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Exchange-Rate-Based Stabilization: A Critical Look at the Stylized Facts

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Abstract

Do exchange-rate-based stabilizations generate distinctive economic dynamics? To address this question, this paper identifies stabilization episodes using criteria that differ from those in previous empirical studies of exchange-rate-based stabilizations. We find that, while some differences can be detected between exchange-rate-based stabilizations and stabilizations where the exchange rate is not the anchor, the behavior of important variables does not appear to differ—especially output growth, which is good in both cases. There is also no evidence that fiscal discipline is enhanced by adopting an exchange-rate anchor, or that there are any systematic differences in the success records of stabilizations that use the exchange rate as a nominal anchor and those that do not.

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I. INTRODUCTION

In recent years, several articles have identified a set of empirical regularities that arise during exchange rate-based stabilization (ERBS) in high inflation countries. These empirical regularities are presumably not observed when the inflation stabilization strategy does not rely on the use of the exchange rate and are, thus, commonly referred to as the ERBS "syndrome".[2] The main features of the syndrome include a boom-bust cycle (as opposed to the initial recessionary effects of money-based stabilizations); a consumption (and sometimes also an investment) boom; a pronounced real exchange rate appreciation; and worsening trade and current account balances. In addition, the literature points out that there is a particularly high incidence of failure among ERBS in high inflation countries.

It is quite surprising that, although the identification of an ERBS syndrome was based on a relatively small sample of countries from Latin America and Israel and its relevance for other countries has not been studied, it has nonetheless inspired a growing theoretical literature.[3] There are also potentially serious methodological problems with the way in which the comparison of ERBS with other stabilizations has been usually carried out. Most importantly, there are inconsistencies in the timing of ERBS and the typical control group of money-based stabilizations (MBS), as the former presumably start when the exchange rate is actually pegged whereas the latter are assumed to begin when they are announced. In addition, there is no obvious reason why the control group against which the ERBS have been compared should be confined to MBS; instead it should include all non-ERBS.[4]

This paper looks at the stylized facts of ERBS and other stabilization plans where the exchange rate was not the anchor (OS), trying to correct some of the problems mentioned above. To this end, the paper follows earlier work by Ball (1994) and Easterly (1996) and constructs a set of inflation stabilization episodes on the basis of a simple numerical rule. The timing of all inflation stabilizations, ERBS and otherwise, is, thus, based on a common criterion. In addition to the elements of the ERBS syndrome, the paper looks at the issue of financial discipline, which, according to a widely held view, is enhanced by the use of the exchange rate as an anchor. However, it must be stressed that the paper is mainly descriptive: it identifies patterns in the data and examines their robustness, rather than carrying out formal tests of competing hypotheses. In this sense, the paper should be viewed as a first attempt at

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[2]The main stylized facts of ERBSs were identified by Kiguel and Liviatan (1992) and Végh (1992). Calvo and Végh (1994) and Reinhart and Végh (1994) lend further support to the notion of an ERBS syndrome.

[3]See, for example, Mendoza and Uribe (1996, 1999), Rebelo and Végh (1996), Reinhart and Végh (1995), Roldós (1995), and Uribe (1997).

[4]For example, a control group of only 6 MBS programs is used in Kiguel and Liviathan (1992) and 5 MBS programs in Calvo and Végh (1994) and Reinhart and Végh (1994).

establishing stylized facts on the basis of a rule-based selection of inflation stabilization episodes, leaving formal testing of other important issues for further research.

The results are not totally supportive of the ERBS syndrome described in the literature. While differences in the behavior of some macroeconomic variables between ERBS and OS were detected, there is no evidence of a "recession now vs. recession later" trade-off between ERBS and OS; in fact, growth performance during stabilization is good in both groups, as had been found by Easterly (1996). There is also no evidence that fiscal discipline is enhanced by the adoption of an exchange rate anchor, or that there are any systematic differences in the records of success of ERBS and OS.

The following section explains the selection of inflation stabilization episodes on the basis of mechanical rules; section III makes various comparisons between ERBS and OS, and section IV concludes.

II. IDENTIFYING STABILIZATION EPISODES

The selection of the inflation stabilization episodes used in this study is based on the application of some rules to a data set of annual inflation rates for the period 1960-1997 for a group of 143 countries.[5] The alternative to a rules-based method for selecting episodes would be a comprehensive review of the history of those countries, aimed at identifying periods in which governments put in place anti-inflation economic programs. This alternative route would necessarily entail some controversial judgements regarding, for instance, whether to exclude programs that could not be considered serious attempts at disinflation, or programs that were abandoned soon after they were implemented. Furthermore, in most cases, identifying the precise timing of stabilization episodes could be equally arbitrary. It is not always the case that inflation stabilization programs have a clearly identifiable start date, with the exceptions being perhaps those in which the exchange rate played a central role and its future path was announced along with other measures.[6] Moreover, it is often the case that inflation is successfully brought down after more than one attempt and, even in those cases, it is not entirely clear when a given stabilization plan ended and the next one began.

Another alternative would be to rely on existing work documenting stabilization programs in high inflation countries. But those studies are not likely to provide a comprehensive account of stabilization episodes. One of the purposes of the present study is to examine a range of inflation stabilization episodes that goes beyond the set that has been well documented in the literature. Furthermore, doubts about the precise timing of the stabilization programs and

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[5]This represents a sub-set of countries for which the IMF publishes data which excludes the eastern European countries and the former republics of the Soviet Union.

[6]Even in those cases, other stabilization policies may have been put in place before the announcement of a path for the exchange rate, thus obscuring the timing of stabilization.

consistency across countries of the methodology for selecting relevant episodes are not likely to be resolved by relying on a survey of existing studies of stabilization experiences. However, it must be acknowledged that, whereas specifying a rule for selecting inflation stabilization episodes simplifies the task of identifying episodes enormously and does not discriminate against programs that have not been documented, it does not remove subjectivity completely from the analysis. Rules will be unavoidably arbitrary but the patterns detected under one set of rules can be checked for robustness with respect to small changes in the eligibility criteria.

Ball (1994) and Easterly (1996) have used rules for the identification of inflation stabilization episodes. Building upon earlier work by Bruno and Easterly (1995), Easterly (1996) defines a stabilization episode as a movement from an "inflation crisis" to a "non-crisis" period where the former is defined as a period of at least two consecutive years of inflation above 40 percent and the latter as a period of at least two consecutive years with inflation below 40 percent. The two-year minimum is used to eliminate spikes in inflation due purely to one-time price shocks such as changes in key import prices, devaluations or price liberalizations; while the 40 percent threshold level is found by Bruno and Easterly (1995) to be useful in discriminating between periods of very high inflation and moderate to low inflation. To establish the timing of stabilizations, Easterly defines the peak year during the crisis period as "year 0", or the stabilization year, and the year after the peak as the first post-stabilization year.

Easterly found 28 stabilization episodes, shown under criterion (1) in Table 1, and his rule could be considered a relatively stringent criterion for the selection of stabilization episodes. Notably, the list excludes a number of well documented, albeit mostly failed, stabilization attempts, including Argentina and Chile's *tablitas* of the late 1970s, and the heterodox programs of Argentina, Brazil and Peru in the mid-1980s. The sample also excludes several programs in Africa. In a deliberate attempt to produce a larger sample, 3 alternative rules were used here to identify stabilization episodes, all of them based on the requirement that, prior to stabilization, inflation remained at or above 40 percent for at least two years:

- Criterion (2): stabilization occurs when inflation is brought down below 40 percent and remains below 40 percent for at least another year.

- Criterion (3): stabilization occurs when the inflation rate is lowered by at least ¼ the first year and remains below the pre-stabilization level for at least another year.

- Criterion (4): stabilization occurs when the inflation rate is lowered by at least ½ the first year and remains below the pre-stabilization level for at least another year.

Table 1. Stabilization Episodes

| | STABILIZATION DATE | | | | Date of Fund arrangement 1/ |
| | Easterly (1996) | Alternative criteria: | | | |
	(1)	(2)	(3)	(4)	
Argentina 1			1977	1977	August 1976
Argentina 2			1980		
Argentina 3			1986	1986	March 1986
Argentina 4	1990	1992	1991	1991	May 1990
Bangladesh	1975	1975	1975	1975	June 1974
Bolivia	1986	1987	1986	1986	June 1986
Brazil 1	1965	1967	1966		January 1965
Brazil 2			1991	1991	
Chile 1		1965	1965		January 1965
Chile 2	1974		1975		January 1974
Chile 3		1979		1977	
Congo, Democratic Republic of 1		*1969*	*1969*	*1969*	July 1967
Congo, Democratic Republic of 2		1981	1980	1980	August 1979
Congo, Democratic Republic of 3	1984		1985	1985	December 1983
Costa Rica	1983	*1983*	*1983*	*1983*	December 1982
Dominican Republic	1991	1992	1992	1992	August 1991
Ecuador 1			1990		September 1989
Ecuador 2	1993	1994	1994		
Ghana 1			1978		
Ghana 2	1984	*1985*	*1985*	*1985*	August 1983
Guinea		*1988*	*1988*		July 1987
Guinea Bissau 1			1990	1990	March 1989
Guinea Bissau 2	1993		1993	1994	
Guyana		1992	1992	1992	July 1990
Iceland 1	1975	1976	1976		
Iceland 2	1984	1984	1984	1984	
Indonesia	1967	1969	1967	1969	
Israel	1985	1987	1986	1986	
Jamaica	1992	1993	1993	1993	June 1991
Lebanon 1			1988	1988	
Lebanon 2		1993	1993	1993	
Mexico 1			1984		January 1983
Mexico 2	1988	1989	1989	1989	November 1986
Mozambique			1988	1988	June 1987
Nicaragua	1991	1992	1991	1991	September 1991
Nigeria	1989	1990	1990	1990	February 1989
Peru 1			1986	1986	April 1984
Peru 2	1991		1991	1991	September 1991
Peru 3		1994			March 1993
Sao Thome & Principe		1992	1992		June 1989
Sierra Leone 1			1988	1988	November 1986
Sierra Leone 2	1992	1993	1992	1993	
Somalia 1	1981	1982	1982		February 1980
Somalia 2	1985		*1985*	*1985*	February 1985
Syrian Arab Republic		*1988*	*1988*		
Turkey 1	1981	1981	1981	1981	June 1980
Turkey 2		1986			April 1984
Uganda 1	1981		1982	1982	January 1980
Uganda 2	1988	1990	1989	1989	June 1987
Uruguay 1	1968	1969	1969	1969	June 1968
Uruguay 2			1976		May 1975
Uruguay 3	1980	1981	1981		March 1979
Uruguay 4			1992		December 1990
Venezuela		1991			December 1990
Zambia			1994	1994	July 1992
Total number of episodes	28	34	51	36	41
Number of Easterly (1996) episodes	28	22	28	22	
Preceded by Fund arrangements	21	25	38	27	

