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When is stabilization expansionary?

Evidence from high inflation

SUMMARY

Countries which stabilize from high inflation – here defined as an annual rate above 40% – usually have output expansions in the first and subsequent years of stabilization. These expansions occur in both exchange-rate-based and money-based stabilizations. The paper reaches these conclusions after examining a sample of all 28 episodes in the international data that meet a pre-defined criterion for stabilization from high inflation. The results do not change with alternative growth and stabilization definitions. The paper documents similar expansionary stabilizations in historical data and in the recent experience of the former Communist economies. Expansionary stabilizations may be an indirect confirmation of recent theories of political economy that predict that stabilization will not occur until the gains are very large.

—William Easterly

When is stabilization expansionary? Evidence from high inflation

William Easterly

World Bank

1. INTRODUCTION

Is stabilization from high inflation contractionary, neutral or expansionary? Traditional wisdom used to say the first; conventional wisdom has drifted partially towards the second; recent theory and events may suggest the third. This paper finds that the phenomenon of short-run output expansion during disinflation from high initial levels is surprisingly widespread.

Stabilizations are expansionary

After reviewing the literature, the paper examines output behaviour during all episodes of stabilization from high inflation that meet a pre-defined criterion in the international data between 1960 and 1994. Next, the paper investigates the components of output growth: productivity on the supply side and consumption on the demand side. It also studies fiscal and monetary trends during stabilization, and the role of war and debt relief in crisis and recovery. Then the paper examines two other possible explanations for the expansionary stabilization phenomenon: (1) a reflection of temporary booms following exchange-rate-based stabilizations, and (2) the recovery from a severe temporary shock to the level of output. Neither is sufficient to explain the expansionary stabilization phenom-enon. The paper then turns to evidence from outside the main dataset: namely, from historical hyperinflations and from the recent experiences of countries in transition from planning to market systems. A final section contains interpretations of the findings and draws policy implications.

2. PREVIOUS LITERATURE

While there is not much reason to doubt the conventional wisdom that stabilizing inflation from low to moderate levels is costly (see Ball (1993) for some recent quantification), the literature has been less clear about high inflation. The case study literature debates whether stabilization from high inflation involves strong output costs. The classic article by Sargent (1982) refuted the Phillips curve conventional wisdom of most of the previous literature by claiming that stabilizations of hyperinflations in the 1920s took place without significant output costs. Many students of high inflation have since agreed that hyperinflations can be stabilized at close to zero output costs, although they maintain that stabilizing mere chronic inflations – inflation of several hundred per cent persisting for long periods – is still costly (Kiguel and Liviatan, 1988, 1992a; Vegh, 1992).

In contrast to the presumption that reducing inflation lowers output in the *short run*, the theoretical and empirical literature on endogenous growth argues that reducing inflation would raise the *long-run* rate of growth (Fischer, 1993; Jones and Manuelli, 1993; De Gregorio, 1992, 1993; De Gregorio and Sturzenegger, 1994; Barro, 1995). Such a standard short-run/

long-run distinction should not bother anyone, except that the negative correlation between growth and inflation in this literature is actually strongest with pooled annual data and weakest with averages for growth and inflation over long periods such as 30 years (e.g. Fischer, 1993).[1] It appears that a negative cross-section correlation between growth and inflation, if any, is mainly determined by the high-inflation countries (see Levine and Zervos (1993) and Bruno and Easterly (1995) for a discussion of these points).

The high-inflation case study literature has noticed that stabilizations are sometimes expansionary, but it has attributed this to temporary booms accompanying exchange-rate-based stabilizations, which often turn out to be unsustainable (Kiguel and Liviatan, 1992b; Calvo and Vegh, 1994; Rebelo and Vegh, 1995). A shorthand summary of the consequences of money-based versus exchange-rate-based stabilizations in this literature is that it is a choice between 'recession now and recession later' (Vegh, 1992). Hence, the Phillips curve prior that stabilization of inflation is costly is preserved in this literature; it is just shifted over time.

More agnostic conclusions emerge concerning 'extreme inflations' (defined as over 1000%) in the well-known survey by Dornbusch et al. (1990). They profess uncertainty about which way the short-run output effects will go (or do go in actual experiences) for stabilizing from extreme inflation. They note that even the demand-side effects of bringing inflation down from high levels are unclear, since inflation is, after all, a tax and a regressive one at that.

