

Does IMF support accelerate inflation stabilization?

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Abstract

This paper analyzes the effects of International Monetary Fund (IMF) arrangements on the timing of inflation stabilization programs. By providing financial support that may allow the reduction of inflation without incurring politically unacceptable economic costs, the IMF can hasten stabilization. But, since support can also reduce the costs of inflation, it may instead delay it. Empirical results obtained for 10 countries that suffered from chronic inflation fail to support the hypothesis that IMF financial assistance accelerates stabilization. Rather, they indicate that other factors have a greater impact on the timing of stabilizations: greater fragmentation of the political system delays stabilization, while a higher level of inflation hastens it.

Keywords: IMF arrangements, stabilization, inflation, timing.

JEL codes: E63, E31, F35

Introduction

This paper analyzes the effects of International Monetary Fund (IMF) arrangements and of several political and economic variables on the decision to implement stabilization programs in countries suffering from chronic inflation. By providing financial means that allow the reduction of inflation without incurring politically unacceptable economic costs, foreign aid can hasten stabilization. But, since aid can also reduce the costs of inflation, it may eventually delay the necessary reforms. This is likely to happen when the most influential interest groups do not agree on the need for reform or on how it should be conducted.

In this paper, the information available since the late 1950s on IMF arrangements with 10 countries that suffered from chronic inflation is used to construct a series of variables describing the amount of financial support and the timing of the associated arrangements and transfers. Political and economic variables such as the degree of fragmentation of the political system, the inflation rate, the government budget balance, GDP growth and the stock of foreign exchange reserves are also included in the estimations.

Logit models controlling for fixed effects of countries and time under high inflation are estimated to evaluate the effects of the explanatory variables on the probability of starting a stabilization program under inflationary conditions. Results are not supportive of the hypothesis that IMF support hastens stabilization. Rather, they indicate that other factors have a greater impact on the timing of stabilizations: greater fragmentation of the political system delays stabilization, while a higher level of inflation hastens it. Other political and economic variables do not seem to have significant effects.

1. Delayed stabilization

Countries that have suffered from chronic inflation have often followed unsustainable monetary and fiscal policies for long periods of time. Even when policymakers recognized that these policies were suboptimal, they tended to take too long to reverse them and implement the necessary stabilization programs.

Assuming irrationality or an unreasonable degree of myopia of policymakers is not a desirable way to explain delays, as it offers no constructive explanation of the phenomenon. Thus, one can either assume that the timing of stabilizations is the rational and deliberate choice of a policymaker maximizing an objective function defined on economic variables, or that policy choices result from negotiations between contending interest groups and delays are caused by difficulty in reaching agreements. The rest of this section describes some of the models based on these assumptions.¹

Orphanides (1996) presents a model in which the delay and abandonment of a stabilization program are possible decisions of a policymaker who tries to maximize a social welfare function. A program can be delayed when more favourable conditions are expected, or abandoned when the expected gains of reducing inflation are lower than stabilization costs. In this model, a more severe inflation is likely to hasten stabilization and, if a prospective reform is to be accomplished via the management of the exchange rate, the level of foreign reserves will be a critical factor. Thus, low levels of foreign reserves may result in delayed or abandoned stabilization programs.

Alesina and Drazen (1991) present a political economy model in which delays of stabilizations result when two groups with conflicting interests do not agree on the distribution of the costs of stabilization. This “war of attrition” ends when one of the groups concedes, that is,

accepts paying a higher proportion of the taxes needed to eliminate the deficit. In this model, one important factor leading to delays is the degree of political polarization among interest groups. Drazen and Grilli (1993) and Hsieh (2000) extend this model, emphasizing the possible benefits of adverse exogenous shocks or crises that may hasten stabilization. In this context, a very high level of inflation results in higher costs of delaying stabilization, which in turn lead to earlier implementation of reforms.

Political instability and polarization are the key factors leading to an excessive use of seigniorage in the model of Cukierman, Edwards and Tabellini (1992). When incumbent policymakers face a small probability of re-election and have different preferences from the prospective winners, they are induced to delay reform and leave an inefficient tax system to their successors. Their empirical results show that countries with more unstable political systems tend to rely more on seigniorage.

Interest groups are generally represented by political parties. Thus, fragmented political systems, generally with many parties represented in parliament, tend to be associated with a high degree of political polarization and instability. In the models discussed above, this would lead to greater delays of stabilizations.

2. The effects of external financial support on the timing of stabilization

The economic literature does not present a consensual view of the effects of external financial support on the timing of stabilization. On one hand, the inflow of foreign currency may reduce the costs of stabilization and increase its probability of success, inducing policymakers to stabilize sooner. But, on the other hand, financial assistance also reduces the costs of living with high inflation, possibly leading to greater delays.

Orphanides (1996) analyzes the effects of external aid and conditionality in his model. When a program is already under way, aid can increase the willingness of the government to conclude it successfully. If the government is contemplating the implementation of a stabilization, then programs that would be optimally delayed may now start sooner, and programs that would start even without aid will now have a greater probability of success or become less painful. The trade-off between the probability of success and the cost of adjustment could then be a rationale for conditionality. Finally, the expectation of external aid in the future would lead to greater delays of stabilizations or to the abandonment of programs already under way.

Casella and Eichengreen (1996) introduce foreign aid into the Alesina and Drazen (1991) model. Since they assume that aid is not extended instantaneously upon the advent of high inflation, its effects hinge precisely on the issue of timing. They find that aid that is agreed upon and announced early and dispensed rapidly can hasten stabilization, while aid offered late will have the opposite effect. In a “war of attrition” game, aid announced early accelerates the transmission of information, leading to an earlier concession by the loser. Aid that is announced late in the game will only serve to provide the interest groups with additional resources that allow them to keep fighting. Furthermore, long intervals between the announcement and the disbursement of aid will tend to increase delays. This happens because the announcement of aid provides an incentive to postpone concessions until financial assistance arrives. The greater the amount of the transfer, the more important it is to get the timing right. They conclude that only aid that is decided upon and transferred early enough will surely increase welfare in the receiving country.

