hard by the 1997-98 crisis in Asia. Third, the nature of the initial disequilibrium differed across countries: in countries without structural conditions, GDP had declined more sharply prior to the program, and their rates of inflation were higher (Table 3). Fourth, programs containing structural conditionality had a higher incidence of program interruption.<sup>13</sup> Finally, programs that did not include structural conditions were mostly short-term in nature, that is, Stand-By Arrangements (SBA) and these countries were comparatively richer. In contrast, the IMF-supported programs with heavy structural content were mostly low-income countries, supported by the Enhanced Structural Adjustment Facility (ESAF) and the Poverty Reduction and Growth Facility (PRGF). The last finding seems to be consistent with the professed goal of structural conditionality: to deal with structural weaknesses limiting growth potential. All these caveats suggest that the selection of countries (program vs. nonprogram, with vs. without structural conditions) is nonrandom and that this sample attribute has to be addressed empirically and in a systematic fashion.

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<sup>13</sup> This result is to be expected. The more conditions, both quantitative and structural, that are required for program continuation, the higher the risk of missing one or more of them. For example, Goldstein (2000) argued that the number of conditions imposed on Indonesia in the 1998 program was overwhelming and paralyzed the decision-making process. Of course, missing one structural performance criterion would not necessarily stop a program: providing the macroeconomic program remained on track, the missed condition would likely be waived. Moreover, some authors found the likelihood of waivers to be positively related to the political clout of individual countries (Bird, 2002).

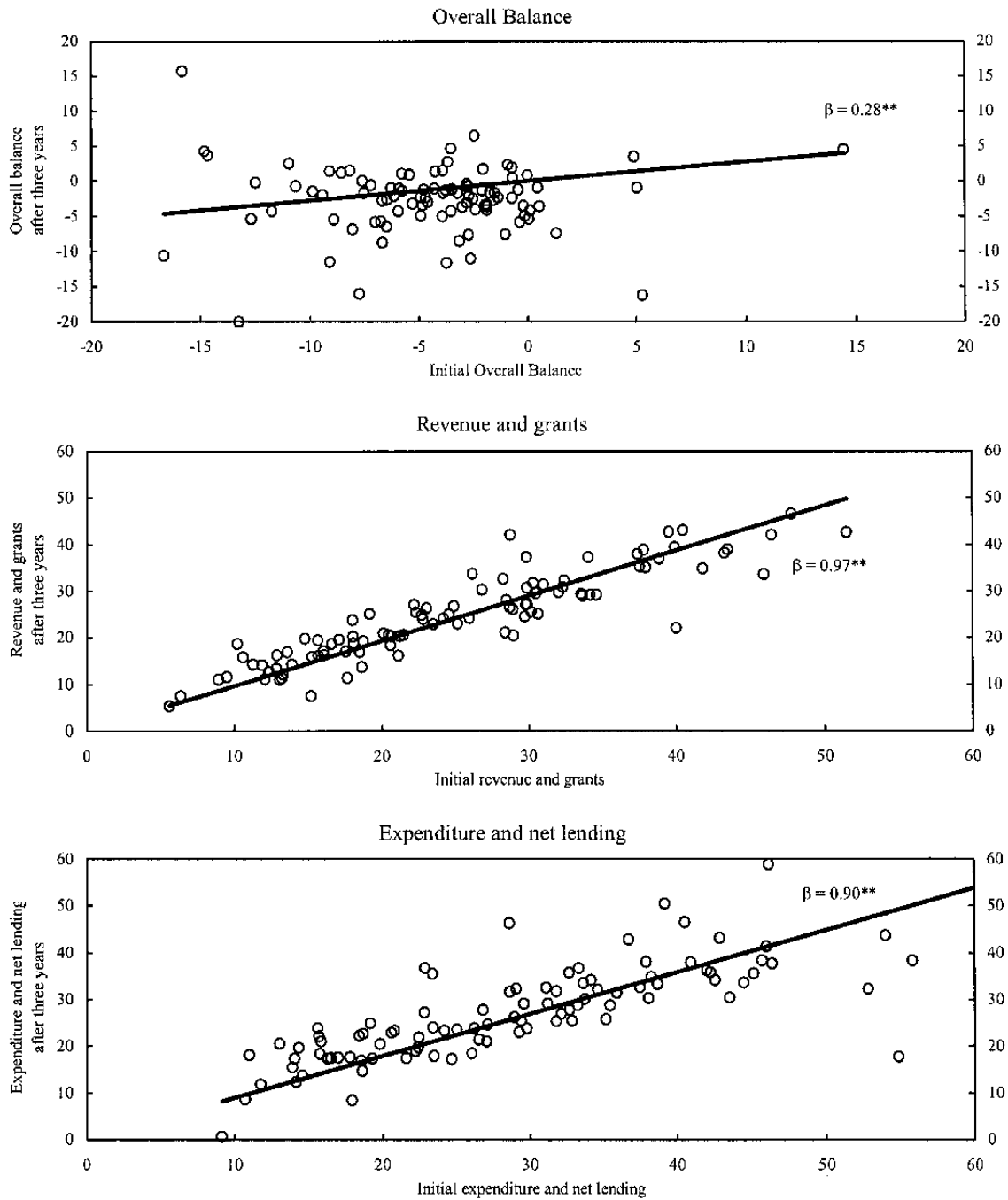
Table 2. Fiscal Outcomes for Program and Nonprogram Countries in the 1990s 1/  
(In percent of GDP)

	Overall balance			Revenue and grants			Expenditure and net lending		
	Initial	End-period	Change	Initial	End-period	Change	Initial	End-period	Change
<b>All countries</b>									
Average	-4.4	-2.6	1.8	25.2	24.9	-0.3	29.2	27.2	-2.0
Median	-3.7	-2.1	1.5	24.2	24.2	0.0	28.9	25.8	-2.0
Standard deviation	4.7	4.8	6.7	10.6	10.1	4.7	11.6	9.9	7.4
<b>Nonprogram countries</b>									
Average	-4.5	-1.2	3.2	27.0	27.4	0.4	31.5	28.7	-2.8
Median	-3.7	-1.2	2.4	27.2	26.9	0.3	31.5	29.1	-2.6
Standard deviation	5.3	4.8	7.4	10.3	10.5	3.7	12.3	9.1	6.7
<b>Program countries</b>									
Average	-4.2	-3.8	0.4	23.4	22.4	-1.0	27.0	25.8	-1.2
Median	-3.7	-3.1	0.5	20.6	20.5	-0.5	24.7	23.4	-0.8
Standard deviation	4.1	4.4	5.6	10.7	9.1	5.4	10.4	10.5	8.0
<i>Of which:</i>									
<b>Without structural conditions</b>									
Average	-2.9	-4.7	-1.9	24.0	23.7	-0.3	26.9	28.5	1.6
Median	-2.7	-3.6	-0.8	22.2	22.9	0.2	24.2	25.4	1.0
Standard deviation	3.6	4.5	5.0	10.9	9.9	4.7	10.6	11.8	6.5
<b>With structural conditions</b>									
Average	-6.3	-2.5	3.7	22.6	20.4	-2.1	27.1	21.9	-5.2
Median	-5.9	-2.5	2.6	19.3	19.7	-1.5	25.4	20.4	-4.7
Standard deviation	4.1	4.0	4.9	10.6	7.8	6.3	10.4	7.0	8.5
<i>Of which:</i>									
<b>With fiscal conditions</b>									
Average	-6.3	-2.8	3.5	21.0	19.0	-2.0	25.5	20.7	-4.8
Median	-6.2	-2.5	2.6	17.8	19.2	-1.5	23.7	19.1	-4.2
Standard deviation	4.3	4.1	5.1	10.2	6.6	6.6	9.7	5.9	8.9
Memorandum item									
<b>Transition countries</b>									
Average	-4.3	-3.8	0.5	27.9	26.1	-1.8	30.6	28.9	-1.7
Median	-3.9	-3.2	0.5	28.7	25.2	-1.5	31.1	26.9	-3.9
Standard deviation	4.3	3.3	3.9	10.1	9.6	5.6	9.4	9.5	6.8

Source: *World Economic Outlook*, authors' calculations.

1/ Three years after the end of the IMF-supported program(s) or 1999 for nonprogram countries. The median initial observation is 1993 and the median end-period observation is 1999.

Figure 1. Three-year Changes in Fiscal Indicators, Summary 1/, 2/  
(In percent of GDP, 97 countries)