Recent theoretical literature has also shed new light on the possible short-run output effects of inflation stabilization. Forward-looking models have suggested how fiscal or monetary stabilization could be expansionary even in the short run due to favourable effects on consumers' wealth and expectations (Giavazzi and Pagano, 1990, 1995; Bertola and Drazen, 1992; Roldós, 1993; Rebelo, 1994). Political economy stories for inflation stabilization have proposed that stabilizations are delayed by a war of attrition between interest groups (Alesina

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[1] Another alternative in the analysis of cross-country inflation would be to use formal time-series methods to estimate structural parameters and to shed light on causality. This has been pursued only to a modest extent in the literature because of the poor quality and limited quantity of the data.

and Drazen, 1991). A corollary of the Alesina–Drazen model is that stabilization occurs only when the output losses from inflation (or the output gains from stabilization) become high enough to induce one interest group to bear the fiscal costs of stabilization. This has the intriguing empirical implication that inflation stabilization will be delayed until such a time as stabilization will lead to a strong growth improvement, possibly even in the short run. A closely related possibility is that only a severe crisis like a high inflation could break a war of attrition over reforms, so that such crises could actually be beneficial (i.e. raise growth) over some horizon (Drazen and Grilli, 1993). The literature on cleansing recessions (e.g. Aghion and Saint-Paul, 1993) suggests a beneficial effect of crises without reference to political economy.

The theoretical and empirical uncertainty summarized in the preceding paragraphs indicates that going down the well-trodden inflation and growth path is still worth the trip. Moreover, recent events have kindly provided researchers with a bumper crop of new high-inflation and stabilization experiences. These range from the finally successful stabilizations in chronic inflation countries like Argentina and Peru, to the outbreak of high inflation in many of the ex-Communist countries, a few of which have since managed to stabilize.

The case study literature has indeed already yielded many insights from detailed examination of individual cases. But it could usefully be supplemented by a more systematic examination of the data to ascertain which stylized facts generalize beyond individual cases. Michael Bruno and I took this approach in a previous paper (Bruno and Easterly, 1995), where we examined *all* episodes of inflation higher than 40% in the global dataset.

Growth is negative during high inflation, but positive afterwards

We found a surprisingly robust pattern. Per-capita output growth is sharply negative during episodes of high inflation. But after the inflation crisis ends, output growth is even higher than the pre-crisis growth. These findings are robust to a number of checks, as well as controlling for exogenous shocks such as wars. We did not attempt to resolve the difficult issue of direction of causality in that paper (nor will I attempt it in this paper). We viewed our exercise as a way to pin down more firmly the stylized facts, and hence to narrow the set of models consistent with the data. But our focus was on the medium-run growth performance after the ending of a high inflation, and

hence we did not address the short-run consequences of inflation stabilization. In this paper, I use an updated and extended version of our dataset to try to shed light on the very different question of whether inflation stabilization is associated with output expansion even in the short run.

3. BASIC FINDINGS

I first provide some definitions, next present the central findings, and then subject them to robustness checks.

3.1. Definitions

I follow the Bruno and Easterly (1995) definition of a high-inflation crisis as a period when inflation is above an annual rate of 40% for two years or more; the crisis period ends when inflation is below 40% for two years or more. Bruno and Easterly (1995) showed that this breakpoint, admittedly somewhat arbitrary, was successful in discriminating between periods of very high inflation and moderate to low inflation. The distinctions in average inflation between our crisis and non-crisis periods were sharp: 155% per annum during 'crisis' periods and 20% per annum during 'non-crisis' periods in the same countries.

A 'stabilization episode' is defined as a movement from the 'inflation crisis' period to a 'non-crisis' period; each period must be a minimum of two years. The two-year minimum is used to eliminate spikes in inflation due purely to one-time price shocks like devaluations, imported oil price increases, or price liberalizations. Hence, *stabilizations are all episodes in the cross-country data of movement from two years or more of above 40% annual inflation to two years or more of below 40% annual inflation.*[2]

Ex-Communist countries are excluded from the sample, because their output behaviour seems *sui generis* to the transition experience. However, I will consider the ex-Communist countries in the last section, and we will see that their experience actually does conform to the behaviour of the general sample.