Sources: Easterly (1996), IFS, and national sources.

1/ Date of nearest Fund arrangement, prior to earliest stabilization date among criteria (1)-(4).

(1) First year after peak inflation in a transition from a high inflation to a low inflation period. The former is defined as at least 2 years of inflation above 40 percent and the latter as at least two years of inflation below 40 percent.

(2) First of at least two years of inflation below 40 percent, following at least two years of inflation above 40 percent.

(3) Year of at least 25 percent reduction in the inflation rate from a level of at least 40 percent, preceded by at least another year of inflation above 40 percent. Inflation in the second year of stabilization must remain below its level in the last pre-stabilization year.

(4) Year of at least 50 percent reduction in the inflation rate from a level of at least 40 percent, preceded by at least another year of inflation above 40 percent. Inflation in the second year of stabilization must remain below its level in the last pre-stabilization year.

The results of applying the three rules to the data are shown under criteria (2)-(4) in Table 1.[7] Criterion (2) produces 34 stabilization episodes, of which 22 coincide with those in Easterly's sample.[8] The timing of stabilization, however, tends to be delayed by a year in most cases, reflecting in part the fact that Easterly' selection was based on end-of-period inflation whereas in this paper average inflation was used.[9, 10] The fact that this rule does not produce a very large number of episodes shows the discriminating power of the 40 percent threshold, since no minimum reduction in inflation is required. However, a potential shortcoming of this criterion is that it could pick up cases in which inflation may have been lowered from slightly over 40 percent to slightly less than 40 percent, which would not represent economically meaningful stabilization episodes. In fact, only two marginal cases were picked up and were dropped from the sample: Israel 1976 and Guinea 1982.

Unlike criterion (2), criterion (3) does not impose a uniform ceiling on post-stabilization inflation but requires a reduction of at least ¼ in inflation in the first year of stabilization. This proved to be a significantly less restrictive criterion, as it produced 51 stabilization episodes, including all 28 found by Easterly. This criterion also picks up the well-know episodes not captured by Easterly's rule, mentioned earlier.[11] Criterion (4), which requires halving inflation as a minimum, produced 36 episodes, including 22 of the 28 identified by Easterly. Therefore,

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[7]The following episodes were identified but are not included in Table 1: Nicaragua 1981 (as a large share of prices were controlled by the government); and Afghanistan 1992, Equatorial Guinea 1986, Guinea Bissau 1982 and Somalia 1991 (either because of unreliable inflation data or lack of data on other variables also studied in this paper).

[8]Strictly speaking, the rule produced 28 episodes. Six additional episodes, denoted by italics on Table 1, were identified when the threshold was lowered to 35 percent in an attempt to capture "near misses". This exercise was also carried out for criteria (3) and (4).

[9]The reason for this was the availability of data: there was a relatively large number of countries for which the series of end-of-period inflation rates contained missing observations. As a result, annual average inflation rates were used which, admittedly, will tend to push forward the stabilization date by one year. The significance of this point is discussed later.

[10]Since the "stabilization year" is set here as the first year in which a meaningful reduction in inflation takes place, and not as the peak inflation year as in Easterly (1996), dates for criterion (1) in Table 1 have been adjusted to make them comparable to those obtained for criteria (2)-(4).

[11]Table 1 shows a stabilization date of 1975 for Chile under criterion (3) and 1977 under criterion (4). In fact, according to criterion (3) a "stabilization" occurred every year in Chile in the period 1975-78, but only the first year of this continuum is shown on Table 1. Under criterion (4) this stabilization period begins in 1977.

it was decided to carry out a comparative study of the stylized facts that would arise from the two samples produced by the most stringent and loosest criteria: Easterly's and criterion (3).

Since the episodes contained in the two samples to be used in this study were selected exclusively on the basis of inflation performance, some additional information that stabilization programs were actually put in place in those cases is needed in order to rule out the possibility that the selected episodes actually represent positive supply shocks. One way to deal with this issue is to check for the existence of Fund programs during a period of, say, up to two years prior to the stabilization date identified in Table 1. Of the 55 episodes listed in Table 1, 41 were preceded by, or coincided with, a Fund program. Moreover, 38 of the 51 episodes identified by criterion (3) were preceded by or coincided with a Fund program; and there is further evidence that in most of the remaining 13 cases, stabilization programs were put in place: Argentina 1980 actually represents its *tablita* experiment, which ran from December 1978 to February 1981; Brazil 1990 is president Collor's stabilization plan of 1990-91; Indonesia's "stabilization and rehabilitation" program started in 1966 is documented by Azis (1994); the Israeli stabilization plan has been analyzed extensively—Bruno and Piterman (1988) is the first of several studies dealing with the Israeli stabilization—; Iceland's two stabilization plans are reviewed by Andersen and Guðmundsson (1998); and Ghana's strategy to mop up excess liquidity in 1978 is documented by Sowa (1993). Other episodes are not well documented in the literature but clearly constitute bona-fide stabilization programs: Lebanon's 1993 stabilization is part of the economic reconstruction plan started in 1991 following the Taif peace treaty, and Ecuador 1994 reflects the efforts of that country's authorities to bring down inflation through the active use of the exchange rate as a tool to anchor expectations about inflation. Thus, of the 51 episodes identified associated with criterion (3) there are only three in which there is no clear independent evidence of the adoption of a stabilization plan: Lebanon 1988, Sierra Leone 1992 and Syria 1988.

There are other problems associated with the identification of stabilization episodes based exclusively on the actual behavior of inflation. First, since the selected stabilization episodes are those for which a given reduction in inflation is actually observed, it follows that the resulting sample is comprised mainly of programs that enjoyed some degree of success. Short-lived programs that did not manage to make a significant dent to average annual inflation would not have been picked up. Second, the rules may be picking up the delayed effects of programs that pursued more than one objective at a time or, more likely, programs that pursued a sequence of events, such as restoration of external balance first, and only subsequently a reduction in inflation. Thus, either by pushing forward the timing of stabilization, or by focusing only on relatively successful episodes, it is likely that the sample of episodes identified here may be biased in the sense of being associated with a more positive economic outlook around stabilization time (i.e., higher growth, better external accounts, etc.). While no systematic attempt to correct these potential biases is made in this paper, the issue is informally taken into account in interpreting the results.

In the following sections, Easterly's sample, which will be denoted as Sample 1, and the sample arising from using criterion (3) which will be referred to as Sample 2, will be used. A

comparison of the results generated by each of these samples will hopefully shed some light about whether the identified stylized facts are robust to changes in the precise statistical definition of a stabilization episode.

III. NOMINAL ANCHORS AND STYLIZED FACTS

Sample 1 was split into ERBS and OS in Easterly (1996). ERBS were identified as cases in which the exchange rate was fixed as part of the program and the country had current account convertibility.[12] Of the 28 programs in Easterly's sample, 9 were found to be ERBS. For sample 2, the identification of ERBS was based on a two-stage procedure. First, information was obtained from the empirical literature on ERBS as well as from IMF staff reports in the cases in which a Fund programs was in place at the time of stabilization. This first step led to the identification of 13 ERBS. For each of the remaining programs, the joint condition of a fixed exchange rate and current account convertibility was checked; this check did not reveal any additional ERBS. Table 2 shows the breakdown of samples 1 and 2 in to ERBS and OS. Since the stabilization dates in samples 1 and 2 were obtained using a mechanical rule, the last column of Table 2 provides the dates in which exchange rates were actually pegged for the ERBS. The rules-determined and historical dates coincide in only 3 of the 13 ERBS in sample 2. The historical date precedes the rules-determined date by one year in seven cases, and by two years in the remaining 3 cases.

The following sub-sections study the behavior of several macroeconomic variables during a 7-ear window—from t-3 to t+3, where t is the stabilization year. As a rule, the sample median, and a 95 percent confidence interval around it are shown for each variable. Median was selected over the mean because sample means are in most cases seriously affected by a few extreme values; as a result, standard deviations and, thus, confidence intervals around the means, tend to be extremely wide rendering comparisons of means largely meaningless.