Hsieh (2000) also analyzes the effects of foreign aid in a framework similar to that of Alesina and Drazen (1991). He concludes that foreign aid is counterproductive because, by reducing the costs of further delay, it will decrease the probability of an agreement.

According to Dornbusch, Sturzenegger and Wolf (1990), external support can contribute to the credibility of a program in two ways. First, external parties can monitor the execution of the program when conditionality is imposed. Second, the foreign exchange transferred will increase the probability of success of exchange rate based stabilizations. Although they claim that the effectiveness of external aid is still an open issue, they conclude that it critically eases the adjustment. Thus, by decreasing the costs of stabilization, external support leads to its earlier implementation.

Although conditionality increases the credibility and reduces the delays of stabilizations in the above models, Rodrik (1989) developed an imperfect information model in which conditional assistance from international financial institutions can undermine the credibility of reforms or stabilizations. He considers a framework in which economic agents are unable to distinguish between a truly reform-minded government and one that may reform just to secure the much desired foreign assistance. In this setting, the simple announcement of reform is not informative. This means that the reform-minded government will have to go much further in order to reveal its true type and secure credibility for the stabilization. The increased costs of stabilization may eventually lead to greater delays of credible stabilizations.²

3. IMF programs and the timing of inflation stabilization

Given that the purpose of this article is to determine whether IMF financial support accelerates inflation stabilization, it is important to discuss the channels through which IMF programs may affect the timing of stabilization.

First, there is the provision of foreign exchange reserves. As discussed in the previous section, there is no consensus in the literature regarding the effects of external financial assistance on the timing of stabilization. Furthermore, Dreher and Vaubel (2004) argue that IMF lending causes moral hazard problems. That is, they find that money growth and budget deficits are higher the less a country has exhausted its borrowing potential in the IMF and the more credit it has received from it.

Second, the adjustment measures proposed in IMF programs should ease the implementation of inflation stabilization plans. That is, the targets usually set in a ‘Letter of Intent’ regarding the reduction of the growth rates of domestic credit and money creation and fiscal discipline are also essential components of inflation stabilization programs.³ The problem is that compliance with conditionality is very small, reducing the chances of success of stabilizations linked to IMF programs.⁴

Third, from a political economy perspective, IMF conditionality may induce countries to modify policies in a way consistent with inflation reduction, when it would be difficult to find domestic consensus in the absence of external pressure (see Mussa and Savastano, 1999). Thus, internal political agreement regarding inflation stabilization may be easier to obtain when a country is already committed to fiscal and monetary discipline by an IMF program. But, the importance of this channel will be small when compliance with conditionality is low.

Finally, the IMF may affect the timing of inflation stabilization through policy advice. The views expressed by IMF officials that visit a country suffering from chronic inflation may help convince the authorities and the general public of the need to reduce inflation. They may also use their expertise to help the local authorities design more efficient stabilization programs.

4. The Data and the Empirical Model

The dataset is composed of quarterly data from the first quarter of 1957 to the fourth quarter of 1999, for countries that experienced chronic inflation and implemented important stabilization programs at some time in this period.

The first major issue addressed when constructing the dataset involved determining when a stabilization program had been implemented. The method consisted of searching the economic literature for information on the starting dates of important stabilizations undertaken in countries suffering from chronic inflation. The 25 stabilization plans, implemented in 10 different countries, most commonly referred to in the literature, are listed in Table 1, which also indicates the quarter of implementation and the type (exchange rate-based or money-based) of each stabilization program.⁵ The list of IMF arrangements with the sample countries is presented in Table 2.⁶

<< Insert Tables 1 and 2 around here >>

The second issue was to determine when inflation was “high”, that is, when a stabilization program was clearly necessary. Inflation was considered high when it was over twice the average inflation rate of the last 10 years (and above 25%) or greater than or equal to 100% (alternative definitions were used in the empirical analysis).

The empirical analysis uses logit models, controlling for time under high inflation and fixed effects of countries, to evaluate the effects of IMF financial assistance on the probability of starting an inflation stabilization program, given a situation of high inflation. Each inflation spell contains all the consecutive quarters of high inflation, until a stabilization plan was implemented or inflation simply ceased to be high. For each quarter and inflation spell the dependent variable (*STAB*) takes the value of one if a stabilization plan was implemented in that quarter, and zero otherwise. If no stabilization is implemented, *STAB* takes the value of zero for all the observations in that inflation spell.

The baseline model hypothesizes that the probability of implementing a stabilization program in a given quarter depends on the following explanatory variables:

- *IMF*: dummy variable that takes the value of 1 if there was an arrangement with IMF in the present quarter or in previous quarters of the current inflation spell, and equals zero otherwise. Although the models referred to in section 3 do not provide a definite conclusion on the effect of external assistance on the timing of stabilization, we will test the hypothesis that an IMF arrangement will accelerate stabilization (positive coefficient);
- *%Drawn*: Accumulated percentage of the amount agreed to with the IMF that was drawn up to and including the present quarter. Higher values reflect greater availability of funds and, in principle, greater compliance with conditionality.⁷ Thus, they should ease the implementation of an inflation stabilization program (a positive coefficient is expected);
- *Disbursements / Total Reserves*: total disbursements in the present quarter as a percentage of the country's total reserves minus gold. Greater disbursements lead to

greater availability of foreign exchange reserves which, according to Orphanides (1996), should increase the probability of starting an exchange rate-based stabilization. Since our sample includes 18 ERBS (out of 25 plans), a positive coefficient is expected for this variable;⁸