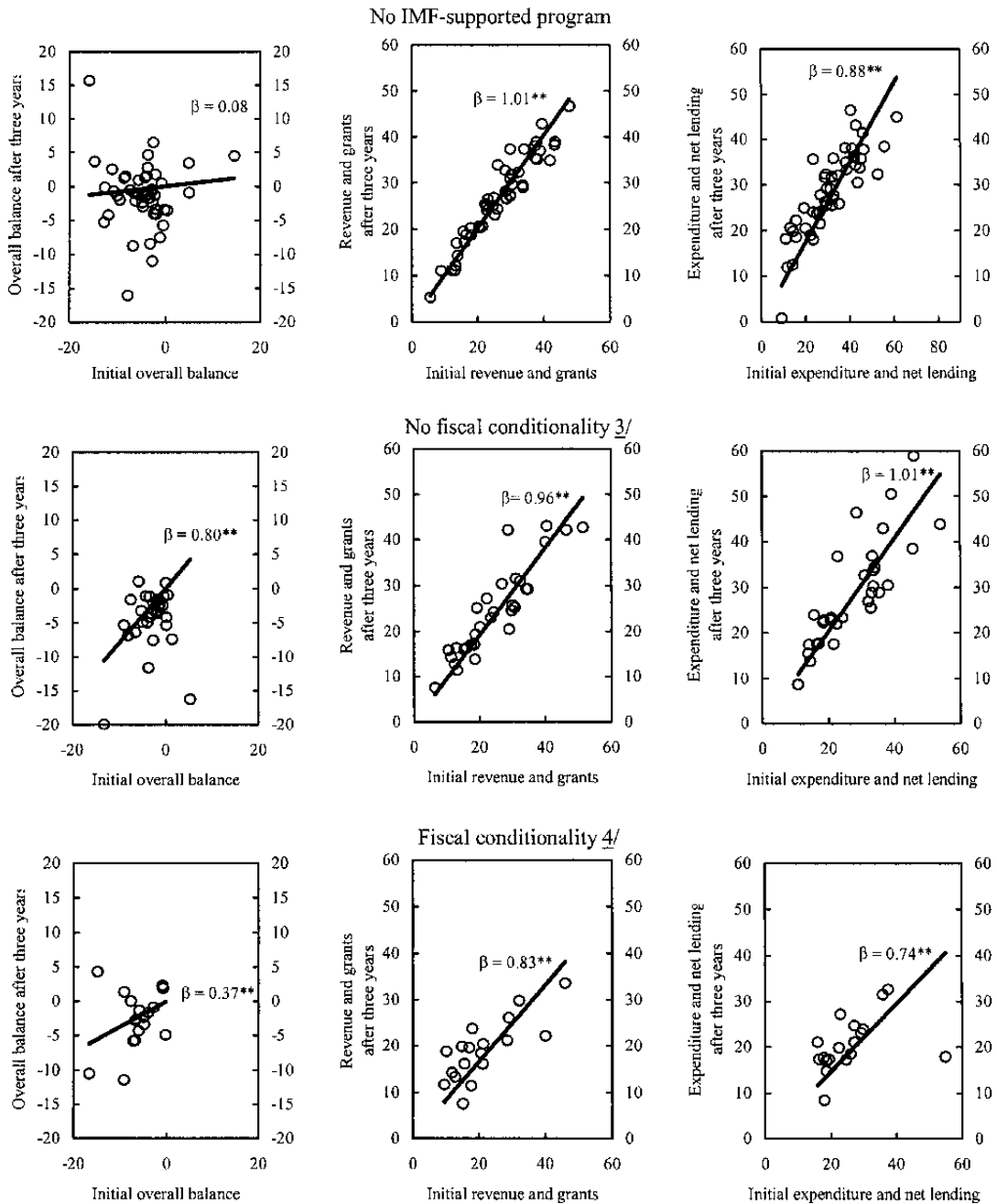


Source: World Economic Outlook; author's calculations.

1/ Three years after the end of the IMF-supported program(s) or 1999 for nonprogram countries. The median initial observation is 1993 and the median end-period observation is 1999.

2/ The significance of the slope coefficient at the 95 and 99 percent levels is denoted by '1' and '2', respectively.

Figure 2. Three-year Changes in Fiscal Indicators, By Program Type 1/, 2/  
(In percent of GDP)



Source: World Economic Outlook; author's calculations.

1/ Three years after the end of the IMF-supported program(s) or 1999 for nonprogram countries. The median initial observation is 1993 and the median end-period observation is 1999.

2/ The significance of the slope coefficient at the 95 and 99 percent levels is denoted by  $^{**}$  and  $^{***}$ , respectively.

3/ IMF-supported programs without fiscal structural conditionality.

Table 3. Selected Characteristics of Program and Nonprogram Countries

	Pre-program developments					Program stoppage 5/	Post-program real GDP 4/,6/
	GDP per capita 1/,2/	Current account 1/,3/	Real GDP 1/,4/	Terms of trade 1/,4/	Inflation 1/,4/		
<b>All countries</b>							
Average	6,882	-4.4	1.5	0.8	229.0	n.a.	3.9
Median	1,954	-2.8	2.7	0.4	11.2	n.a.	3.5
Standard deviation	9,237	10.1	6.7	8.1	1,028.6	n.a.	5.2
<b>Nonprogram countries</b>							
Average	12,751	-2.3	3.9	0.9	6.1	n.a.	3.6
Median	12,772	-1.2	3.3	0.1	2.9	n.a.	3.1
Standard deviation	10,170	8.6	4.1	4.8	6.4	n.a.	2.5
<b>Program countries</b>							
Average	1,134	-6.6	-0.7	0.6	447.3	57.1	4.1
Median	774	-3.6	1.5	0.5	23.9	n.a.	3.7
Standard deviation	1,092	11.0	8.0	10.4	1,420.4	n.a.	6.9
<i>Of which:</i>							
<b>Without structural conditions</b>							
Average	1,511	-7.6	-1.5	2.0	610.2	48.3	3.5
Median	1,239	-3.2	1.2	0.5	28.1	n.a.	4.1
Standard deviation	1,250	11.4	7.9	7.3	1,767.6	n.a.	3.0
<b>With structural conditions</b>							
Average	587	-5.2	0.4	-1.5	211.1	70.0	5.0
Median	367	-3.9	2.8	1.0	19.9	n.a.	3.5
Standard deviation	427	10.4	8.1	13.6	627.5	n.a.	10.3
<i>Of which:</i>							
<b>With fiscal conditions</b>							
Average	538	-5.4	1.7	-1.7	216.5	77.8	5.4
Median	354	-3.9	3.0	1.0	16.8	n.a.	3.9
Standard deviation	421	11.0	7.4	13.6	662.6	n.a.	10.8
Memorandum item:							
<b>Transition countries</b>							
Average	1,272	-5.7	-6.4	-1.2	1,018.4	52.4	2.6
Median	1,118	-3.0	-5.0	0.5	233.1	n.a.	2.9
Standard deviation	1,143	10.5	8.6	11.0	2,059.7	n.a.	3.2

Source: *World Economic Outlook*, authors' calculations.

1/ Average for 1993-94.

2/ In 1995 US dollars.

3/ In percent of GDP.

4/ Percentage change.

5/ Program stoppage occurs if either: (i) the last scheduled program review was not completed; or (ii) all scheduled reviews were completed but the subsequent annual arrangement was not approved in ESAF/PRGF arrangements. If a country had more than one program during this period, one stoppage overrides one or more successes.

6/ Average for 1997-99.

### III. SPECIFICATION OF THE MODEL

In previous sections we argued that fiscal developments are affected by various exogenous and country-specific effects and, hence, a simple averaging may conceal important relationships. Therefore, we will reexamine the results in multivariate panel and cross-country regressions.

The econometric investigation of the role of IMF-supported programs has traditionally been motivated by the following question (Dicks-Mireaux, *et al.*, 2000): “Did the involvement of the IMF significantly improve the macroeconomic outcomes relative to what they would have been in the absence of an IMF-supported program?” Most researchers have answered this question in a model in which macroeconomic outcomes, such as inflation, external balance, and so on,  $y$ , are described as a function of: (a) macroeconomic policies that would have been observed in the absence of an IMF-supported program,  $x$ ; (b) exogenous variables, such as terms-of-trade shocks or wars, and political economy variables, such as the stability of the government,  $w$ ; (c) the existence of an IMF-supported program (usually a dummy variable,  $d^{IMF}$ , equal to one if a Fund program is in place and zero otherwise); (d) random shocks,  $\varepsilon$ :

$$(1) \quad y_{ij} = \beta_{0j} + \beta_{jk} x_{ik} + \alpha_{jh} w_{ih} + \phi_j d_i^{IMF} + \varepsilon_{ij},$$

where  $y_{ij}$  is the  $j$ -th target variable in country  $i$ , and  $x_{ik}$  and  $w_{ih}$  are  $k$ - and  $h$ -element vectors, respectively. For the  $j$ -th target variable,  $\beta_{jk}$  and  $\alpha_{jh}$  are  $k \times 1$  and  $h \times 1$  vectors, respectively, of fixed parameters.

This model is then estimated using either pooled or cross-section data drawn from countries and periods with and without IMF-supported programs, with the aim of establishing the “independent effect” of Fund programs on the relevant variables. If the parameter  $\phi_j$  is found to be statistically significant, then it is said that IMF-supported programs have macroeconomic effects.<sup>14</sup> The interpretation of the additive dummy,  $d_i^{IMF}$ , is not unique,

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<sup>14</sup> The GEE estimates of  $\phi$  may suffer from simultaneous equation bias: participation in IMF-supported programs depends on past policies (Conway, 1994 and 2000; Przeworski and Vreeland, 2000; and Barro and Lee, 2002). Formally, it is easy to show that an OLS regression underestimates the true effect of Fund programs. Unfortunately, the alternatives—two-stage least squares or probit regressions of the Fund program dummy on past policies and shocks—would be even more misleading. We would estimate not the impact of actual IMF programs, but the impact of policies in countries that should have had an IMF program. Countries that participated in an IMF-supported program even though they did not have to would be excluded and those that did not participate even though they should have would be added. We are grateful to Eduardo Ley and Javier Hamann for bringing this issue to our attention.

however, because it captures the total of four channels through which Fund-supported programs are assumed to affect the macroeconomic outcomes: (i) the confidence effect of a program (in some countries the exchange rate is said to appreciate upon the arrival of the IMF team); (ii) the introduction of policies that are different from what they would have been without a program; (iii) cumulative changes in the impact of any given isolated set of policies and IMF financing, that is, the so-called catalytic effect of Fund programs; and (iv) changes in the structure of the economic system through structural reforms.

The simple model has two obvious drawbacks. First, “macroeconomic policies in the absence of an IMF-supported program” is an unobservable variable that has to be constructed in an *ad hoc* fashion. Second, the simple additive character of the IMF program dummy can result in observational equivalence. For example, an identical macroeconomic outcome can be achieved because a country received a bigger loan, implemented better policies or far-reaching structural reforms, or a combination of all of the above. We will address these issues in turn.

The key empirical issue in (1) is obviously the formulation of policies adopted in the absence of Fund involvement ( $x_{ik}$ ). These policies can be observed only for nonprogram countries or nonprogram periods in countries with previous/subsequent Fund-supported programs and a counterfactual has to be estimated for program periods. Goldstein and Montiel (1986) suggested constructing a policy reaction function linking the annual changes in macroeconomic policies,  $\Delta x_{ik}$ , to the deviations of observed lagged outcomes,  $y_{ij(-1)}$  from their target values,  $y_{ij}^*$ . An enhanced policy reaction function, such as the one suggested in Dicks-Mireaux *et al.* (2000), may also contain some lagged exogenous variables,  $w_{ih}$ , that the authorities would take into account in designing their policies:

$$(2) \quad \Delta x_{ik} = \gamma_{kj} [y_{ij}^* - y_{ij(-1)}] + \delta_{ih} w_{ih(-1)} + \eta_{ik},$$

where matrix  $\gamma_{kj}$  describes the speed of adjustment of policy instruments to disequilibria in the target variables. In estimating such a policy reaction function, researchers make two simplifying assumptions. First, the program countries’ counterfactual policies are identical to the set of policies of nonprogram countries. Second, the program countries are faced with shocks identical to those observed by nonprogram countries.