A. Financial discipline

The key argument in favor of selecting an exchange rate anchor during disinflation relates to its ability to strengthen domestic financial discipline. The argument is that a credible commitment to a highly visible variable such as the exchange rate (as opposed to an inflation or money target) will be a relatively more effective way to eliminate an "inflation bias" in wage and financial contracts, and would provide a better incentive to produce the fiscal adjustment needed for the sustainability of low inflation and the viability of the peg itself.[13] The theoretical merits of this argument aside, the empirical evidence on the ability of pegged

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[12]Due to the absence of current account convertibility, the stabilization programs in Bangladesh 1975 and Ghana 1984 were not considered ERBSs.

[13]See, for example, the chapter on exchange rate regimes and financial discipline in Aghevli et al. (1991).

Table 2. Stabilization Episodes: Anchors

	Easterly (1996) sample		Alternative sample		ERBS historical dates 1/
	Date	Exchange rate anchor	Date	Exchange rate anchor	
Argentina 1			1977		
Argentina 2			1980	Yes	1979
Argentina 3			1986	Yes	1985
Argentina 4	1990	Yes	1991	Yes	1991
Bangladesh	1975		1975		
Bolivia	1986		1986		
Brazil 1	1965	Yes	1966	Yes	1964
Brazil 2			1991		
Chile 1			1965		
Chile 2	1974		1975		
Congo, Democratic Republic of 1			*1969*		
Congo, Democratic Republic of 2			1980		
Congo, Democratic Republic of 3	1984		1985		
Costa Rica	1983		*1983*		
Dominican Republic	1991		1992		
Ecuador 1			1990		
Ecuador 2	1993	Yes	1994	Yes	1993
Ghana 1			1978		
Ghana 2	1984		*1985*		
Guinea			*1988*		
Guinea Bissau 1			1990		
Guinea Bissau 2	1993		1993		
Guyana			1992		
Iceland 1	1975		1976		
Iceland 2	1984	Yes	1984	Yes	1983
Indonesia	1967		1967		
Israel	1985	Yes	1986	Yes	1986
Jamaica	1992		1993		
Lebanon 1			1988		
Lebanon 2			1993		
Mexico 1			1984		
Mexico 2	1988	Yes	1989	Yes	1988
Mozambique			1988		
Nicaragua	1991	Yes	1991	Yes	1991
Nigeria	1989		1990		
Peru 1			1986	Yes	1986
Peru 2	1991		1991		
Sao Thome & Principe			1992		
Sierra Leone 1			1988		
Sierra Leone 2	1992		1992		
Somalia 1	1981		1982		
Somalia 2	1985		*1985*		
Syrian Arab Republic			*1988*		
Turkey	1981		1981		
Uganda 1	1981		1982		
Uganda 2	1988		1989		
Uruguay 1	1968	Yes	1969	Yes	1968
Uruguay 2			1976		
Uruguay 3	1980	Yes	1981	Yes	1979
Uruguay 4			1992	Yes	1991
Zambia			1994		
Total number of episodes	28		51		
Exchange rate-based stabilizations		9		13	

Sources: Easterly (1996), IFS, and national sources.

1/ Year in which exchange rates were actually pegged, if peg ocurred within the first six months of the year;
the following year if peg ocurred during the last six months of the year.

exchange rates to strengthen financial discipline is mixed. After controlling for several factors, Edwards (1993) finds that countries that pegged their exchange rates at the beginning of the 1980s were financially more responsible than those with a more flexible exchange rate regime. However, in various studies Tornell and Velasco (1995a, 1995b, 1998) find no evidence in support of the view that the adoption of an exchange rate anchor imposes stronger fiscal discipline. Tornell and Velasco (1995b) show that during the 1980s fiscal discipline was stronger among Sub-Saharan countries with flexible exchange rate regimes than among those with fixed exchange rates (the Franc zone countries); while Tornell and Velasco (1998) and (1995a) find that fiscal adjustment was stronger, and occurred more often, in MBS than in ERBS in Latin America.

The issue of financial discipline is discussed here in terms of the behavior of inflation pre- and post-stabilization and the evolution of fiscal and monetary variables. A comparison of the actual reduction in inflation between ERBS and OS is, in principle, not a valid way of judging the relative merits of these strategies in reducing inflation (especially when no control is made for the paths targeted for the exchange rate and money). Nonetheless, some (weak) results in favor of the financial discipline effect of exchange rate anchors emerges from Figures 1 and 2. According to both samples, inflation in the pre-stabilization years is higher in ERBS than in OS (at least 20 percentage points in the *level* of inflation), and yet post-stabilization inflation is lower in ERBS, although the difference is relatively small.[14] And three years after stabilization, inflation is lower in ERBS than in OS in both samples. However, as before, differences in inflation performance between ERBS and OS are not statistically significant. Differences across regimes in the behavior of money growth rates are less clear; in particular, there is almost no difference in the average of median rates of money growth in the post-stabilization years, suggesting that real money balances grow faster after stabilization in ERBS than in OS.

The bottom panels of Figures 1 and 2 provide no evidence consistent with the view that fiscal discipline is stronger in ERBS. Fiscal adjustment in year t is stronger in ERBS in sample 1 (1¼ p.p. of GDP vs. ¼ p.p. in OS) but weaker in sample 2 (¾ p.p. of GDP vs. 1½ p.p. in OS);[15] however, when the cumulative change in the fiscal balance from t-1 to t+1 is considered, adjustment under OS is stronger (1¾ p.p. of GDP vs. 1½ p.p. in ERBS in sample 1; 1 p.p. of GDP vs. -¾ p.p. in ERBS in sample 2). Fiscal balances deteriorate in the second or third post-stabilization years in all cases, but in no case do fiscal balances in year t+3 fall below their level in year t-1. To the extent that the difference in fiscal balances between years t+3 and t-1 can be considered as an indicator of the "durability" of the initial fiscal adjustment, better results are obtained in OS.

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[14]Notice that in the cases of inflation and money growth the charts show a transformation, X/(1+X), rather than the actual level of the variable in order to prevent the width of the associated confidence interval from obscuring the changes in the median.

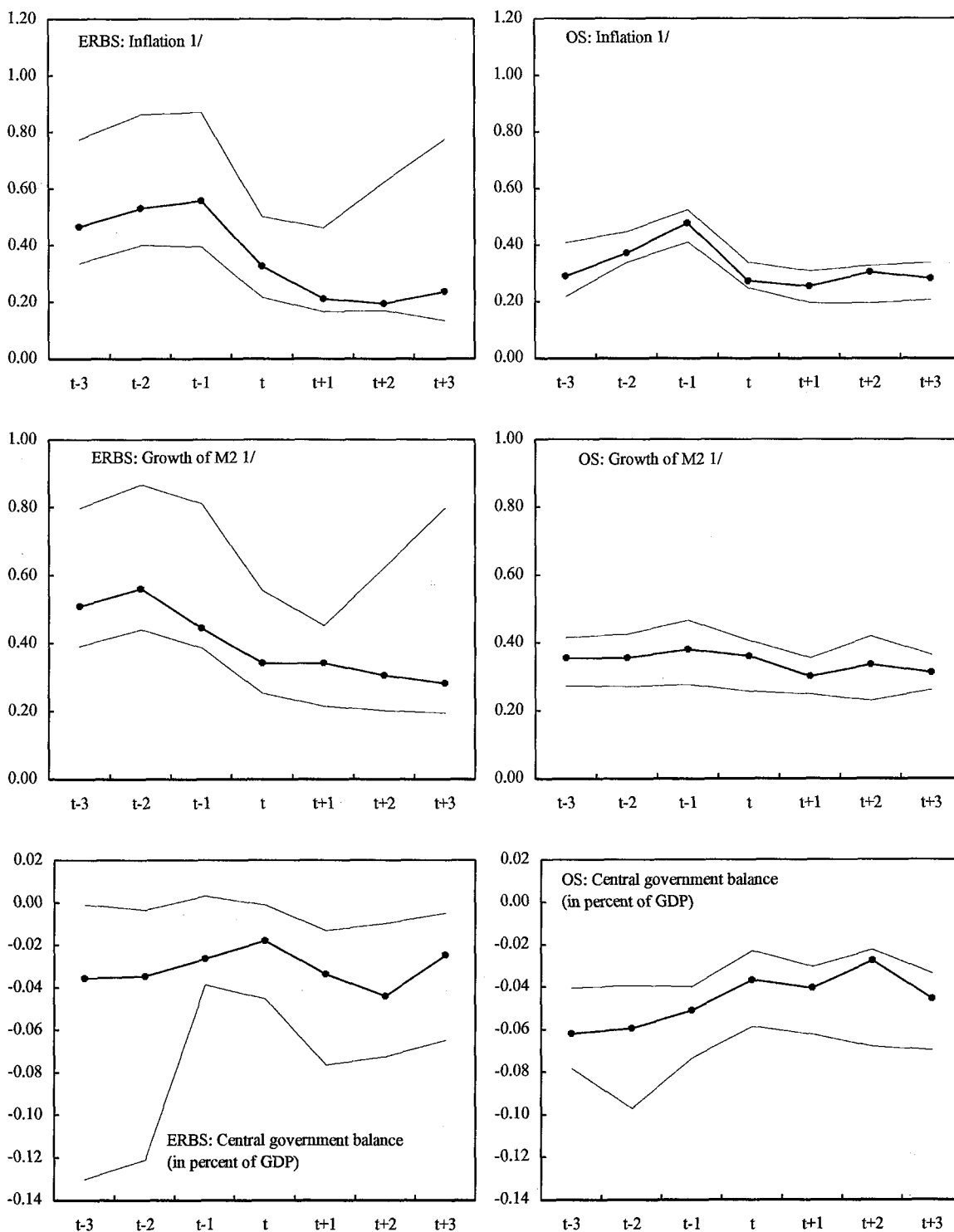[15]The abbreviation "p.p." is used to denote "percentage points."