- *Fragmentation=1* and *Fragmentation=2*: dummies for the lower degrees of fragmentation of the political system (*Fragmentation>2*, that stands for coalition and minority governments, is left out of the regressions). Greater fragmentation of the political system leads to greater delays in the models of Alesina and Drazen (1991), Cukierman et al. (1992) and Drazen and Grilli (1993). Thus, positive coefficients are expected for these dummy variables;
- *Ln(Inflation)*: natural log of growth in the CPI since the same quarter of the previous year. In most of the models referred to in section 2, higher inflation increases the costs of delay, increasing the likelihood of implementation of a stabilization programs (a positive coefficient is expected) ;
- Control variables not directly related to the models described above but with the potential to affect the probability of implementing a stabilization program:
 - *Fiscal Balance/GDP*: Fiscal Balance as a percentage of GDP. Higher fiscal balances facilitate inflation stabilization (positive coefficient);
 - *GDPgrowth*: real GDP growth since same quarter of previous year. The restrictive fiscal and monetary policies associated with inflation stabilization are less painful when economic growth is high (a positive coefficient is expected);
 - Country dummies are included to control for country fixed effects;

- Five dummy variables that stand for the first five years of high inflation before stabilization (the sixth dummy, that stands for the sixth and later years is left out). These account for the possibility that the probability to start a stabilization program is also affected by the time spent in a situation of high inflation. Since the passage of time implies higher accumulated costs of inflation, higher probabilities of stabilizing should be associated with the dummies for the later years.⁹

All the explanatory variables used in this paper are described in Table 3.¹⁰ Macroeconomic and IMF related variables were lagged one quarter because the start of a stabilization program could affect their contemporaneous values.

<< Insert Table 3 around here >>

It is possible that inflation stabilizations and IMF arrangements are jointly determined by some other factors. Thus, lagging the variables related to IMF programs by one quarter may not be sufficient to deal with potential endogeneity/simultaneity.¹¹ This possibility was accounted for by replicating the analysis using instruments for *IMF*, *%Drawn*, and *Disbursements / Total Reserves*. The list of instruments includes a large number of political and economic variables that have been suggested in the IMF literature:¹² *Ideological Orientation*, *Polity Index of Democracy*, *Government Crises*, *Total Reserves / Imports*, *Quarterly percentage change in total reserves*, *U.S. Treasury Bill rate*, *GDP growth of main trading partners*, *Oil Price index*, *Trade/GDP*, *GDP per capita*, *Current Account / GDP*, and the *Real Effective Exchange Rate* (see Table 3 for the description of these variables).¹³

A two-stage method was used to deal with the potential endogeneity of the IMF variables.¹⁴ In the first stage, a probit model was estimated for *IMF(-1)* and OLS models were

estimated for *%Drawn(-1)* and *Disbursements / Total Reserves (-1)*. The models regress those variables on all their instruments and on the exogenous variables included in the baseline model. Then, in the second stage, the predicted values for the IMF variables were used in a probit estimation of the baseline model.

5. Empirical Evidence

The results of the baseline estimation are shown in column 1 of Table 4. The existence of an arrangement with the Fund in a previous quarter of the same inflation spell, *IMF(-1)*, the accumulated percentage of the amount agreed to with the IMF that was drawn through the previous quarter, *%Drawn(-1)*, and the lagged total disbursements as a percentage of total reserves do not seem to affect the probability of starting a stabilization program (these variables are not statistically significant). Results also indicate that lower fragmentation of the political system increases the probability of starting a stabilization program promptly. *Fragmentation=1* and *Fragmentation=2* are statistically significant and the coefficients have the expected positive signs. Since the most fragmented political systems are generally the most unstable and polarized, these results support the conclusions of the political conflict model of Alesina and Drazen (1991). The first lag of the natural logarithm of inflation is statistically significant and has a positive coefficient, providing support for the benefit of crises models of Drazen and Grilli (1993) and Hsieh (2000). That is, stabilization tends to be implemented sooner if the existing level of inflation is higher. Concerning the control variables, the lagged fiscal balance as a percentage of GDP does not seem to affect the timing of stabilizations, while higher GDP growth in the previous quarter appears to hasten them.¹⁵

<< Insert Table 4 around here >>

In the estimations of columns 2 to 5, four variables related to the timing of agreements and transfers of funds were added to the baseline model. Contrary to our expectations, the probability of starting a stabilization in a given quarter increases with the time since the start of an IMF arrangement, *Time_since_IMF* (column 2) and with *Time_since_drawn25%* (column 3), which counts the number of quarters since at least 25% of the amount agreed to was drawn. The estimated marginal effects are that one additional quarter since the start of an IMF program increases the probability of starting a stabilization plan by 6.06 percentage points, and that an additional quarter since 25% of the amount agreed to was drawn increases that probability by 4.84 percentage points. These results indicate that countries do not tend to stabilize as soon as they reach agreements with the IMF or as soon as they begin to draw the funds provided to them. The time that passes from the onset of high inflation to the start of an IMF arrangement, *Time_IMF* (column 4), and the time elapsed between the start of an arrangement and the withdrawal of 25% of the amount agreed to, *Time_IMF_drawn25%* (column 5), do not seem to matter. The results of columns 2 to 5 fail to support the model of Casella and Eichengreen (1996), which attributes great importance to the timing of announcements and transfers of financial assistance. Finally, the model of column 6 adds lagged total reserves minus gold as a percentage of imports to the baseline model. Since this variable is not statistically significant, there is no empirical support for Orphanides' (1996) hypothesis that the timing of stabilization depends on the stock of foreign exchange reserves.

A considerable number of robustness tests not reported here were performed. They consisted in replacing some explanatory variables with reasonable alternatives and in adding control variables to the baseline model. The alternatives used for IMF assistance were: *TFC/TR*, *Drawn25%*, *IMF start last year*, *Amount agreed / Total Reserves*, and *Number of IMF programs*.

Additional political variables were: *Ideological Orientation*, *Polity Index of Democracy*, and *Government Crises*. Additional control variables were: *Total Reserves / Imports*, *Quarterly percentage change in total reserves*, *U.S. Treasury Bill rate*, *GDP growth of main trading partners*, *Oil Price index*, *Trade/GDP*, *GDP per capita*, *Current Account / GDP*, and the *Real Effective Exchange Rate* (see Table 3 for the description of the above-referred variables). The main conclusions of the analysis are unchanged in these alternative estimations. The same is true when probit or proportional hazards models are estimated instead of logit models.¹⁶

The results of the sensitivity analysis are presented in Table 5. Column 1 shows the results obtained when only Exchange Rate Based Stabilizations are considered. Given the important role of external reserves in this type of programs, it is possible that financial assistance from the IMF becomes more important. Results are very similar to those shown in column 1 of Table 4. The main differences are that the fragmentation dummies have lower levels of statistical significance and the opposite happens to *GDP growth*. Thus, the conclusions regarding the main testable hypothesis remain unchanged.