In reality, IMF-supported programs can be associated with either smaller or larger fiscal adjustment than in nonprogram countries. On the one hand, IMF financing is designed to bring about stabilization at lower overall cost, hence, the initial improvement in the overall balance could be smaller in program countries than in nonprogram countries. On the other hand, the initial imbalances and credibility problems may be such that a comparatively larger adjustment in the fiscal balance is designed for credibility reasons. For example, the program may target a 5 percent surplus knowing that a 3 percent surplus is more realistic based on past performance. Ultimately, the longer the period under consideration, the less relevant becomes the issue of the initial adjustment: the size of the initial adjustment ought to be irrelevant two or three years after the end of the program.



Substituting (2) into (1) to eliminate the unobservable values of  $x_{ik}$  and subsuming  $y_{ij}^*$  in the constant, the usual specification of the GEE becomes:

$$(3) \quad \Delta y_{ij} = \beta_{0j} - (\beta_{jk} \gamma_{kj} + 1) y_{ij(-1)} + \beta_{jk} x_{ik(-1)} + \alpha_{jh} w_{ih} + \beta_{jk} \delta_{ih} w_{ih(-1)} + \phi_j d_i^{IMF} + (\varepsilon_{ij} + \beta_{jk} \eta_{ik}).$$

Our modification of the simple GEE is threefold. We attempt to separate the impact of: (i) structural conditionality, (ii) the country's performance under the program, and (iii) "too many" structural conditions.

First, we try to separate the role of structural conditionality, and fiscal structural conditionality in particular, from the other effects of IMF-supported programs. We test whether the presence and implementation of Fund fiscal structural conditionality, leads to fiscal outcomes that are statistically different from those without such conditionality. In this extension of the GEE model, we do not see a need to establish counterfactual structural policies: fiscal and other structural reforms are introduced—often with technical assistance from IMF or World Bank staff—irrespective of the presence of an IMF-supported program or without specific conditionality. Hence, the permissible set of fiscal reforms, say, the introduction of a value added tax, an expenditure monitoring system, and so on, ought to be identical for both program and nonprogram countries.

To this end, we introduce a set of variables,  $c$ , into equation (3) to test the significance of fiscal structural conditionality,  $FSC$ . These variables can be defined either as a

duration-adjusted count of fiscal structural conditionality,  $c_i^{FC} = \frac{\sum_i FSC_i}{duration}$ ; as a share of

implemented structural conditions,  $FSC_i^I$ , vis-à-vis all fiscal structural conditions,

$i_i^{FC} = \frac{\sum_i FSC_i^I}{\sum_i FSC_i}$ , or as a simple dummy variable. In line with the breakdown of fiscal

structural conditions in Table 1, these dummy variables can be specified as revenue increasing or expenditure lowering, and so on.

Second, we augment the Fund-program dummy to reflect the compliance with all program conditions in an interactive dummy,  $\tilde{d}_i^{IMF}$ . Successful programs are defined as those that either disbursed all committed resources without interruption or those which were designed and executed as precautionary arrangements (following the narrowest definition of program success in Ivanova *et al.*, 2003).

Third, we experiment also with a simple count of all structural conditions,  $t_{jk}^{TC}$  to test for the argument that too many structural conditions are counterproductive: it is increasingly believed that economic reforms are implemented only to the extent of their support by the people of the country itself (Khan and Sharma, 2001 and Boughton and Mourmouras, 2002).

In countries where “reform ownership” is low, a large number of structural conditions may indicate that IMF staff tried to substitute the lack of a reform drive with additional, detailed conditionality and vice versa.<sup>15</sup> There could be some exceptions: for example, a country may insist on a detailed specification of structural conditionality in order to avoid unnecessary domestic political confrontation about the design of reforms, such as in Bulgaria in 1997 (International Monetary Fund, 2001).

Formally, the reduced GEE equation becomes:

$$(4) \quad \Delta y_{ij} = \beta_{0j} - (\beta_{jk} \gamma_{kj} + 1) y_{ij(-1)} + \beta_{jk} x_{ik(-1)} + \alpha_{jh} w_{ih} + \beta_{jk} \delta_{ih} w_{ih(-1)} + \phi_j \tilde{d}_i^{IMF} + \psi_j c_i^{SC} + \theta_j t_i^{TC} + (\varepsilon_{ij} + \beta_{jk} \eta_{ik}).$$

What are the expected signs of the variables pertaining to IMF conditionality? First,  $\phi$  is indeterminate, that is, IMF-supported programs can be associated with either smaller or larger fiscal adjustment than that in nonprogram countries. Second,  $\psi$  should be associated with an improvement in the fiscal balance: we have identified structural measures that—if implemented properly—would either increase revenue or lower expenditure. Structural measures to lower revenue and increase expenditure were rare and most conditions targeted an improvement in the overall balance. Finally, the expected sign of  $\theta$  is negative: an excessive number of conditions would hinder the fiscal effort through the “ownership” nexus by overwhelming the authorities and possibly distracting them from their ultimate goal of fiscal adjustment.

#### IV. SAMPLE SELECTION AND ESTIMATION

The model is estimated in three steps. First, using data for 48 nonprogram countries only, we estimate the policy reaction function (equation 2) for the relevant macroeconomic variables, and the coefficients of the policy reaction function are saved.<sup>16</sup> Second, using the estimated parameters of the policy reaction function, macroeconomic policies in 64 program countries during 1993-96 are simulated to reflect what those policies would have been in the absence of an IMF-supported program. Hence, the vector of policies,  $x_{ik}$ , in equation (1) comprises actual observed policies in countries without Fund programs and counterfactual policies in countries with Fund programs. Third, the GEE equation (equation 4) is estimated for both program and nonprogram countries (112 observations), capturing the impact of IMF-supported programs and structural conditionality residually.

<sup>15</sup> See, for example, Collier *et al*, 1997, and Dollar and Svensson, 2000. Their argument is that the drive for comprehensive conditionality—“these patients are sicker than the rest, let us give them more medication”—led to excessive conditionality.

<sup>16</sup> The alternative is to estimate the policy reaction function for program countries before they entered an IMF arrangement. This approach has two disadvantages. First, many countries have presumably pursued “bad” policies in the run-up to the IMF-supported program and, hence, the pre-program-based policy reaction function would be a model of unsustainable policies. Second, for some of the repeated users of Fund resources, it may be difficult to find long enough periods of sustainable pre-program policies.

The 1993-96 period was selected because of three considerations. First, this four-year period followed the IMF membership of transition economies in 1991-92, but preceded the “Asian” crisis of 1997-98. Second, during this period the IMF was deeply involved in structural reforms in less developed economies through its Enhanced Structural Adjustment Facility (ESAF). Third, we need three years of after-program data for the GEE estimation, which makes 1996 the latest permissible cutoff point in our sample.

### A. The Policy Reaction Function

The policy reaction function determines endogenously the stance of monetary, external, and incomes policies, respectively, as a function of the intended fiscal adjustment. Three endogenously determined variables,  $x_{ik}$ , following the procedures established by previous researchers, are used: (i) the *ex post* real interest rate (the representative nominal interest rate *minus* the CPI); (ii) the nominal effective exchange rate (NEER); and (iii) the current account balance as a percentage of GDP (see Table 4 for definitions). The estimation is for the period 1992-97 with data for 48 countries (Table A1-1). Countries in the sample used to estimate the policy reaction function did not have a Fund-supported program during the 1991-97 period, or two years prior to 1991. The sample is fairly heterogeneous and captures two extremes of IMF membership. On the one hand, it contains a group of industrialized countries that graduated from Fund programs in the early 1970s. On the other hand, it contains a group of small economies that either obtain external financing outside of the Fund or do not need it.

The endogenous policy variables were initially regressed on a wide vector of explanatory variables that was—using the general-to-specific approach—narrowed eventually to five variables: (i) the change in the overall fiscal balance in percent of GDP ( $\Delta y_{ij}$ ); (ii) the terms-of-trade index; (iii) the oil price (the international crude oil price in U.S. dollars); (iv) the political cohesion index (a measure of political stability); and (v) an OECD intercept dummy (unity for countries that are members of the Organization for Economic Cooperation and Development, and zero otherwise). Table 5 summarizes these results. Needless to say, the estimated coefficients are statistically significant and correspond to the usual priors: higher fiscal deficits are associated with higher current account deficits, improvements in the terms of trade with narrower current account deficits, and so on

Table 4. Definitions of Variables

Variable	Description	Source 1/
Overall balance Revenue and grants Expenditure and net lending	Change from the pre-program year; in percent of GDP	WEO
Real GDP growth	Gross domestic product at constant prices; year-on-year change in percent	WEO
GDP per capita	Gross domestic product in constant US dollars	WEO
Aid-to-GDP ratio	External aid; change from the pre-program period	WDI
Inflation rate	Consumer price index (CPI); year-on-year change in percent	WEO
Terms of trade	Terms of trade of goods and services; year-on-year change in percent	WEO
Index of political cohesion	This variable measures if one party controls both the legislative and executive branches of the government	DPI
Political fractionalization	This variable records the number of veto players in a polity	DPI
Program stoppage	Program stoppage occurs if either: (i) the last scheduled program review was not completed; or (ii) all scheduled reviews were completed but the subsequent annual arrangement was not approved in ESAF/PRGF arrangements.	IMMA
Current account balance	Current account balance; estimated from the policy reaction function for program countries, actual data for nonprogram countries; in percent of GDP	WEO
Nominal exchange rate	Nominal effective exchange rate; estimated from the policy reaction function for program countries, actual data for nonprogram countries; change from the pre-program period in percent	WEO
Real interest rate	<i>Ex post</i> real money market interest rate; deflated by the CPI; estimated from the policy reaction function for program countries, actual data for nonprogram countries; in percent	IFS
IMF program dummy	1 if the country had an IMF-supported program during 1993-96, 0 otherwise	MONA
Measures (count)	Number of fiscal measures (narrowly or broadly defined) adjusted for program duration	MONA
Measures (implementation)	Number of implemented fiscal measures (narrowly or broadly defined) adjusted for program duration	MONA

1/ The abbreviations stand for the following data sources, respectively: World Economic Outlook; World Development Indicators; Database of Political Institutions, Version 3.0; Ivanova *et al.* (2003); International Financial Statistics; and the Monitoring of Fund Arrangements Database.