Figure 1. Sample 1: Inflation, Monetary and Fiscal Accounts
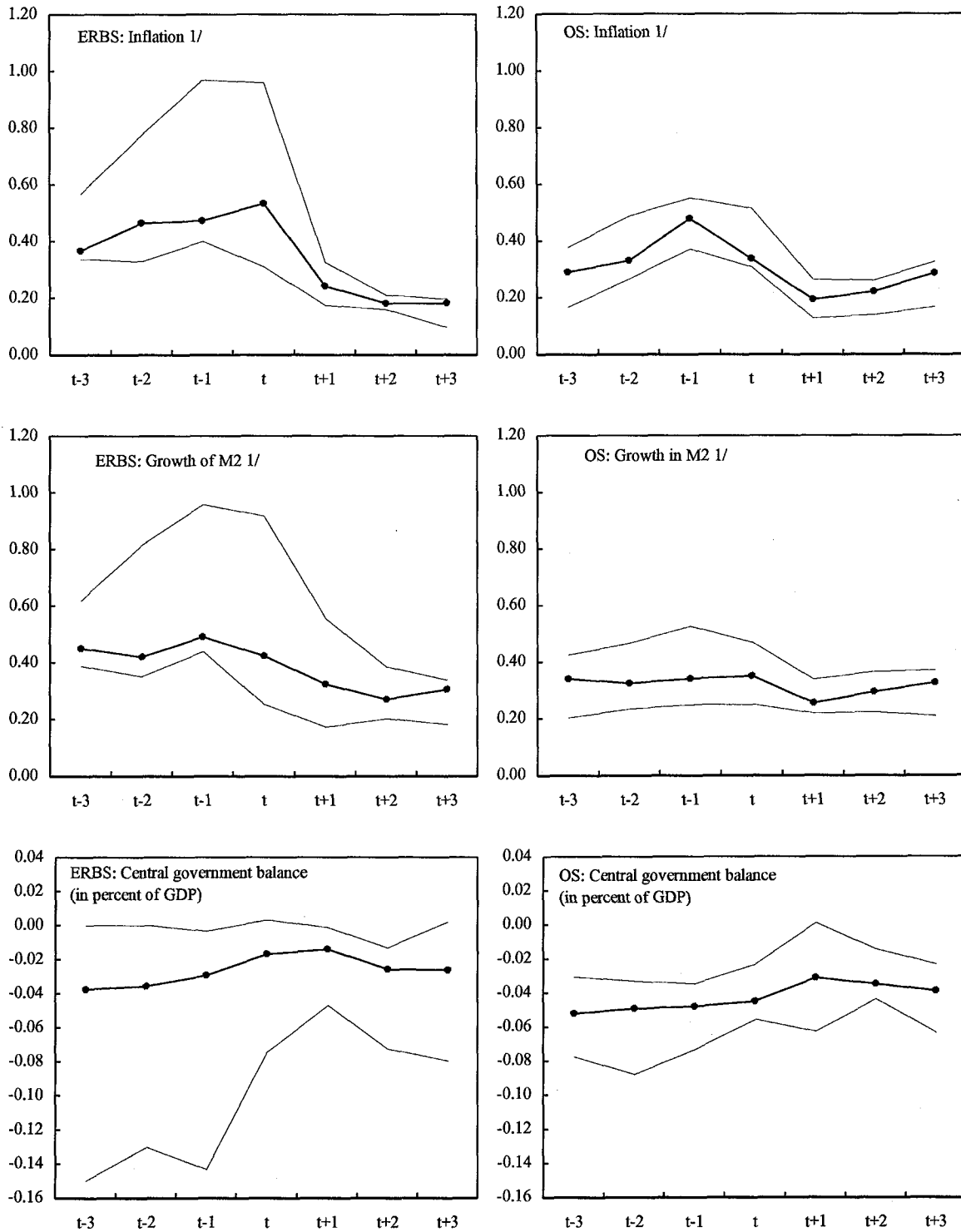
Source: IFS, national sources and author's estimates.

1/ The following transformation was used: x = X/(1+X).

Figure 2. Sample 2: Inflation, Monetary and Fiscal Accounts

Source: IFS, national sources and author's estimates.

1/ The following transformation was used: $x = X/(1+X)$.

Important differences in pre-stabilization patterns of fiscal balances exist between ERBS and OS. Clearly, pre-stabilization fiscal deficits tend to be smaller in ERBS than in OS (about 3½ percent of GDP in ERBS vs. 5 percent of GDP in OS in both samples), suggesting that the prevailing fiscal situation may be a factor in the selection of an anchor during stabilization. On the other hand, adjustment in the runup to stabilization (from t-3 to t-1) is not necessarily greater under one type of program: the improvement in fiscal balance is larger in ERBS in sample 1, but (slightly) larger in OS in sample 2.

B. The ERBS syndrome

As mentioned earlier, the main stylized facts of the ERBS syndrome identified in the literature are: a boom-bust cycle (as opposed to the initial recessionary effects of money-based stabilizations); a consumption (and sometimes also an investment) boom; a pronounced real exchange rate appreciation; and worsening trade and current account balances.

Figures 3 and 4 show the behavior of GDP and per-capita GDP growth around stabilization for both ERBS and OS in both samples. There appears to be no evidence from either sample of a "recession-now vs. recession-later" trade-off involved in the selection of nominal anchors. A slowdown in growth does occur in ERBS, as GDP growth rates decline by about 1½ p.p. two or three years after stabilization; this trend is clearer when per-capita GDP growth rates are considered. But there is no evidence of a recession during (or following) stabilization in OS. Despite relatively wide confidence intervals in some cases, Figures 3 and 4 show that growth performance improves during inflation stabilization and its immediate aftermath both in ERBS and OS.

The behavior of private consumption (as a percentage of GDP) does differ in ERBS and OS, as shown in Figure 5, but the key differences are statistically significant only in sample 1. The top left panel of Figure 5 shows a sizeable (nearly 3 p.p. of GDP) and statistically significant increase in the private consumption-to-GDP ratio in the stabilization year, followed by an additionally (albeit smaller and not statistically significant) increase in year t+1. The bottom left panel shows similar, but not statistically significant, results for sample 2. Nothing remotely similar to this result can be found in the case of OS in either sample. Thus, there seems to be some statistical support to the "consumption boom" element of the ERBS syndrome described by the literature.
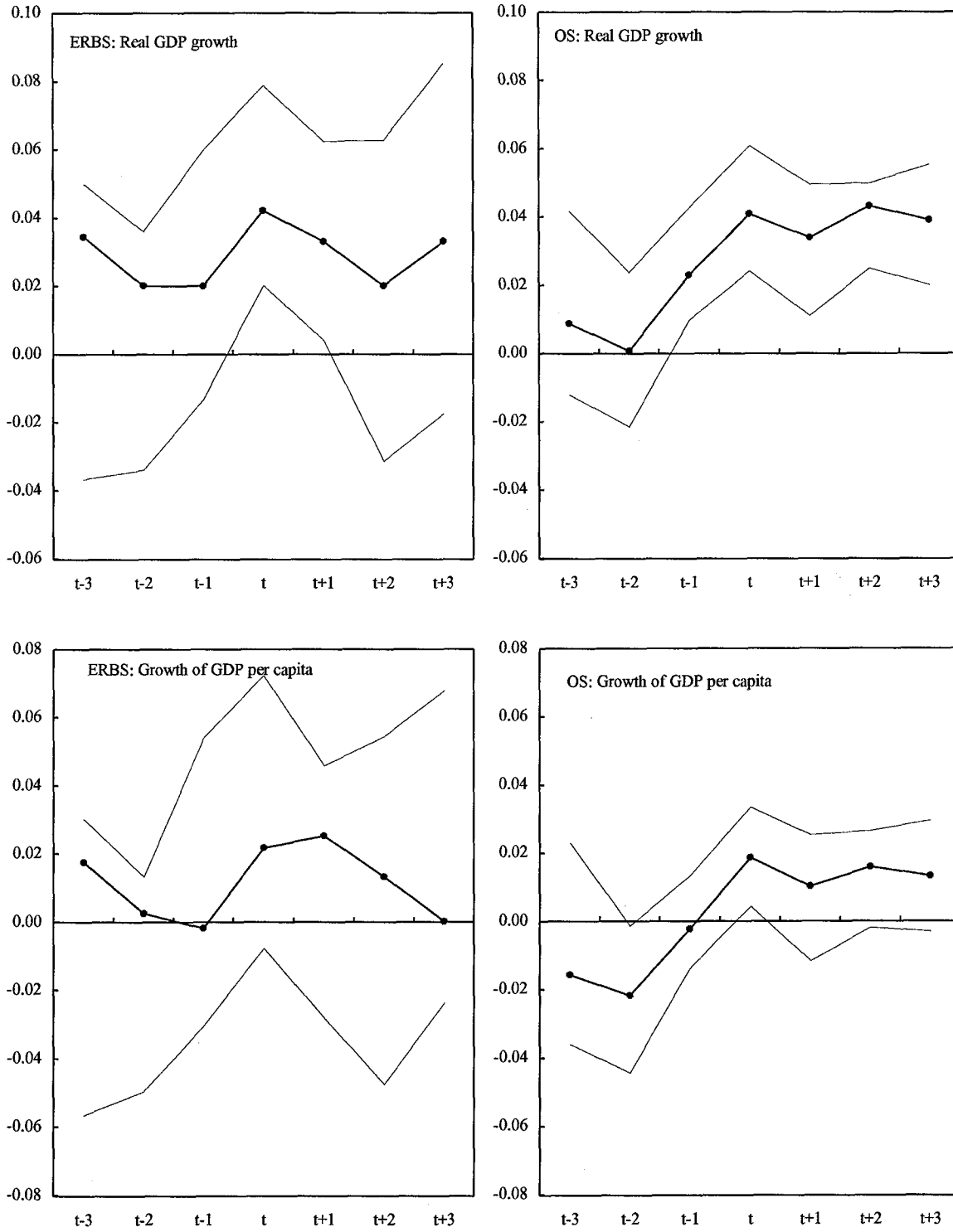
Investment behavior in the post-stabilization years also tends to differ between OS and ERBS, as shown in Figure 6. In ERBS investment does not deviate considerably from its value in year t during the post-stabilization years, except for a 1 p.p. of GDP fall in year t+3 in sample 2. The picture is quite different in OS, where an increasingly positive deviation can be detected, especially in sample 1 (investment in year t+3 is 3 p.p. of GDP higher than in year t, although the difference is not statistically significant). In sample 2, the differences between investment in years t+2 and t+3 and its value in year t are smaller, but statistically significant. In the pre-stabilization years, the clearest development is a decline of at least 1 p.p. of GDP in investment in year t-1 in all cases; only in ERBS in sample 2 the investment declines for two