<< Insert Table 5 around here >>

Columns 2 to 4 show the results obtained for alternative definitions of high inflation. In column 2, inflation is considered high when it is at least twice the average inflation of the last 5 years or greater or equal to 100%. Results are virtually the same as those of column 1 of Table 4. When inflation is considered high at 50% a year or higher (column 3), *Fragmentation=1* is only marginally significant and *GDP growth(-1)* is no longer significant, meaning that the growth rate of GDP no longer affects the timing of inflation stabilizations.

In the estimation of the last column of Table 5, inflation is defined as high at 100% a year or higher. Since this definition implies considering only those cases in which inflation is very

high, we should expect some changes in results, and this turns out to be the case. First, the existence of an arrangement with the IMF in previous quarters of the same inflation spell, *IMF(-1)*, is now marginally significant, indicating that when inflation is very high, Fund assistance may hasten stabilization. Second, *Fragmentation=1* is no longer statistically significant, meaning that dictatorships no longer stabilize faster than democracies. Although *Fragmentation=2* is only marginally significant, its marginal effect on the probability of stabilization remains high, meaning that less fragmented democracies still stabilize faster than the most fragmented ones. Third, lagged GDP growth is not statistically significant.

Table 6 shows the results of the two-stage estimations. In the first column, only the existence of an IMF program in previous quarters of the current inflation spell, *IMF(-1)*, is treated as endogenous. This variable is marginally statistically significant, indicating that the existence of an IMF arrangement hastens stabilization. But, *%Drawn(-1)* has a negative coefficient, indicating that greater accumulated percentage drawings of the amounts agreed to with the IMF delay stabilizations. Results regarding the remaining explanatory variables are similar to those of column 1 of Table 4. In the estimation reported in the second column, all IMF variables are treated as endogenous, which is eventually a more realistic assumption than that of the first column. Now, *IMF(-1)* is not statistically significant and *%Drawn* changes sign and is marginally statistically significant, providing weak evidence that larger percentages drawn accelerate stabilization.¹⁷

<< Insert Table 6 around here >>

6. Conclusions

The empirical analysis of the effects of IMF financial assistance on the timing of stabilizations does not support the hypothesis that IMF financial assistance hastens stabilizations. The exceptions are that, in the two-stage estimations, there is weak evidence that a higher accumulated percentage drawn hastens stabilization, and that, for inflation rates above 100%, there is weak evidence that the existence of an arrangement with the IMF increases the probability of implementing an inflation stabilization program. Contrary to what was expected, a longer period of time since the start of an IMF arrangement (or since the withdrawal of 25% of the amount agreed to) tends to increase the probability of starting a stabilization. Thus, there is no clear evidence that IMF assistance hastens stabilizations, nor is there evidence for the effects of the timing of the arrangements predicted in the model of Casella and Eichengreen (1996).

The hypothesis that higher fragmentation of the political system leads to delays of stabilizations is always supported by the empirical results. Since the fragmentation of the political system is generally associated with political instability and polarization, there is evidence in favour of the political conflict models of Alesina and Drazen (1991) and Cukierman, Edwards, and Tabellini (1992). There is also some support for the hypothesis that higher inflation hastens stabilizations, as suggested by Drazen and Grilli (1993), Orphanides (1996), and Hsieh (2000).

In sum, financial assistance from the IMF may not matter much for the timing of inflation stabilization programs; empirical results suggest that the structure of the political system may play a more important role. In more fragmented political systems, usually the most unstable and polarized, conflicts of interests between political parties make the approval of new legislation harder and stabilization programs are often delayed until a serious crisis sets in, regardless of

whether financial assistance is received or not. Thus, as suggested by political conflict models, the structure of the political system may help explain why suboptimal policies are kept for long periods of time and necessary corrective actions are not taken.

¹ For more complete descriptions of these models see Drazen (2000) and Veiga (2000).

² Empirical results obtained by Ball and Rausser (1995) do not offer a final conclusion regarding the effect of foreign assistance on the credibility and ultimate success of stabilization programs. Nevertheless, they find weak evidence that countries receiving IMF support tend to have greater difficulty stabilizing.

³ For a description of the IMF approach to stabilization see Mussa and Savastano (1999). Although a target for the rate of inflation was not generally included in the list of quantitative performance criteria, inflation reduction/stabilization was among the main objectives of the IMF programs implemented in the sample countries (see the IMF annual reports for descriptions of the programs' main objectives and the IMF webpage for the Letters of Intent signed since 1998).

⁴ According to Hutchison and Noy (2003), the failure of stabilization programs in Latin America is related to the low completion rates of IMF programs (see Dreher, 2004, for data on interruptions of IMF Stand-By and EFF Programs). A pessimistic view of compliance with conditionality and of the effectiveness of IMF-supported programs is that of Evrensel (2002), according to whom the IMF cannot impose its conditionality even during program years, and, on average, program countries enter a new program in worse macroeconomic situation than before. Haque and Khan (1998) offer a more optimistic view, concluding that IMF-supported programs have generally been successful in stabilizing the economy.

⁵ The programs described in Table 1 are those that are more commonly referred to in the literature as serious attempts at reducing inflation. Other, less relevant, programs were implemented, but most of them lasted only for a few months and had little or no effects on inflation. For a complete list of the programs implemented since the 1950s that are referred to in the literature on inflation stabilization, see Castro and Veiga (2004). When there were inconsistencies regarding starting dates of stabilizations among different sources, the dates indicated in Calvo and Végh (1999) were used.

⁶ The most common type of arrangement is the Stand-By (126 out of 142 in my sample). It consists of a decision of the IMF by which a member is assured that it will be able to make purchases (drawings) from the General Resources Account up to a specified amount and during a specific period of time, provided that the member observes the terms

set out in the supporting arrangement. Descriptions of this and of the other types of arrangements are available at the IMF's webpage (<http://www.imf.org>).