The fiscal targets,  $y_{ij}^*$ , were derived from one-year-ahead World Economic Outlook (WEO) projections. Those projections are based on the annual policy discussions between the authorities and IMF staff and reflect the authorities' desired policy stance for the period ahead.<sup>17</sup> The difference between this projection and the current fiscal outturn,  $y_{ij(-1)}$ , then measures the fiscal disequilibrium to which the authorities react with changes in policy instruments in the coming year. We save the estimated coefficients from the policy reaction function,  $\hat{\gamma}$  and  $\hat{\mu}$ , and use them to simulate the changes in policy instruments in program countries during 1993-96. In doing so, we obtain an estimate of what the policies in program countries would have been, at given fiscal disequilibrium, in the absence of an IMF-supported program.

### B. The Generalized Evaluation Estimator

We consider three target variables ( $y_{ij}$ ) measuring fiscal developments: (i) the overall central government balance; (ii) central government revenue and grants; and (iii) central government expenditure and net lending, with all variables expressed in percent of GDP, in 64 countries that operated under IMF-supported programs and 48 nonprogram countries during 1993-96. While the first target might be intuitively preferable to the other variables as a measure of the fiscal stance, revenue and expenditure regressions are useful checks: programs do not target automatically an improvement in the overall balance. For example, the domestic financing constraint may be relieved either through medium-term aid commitments or through access to international capital markets. Consequently, some IMF-supported programs may target an improvement in revenue collection or changes in the structure of fiscal expenditure, without any change in the overall balance or, indeed, with a worsening thereof.<sup>18</sup> While the endogenous variables are derived from the policy reaction function, the exogenous variables are two-year averages, lagged one period: the terms of trade, GDP per capita in constant U.S. dollars, foreign aid in percent of GDP, the rate of inflation, and real GDP growth.

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<sup>17</sup> This specification of  $y^*$  is not the only one available. More complex alternatives could, for example, derive the targeted fiscal balance from a sustainable debt trajectory (Bohn, 1998) or base it on medium-term fiscal rules (Scott, 1996). However, given the weight of low-income countries in our sample, such sophisticated specifications would be superficial.

<sup>18</sup> IMF-supported arrangements in capital account crises provide examples of sizable fiscal stimuli (see Ghosh *et al*, 2002).

Table 5. The Estimates of the Policy Reaction Function  
(Heteroscedasticity-consistent, feasible GLS regression estimates,  
*t*-statistics in parentheses) 1/

Dependent variable	Current account balance	Nominal effective exchange rate	Real interest rate
Overall fiscal balance ( $y_t^* - y_{t-1}$ )	0.21346*** (6.10)	4.56403*** (2.59)	-3.59938** (2.50)
Terms of trade	-0.00005** (2.05)	-0.11601*** (3.50)	-0.01507* (1.64)
International oil prices		0.66082*** (3.56)	0.11747** (2.31)
Political cohesion	0.00170** (2.30)		
Dummy for OECD membership			-1.12769*** (5.34)
Log likelihood	667.0774	-1012.315	-630.634
Number of observations	288	288	288

Source: Authors' estimates.

Note: All variables, except the OECD dummy, are in first differences.

1/ The superscripts \*\*\*, \*\*, and \* denote the rejection of the null hypothesis that the estimated coefficient is zero at the 1 percent, 5 percent, and 10 percent significance levels, respectively.

This paper is primarily interested in the long-term effects of IMF-supported programs. In the short run, during the program period, fiscal developments can be affected by temporary tightening, with little or no long-term fiscal consequences.<sup>19</sup> We want to measure the impact of IMF-supported programs beyond the initial, short-term impact of the program and, hence, we consider fiscal variables one, two, and three years after the initial program ended, with 112, 109, and 97 observations, respectively. For example, if a country had a three-year program from January 1993 to December 1995, our fiscal variables in the one-, two-, and three-year GEE estimation would be dated 1997, 1998, and 1999, respectively.<sup>20</sup> For nonprogram countries, we use 1997-99 data and a two-year average for the “pre-program” period in 1991-92.

### C. The Results in the Full Sample

In general, we find that the fiscal developments are driven mostly by cyclical variables as opposed to macroeconomic policy variables (Tables A2-1 through A2-3).<sup>21</sup> In all cases, the robust estimators are the autoregressive terms and GDP growth; in some cases, we also found inflation, the real rate of interest, and certain conditionality variables to be significant. In contrast, the role of the endogenously determined macroeconomic policies is relatively small and the overall contribution of the policy reaction function is minimal. The dummy measuring program participation is statistically insignificant. This implies that the presence of an IMF program does not make the fiscal adjustment softer—on average, program countries seem to adjust as much as nonprogram countries for given initial conditions. Countries in programs without interruptions seem to adjust even more, but these results are not statistically significant at the usual level.

The lack of in-sample variability in the structural conditionality variables and their overall substitutability—it does not really matter whether we use simple count, duration-adjusted count, or implementation ratio—suggest that these variables operate more like an intercept dummy variable as opposed to a slope coefficient. Unlike Ivanova *et al.* (2003) or

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<sup>19</sup> Gupta *et al* (2002) report that the probability of a reversal in fiscal adjustment is as high as 70 percent at the end of the second year for low-income countries. Three possible explanations are available for this finding. First, poor fiscal discipline or a lack of ownership may have caused the reversal. Second, the initial fiscal tightening could have been excessively tight, necessitating a subsequent fiscal stimulus. Finally, the initial adjustment may have been a mirage: the fiscal authority could run unreported arrears vis-à-vis its suppliers, i.e., improving its initial cash balance and worsening its final cash balance by eventual arrears repayment.

<sup>20</sup> Thus, we are comparing periods of different length. The time span between the pre-program and first post-program observations can be as short as 2 years (12-month Stand-By Arrangement) and as long as 5 years (3-year Enhanced Structural Adjustment Facility with delayed reviews). Empirically, the length of the program itself is not found to be a statistically significant variable.

<sup>21</sup> The last column presents the estimated equation with statistically significant variables only.

Thomas (forthcoming) we did not find any statistically significant impact of the political stability variables. Also, we did not find any systematic impact of the type of IMF-supported program and location of the country: the dummy for the Stand-By or ESAF/ PRGF Arrangements, the “transition dummy,” and the dummy for country locations were typically insignificant. The only statistically significant regional dummy was the sub-Saharan African dummy.

### **The overall balance**

We find that the change in the overall balance is predicted reasonably well by the pre-program overall balance (a bigger initial deficit is associated with a bigger improvement), lagged GDP growth (faster growth improves the balance), and the level of development (countries with higher GDP per capita improved their overall balance by more than countries with low GDP per capita), see Table A2-1. These three variables account for almost all of the explained variance of the dependent variable.

Several other variables are either marginally significant or their significance is found only in certain regressions. One of them is the aid-to-GDP ratio, indicating some stabilizing impact of aid inflows.<sup>22</sup> While moderate inflation is associated with improvements in the overall balance, countries with average inflation of more than 50 percent worsened their fiscal position; this may in part reflect tax collection lags (the Tanzi-Oliveira effect). Although we experimented with various versions of the high-inflation variable, the simple dummy yielded the most consistent results. The evidence on the effect of terms-of-trade and nominal exchange rate shocks is mixed. Finally, countries with tighter monetary policies seem to have a more pronounced improvement in their overall balance.

The IMF program performance variables are statistically insignificant, although the signs of their parameters are intuitive. For example, countries with program stoppages did worse than the average, and countries with uninterrupted IMF-supported programs did better than the average. The conditionality variables were all insignificant, even though the signs seem to tell a relatively consistent story: more structural conditions were associated with below-average performance, while their implementation was associated with better-than-average performance.

### **Revenue and grants**

Revenue regressions explained much less of the variance of the dependent variable, even though the results were also dominated by the pre-program revenue levels and cyclical effects (Table A2-2). This ratio worsened in countries with a larger-than-average initial revenue-to-GDP ratio and, moreover, it was inversely related to real GDP growth. Both results are intuitive: on the one hand, the tax burden may have peaked in some countries in

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<sup>22</sup> The improvement in the overall balance is partly tautological, because revenues already include grants, a part of aid.



the late 1980s and, on the other hand, fast-growing economies have less need to increase their tax-to-GDP ratio.

The role of the aid, inflation, and interest variables was surprising. The aid-to-GDP ratio was statistically insignificant in all but the one-year-after-the-program version, however, the sign was consistently positive in all regressions. An increase in aid was associated with an increase in the revenue-and-aid-to-GDP ratio, albeit the elasticity was much less than one.<sup>23</sup> Hence, the observed decline in aid receipts does not explain fully the decline in revenue and grants. Inflation worsened revenue in most regressions and no nonlinearity in the inflationary impact was found. The real interest rate was significant in all versions of the equation indicating that countries with tight monetary conditions did worse in revenue collection, although the quantitative impact of high real interest rates was small.

We did not find any statistically significant impact of Fund-supported programs with the exception of revenue three years after the program. The sign was consistently negative for all programs, suggesting that the availability of IMF financing (and other financing linked to an IMF-supported program) led to a post-program relaxation of the revenue effort. Also good performance under the program did not seem to contribute to improved revenue collection beyond the first or second year after the program. All but one variable describing the quantity of structural measures were statistically insignificant, although they all came with a negative sign, suggesting the presence of the ownership nexus. In summary, these results suggest that revenue enhancing measures, and perhaps also technical assistance provided to program countries, failed to provide a sustainable increase in the revenue-to-GDP ratio.

### **Expenditure and net lending**

The behavior of the expenditure-to-GDP ratio was mostly explained by pre-program expenditure levels, the real rate of growth, and the real rate of interest, at levels of statistical significance comparable to the overall balance regressions (Table A2-3). Unlike in previous regressions, where the relationships were linear in nature, however, we found strong nonlinearity vis-à-vis past expenditure-to-GDP ratios. A simple quadratic representation worked fine: the expenditure-to-GDP ratio declined in countries with low pre-program expenditure ratios, but increased in countries with high levels thereof. This result is consistent with our initial findings from Tables 1 and 2: program countries without structural conditions, which had comparatively higher initial expenditure-to-GDP ratios, increased those ratios somewhat.<sup>24</sup> In contrast, structural conditionality countries lowered their already low expenditure-to-GDP ratios even further. Countries that grew faster lowered their

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<sup>23</sup> It is worth noting that some authors have argued that foreign aid is associated with a longer-term fall in revenue, because it breeds corruption and creates a perverse motivation for the authorities not to collect taxes (Ziegler, 1996). Similarly, political economy models have been mostly skeptical about any positive fiscal effects of aid (Bulow and Klemperer, 1999 or Tornell and Lane, 1999).