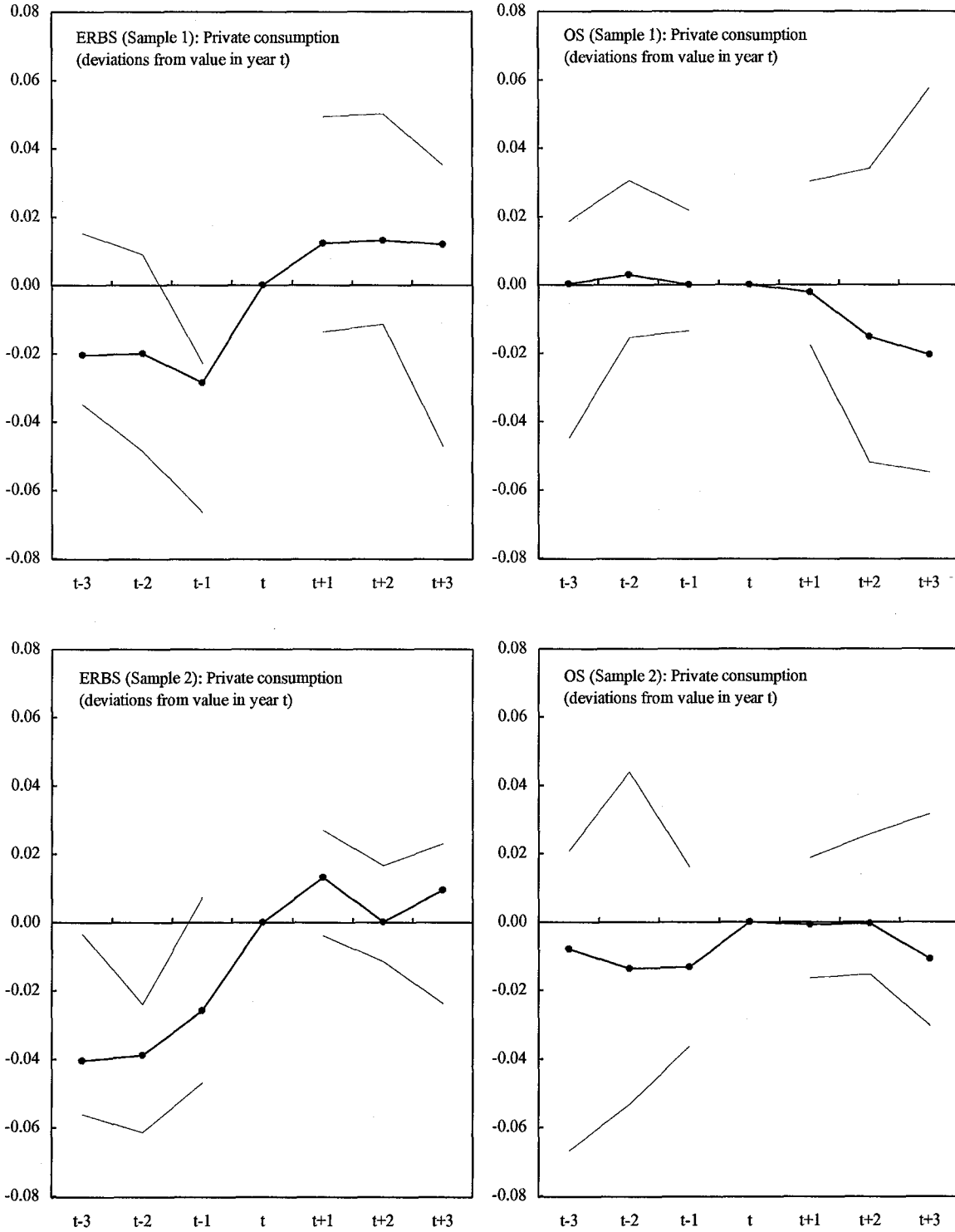Figure 3. Sample 1: Growth of GDP and per-capita GDP during Disinflation
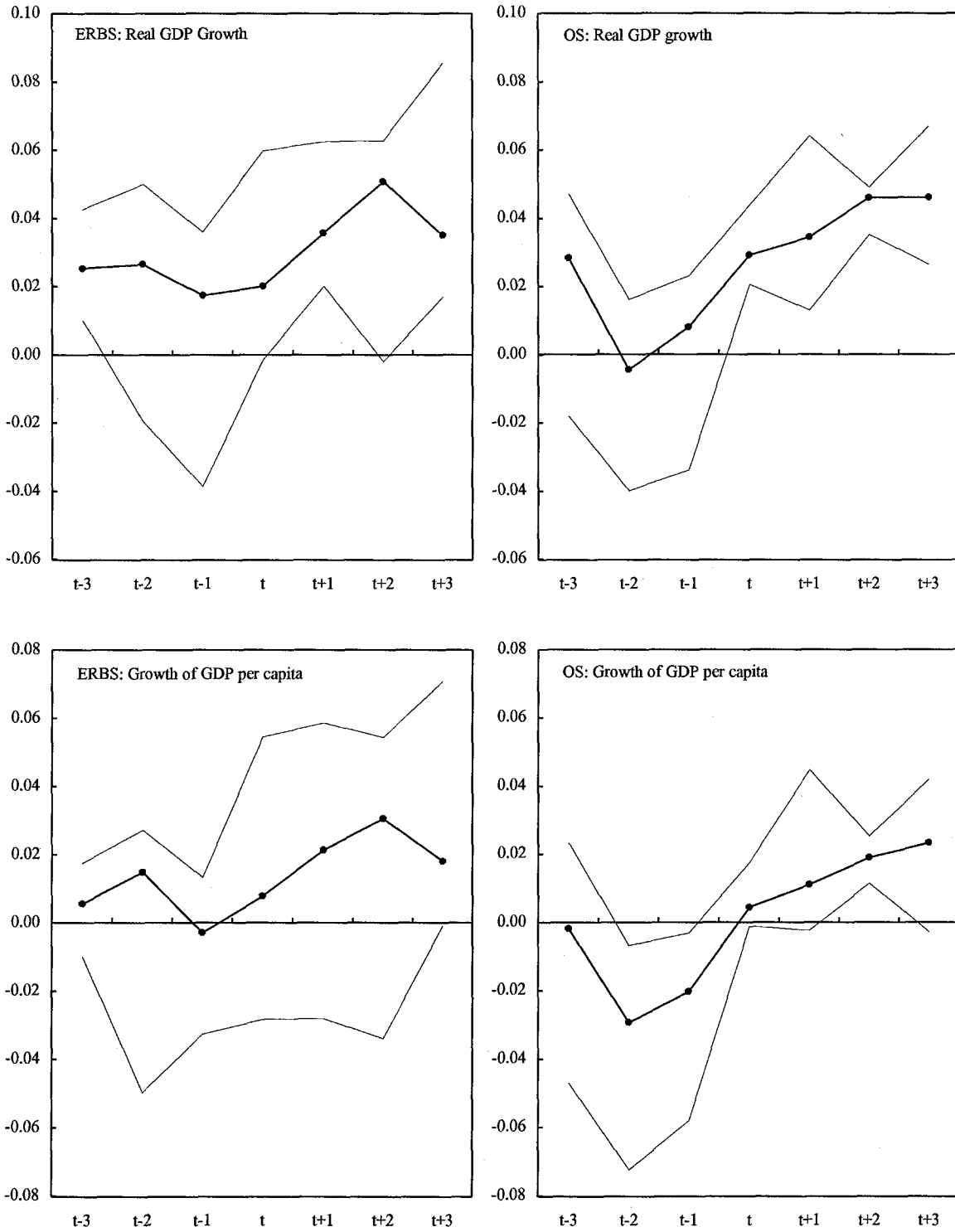
Source: IFS, national sources and author's estimates.