⁷ The approval of an IMF program leads to the release of the first tranche of the loan, but the disbursement of the remaining tranches depends of the compliance with the policy undertakings and performance criteria set in the Letter of Intent. Thus, a greater accumulated percentage drawn of the amount agreed to with the IMF (greater value of *%Drawn*) should, in principle, imply greater compliance with conditionality.

⁸ As pointed out by an anonymous referee, *%Drawn* and *Disbursements / Total Reserves* could have the opposite impact if the effect of moral hazard dominates.

⁹ It was not possible to include a dummy variable for each quarter of high inflation because for many of them there would be no stabilizations starting. Thus, they would totally predict the value of the dependent variable, and the model could not be estimated.

¹⁰ For some countries, only annual data are found for some variables, especially for earlier decades (1950s and 1960s). The variables for which linear interpolation was used to generate quarterly values are: *GDP growth*, *Fiscal Balance / GDP*, *GDP growth of main trading partners*, *Trade/GDP*, *GDP per capita*, and *Current Account / GDP*. Other interpolation methods such as “cubic mach last” of EvIEWS 4.1, were tried, but empirical results are virtually the same regardless of the method used.

¹¹ This point was made by an anonymous referee.

¹² See, among others, Bird et al. (2004), Dreher (2004), Joyce (1992), and Knight and Santaella (1997).

¹³ Some variables referred to in the literature were not included in the estimations whose results are reported because only annual data was available for them and, even after using linear interpolation, there were still many missing values. These include: *Total Debt Service / Exports*; *Debt/GDP*; *Short-term debt / Total Debt*; *Government consumption / GDP*; *Investment / GDP*; *Foreign Direct Investment / GDP*; and, *Change in Terms of Trade*. Nevertheless, results changed little when these variables were included.

¹⁴ On two-stage estimation methods for limited-dependent and qualitative variables, see Maddala (1983, Chapter 8).

¹⁵ Although results are not shown for the dummy variables representing country fixed effects and time under high inflation, it is worth mentioning that they are globally statistically significant. Individually, five of the nine country dummies and those representing the first three years of high inflation are statistically significant. As expected, the

time under high inflation dummies have negative signs and the absolute value of the estimated coefficients decreases with time under high inflation.

¹⁶ All results referred to but not shown in this paper are available from the author upon request.

¹⁷ The results of the first stage estimations of the reduced form equations for *IMF(-1)*, *%Drawn (-1)*, and *Disbursements / Total reserves (-1)* are presented in the appendix.

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Table 1: Inflation Stabilization Programs

| Country | Program dates and names | Type |
|---------------------------|--------------------------------|-------------|
| Argentina | 1959.3 | ERBS |
| | 1967.1 | ERBS |
| | 1973.3 | ERBS |
| | 1978.4 (Tablita) | ERBS |
| | 1985.2 (Austral) | ERBS |
| | 1989.4 (Bonex) | MBS |
| | 1991.2 (Convertibility) | ERBS |
| Bolivia | 1985.3 | ERBS |
| Brazil | 1964.1 | ERBS |
| | 1986.1 (Cruzado) | ERBS |
| | 1990.1 (Collor) | MBS |
| | 1994.3 (Real) | ERBS |
| Chile | 1975.2 | MBS |
| | 1978.1 (Tablita) | ERBS |
| Dominican Republic | 1990.3 | MBS |
| Israel | 1985.3 (Shekel) | ERBS |
| Mexico | 1976.4 | ERBS |
| | 1987.4 | ERBS |
| Peru | 1985.3 | ERBS |
| | 1990.3 | MBS |
| Turkey | 1980.1 | MBS |
| Uruguay | 1960.4 | MBS |
| | 1968.2 | ERBS |
| | 1978.4 (Tablita) | ERBS |
| | 1990.4 | ERBS |

Sources: Bruno, et al. (1988), Bruno, et al. (1991), Calvo and Végh (1999), and Kiguel and Leviatan (1992).

Notes: ERBS = Exchange Rate Based Stabilization (18 in this sample); MBS = Money Based Stabilization (7 in this sample).