<sup>24</sup> We did not find, however, any evidence of Wagner's law—a positive relationship between expenditures and the level of development—in our data.

expenditure-to-GDP ratio, owing to the GDP increase, and the expenditure-to-GDP ratio also declined in countries with tighter monetary policies.

We did not find any statistically significant impact of IMF-supported programs on expenditure developments. However, the signs of the estimated coefficients were consistently negative for the all-program dummy and positive for the successful-program dummy. The structural conditionality dummy and all other conditionality variables were negative and statistically significant, irrespective of what the variables measured, suggesting significant expenditure compression in countries with structural conditionality.

In the GEE model, we cannot pinpoint the driving forces behind expenditure developments. In particular, it is difficult to distinguish whether expenditures that were cut were wasteful (Gupta *et al.*, 2002) or whether, as claimed by some critics, the expenditure compression was excessive. We can only conjecture that the increasing value of the estimated coefficients points to the former explanation, as expenditure compression tends to accelerate after the end of the Fund arrangement. This observation is also consistent with a substantial body of evidence that social and capital spending is protected in low-income program countries (Abed *et al.*, 1998).

#### **D. Are Countries with Programs Containing Structural Conditionality “Different”?**

We found the estimated coefficients of the conditionality variables to be insignificant for all but the expenditure regressions, with virtually no differences as regards the construction of the variable. In some cases the parameters were marginally significant, but with the wrong sign: for example, a higher implementation ratio of revenue measures seemed to be associated with lower revenue and grants, and so on. In addition, the impact of IMF programs was statistically insignificant, but those countries where the program proceeded successfully seemed to be doing better in terms of the overall balance and partly in revenue collection.

We do not see a unique explanation for these findings, as they can be justified by different relationships. First, these results may imply that historically poor performance, owing to deep-rooted structural weaknesses, persistent shocks, or a lack of a reform drive, was compensated with additional conditionality. As predicted by the “ownership” literature, without addressing the causes of the past performance, additional conditions would not affect the fiscal performance. Second, the positive effect of revenue measures may be only short-lived and IMF conditionality in the fiscal area fails to bring about sustained fiscal improvements.

To highlight the developments in structural conditionality countries, we reestimated our regressions for the program countries only (Table 6).<sup>25</sup> We found that the overall balance

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<sup>25</sup> The sample sizes for one-, two-, and three-year-after-the-program regressions are 64, 61, and 49 observations, respectively. While the size and signs of the individual coefficients are broadly unchanged, their statistical significance declined predictably with the loss of degrees of freedom. The results are robust to changes in the definition of the structural conditions

improvement was larger in countries with structural conditionality than in other program countries by about 1½ and 3 percentage points of GDP in the two- and three- years-after-the-program samples, but that these results were statistically significant only for the last sample period. Revenue and grants declined by more than 2 percentage points of GDP more in structural conditionality countries. However, these results are only marginally significant. Contrary to what we observed in Table 2 using simple averages, controlling for the change in aid inflows does not explain revenue underperformance in structural conditionality countries. Finally, the expenditure and net lending decline in structural conditionality countries was increasing over time—from about 2 percentage points one year after the program to 8 percentage points of GDP three years after the program—and these results were statistically significant.

The estimated parameters for the Africa dummy are consistent with earlier findings of a high risk of fiscal reversals in low-income countries (Gupta *et al.*, 2002). While African countries started with a better-than-average post-program overall balance of more than 3 percent of GDP, this result disappeared in the second year after the end of the program period. On the expenditure side, the African average was statistically indistinguishable from the rest initially, but by the third year expenditure was 7 percentage points of GDP higher than predicted. In contrast, revenue performance was better than predicted, although not sufficiently to offset the expenditure increase.

These results seem to suggest that countries with structural conditionality are indeed different from the rest of the sample. Countries with structural conditionality have been subject to more pronounced shocks than other countries. For example, they are more likely to have negative terms-of-trade shocks and their terms of trade are twice as volatile. The effort to address deep-rooted fiscal weaknesses in those countries through extensive structural conditionality failed, most likely because conditionality is a poor substitute for homegrown reform. Post-program fiscal performance in those countries was driven by accelerating expenditure compression, which may not be a bad thing, provided, for example, the pre-program level of spending was wasteful or that a statist budget was replaced with a less intrusive one.

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dummy, such as using the dummy only for countries with certain thresholds for implementation ratios and so on.

Table 6. Fiscal Adjustment in Countries with Structural Conditionality Relative to Countries Without Structural Conditionality<sup>1/</sup>

(Heteroscedasticity-consistent OLS Regression estimates of the structural conditionality and Africa dummies, t-statistics in parentheses)

		Overall balance	Revenue and grants	Expenditure and net lending
One-year-after-the-program sample	SC dummy	-0.0018 (0.17)	-0.0106 (0.72)	-0.0192 (1.15)
	Africa dummy	0.0327** (2.33)	0.0258* (1.92)	-0.0116 (0.79)
Two-years-after-the-program sample	SC dummy	0.0163 (1.28)	-0.0224* (1.73)	-0.0564*** (2.94)
	Africa dummy	-0.0035 (0.26)	0.0203 (1.32)	0.0229 (1.02)
Three-years-after-the-program sample	SC dummy	0.0325** (2.46)	-0.0286*** (3.30)	-0.0810*** (4.42)
	Africa dummy	-0.0126 (0.54)	0.0565*** (4.27)	0.0714*** (3.33)

Source: Authors' estimates.

1/ The superscripts \*\*\*, \*\*, and \* denote the rejection of the null hypothesis that the estimated coefficient is zero at the 1 percent, 5 percent, and 10 percent significance levels, respectively.

## V. CONCLUDING REMARKS

This paper presents empirical tests of the relevance of structural conditionality for fiscal performance in a large sample of countries during the 1990s. Although the overall fiscal balance improved in most countries, the impact of IMF-supported programs was not statistically significant, owing to the large variance in the sample of program countries. In programs with structural conditionality, revenue declined slightly and expenditure declined significantly. In contrast, in programs without structural conditionality, revenue remained stable and expenditure increased somewhat. The statistical insignificance of IMF-supported programs indicates that program participation does not make the fiscal adjustment automatically softer—on average, program countries adjust as much as nonprogram countries. In general, all fiscal variables were strongly influenced by the business cycle.

Our results highlight the difficulty in identifying the impact of structural conditionality. Several effects seem to be in play. First, we find some evidence that programs with too many structural conditions have worse results than those with fewer conditions (the “ownership

nexus”). Second, we find no quantitative evidence that structural conditionality aimed at raising revenue was successful. Third, post-program expenditure compression clearly was much stronger in countries with structural conditionality, but the risk of reversal was higher too, especially in sub-Saharan Africa. The choice of having structural conditions is nonrandom and it reflects the underlying conditions and shocks faced by the country prior to the program. Countries with structural programs are typically poorer than the rest and more exposed to external shocks, and have deep-rooted imbalances and a problematic track record of economic reforms.

The findings in this paper are not definitive and the possibilities for further research are extensive. First, more work is needed to examine the role of initial shocks, structural weaknesses, and regime-specific effects, such as the choice of the exchange rate regime. Second, the policy reaction function can be specified differently, reflecting, for example, policies that would stabilize the debt-to-GDP ratio or that would be based on “fiscal rules.” Third, it could be worth attempting to identify empirically the impact of “reform ownership.” Finally, some of the issues, such as the appropriateness of the initial revenue and expenditure levels, cannot be addressed adequately in a cross-country model and need to be investigated in case studies.

Table A1-1. List of Countries and Areas Used for the Estimation of the Policy Reaction Function

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Australia	Lebanon
Austria	Maldives
Bahamas, The	Malta
Bahrain	Mauritius
Belgium	Myanmar
Belize	Netherlands
Botswana	New Zealand
Canada	Norway
China	Oman
Colombia	Paraguay
Cyprus	Portugal
Denmark	Qatar
Fiji	Samoa
Finland	Singapore
France	Solomon Islands
Germany	South Africa
Greece	Spain
Grenada	St. Lucia
Hong Kong SAR	Swaziland
Ireland	Sweden
Israel	Switzerland
Italy	United Kingdom
Japan	United States
Kuwait	Vanuatu

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Table A1-2. Structural Conditionality in IMF-Supported Programs During 1993-96

Country	Did the program contain structural conditions?	Number of structural conditions in the fiscal area
Albania	Yes	10
Algeria	Yes	3
Benin	Yes	8
Bolivia	Yes	8
Bulgaria	Yes	0
Burkina Faso	Yes	14
Cambodia	Yes	16
Cameroon	Yes	5
Central African Republic	Yes	7
Chad	Yes	10
Côte d'Ivoire	Yes	8
Ecuador	Yes	1
Equatorial Guinea	Yes	4
Gabon	Yes	1
Ghana	Yes	8
Guinea-Bissau	Yes	11
Guyana	Yes	3
Kenya	Yes	4
Kyrgyz Republic	Yes	9
Lao People's Democratic Republic	Yes	10
Lithuania	Yes	0
Malawi	Yes	8
Mauritania	Yes	13
Mongolia	Yes	3
Niger	Yes	1
Pakistan	Yes	4
Papua New Guinea	Yes	5
Russian Federation	Yes	2
Senegal	Yes	8
Togo	Yes	6
Ukraine	Yes	1
Vietnam	Yes	3
Zambia	Yes	4

Table A1-2. Structural Conditionality in IMF-Supported Programs During 1993-96

Country	Did the program contain structural conditions?	Number of structural conditions in the fiscal area
Azerbaijan	No	0
Belarus	No	0
Congo, Republic of	No	0
Costa Rica	No	0
Croatia	No	0
Czech Republic	No	0
Dominican Republic	No	0
Egypt	No	0
El Salvador	No	0
Estonia	No	0
Georgia	No	0
Haiti	No	0
Hungary	No	0
Jordan	No	0
Kazakhstan	No	0
Latvia	No	0
Lesotho	No	0
Macedonia, FYR	No	0
Mexico	No	0
Moldova	No	0
Nicaragua	No	0
Panama	No	0
Peru	No	0
Philippines	No	0
Poland	No	0
Romania	No	0
Sierra Leone	No	0
Slovak Republic	No	0
Turkey	No	0
Uganda	No	0
Uzbekistan	No	0