Figure 4. Sample 2: Growth of GDP and per-capita GDP during Disinflation

Figure 5. Private Consumption during Disinflation
(in percent of GDP)

ERBS (Sample 1): Private consumption
(deviations from value in year t)

OS (Sample 1): Private consumption
(deviations from value in year t)

ERBS (Sample 2): Private consumption
(deviations from value in year t)

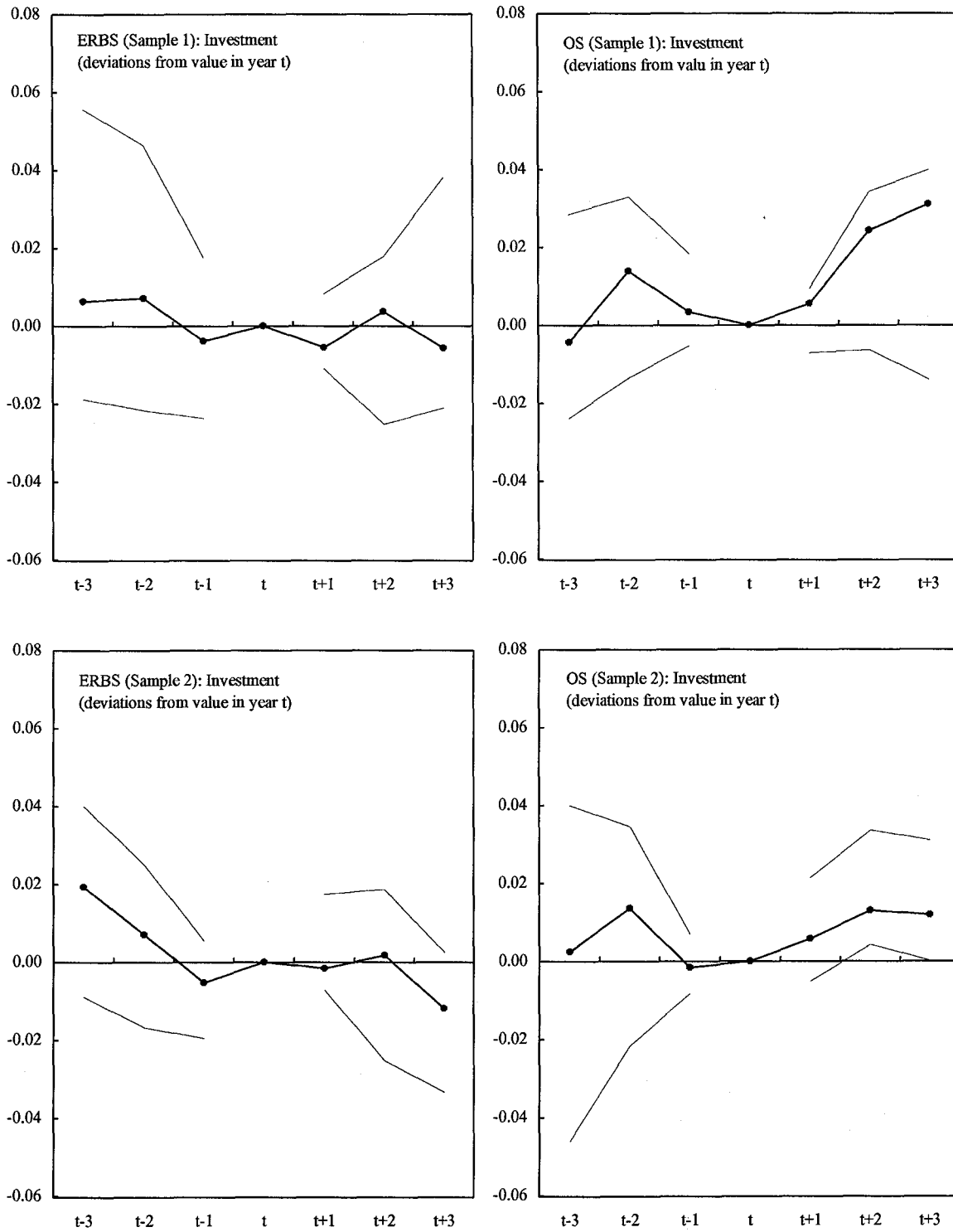OS (Sample 2): Private consumption
(deviations from value in year t)

Source: IFS, national sources and author's estimates.

Figure 6. Investment during Disinflation
(in percent of GDP)

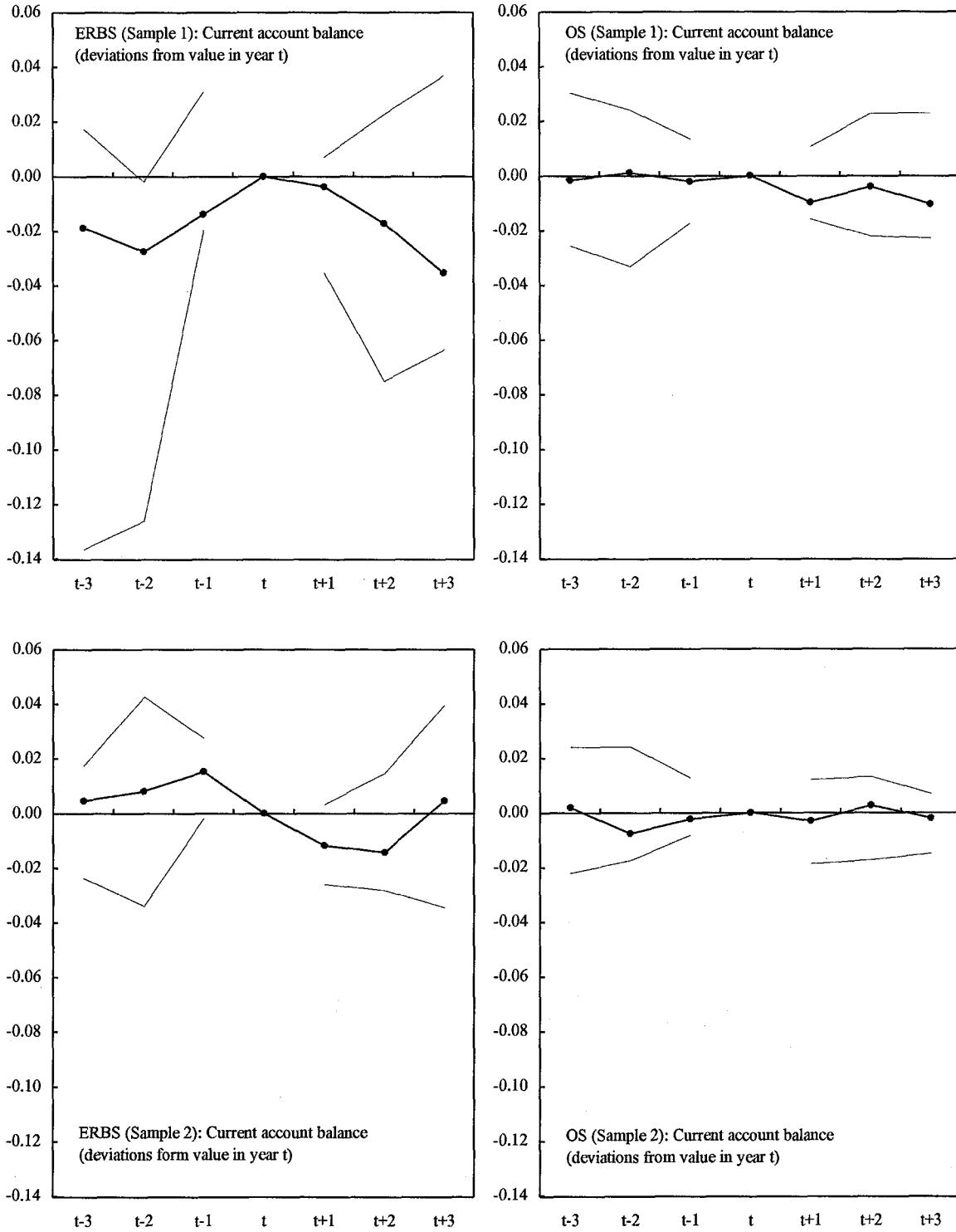Source: IFS, national sources and author's estimates.

years prior to stabilization (the cumulative decline is 2½ p.p. of GDP). Thus, there is no evidence of an investment boom in ERBS and instead there is weak evidence suggesting that investment falls somewhat in the run-up to stabilization in all cases. There appears to be somewhat stronger evidence suggesting that investment recovers more sluggishly in post-stabilization years following ERBS.