Table 2: IMF arrangements

| Country | Month and year of IMF arrangements |
|---|---|
| Argentina: 16 SB 2 EFF | 12/58-12/59; 12/59-12/60; 12/60-12/61; 12/61-05/62; 06/62-10/63; 05/67-04/68; 04/68-04/69; 08/76-08/77; 09/77-09/78; 01/83-04/84; 12/84-05/86; 07/87-09/88; 11/89-03/91; 07/91-03/92; 03/92-03/96(EFF); 04/96-01/98; 02/98-03/00 (EFF); 03/00-03/03 |
| Bolivia: 14 SB 1 SAF, 2 ESAF 1 PRGF | 11/56-12/57; 12/57-02/59; 05/59-09/60; 07/61-07/62; 08/62-08/63; 09/63-08/64; 09/64-08/65; 09/65-11/66; 12/66-12/67; 12/67-01/69; 01/69-01/70; 01/73-01/74; 02/80-01/81; 06/86-06/87; 12/86-07/88 (SAF); 07/88-05/94 (ESAF); 12/94-09/98 (ESAF); 09/98-09/01(PRGF) |
| Brazil: 14 SB 1 EFF | 06/58-06/59; 05/61-05/62; 01/65-01/66; 02/66-01/67; 02/67-02/68; 04/68-04/69; 04/69-02/70; 02/70-02/71; 02/71-02/72; 03/72-03/73; 03/83-02/86 (EFF); 08/88-02/90; 01/92-08/93; 12/98-12/01 |
| Chile: 15 SB 1 EFF | 04/56-03/58; 04/58-03/59; 04/59-12/59; 02/61-02/62; 02/62-02/63; 01/63-01/64; 02/64-01/65; 01/65-01/66; 03/66-02/67; 03/68-02/69; 04/69-04/70; 01/74-01/75; 03/75-03/76; 01/83-01/85; 08/85-08/89 (EFF); 11/89-11/90 |
| Dom. Republic: 5 SB, 1 EFF | 12/59-12/60; 08/64-07/65; 01/83-01/85 (EFF); 04/85-04/86; 08/91-03/93; 07/93-03/94 |
| Israel: 3 SB | 11/74-02/75; 02/75-02/76; 10/76-10/77 |
| Mexico: 5 SB, 3 EFF | 03/59-09/59; 07/61-07/62; 01/77-12/79 (EFF); 01/83-12/85 (EFF); 11/86-04/88; 05/89-05/93 (EFF); 02/95-02/97; 07/99-11/00 |
| Peru: 17 SB 4 EFF | 02/54-02/58; 02/58-02/59; 03/59-02/60; 03/60-02/61; 03/61-02/62; 03/62-02/63; 03/63-02/64; 03/64-02/65; 04/65-03/66; 03/66-03/67; 08/67-08/68; 11/68-11/69 04/70-04/71; 11/77-09/78; 09/78-08/1979; 08/79-07/1980; 06/82-04/1984 (EFF); 04/84-07/85; 03/93-03/1996 (EFF); 07/96-03/99 (EFF); 06/99-05/02 (EFF) |
| Turkey: 17 SB | 01/61-12/61; 03/62-12/62; 02/63-12/63; 02/64-12/64; 02/65-12/65; 02/66-12/66; 02/67-12/67; 04/68-12/68; 07/69-06/70; 08/70-08/71; 04/78-07/79; 07/79-06/80; 06/80-06/83; 06/83-03/84; 04/84-04/85; 07/94-03/96; 12/99-12/2002 |
| Uruguay: 20 SB | 06/61-06/62; 10/62-10/63; 06/66-06/67; 03/68-02/69; 05/70-05/71; 06/72-06/73; 05/75-05/76; 08/76-08/77; 09/77-09/78; 03/79-03/80; 05/80-05/81; 07/81-07/82; 04/83-04/85; 09/85-03/87; 12/90-03/92; 07/92-06/93; 03/96-03/97; 06/97-03/99; 03/99-03/00; 05/00-03/2002 |

Sources: IMF, *IMF Annual Report*, several issues, and <http://www.imf.org>.

Notes: When the IMF program is not a stand-by, the facility used is indicated between parentheses. The abbreviations used are the following:
SB = Stand-by; EFF = Extended Fund Facility; SAF = Structural Adjustment Facility;
ESAF = Enhanced Structural Adjustment Facility;
PRGF = Poverty Reduction and Growth Facility.

Table 3: Description of the Variables Used

| Variables related to IMF arrangements: | Sources |
|--|---|
| <i>IMF</i> = 1 if there was an arrangement with IMF in the present or in previous quarters of the current inflation spell, and =0 otherwise | <i>IMF Annual Report</i> |
| % <i>Drawn</i> – Accumulated percentage of the amount agreed to with the IMF that was drawn up to and including the present quarter | <i>IMF Annual Report</i> and IFS-IMF |
| <i>Disbursements/Total Reserves</i> – total disbursements in the present quarter as a percentage of Total Reserves minus gold. | IFS-IMF |
| <i>Time_since_IMF</i> – number of quarters since the start of the first IMF program in the current inflation spell | <i>IMF Annual Report</i> |
| <i>Time_since_drawn25%</i> - number of quarters since the quarter in which at least 25% of the total amount agreed to had been drawn | <i>IMF Annual Report</i> and IFS-IMF |
| <i>Time_IMF</i> – number of quarters from the beginning of high inflation to the start of an IMF program | <i>IMF Annual Report</i> |
| <i>Time_IMF_drawn25%</i> - number of quarters from the start of an IMF arrangement to the time when at least 25% of the agreed amount to had been drawn | <i>IMF Annual Report</i> and IFS-IMF |
| <i>TFC/TR</i> – Total Fund Credit and Loans Outstanding as a percentage of Total Reserves minus gold | IFS-IMF |
| <i>Drawn 25%</i> = 1 if the accumulated percentage of the amount agreed to with the IMF that was drawn up to and including the present quarter is at least 25%, and =0 otherwise | <i>IMF Annual Report</i> and IFS-IMF |
| <i>IMF start last year</i> = 1 if an IMF program started in the last 4 quarters, and =0 otherwise | <i>IMF Annual Report</i> |
| <i>Amount agreed / Total Reserves</i> – Total fund arrangements (amount agreed) as a percentage of total reserves minus gold. | <i>IMF Annual Report</i> and IFS-IMF |
| <i>Number of IMF programs</i> – number of IMF arrangements in the respective country since 1957. | <i>IMF Annual Report</i> |
| Political variables: | Sources |
| Dummy variables for the degree of fragmentation of the political system: <i>Fragmentation</i> = 1 No parties allowed or exclusive one-party systems; <i>Fragmentation</i> = 2 One-party majority parliamentary government; or presidential government, with the same party in control of the parliament (with an overall majority); <i>Fragmentation</i> > 2 More fragmented political systems. | <i>Political Handbook of the World</i> and <i>World Europa Yearbook</i> |
| <i>Ideological Orientation</i> - Political orientation of the government: 1 conservative, antilabor or antileft government; 2 center-right government or coalition of center-right and center-left parties; 3 center-left government; 4 socialist or populist government. | <i>Political Handbook of the World</i> and <i>World Europa Yearbook</i> |
| <i>Polity Index</i> - polity scale, ranging from 10 (strongly democratic) to -10 (strongly autocratic). | Polity IV |
| <i>Government Crises</i> –Number of Government Crises: rapidly developing situations that threaten to bring the downfall of the present regime. | CNTS |