Table A2-1. The Overall Balance One Year After the Program: Estimates of the GEE (continued)  
(Heteroscedasticity-consistent OLS, *t*-statistics in parentheses)

	(1)	(2)	(3)	(4)	(5)	(6)
<i>Control variables</i>						
Constant	-0.0274 (2.09)	-0.0264 (2.47)	-0.0203 (1.95)	-0.0227 (2.22)	-0.0228 (2.37)	-0.0372 (3.99)
Initial value of the dependent variable	-0.7276 (8.67)	-0.7541 (7.47)	-0.7219 (9.21)	-0.7089 (8.85)	-0.7097 (9.11)	-0.7337 (8.20)
Lagged real GDP growth	0.0039 (3.09)	0.0040 (3.12)	0.0039 (3.31)	0.0039 (3.27)	0.0039 (3.36)	0.0047 (4.47)
GDP per capita	6.73E-07 (1.68)	5.87E-07 (1.67)	4.32E-07 (1.07)	5.45E-07 (1.39)	5.42E-7 (1.48)	9.79E-7 (3.52)
Aid-to-GDP ratio	0.0011 (1.09)	0.0011 (1.11)	0.0009 (0.95)	0.0010 (1.08)	0.0010 (1.06)	
Lagged inflation rate	0.0002 (1.09)	0.0001 (2.14)	0.0001 (2.14)	0.0001 (1.92)	0.0001 (1.97)	0.0002 (3.08)
High inflation dummy 1/	-0.0474 (2.71)	-0.0366 (2.43)	-0.0386 (2.56)	-0.0374 (2.49)	-0.0390 (2.54)	-0.0441 (3.77)
Lagged terms of trade	-0.0007 (1.26)	-0.0007 (1.16)	-0.0008 (1.44)	-0.0008 (1.33)	-0.0008 (1.33)	
<i>Policy variables</i>						
Current account balance	0.1227 (1.18)	0.1234 (1.20)	0.1062 (1.13)	0.1083 (1.16)	0.1107 (1.17)	
Nominal exchange rate	2.20E-05 (0.33)	5.11E-06 (0.09)	2.13E-05 (0.37)	2.43E-05 (0.42)	2.36E-5 (0.41)	
Real interest rate	1.68E-06 (1.18)	1.41E-06 (1.13)	1.48E-06 (1.19)	1.17E-06 (0.96)	1.15E-6 (0.93)	
<i>IMF program performance</i>						
IMF program dummy	0.0157 (0.89)					
Program stoppage	-0.0114 (0.85)					
"Successful IMF program" dummy 2/		0.0155 (1.01)				
<i>Conditionality variables</i>						
Fiscal measures (count)			-0.0218 (0.55)			
Fiscal measures (implementation)				0.0066 (0.63)		
Fiscally relevant measures (implementation) 3/					0.0073 (0.64)	
R <sup>2</sup>	0.515	0.515	0.509	0.509	0.509	0.45.3
Log-likelihood	195.5	195.6	194.8	194.87	194.8	188.8
Number of observations	112	112	112	112	112	112
Normality test [ $\chi^2(2,2)$ ]	64.25	64.72	75.90	72.71	70.81	131.68
Heteroscedasticity test ( <i>F</i> )	1.70	1.89	2.10	1.94	1.92	0.81

Source: Authors' estimates.

1/ The dummy takes value of 1 if the lagged, two-year average inflation was higher than 50 percent per annum; and 0 otherwise.

2/ The dummy is equal to 1 if either all committed resources were disbursed or if the program was precautionary; and 0 otherwise.

3/ Includes all structural measures with fiscal implications.

Table A2-1. The Overall Balance Two Years After the Program: Estimates of the GEE (continued)  
(Heteroscedasticity-consistent OLS, *t*-statistics in parentheses)

	(1)	(2)	(3)	(4)	(5)	(6)
<i>Control variables</i>						
Constant	-0.0296 (1.86)	-0.0332 (2.48)	-0.0308 (2.23)	-0.0301 (2.24)	-0.0304 (2.32)	-0.0297 (4.52)
Initial value of the dependent variable	-0.9019 (9.84)	-0.9076 (9.21)	-0.8734 (9.45)	-0.8714 (9.26)	-0.8723 (9.47)	-0.9011 (8.91)
Lagged real GDP growth	0.0016 (1.46)	0.0017 (1.65)	0.0019 (1.66)	0.0018 (1.68)	0.0018 (1.69)	0.0020 (2.36)
GDP per capita	6.05E-07 (1.02)	7.13E-07 (1.32)	6.70E-7 (1.18)	6.57E-7 (1.15)	6.65E-7 (1.22)	
Aid-to-GDP ratio	0.0010 (1.64)	0.0011 (1.81)	0.0011 (1.71)	0.0010 (1.64)	0.0010 (1.58)	0.0009 (2.60)
Lagged inflation rate	-5.62E-05 (0.12)	9.22E-05 (0.00)	-1.74E-5 (0.04)	-4.09E-5 (0.09)	-2.53E-5 (0.06)	
High inflation dummy 1/	-0.0015 (0.04)	-0.0024 (0.06)	-0.0027 (0.07)	-2.74E-5 (0.00)	-0.0023 (0.07)	
Lagged terms of trade	-0.0001 (0.42)	-0.0001 (0.50)	-0.0002 (0.68)	-0.0001 (0.46)	-0.0001 (0.46)	
<i>Policy variables</i>						
Current account balance	0.0636 (0.92)	0.0636 (0.90)	0.0506 (0.78)	0.0487 (0.76)	0.0508 (0.78)	
Nominal exchange rate	-6.75E-05 (0.98)	-7.25E-05 (0.93)	-6.23E-5 (0.83)	-6.19E-5 (0.84)	-6.17E-5 (0.85)	
Real interest rate	3.10E-06 (3.24)	2.24E-06 (2.92)	2.20E-6 (2.92)	2.27E-6 (2.81)	2.27E-6 (2.85)	3.09E-6 (4.03)
<i>IMF program performance</i>						
IMF program dummy	0.0132 (0.82)					
Program stoppage	-0.0179 (1.62)					
"Successful IMF program" dummy 2/		0.0145 (1.35)				
<i>Conditionality variables</i>						
Fiscal measures (count)			-0.0315 (0.86)			
Fiscal measures (implementation)				0.0044 (0.43)		
Fiscally relevant measures (implementation) 3/					0.0061 (0.46)	
R <sup>2</sup>	0.583	0.579	0.573	0.571	0.572	0.529
Log-likelihood	205.01	204.5	203.7	203.5	203.6	198.4
Number of observations	109	109	109	109	109	109
Normality test [ $\chi^2(2,2)$ ]	9.73	12.57	11.98	12.31	11.98	26.66
Heteroscedasticity test ( <i>F</i> )	0.95	0.97	0.69	0.68	0.64	0.66

Source: Authors' estimates.

1/ The dummy takes value of 1 if the lagged, two-year average inflation was higher than 50 percent per annum; and 0 otherwise.

2/ The dummy is equal to 1 if either all committed resources were disbursed or if the program was precautionary; and 0 otherwise.

3/ Includes all structural measures with fiscal implications.

Table A2-1. The Overall Balance Three Years After the Program: Estimates of the GEE (completed)  
(Heteroscedasticity-consistent OLS, *t*-statistics in parentheses)

	(1)	(2)	(3)	(4)	(5)	(6)
<i>Control variables</i>						
Constant	-0.0356 (2.92)	-0.0433 (4.41)	-0.0429 (4.04)	-0.0415 (3.68)	-0.0435 (4.11)	-0.0487 (6.78)
Initial value of the dependent variable	-1.0536 (7.45)	-1.0553 (6.99)	-1.0379 (7.18)	-1.0487 (7.21)	-1.0370 (7.13)	-1.0394 (7.33)
Lagged real GDP growth	0.0025 (4.02)	0.0025 (3.96)	0.0025 (3.91)	0.0025 (3.92)	0.0024 (4.03)	0.0024 (3.88)
GDP per capita	9.47E-7 (1.46)	1.27E-6 (2.15)	1.27E-6 (2.04)	1.20E-6 (1.57)	1.32E-6 (2.09)	1.54E-6 (4.61)
Aid-to-GDP ratio	0.0006 (0.667)	0.0006 (0.63)	0.0007 (0.70)	0.0006 (0.63)	0.0006 (0.63)	
Lagged inflation rate	0.0001 (2.39)	0.0001 (4.18)	0.0001 (3.77)	0.0001 (3.54)	0.0001 (3.42)	0.0001 (3.98)
High inflation dummy 1/	-0.0043 (0.17)	-0.0097 (0.44)	-0.0111 (0.50)	-0.0842 (0.35)	-0.0009 (0.40)	
Lagged terms of trade	0.0002 (2.81)	0.0002 (2.42)	0.0001 (0.95)	0.0002 (2.41)	0.0002 (2.50)	0.0002 (3.41)
<i>Policy variables</i>						
Current account balance	0.0505 (0.60)	0.0456 (0.53)	0.0419 (0.53)	0.0416 (0.52)	0.0422 (0.54)	
Nominal exchange rate	0.0002 (3.88)	0.0002 (3.78)	0.0002 (3.43)	0.0002 (3.68)	0.0002 (3.77)	0.0002 (3.91)
Real interest rate	3.73E-6 (2.88)	3.15E-6 (4.12)	3.04E-6 (3.58)	3.26E-6 (3.54)	3.02E-6 (3.75)	2.92E-6 (5.26)
<i>IMF program performance</i>						
IMF program dummy	0.0023 (0.14)					
Program stoppage	-0.0177 (1.07)					
"Successful IMF program" dummy 2/		0.0049 (0.42)				
<i>Conditionality variables</i>						
Fiscal measures (count)			0.0301 (0.57)			
Fiscal measures (implementation)				-0.0028 (0.22)		
Fiscally relevant measures (implementation) 3/					0.0011 (1.01)	
R <sup>2</sup>	0.630	0.621	0.622	0.621	0.623	0.614
Log-likelihood	173.6	172.5	172.6	172.5	172.7	171.7
Number of observations	97	97	97	97	97	97
Normality test [ $\chi^2(2,2)$ ]	32.55	32.94	34.24	33.72	35.12	48.06
Heteroscedasticity test ( <i>F</i> )	0.50	0.46	0.54	0.50	0.52	0.67

Source: Authors' estimates.

1/ The dummy takes value of 1 if the lagged, two-year average inflation was higher than 50 percent per annum; and 0 otherwise.