Moderate differences in the behavior of the current account balance in pre- and post-stabilization years seem to exist between ERBS and OS (Figure 7). In the case of ERBS, samples 1 and 2 show changes in different directions in current account balances in the stabilization year and a deterioration following stabilization, although this trend is not statistically significant. In OS, on the other hand, there is no change in the median current account balance in the stabilization year, and no clear pattern in post-stabilization years. Furthermore, the behavior of the current account balance provides another example of important differences in pre-stabilization dynamics, which may be indicative of endogeneity of anchor selection: the median deviations from values recorded in the stabilization year indicate an improvement in current account balances in ERBS (between years t-2 and t-1 in sample 1 and between years t-3 and t-1 in sample 2), but only minimal changes in OS.

Figure 8 shows some additional, but weak, evidence in support of one of the elements of the ERBS syndrome. The trends exhibited by the real exchange rate differ markedly between ERBS and OS: real exchange rates tend to appreciate before and after stabilization when the exchange rate is used as an anchor, but tend to depreciate before and after stabilization in OS. These changes are not statistically significant, however. Interestingly, there is a sizeable (about 10 to 20 percent) depreciation in year t-2 in all cases (which is consistent with the notion of restoration of external equilibrium prior to inflation stabilization discussed earlier). Quite clearly, in the ERBS the real appreciation is not only a post-stabilization phenomenon; in fact, for this to be the case ERBS would have had to be dated two years too late on average. Otherwise there is room to ponder whether policymakers may not have been managing the exchange rate with the purpose of lowering inflationary expectations for some time before they adopted a publicly-announced ERBS. There is also the possibility that, before the exchange rate was used explicitly as an anchor, tight monetary policy may have led to an appreciation before it caused a reduction in (average) inflation. On the other hand, for OS there is no clear evidence of real appreciation prior to inflation stabilization, except for a sizeable but not statistically significant appreciation in year t-1 in sample 1.

Using a sample similar to those used by the studies that first identified the ERBS syndrome, Gould (1996) found that the choice of nominal anchor is endogenously determined by the prevailing level of international reserves. Figure 9 provides some evidence of a possible systematic difference in the behavior of reserves prior to stabilization in ERBS and OS. Between years t-3 and t gross international reserves are generally higher in ERBS than in OS (3½ months of imports vs 1¾ in sample 1; 4½ months of imports vs. 2 months in OS in sample 2). It must be stressed, however, that confidence intervals are quite wide in the case of ERBS and these differences in reserves levels are not statistically significant.

Figure 7. The Current Account during Disinflation
(in percent of GDP)

ERBS (Sample 1): Current account balance
(deviations from value in year t)

OS (Sample 1): Current account balance
(deviations from value in year t)

ERBS (Sample 2): Current account balance
(deviations form value in year t)

OS (Sample 2): Current account balance
(deviations from value in year t)

Source: IFS, national sources and author's estimates.

Figure 8. The Real Exchange Rate during Disinflation
(value in year t=100)
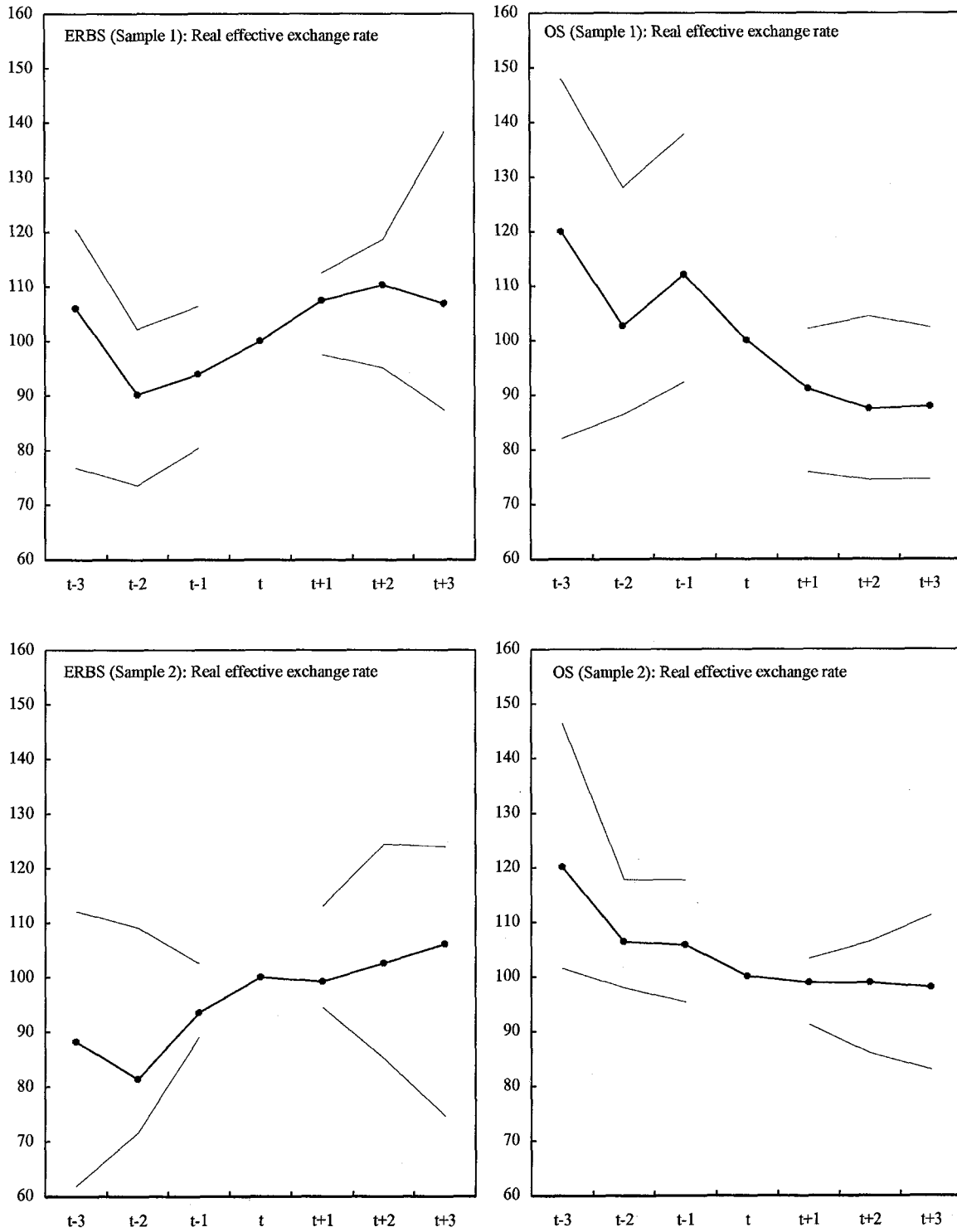
Source: IFS, national sources and author's estimates.

Figure 9. International Reserves during Disinflation
(in months of imports)

ERBS (Sample 1): Gross international reserves

OS (Sample 1): Gross international reserves

ERBS (Sample 2): Gross international reserves

OS (Sample 2): Gross international reserves
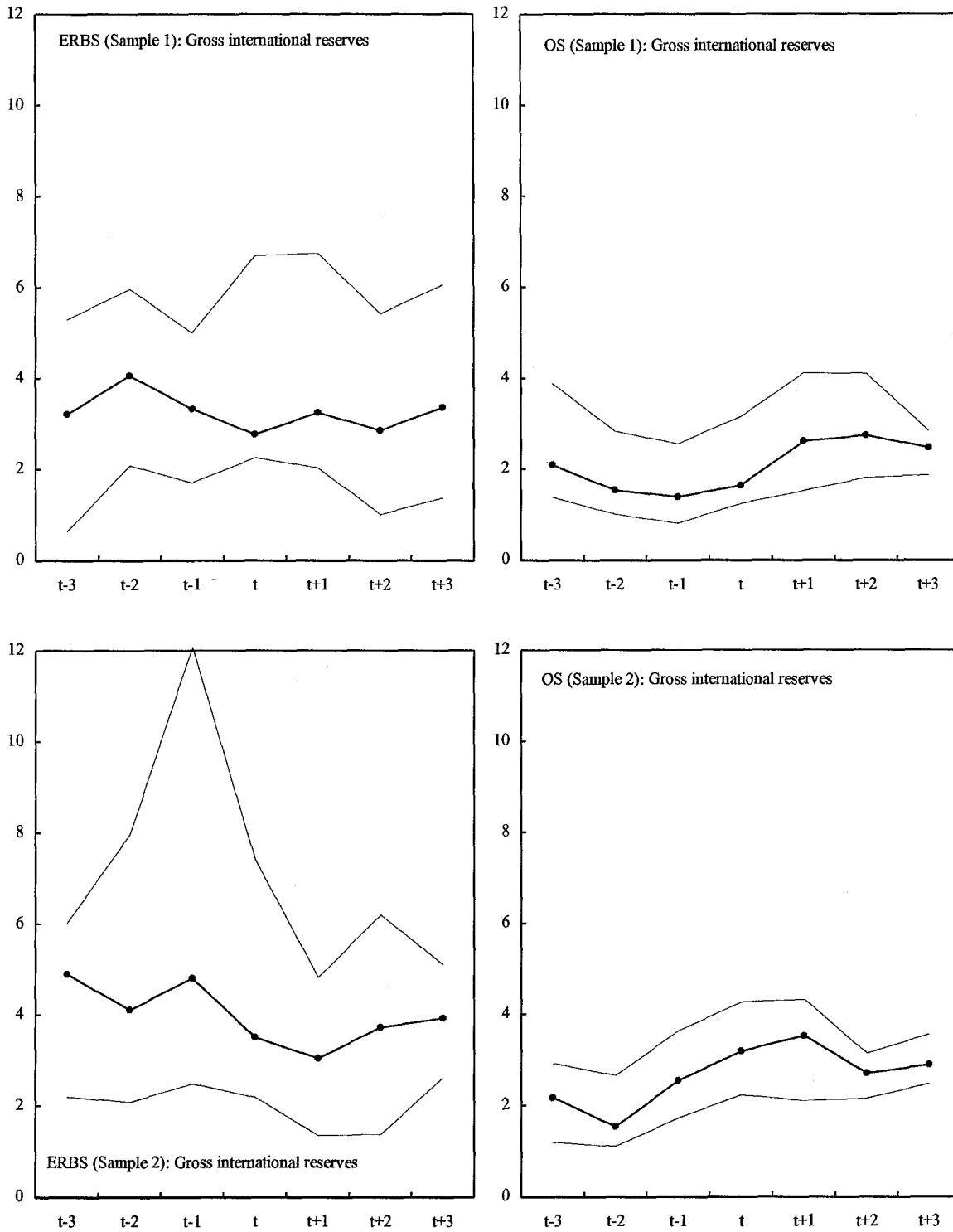
Source: IFS, national sources and author's estimates.