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[2] For previous examples of the kind of episodic analysis used in this paper, see Kamin (1987) and Eichengreen *et al.* (1995).

I still have to determine how to date the beginning of a stabilization episode in order to describe the associated economic performance. Dating of stabilization episodes is a far from trivial exercise. Playing with dates becomes a national sport in all countries with large regime shifts, with supporters and critics of the regime shift using the dates that suit their arguments. For example, critics of the military's economic policies in Chile in the 1970s could show that per-capita output was 23% lower in 1975 under Pinochet than in 1971 under Allende. Supporters of Pinochet's economic policies preferred to talk about the 33% rise in per-capita income from 1975 to 1980. Of course, both sides would be shading their arguments – the Pinochet critics by dropping two years of negative growth under Allende, and the Pinochet supporters by dropping two years of negative growth under Pinochet.

Something similar occurred with the inflation stabilization and subsequent recovery in the USA in the 1980s. True believers were fond of citing the 'seven fat years' from 1982 to 1989 when Reaganomics was allegedly in full flower (which happened to be from trough to peak on the business cycle). The recession during Reagan's first two years in 1981–2 could be attributed by believers to the lagged effect of Carter's policies; apparently Reagan's policies did not have similar lagged effects in the two years 1989–90 after his term.[3]

Clearly some objective criterion is needed to prevent such game playing. Inflation stabilization plans are sometimes announced with a great fanfare, and I could set the beginning of the stabilization episode at the date of such announcements; this is the approach adopted by Kiguel and Liviatan (1988, 1992a,b) and Vegh (1992; continued in Calvo and Vegh, 1994, and Reinhart and Vegh, 1995). This approach works well with the dramatic Southern Cone and Israeli exchange-rate-based stabilizations that those authors cover. It is much more problematic with money-based stabilizations. Anyone following Russia's long and winding road towards stabilization over the last four years would be hard pressed to say when 'the' stabilization effort began. Results are always scarcer than promises.

This paper chooses a transparent, results-based measure of the beginning of a stabilization. I define the peak year for

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[3] This description of the Reaganomics debate is based on Krugman (1994).

inflation prior to the stabilization as year 0. The year after the peak will be year 1 of stabilization. I will keep counting post-stabilization years until the period ends or until a new inflation crisis (above 40%) develops. Pre-stabilization years are numbered as far backwards as the high-inflation (above 40%) period extends.

In the empirical application, I use end-of-period inflation for the years before and after the 28 stabilization episodes that satisfy these criteria in the available international data on inflation for 1960–94.[4] The episodes include well-studied cases like Israel as well as those in the Southern Cone – Argentina, Bolivia, Brazil, Chile and Uruguay. However, the inflation crisis criterion also picks out a number of less well-known African and Asian cases. All of the inflation crises are in developing countries with the exception of two little-known crises in Iceland, which seems to form a kind of Northern Cone.

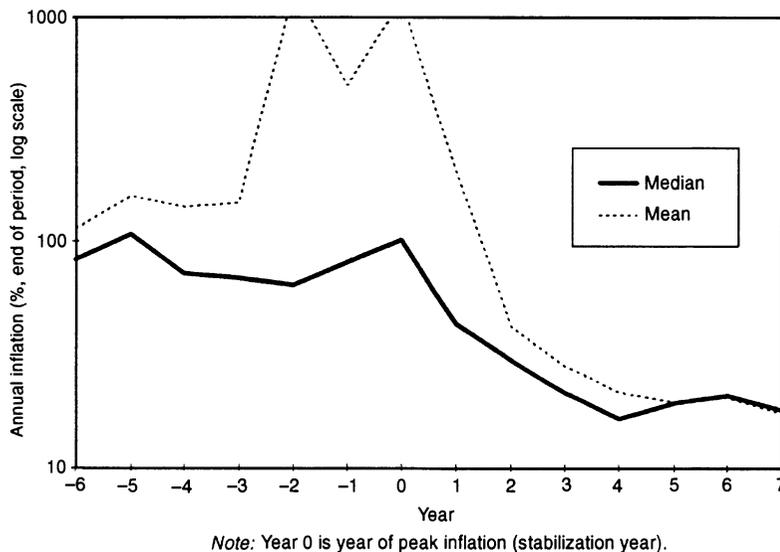Figure 1 shows the median and mean inflation rates in the

> **The peak year for inflation prior to stabilization is year 0**

Note: Year 0 is year of peak inflation (stabilization year).