2/ The dummy is equal to 1 if either all committed resources were disbursed or if the program was precautionary; and 0 otherwise.

3/ Includes all structural measures with fiscal implications.

Table A2-2. Revenue and Grants One Year After the Program: Estimates of the GEE (continued)  
(Heteroscedasticity-consistent OLS, *t*-statistics in parentheses)

	(1)	(2)	(3)	(4)	(5)	(6)
<i>Control variables</i>						
Constant	0.0452 (2.95)	0.0395 (2.98)	0.0438 (3.16)	0.0416 (3.05)	0.0428 (3.14)	0.0321 (2.74)
Initial value of the dependent variable	-0.1203 (2.24)	-0.1278 (2.40)	-0.1180 (2.20)	-0.1190 (2.22)	-0.1126 (2.16)	-0.1115 (1.98)
Lagged real GDP growth	-0.0016 (0.85)	-0.0014 (0.75)	-0.0017 (0.88)	-0.0016 (0.83)	-0.0018 (0.93)	
GDP per capita	4.28E-8 (0.09)	2.97E-7 (0.70)	7.16E-8 (0.18)	1.64E-7 (0.42)	6.70E-8 (0.17)	
Aid-to-GDP ratio	0.0018 (3.21)	0.0019 (3.60)	0.0016 (2.90)	0.0018 (3.35)	0.0017 (2.89)	0.0017 (3.71)
Lagged inflation rate	-0.0002 (1.53)	-0.0002 (1.43)	-0.0002 (1.58)	-0.0002 (1.52)	-0.0002 (1.61)	-0.0002 (2.06)
Lagged terms of trade	0.0002 (0.34)	0.0003 (0.61)	0.0001 (0.14)	0.0002 (0.36)	0.0002 (0.35)	
<i>Policy variables</i>						
Current account balance	0.0303 (0.67)	0.0532 (1.19)	0.0246 (0.52)	0.0302 (0.65)	0.0275 (0.60)	
Nominal exchange rate	-4.14E-5 (0.81)	-6.31E-5 (1.06)	-4.76E-5 (0.89)	-4.07E-5 (0.79)	-3.70E-5 (0.76)	
Real interest rate	-5.13E-6 (2.36)	-4.96E-6 (2.36)	-4.50E-6 (2.34)	-4.94E-6 (2.32)	-4.81E-6 (2.33)	-4.53E-6 (2.52)
<i>IMF program performance</i>						
IMF program dummy	-0.0051 (0.46)					
"Successful IMF program" dummy 1/		0.0170 (1.31)				
<i>Conditionality variables</i>						
Revenue measures (dummy)			-0.0261 (1.46)			
Revenue improving measures (implementation) 2/				-0.0074 (0.61)		
All revenue improving measures (implementation) 2/					-1.0138 (1.24)	
R <sup>2</sup>	0.214	0.228	0.239	0.214	0.221	0.189
Log-likelihood	191.8	192.8	193.6	191.8	192.3	190.0
Number of observations	112	112	112	112	112	112
Normality test [ $\chi^2(2,2)$ ]	32.55	29.71	29.21	34.84	29.88	44.14
Heteroscedasticity test ( <i>F</i> )	0.99	0.92	0.74	1.00	0.99	2.48

Source: Authors' estimates.

1/ The dummy is equal to 1 if either all committed resources were disbursed or if the program was precautionary; and 0 otherwise.

2/ Includes all structural measures with revenue improving implications.

Table A2-2. Revenue and Grants Two Years After the Program: Estimates of the GEE (continued)  
(Heteroscedasticity-consistent OLS, *t*-statistics in parentheses)

	(1)	(2)	(3)	(4)	(5)	(6)
<i>Control variables</i>						
Constant	0.0483 (4.31)	0.0462 (3.85)	0.0471 (3.96)	0.0481 (3.98)	0.0472 (3.96)	0.0425 (3.99)
Initial value of the dependent variable	-0.1390 (3.16)	-0.1390 (3.12)	-0.1390 (3.11)	-0.1386 (3.08)	-0.1327 (3.06)	-0.1317 (2.92)
Lagged real GDP growth	-0.0015 (1.43)	-0.0015 (1.44)	-0.0015 (1.43)	-0.0016 (1.54)	-0.0017 (1.65)	-0.0019 (1.63)
GDP per capita	3.38E-8 (0.07)	4.71E-8 (0.09)	6.36E-10 (0.00)	1.64E-8 (0.03)	4.99E-8 (0.10)	
Aid-to-GDP ratio	0.0006 (0.91)	0.0007 (0.99)	0.0006 (0.80)	0.0007 (1.02)	0.0005 (0.68)	
Lagged inflation rate	-0.0006 (2.15)	-0.0006 (2.35)	-0.0006 (2.37)	-0.0006 (2.44)	-0.0006 (2.32)	-0.0006 (2.74)
Lagged terms of trade	-0.0003 (1.95)	-0.0003 (2.10)	-0.0002 (1.53)	-0.0003 (2.22)	-0.0003 (2.25)	
<i>Policy variables</i>						
Current account balance	0.0212 (0.44)	0.0253 (0.53)	0.0201 (0.41)	0.0188 (0.39)	0.0186 (0.38)	
Nominal exchange rate	-7.75E-5 (1.55)	-7.89E-5 (1.53)	-8.14E-5 (1.62)	-8.23E-5 (1.58)	-8.12E-5 (1.58)	
Real interest rate	-4.95E-6 (4.20)	-4.91E-6 (3.86)	-4.75E-6 (3.87)	-4.88E-6 (4.07)	-4.77E-6 (4.05)	-4.82E-6 (3.61)
<i>IMF program performance</i>						
IMF program dummy	-0.0027 (0.23)					
“Successful IMF program” dummy 1/		0.0020 (1.17)				
<i>Conditionality variables</i>						
Revenue measures (dummy)			-0.0091 (0.73)			
Revenue improving measures (implementation) 2/				-0.0132 (0.95)		
All revenue improving measures (implementation) 2/					-0.0136 (1.29)	
R <sup>2</sup>	0.235	0.234	0.238	0.239	0.243	0.195
Log-likelihood	197.9	197.9	198.1	198.2	198.5	195.2
Number of observations	109	109	109	109	109	109
Normality test [ $\chi^2(2,2)$ ]	20.62	19.71	20.66	21.05	18.97	22.14
Heteroscedasticity test ( <i>F</i> )	0.30	0.30	0.25	0.24	0.26	1.34

Source: Authors' estimates.

1/ The dummy is equal to 1 if either all committed resources were disbursed or if the program was precautionary; and 0 otherwise.

2/ Includes all structural measures with revenue improving implications.

Table A2-2. Revenue and Grants Three Years After the Program: Estimates of the GEE (completed)  
(Heteroscedasticity-consistent OLS, *t*-statistics in parentheses)

	(1)	(2)	(3)	(4)	(5)	(6)
<i>Control variables</i>						
Constant	0.0582 (4.14)	0.0420 (3.65)	0.0420 (3.71)	0.0431 (3.72)	0.0445 (4.08)	0.0514 (4.35)
Initial value of the dependent variable	-0.1403 (2.89)	-0.1310 (2.60)	-0.1355 (2.72)	-0.1362 (2.74)	-0.1267 (2.78)	-0.1434 (2.90)
Lagged real GDP growth	-0.0019 (2.42)	-0.0019 (2.27)	-0.0017 (1.91)	-0.0018 (2.22)	-0.0017 (2.38)	-0.0022 (3.01)
GDP per capita	-3.85E-8 (0.75)	1.64E-7 (0.34)	1.77E-7 (0.40)	1.64E-7 (0.36)	-2.75E-8 (0.07)	
Aid-to-GDP ratio	0.0008 (1.41)	0.0007 (1.09)	0.0007 (1.04)	0.0007 (1.11)	0.0006 (0.96)	
Lagged inflation rate	-2.07E-5 (0.52)	-4.28E-5 (0.93)	-3.63E-5 (0.82)	-4.14E-5 (0.93)	3.07E-5 (0.75)	
Lagged terms of trade	3.51E-5 (0.33)	6.29E-6 (0.05)	8.17E-5 (0.55)	3.45E-6 (0.03)	9.49E-6 (0.10)	
<i>Policy variables</i>						
Current account balance	0.0328 (0.93)	0.0346 (0.93)	0.0391 (1.05)	0.0379 (1.03)	0.0409 (1.20)	
Nominal exchange rate	5.46E-5 (0.77)	7.40E-5 (1.01)	7.24E-5 (0.97)	7.67E-5 (1.00)	6.74E-5 (1.11)	
Real interest rate	-3.69E-6 (3.54)	-3.06E-6 (3.69)	-2.89E-6 (3.72)	-2.96E-6 (3.85)	-2.81E-6 (3.53)	-4.16E-6 (3.87)
<i>IMF program performance</i>						
IMF program dummy	-0.0216 (1.99)					-0.0210 (2.34)
"Successful IMF program" dummy 1/		-0.0053 (0.48)				
<i>Conditionality variables</i>						
Revenue measures (dummy)			-0.0188 (0.81)			
Revenue improving measures (implementation) 2/				-0.0247 (1.02)		
All revenue improving measures (implementation) 2/					-0.0432 (3.24)	
R <sup>2</sup>	0.266	0.239	0.242	0.244	0.300	0.240
Log-likelihood	175.1	173.3	173.5	173.6	177.4	173.4
Number of observations	97	97	97	97	97	97
Normality test [ $\chi^2(2,2)$ ]	18.34	16.13	15.77	15.59	17.08	19.40
Heteroscedasticity test ( <i>F</i> )	0.18	0.18	2.75	0.17	0.21	0.77

Source: Authors' estimates.

1/ The dummy is equal to 1 if either all committed resources were disbursed or if the program was precautionary; and 0 otherwise.

2/ Includes all structural measures with revenue improving implications.