Table 3 (cont.): Description of the Variables Used

| Economic variables: | Sources: |
|--|--------------------|
| <i>Ln(Inflation)</i> – Natural log of Growth of CPI since the same quarter of the previous year | IFS-IMF |
| <i>Fiscal Balance/GDP</i> - Fiscal Balance (Government Budget Balance) as a Percentage of GDP | IFS-IMF |
| <i>GDP growth</i> - Growth of Real GDP since the same quarter of the previous year | IFS-IMF |
| <i>Total Reserves / Imports</i> – Total Reserves minus Gold as a percentage of Imports | IFS-IMF |
| <i>Quarterly percentage change in total reserves</i> | IFS-IMF |
| <i>U.S. Treasury Bill Rate</i> | IFS-IMF |
| <i>GDP growth of main trading partners</i> - Trading Partners' rate of GDP Per Capita growth (weighted average by trade share) | GDN-WB |
| <i>Oil Price Index</i> – Index for the price of Oil | OECD |
| <i>Trade/GDP</i> – Total trade (exports + imports) as a percentage of GDP | WDI-WB |
| <i>GDP per capita</i> - GDP per capita, PPP (current international \$) | WDI-WB |
| <i>Current Account / GDP</i> – Current Account balance as a percentage of GDP | IFS-IMF |
| <i>Real Effective Exchange Rate</i> - Real effective exchange rate against the ten main trading partners | IFS and DOTS - IMF |

Notes:

- CNTS: *Cross National Time Series Data Archive*;
- DOTS-IMF: *Direction of Trade Statistics – International Monetary Fund*;
- GDN: *Global Development Network Growth Database – World Bank* (available on the Internet at <http://www.worldbank.org/research/growth/GDNdata.htm>);
- IFS-IMF: *International Financial Statistics – International Monetary Fund*;
- Polity IV (available at <http://www.cidcm.umd.edu/inscr/polity/index.htm>);
- WDI-WB: *World Development Indicators – World Bank*.

Table 4: Probability of Starting a Stabilization Program

| | 1 | 2 | 3 | 4 | 5 | 6 |
|--|------------------------------|-------------------------------|-------------------------------|-------------------------------|------------------------------|------------------------------|
| IMF (-1) | -.297 (-.42) [-1.81] | .082 (.93) [.37] | .662 (.75) [3.16] | -.831 (-.93) [-5.00] | -.079 (-.10) [-.48] | -.296 (-.40) [-1.80] |
| %Drawn(-1) | -.023 (-1.47) [-.14] | -.001 (-.04) [-.004] | -.016 (-.79) [-.08] | -.021 (-1.38) [-.13] | -.025 (-1.51) [-.15] | -.023 (-1.46) [-.14] |
| Disbursements / Total Reserves (-1) | .061 (1.33) [.37] | .104 (1.85)* [.47] | .122 (2.03)** [.58] | .067 (1.39) [.40] | .060 (1.27) [.36] | .061 (1.25) [.37] |
| Time_since_IMF (-1) | | 1.324 (4.49)*** [6.06] | | | | |
| Time_since_drawn25%(-1) | | | 1.014 (4.38)*** [4.84] | | | |
| Time_IMF (-1) | | | | -.138 (-1.03) [-.83] | | |
| Time_IMF_drawn25% (-1) | | | | | -.124 (-.68) [.75] | |
| Fragmentation = 1 | 2.874 (2.56)** [17.51] | 4.028 (3.15)*** [18.44] | 3.404 (2.69)*** [16.24] | 2.971 (2.63)*** [17.88] | 2.671 (2.31)** [16.19] | 2.875 (2.55)** [17.52] |
| Fragmentation = 2 | 2.008 (2.34)** [12.23] | 2.628 (2.41)** [12.03] | 2.662 (2.49)** [12.71] | 1.992 (2.34)** [11.99] | 1.881 (2.20)** [11.40] | 2.007 (2.29)** [12.23] |
| Ln(Inflation) (-1) | .798 (2.86)*** [4.87] | .069 (.18) [.31] | .018 (.05) [.09] | .820 (2.88)*** [4.93] | .824 (2.92)*** [4.99] | .799 (2.79)*** [4.87] |
| Fiscal Balance / GDP (-1) | .017 (.22) [.10] | -.197 (-1.97)** [-.90] | -.163 (-1.68)* [-.78] | .004 (.05) [.02] | .040 (.49) [.24] | .017 (.20) [.10] |
| GDP growth (-1) | .128 (1.92)* [.78] | .137 (1.77)* [.63] | .143 (1.87)* [.68] | .131 (1.94)* [.79] | .130 (1.98)** [.79] | .128 (1.91)* [.78] |
| Total Reserves / Imports (-1) | | | | | | -.001 (-.002) [-.008] |
| Log Likelihood | -66.32 | -47.75 | -49.88 | -65.76 | -66.08 | -66.32 |
| McFadden R ² | .16 | .30 | .29 | .16 | .16 | .16 |
| Number of Observations | 308 | 308 | 308 | 308 | 308 | 308 |

Sources: see Table 3.

Notes: - t-statistics are in parentheses and the marginal effects of the independent variables on the probability of starting a stabilization program are in brackets;
- Significance level at which the null hypothesis is rejected: ***, 1%; **, 5%, and *, 10%;
- Logit models estimated with a constant, 9 country dummies and 5 dummies for years of high inflation, by Maximum Likelihood (ML).

Table 5: Sensitivity Analysis

| | 1 | 2 | 3 | 4 |
|--|------------------------------|--|------------------------------|-----------------------------|
| | ERBS only | Inf \geq 100% or Inf \geq 2MA of last 5 years | Inf \geq 50% | Inf \geq 100% |
| IMF (-1) | .520 (.68) [2.56] | -.233 (-.33) [-1.54] | .240 (.29) [1.48] | 3.029 (1.70)* [16.24] |
| %Drawn(-1) | -.025 (-1.51) [-.13] | -.019 (-1.15) [-.12] | -.019 (-1.22) [-.12] | -.013 (-.56) [-.07] |
| Disbursements / Total Reserves (-1) | .003 (.07) [.02] | .057 (1.26) [.37] | .053 (1.13) [.33] | .085 (1.41) [.45] |
| Fragmentation = 1 | 2.575 (2.20)** [12.68] | 2.980 (2.53)** [19.70] | 2.175 (1.73)* [13.42] | .826 (.43) [4.43] |
| Fragmentation = 2 | 1.655 (1.73)* [8.15] | 2.062 (2.31)** [13.63] | 1.983 (2.18)** [12.23] | 2.737 (1.92)* [14.68] |
| Ln(Inflation) (-1) | .836 (2.66)*** [4.12] | .755 (2.66)*** [4.99] | .824 (2.77)*** [5.08] | 1.376 (2.30)** [7.38] |
| Fiscal Balance / GDP (-1) | .024 (.32) [.12] | .028 (.37) [.18] | .021 (.26) [.13] | .026 (.23) [.14] |
| GDP growth (-1) | .158 (2.07)** [.78] | .124 (1.86)* [.82] | .094 (1.35) [.58] | .152 (1.35) [.82] |
| Log Likelihood | -56.26 | -65.10 | -56.09 | -33.15 |
| McFadden R ² | .10 | .16 | .18 | .28 |
| Number of Observations | 308 | 281 | 257 | 185 |

Sources: see Table 3.