Figure 1. Annual inflation before and after stabilization in 28 economies

sample. The median inflation rate declines steadily from a peak of about 100% to about 20% by year 4 in the sample of stabilizations. The mean is much higher, with a peak of over 1000%, because the distribution of inflation has a well-known skewness to the right. This skewness shows up here in the form of four full-blown hyperinflations in the data – Argentina, Bolivia, Nicaragua and Peru.

3.2. Central findings

Figure 2(a) shows the median and mean aggregate GDP growth for the stabilization sequence of the 28 episodes.[5] Figure 2(b) shows the median and mean per-capita growth. I use the median as well as the mean as a robustness check on the influence of any large outliers.

Aggregate GDP growth is around 2% per annum during the earlier years of the high inflation; growth then dips near zero or below in the last three years before the peak inflation. Per-capita growth is zero and then sharply negative in the period before stabilization, with a deep trough in the year before peak inflation. Discussions of output behaviour during stabilization often curiously omit discussion of this below average growth performance in the years of high inflation *before* stabilization. The sharp trough immediately before peak inflation and then stabilization could be a tantalizing hint of the Alesina–Drazen and Drazen–Grilli war of attrition stories – things have to get very bad before someone takes action and stabilization gets going. It is a little puzzling that the growth trough comes in year − 1 rather than year 0, although we will see that the timing of this trough is not completely robust.

Median and mean real GDP growth is well above zero in the first year that inflation falls. When the literature labels a stabilization as 'contractionary', it usually means that GDP goes down contemporaneously with a reduction in inflation. Following this terminology and leaving causality aside, one would have

[5]The source of information on growth is the World Bank National Accounts database, which is based on the United Nations National Accounts reporting system. Again, entries for countries identified as inflation crisis countries are updated or filled in as necessary from IMF and World Bank staff reports. It need hardly be said that data for both inflation and growth for these countries are likely to vary greatly in quality, with data for the lower-income economies being particularly questionable.
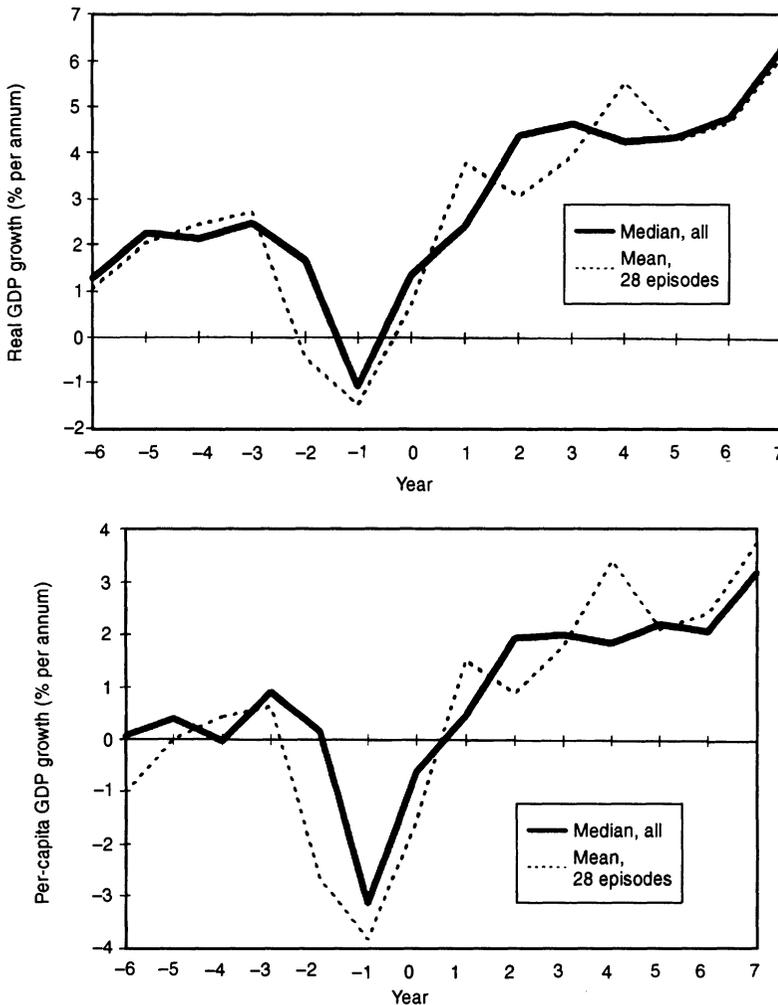
Note: Year 0 is year of peak inflation (stabilization year). Figures for per-capita GDP growth are from World Bank National Accounts.