The difference in reserve holdings between ERBS and OS in post-stabilization years is minimal (3 vs. 2½ months in sample 1; 3½ vs. 3 months in sample 2). The similarity in levels in post-stabilization years reflects two opposite trends: in ERBS reserves fall in the stabilization year and, although they recover somewhat in the following years, they do not reach their pre-stabilization peak. In OS, on the other hand, there is a general upward trend in reserves around stabilization; this increase occurs in years t+1 and t+2 in sample 1 and between years t-1 and t+1 in sample 2. The different trends are unequivocal in year t, when inflation first comes down: reserves are falling under ERBS but going up under OS, although these changes are not statistically significant.

C. Success or failure of ERBS

The ERBS literature often mentions a relatively high rate of failure among ERBSs, but no formal claim has been made about a systematic tendency for one type of stabilization program to succeed or fail more frequently than the other. However, one could argue that ERBS is a intrinsically riskier disinflation strategy because by targeting the exchange rate policymakers provide speculators with the opportunity of a one-sided bet and thus, these programs can potentially fail even in cases were failure is not warranted by macroeconomic fundamentals. On the other hand, as has been discussed earlier, it has been argued that committing to a fixed exchange rate raises the game's stakes and, therefore, that it is more likely to impose financial discipline, ultimately raising the probability of success. Looking at the rates of success of both ERBS and OS in the stabilization programs studied in sample 2 can shed some light on the empirical relevance of these issues.

There is no obvious, clear-cut definition of success that can be used here, especially considering that, by following a rule that defines a stabilization episode as one that produced an actual decline in inflation that lasted for at least two years, one is already biasing the sample somewhat in the direction of success, however defined. Success would then have to be related to a program's ability to keep inflation low for some time beyond the two-year horizon. In principle, it is tempting to require a relatively large number of years of stability to consider a program truly successful. However, there is a risk associated with using too large a number. If a program brings inflation down and keeps its down for, say, 5 years but then inflation spirals out of control beginning in year 6, was the original program ultimately unsuccessful? or could the new inflationary episode be the creation of a different economic team working in a different policy environment? or could the economy have been hit by an extraordinarily adverse shock? It seems that the longer the number of years of low inflation required to consider a stabilization successful, the higher the risk that some truly successful program may be recorded as a failure.

Success was defined on the basis of inflation performance on the second and third post-stabilization years (t+2 and t+3). An obvious advantage of limiting the horizon to t+3 is that a verdict (successful or not) could be reached for all 51 programs in sample 2. Several rules were tried, of which two were selected, essentially because they did not produce extreme rates of success or failure:

Table 3. Sample 2: Successful Stabilization Episodes

	Stabilization Date	Exchange rate anchor	Successful	
			Criterion 1	Criterion 2
Argentina 1	1977		Yes	Yes
Argentina 2	1980	Yes		
Argentina 3	1986	Yes		
Argentina 4	1991	Yes	Yes	Yes
Bangladesh	1975		Yes	Yes
Bolivia	1986		Yes	Yes
Brazil 1	1966	Yes	Yes	Yes
Brazil 2	1991			Yes
Chile 1	1965		Yes	Yes
Chile 2	1975		Yes	Yes
Congo, Democratic Republic of 1	1969			Yes
Congo, Democratic Republic of 2	1980			
Congo, Democratic Republic of 3	1985			
Costa Rica	1983		Yes	Yes
Dominican Republic	1992			Yes
Ecuador 1	1990			Yes
Ecuador 2	1994	Yes		Yes
Ghana 1	1978			
Ghana 2	1985			
Guinea	1988			Yes
Guinea Bissau 1	1990			
Guinea Bissau 2	1993			Yes
Guyana	1992		Yes	Yes
Iceland 1	1976			
Iceland 2	1984	Yes		Yes
Indonesia	1967			Yes
Israel	1986	Yes	Yes	Yes
Jamaica	1993			Yes
Lebanon 1	1988		Yes	Yes
Lebanon 2	1993		Yes	Yes
Mexico 1	1984			
Mexico 2	1989	Yes		Yes
Mozambique	1988		Yes	Yes
Nicaragua	1991	Yes	Yes	Yes
Nigeria	1990			
Peru 1	1986	Yes		
Peru 2	1991		Yes	Yes
Sao Thome & Principe	1992			
Sierra Leone 1	1988			Yes
Sierra Leone 2	1992		Yes	Yes
Somalia 1	1982			
Somalia 2	1985			
Syrian Arab Republic	1988		Yes	Yes
Turkey	1981			Yes
Uganda 1	1982			
Uganda 2	1989		Yes	Yes
Uruguay 1	1969	Yes		Yes
Uruguay 2	1976			
Uruguay 3	1981	Yes		
Uruguay 4	1992	Yes	Yes	Yes
Zambia	1994		Yes	Yes
Total number of episodes	51		20	34
Successful programs in percent of total programs			(39%)	(67%)
Exchange rate-based stabilizations		13	5	9
Successful ERBS programs in percent of ERBS programs			(38%)	(69%)

Sources: Easterly (1996), IFS, and national sources.

• Success—criterion 1: during the second and third post-stabilization years, inflation remains at or below whatever level inflation reached during the stabilization year.

• Success—criterion 2: during the second and third post-stabilization years, inflation remains at or below ¾ of the inflation rate prevailing the year before stabilization.[16]

The results are reported in Table 3. According to criterion 1, which is more restrictive, 20 of the 51 programs were successful. Among ERBS, 5 out of the 13 programs were successful, which implies the same rate of success for ERBS (38 percent) than for OS (39 percent). If criterion 2 is used, 34 out of the 51 programs can be considered successful. Interestingly, of the 13 ERBS episodes 9 are now considered successful which, again, implies a similar rate of success for ERBS (69 percent) than for OS (66 percent). Therefore, there is no evidence here to support the view that programs associated with one or the other anchor are generally more successful.

IV. SUMMARY AND CONCLUSIONS

This paper explores whether the distinctive features of ERBS identified in the literature for a group of Latin American countries and Israel also appear in a larger and somewhat different sample. In the construction of this sample, stabilization episodes are identified and timed by applying a simple rule to a data set of annual inflation rates for the period 1960-97 for a group of 143 countries. Additional evidence supporting the notion that the sample indeed contains stabilization episodes, as opposed to simply positive supply shocks, is provided. In order to gauge the robustness of the results, an alternative sample constructed by Easterly (1996) is also used.

The results are not totally supportive of the ERBS syndrome described in the literature. There is no evidence of a "recession now vs. recession later" trade-off between ERBS and OS; in fact, growth performance during stabilization is good under both anchors, as had been found by Easterly (1996). There appears to be a distinctive consumption boom during ERBS, but not an investment boom; investment seems to recover more sluggishly after ERBS than in other stabilization programs. The real exchange rate does appreciate following ERBS and depreciate in other cases, but these movements are not statistically significant. The current account does not exhibit a clear trend in pos-stabilization years. There is also no evidence that fiscal discipline is enhanced by the adoption of an exchange rate anchor, or that there are any systematic differences in the records of success of ERBS and OS.

The results of this paper seem to warrant formal testing of various hypothesis related to the effects of inflation stabilization. For example, the fact that in several instances there are substantial differences between ERBS and OS not only in post-stabilization but also in pre-

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[16]The reader will recall that the selection rule underlying sample 2 requires a reduction of the inflation rate of at least ¼.

stabilization years may suggest that the selection of a nominal anchor is in itself an endogenous phenomenon—as has already been suggested elsewhere. This would shed some light on the potential role of initial conditions as determinants of post-stabilization dynamics. The effect on growth performance during disinflation of the pre-existing level of inflation, or of the duration of high inflation, also deserves attention. And, of course, several of the elements of the ERBS syndrome need to be re-examined in a context that explicitly accounts for other phenomena and uses a larger control group than the one that has been typically used.

Finally, the data do not provide strong indications that the rules used for selecting a sample of stabilization episodes has systematically timed stabilization episodes incorrectly. There is only weak evidence supporting the view that inflation stabilization is found to be expansionary only because the "dirty work" of macroeconomic correction, in the form of correction of external imbalances, may have preceded inflation stabilization by a year or two.

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