Notes:

- t-statistics are in parentheses and the marginal effects of the independent variables on the probability of starting a stabilization are in brackets;
- Significance level at which the null hypothesis is rejected: ***, 1%; **, 5%, and *, 10%;
- Logit models estimated with a constant, 9 country dummies and 5 dummies for years of high inflation, by Maximum Likelihood (ML).

Table 6: Probability of Starting a Stabilization Program
(Using Instrumental Variables)

| | Using instruments only for: IMF(-1) | Using instruments for: %Drawn(-1) IMF(-1) Disbursements / Total Reserves (-1) |
|-------------------------------------|--|--|
| IMF (-1) | 1.260 (1.87)* [13.44] | -.156 (-.25) [-1.66] |
| %Drawn(-1) | -.021 (-2.15)** [-.22] | .036 (1.72)* [-.004] |
| Disbursements / Total Reserves (-1) | .017 (.60) [.18] | .130 (1.50) [1.38] |
| Fragmentation = 1 | 1.797 (3.03)*** [19.17] | 1.583 (2.53)** [16.83] |
| Fragmentation = 2 | 1.159 (2.52)** [12.37] | 1.447 (2.97)*** [15.39] |
| Ln(Inflation) (-1) | .482 (2.87)*** [5.14] | .458 (2.91)*** [4.87] |
| Fiscal Balance / GDP (-1) | -.029 (-.67) [-.31] | -.006 (-.15) [-.07] |
| GDP growth (-1) | .099 (2.38)** [1.05] | .056 (1.41) [.59] |
| Log Likelihood | -57.97 | -57.14 |
| McFadden R ² | .18 | .19 |
| Number of Observations | 295 | 295 |

Sources: see Table 3.

Notes: - Two-stage estimations were performed. In the first stage, reduced form equations of the potentially endogenous variables were estimated using all instruments for those variables and the remaining explanatory variables for Stab (a probit model was estimated for IMF and OLS models were estimated for the other two variables). In the second stage, the fitted values of the endogenous variables were used in the probit estimations whose results are shown in this table (the results of the first stage estimations are shown in the appendix);

- t-statistics are in parentheses and the marginal effects of the independent variables on the probability of starting a stabilization program are in brackets;
- Significance level at which the null hypothesis is rejected: ***, 1%; **, 5%, and *, 10%;
- Probit models estimated with a constant, 9 country dummies and 5 dummies for years of high inflation, by Maximum Likelihood (ML).

Appendix: Results of first stage estimations for the IMF-related variables

| | Probit estimation for: IMF(-1) | OLS estimation for: %Drawn(-1) | OLS estimation for: Disbursements / Total Reserves (-1) |
|---|-----------------------------------|-----------------------------------|---|
| Fragmentation = 1 | 2.115 (2.59)*** | 9.183 (1.77)* | 1.738 (1.19) |
| Fragmentation = 2 | .225 (.39) | -1.185 (-.30) | .129 (.12) |
| Ln(Inflation) (-1) | -1.911 (-4.61)*** | -3.768 (-2.13)** | -.676 (-1.35) |
| Fiscal Balance / GDP (-1) | .036 (.60) | -.787 (-2.27)** | .086 (.88) |
| GDP growth (-1) | -.082 (-1.88)* | .086 (.32) | -.022 (-.29) |
| Ideological Orientation (-1) | -.736 (-2.33)** | .142 (.07) | -.364 (-.66) |
| Polity Index (-1) | .152 (2.51)** | -.383 (-1.12) | .075 (.78) |
| Government Crises (-1) | .915 (.80) | -7.314 (-1.07) | -.430 (-.22) |
| Quarterly percentage change in total reserves (-1) | .002 (.47) | -.001 (-.02) | .019 (2.21)** |
| U.S. Treasury Bill Rate (-1) | -.059 (-.48) | -.353 (-.48) | -.329 (-1.58) |
| GDP growth of main trading partners (-1) | .130 (.56) | .758 (.68) | .145 (.46) |
| Oil Price Index (-1) | .002 (.19) | .034 (.47) | .012 (.60) |
| Trade/GDP (-1) | -14.230 (-2.44)** | 54.929 (2.10)** | 1.992 (.27) |
| GDP per capita (-1) | -.001 (-.87) | -.020 (-4.35)*** | -.003 (-2.29)** |
| Current Account / GDP (-1) | .559 (4.02)*** | 2.632 (4.39)*** | -.059 (-.35) |
| Total Reserves / Imports (-1) | .773 (1.84)* | -1.251 (-.78) | -1.507 (-3.37)*** |
| Real Effective Exchange Rate (-1) | -.001 (-1.36) | -.0002 (-2.24)** | -.00001 (-.41) |
| Number of IMF programs (-1) | .526 (3.30)*** | 2.272 (2.13)** | .746 (2.48)** |
| R ² | .81 | .35 | .12 |
| Number of Observations | 295 | 295 | 295 |

Sources: see Table 3.

Notes: - t-statistics are in parentheses;
- Significance level at which the null hypothesis is rejected: ***, 1%; **, 5%, and *, 10%;
- Models estimated with a constant, 9 country dummies and 5 dummies for years of high inflation, by Maximum Likelihood (ML).