Table A2-3. Expenditure and Net Lending One Year After the Program: Estimates of the GEF (continued)  
(Heteroscedasticity-consistent OLS, *t*-statistics in parentheses)

	(1)	(2)	(3)	(4)	(5)	(6)	(7)
<i>Control variables</i>							
Constant	-0.3782 (3.66)	-0.3864 (3.88)	-0.4089 (4.06)	-0.3923 (3.84)	-0.4072 (4.06)	-0.3988 (3.79)	-0.4362 (4.09)
Initial value of the dependent variable	-1.9127 (4.26)	-1.8570 (4.60)	-2.0240 (4.82)	-1.8996 (4.55)	-1.9703 (4.83)	-1.9167 (4.43)	-2.1711 (4.84)
Initial value of the dependent variable, square root	1.7620 (3.98)	1.7113 (4.27)	1.8882 (4.49)	1.7613 (4.25)	1.8353 (4.50)	1.7778 (4.14)	2.0133 (4.48)
Lagged real GDP growth	-0.0035 (2.05)	-0.0032 (2.03)	-0.0036 (2.20)	-0.0035 (2.08)	-0.0035 (1.98)	-0.0033 (2.01)	-0.0024 (1.80)
GDP per capita	-9.88E-9 (0.02)	6.69E-7 (1.33)	-1.76E-7 (0.37)	4.00E-7 (0.79)	2.37E-7 (0.47)	4.87E-7 (0.97)	
Lagged inflation rate	-0.0001 (1.31)	-0.0001 (1.33)	-0.0001 (1.70)	-0.0002 (1.54)	-0.0001 (1.39)	-0.0001 (1.46)	
<i>Policy variables</i>							
Current account balance	-0.1054 (1.66)	-0.0887 (1.24)	-0.0953 (1.71)	-0.1031 (1.63)	-0.1049 (1.69)	-0.1102 (1.70)	
Nominal exchange rate	-1.58E-5 (0.21)	-2.94E-5 (0.38)	-1.97E-5 (0.36)	-9.01E-6 (0.13)	5.94E-6 (0.08)	-1.19E-5 (0.16)	
Real interest rate	-5.26E-6 (2.78)	-4.97E-6 (2.90)	-3.48E-6 (2.74)	-4.84E-6 (2.83)	-4.09E-6 (2.65)	-4.68E-6 (2.87)	-1.73E-6 (1.70)
<i>IMF program performance</i>							
IMF program dummy	-0.0191 (1.00)						
"Successful IMF program" dummy 1/		0.0138 (0.88)					
<i>Conditionality variables</i>							
Structural conditionality dummy 2/			-0.0407 (3.10)				-0.0389 (3.19)
Expenditure lowering measures (count)				-0.1888 (1.74)			
Expenditure lowering measures (implementation)					-0.0383 (2.16)		
All expenditure lowering measures (implementation) 3/						-0.0276 (2.29)	
R <sup>2</sup>	0.454	0.449	0.505	0.454	0.476	0.452	0.470
Log-likelihood	176.8	176.3	182.3	176.8	179.0	176.6	178.4
Number of observations	112	112	112	112	112	112	112
Normality test [ $\chi^2(2,2)$ ]	16.41	24.12	9.26	23.74	24.09	24.22	22.82
Heteroscedasticity test ( <i>F</i> )	1.36	1.05	1.02	1.33	1.24	1.36	1.55

Source: Authors' estimates.

1/ The dummy is equal to 1 if either all committed resources were disbursed or if the program was precautionary; and 0 otherwise.

2/ The dummy takes value of 1 if the IMF-supported program included any structural conditions; and 0 otherwise.

3/ Includes all structural measures with expenditure implications.

Table A2-3. Expenditure and Net Lending Two Years After the Program: Estimates of the GEE (continued)  
(Heteroscedasticity-consistent OLS, *t*-statistics in parentheses)

	(1)	(2)	(3)	(4)	(5)	(6)	(7)
<i>Control variables</i>							
Constant	-0.1969 (1.67)	-0.1958 (1.72)	-0.2240 (1.80)	-0.2041 (1.71)	-0.2245 (1.87)	-0.2015 (1.69)	-0.2897 (2.45)
Initial value of the dependent variable	-1.2162 (2.90)	-1.1908 (2.86)	-1.3675 (3.07)	-1.2358 (2.83)	-1.3262 (3.04)	-1.2144 (2.77)	-1.5827 (3.71)
Initial value of the dependent variable, square root	1.0374 (2.35)	1.0112 (2.32)	1.1944 (2.52)	1.0630 (2.32)	1.1554 (2.50)	1.0399 (2.26)	1.4028 (3.07)
Lagged real GDP growth	-0.0016 (0.97)	-0.0018 (1.02)	-0.0017 (1.15)	-0.0019 (1.07)	-0.0018 (1.10)	-0.0017 (0.96)	
GDP per capita	-3.58E-7 (0.52)	-1.42E-7 (0.25)	-8.53E-7 (1.40)	-3.64E-7 (0.63)	-4.62E-7 (0.81)	-2.51E-7 (0.44)	
Lagged inflation rate	-0.0005 (1.31)	-0.0005 (1.30)	-0.0005 (1.51)	-0.0005 (1.45)	-0.0005 (1.44)	-0.0005 (1.34)	
<i>Policy variables</i>							
Current account balance	-0.0361 (0.75)	-0.0246 (0.51)	-0.0282 (0.64)	-0.0365 (0.77)	-0.0347 (0.76)	-0.0425 (0.83)	
Nominal exchange rate	3.63E-5 (0.90)	2.95E-5 (0.69)	1.95E-5 (0.58)	4.08E-5 (0.99)	4.76E-5 (1.13)	2.79E-5 (0.66)	
Real interest rate	-4.03E-6 (2.65)	-4.13E-6 (2.57)	-2.72E-6 (2.50)	-3.81E-6 (2.76)	-3.43E-6 (2.60)	-3.86E-6 (2.67)	-1.80E-6 (1.72)
<i>IMF program performance</i>							
IMF program dummy	-0.0043 (0.25)						
"Successful IMF program" dummy 1/ <sup>1</sup>		0.0107 (0.67)					
<i>Conditionality variables</i>							
Structural conditionality dummy 2/ <sup>2</sup>			-0.0368 (3.20)				-0.0324 (4.01)
Expenditure lowering measures (count)				-0.1646 (1.61)			
Expenditure lowering measures (implementation)					-0.0292 (1.76)		
All expenditure lowering measures (implementation) 3/ <sup>3</sup>						-0.0220 (1.03)	
R <sup>2</sup>	0.319	0.322	0.371	0.327	0.338	0.322	0.337
Log-likelihood	166.7	166.9	171.1	167.3	168.2	166.9	168.2
Number of observations	109	109	109	109	109	109	109
Normality test [ $\chi^2(2,2)$ ]	26.83	25.54	23.63	23.98	27.44	25.19	23.22
Heteroscedasticity test ( <i>F</i> )	0.52	0.77	0.64	0.56	0.54	0.53	0.96

Source: Authors' estimates.

1/ The dummy is equal to 1 if either all committed resources were disbursed or if the program was precautionary; and 0 otherwise.

2/ The dummy takes value of 1 if the IMF-supported program included any structural conditions; and 0 otherwise.

3/ Includes all structural measures with expenditure implications.



Table A2-3. Expenditure and Net Lending Three Years After the Program: Estimates of the GEE (completed)  
(Heteroscedasticity-consistent OLS, *t*-statistics in parentheses)

	(1)	(2)	(3)	(4)	(5)	(6)	(7)
<i>Control variables</i>							
Constant	-0.2080 (1.81)	-0.2133 (1.90)	-0.2382 (2.07)	-0.2198 (1.92)	-0.2287 (2.05)	-0.2156 (1.87)	-0.2695 (2.69)
Initial value of the dependent variable	-1.3773 (3.32)	-1.3504 (3.34)	-1.5737 (3.90)	-1.3901 (3.34)	-1.4655 (3.64)	-1.3669 (3.26)	-1.6354 (4.79)
Initial value of the dependent variable, square root	1.1697 (3.98)	1.1443 (2.66)	1.3550 (3.13)	1.1934 (2.71)	1.2562 (2.93)	1.1664 (2.62)	1.4177 (3.77)
Lagged real GDP growth	-0.0045 (4.14)	-0.0045 (4.15)	-0.0038 (4.27)	-0.0046 (4.28)	-0.0043 (3.97)	-0.0046 (4.18)	-0.0036 (5.94)
GDP per capita	-8.42E-7 (1.43)	-4.08E-7 (0.85)	-1.41E-7 (2.95)	-7.16E-7 (1.39)	-8.52E-7 (1.69)	-5.82E-7 (1.11)	
Lagged inflation rate	-0.0001 (1.58)	-0.0001 (1.73)	-1.16E-5 (0.22)	-0.0001 (1.98)	-0.0001 (2.00)	-0.0001 (1.91)	
<i>Policy variables</i>							
Current account balance	-0.0131 (0.22)	0.0098 (0.18)	-0.0165 (0.40)	-0.0123 (0.22)	-0.0741 (1.14)	-0.0250 (0.42)	
Nominal exchange rate	-4.34E-5 (0.44)	-3.96E-5 (0.38)	-2.53E-5 (0.29)	-3.52E-5 (0.38)	-1.53E-5 (0.14)	-5.34E-5 (0.67)	
Real interest rate	-3.65E-6 (2.59)	-3.54E-6 (2.65)	-1.47E-6 (1.65)	-3.17E-6 (2.51)	-2.51E-6 (2.28)	-3.32E-6 (2.56)	-2.57E-6 (2.47)
<i>IMF program performance</i>							
IMF program dummy	-0.0108 (0.54)						
"Successful IMF program" dummy 1/ <sup>1/</sup>		0.0180 (0.85)					
<i>Conditionality variables</i>							
Structural conditionality dummy 2/ <sup>2/</sup>			-0.0620 (4.49)				-0.0497 (4.12)
Expenditure lowering measures (count)				-0.2463 (2.45)			
Expenditure lowering measures (implementation)					-0.0469 (2.44)		
All expenditure lowering measures (implementation) 3/ <sup>3/</sup>						-0.0732 (3.94)	
R <sup>2</sup>	0.448	0.452	0.534	0.460	0.471	0.463	0.503
Log-likelihood	144.1	144.6	152.5	145.3	146.3	145.6	149.3
Number of observations	97	97	97	97	97	97	97
Normality test [ $\chi^2(2,2)$ ]	21.23	16.34	18.94	17.42	18.19	20.73	26.62
Heteroscedasticity test ( <i>F</i> )	0.72	1.48	0.92	0.74	0.85	0.61	0.39

Source: Authors' estimates.

1/ The dummy is equal to 1 if either all committed resources were disbursed or if the program was precautionary; and 0 otherwise.

2/ The dummy takes value of 1 if the IMF-supported program included any structural conditions; and 0 otherwise.

3/ Includes all structural measures with expenditure implications

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