Figure 2. (a) Real GDP growth during and after high inflation. (b) Per-capita growth during and after high inflation

to conclude from these data that stabilization from high inflation is in fact 'expansionary'.

Median per-capita growth is slightly above zero in the first year. Growth gets stronger as the stabilization continues. By year 2 or 3, output growth reaches a plateau of about 2% per capita and about 4% aggregate. The median is lower than the mean, reflecting one large positive outlier (Uganda). The *change* in growth is strongly positive from the crisis period to the stabilization period.

Of course, *some* of the stabilizations do show negative growth.

The sample includes the notorious output collapse in Chile in 1975 (year 2 according to my dating). This bad experience traumatized macroeconomists (not to mention Chileans), helping to form the view that stabilizations of chronic inflation were contractionary. My data show that this example is counter-balanced in the sample as a whole by expansions. The *typical* outcome is *expanding* total GDP and *stable* per-capita income in the first one or two years that inflation falls, and strongly positive growth even in per-capita terms after year 2 or 3.

3.3. Robustness checks

Is expansionary stabilization too good to be true? This section explores a number of robustness checks on this crazy-sounding result.

3.3.1. Sample composition and selection. A possible problem with the interpretation of this pattern is that the sample of countries is not fixed throughout the sequence. Countries drop in beforehand as they develop inflation, and they drop out afterwards because the period ends or because they have another inflation crisis. The countries that make it through to year 7 after stabilization are better performers on a number of dimensions than those that drop out before the end of the period. These entries and exits to the sample are not random, and the lines in Figures 2(a) and 2(b) could be moving because of composition shift effects. It is reassuring that the pattern in Figure 2 holds for smaller, fixed samples of countries extending backwards or forwards (the sample shrinks to 10 or 11 at either end of the sequence). Also note that in Figure 2 the sample for the critical years − 1, 0, 1, 2 is basically fixed.[6]

Finally, I try omitting from the sample all those recidivist countries that drop out because of renewed high inflation. I exclude from the sample ten episodes of stabilization in countries that later re-entered high inflation. The remaining sample now includes only countries that remain at low inflation until the sample period ends (some countries may still drop out

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[6]Three countries are missing from year −1 because they peak in the first year of their two years above 40%. Uganda (episode 1) is missing from year 0 (1980) because we do not have data for that year, although qualitatively year 0 is known as a year of high inflation; we interpolate in this case between the high inflation in year − 1 and year 1.

of the sample for year 3, year 4, etc. if, for example, their 'year 3' comes after the end of the sample period). If selection effects were important, we would expect the omission of the endogenous drop-outs to change the recovery pattern. But the pattern of output recovery does not change when I omit the drop-outs.

It may be argued that my definition of stabilization – at least two years below an annual rate of 40% – selects out countries which maintain the stabilization effort *because* growth was high. I am pessimistic that such reverse causality questions can be resolved, but I can at least test alternative stabilization definitions. I consider a much weaker definition of stabilization: a decline in inflation in any year in which inflation in the previous year was above 40%. This weak definition does not require countries to stick to stabilization and hence should be less subject to selection bias of the kind suggested. Still, the median growth rate for 155 observations that fit the weak criterion – 3.0% GDP growth – is actually *higher* than the growth rate in year 1 of the strict stabilization definition – 2.4%. Selection effects are not obvious in the data.

3.3.2. Timing issues. Since timing is so crucial, it is worthwhile to compare my dates to those in the smaller sample of Calvo and Vegh (1994; also used in Reinhart and Vegh, 1995). This is also useful because of the possibility that the timing of declines in inflation could be determined by something other than the timing of stabilization policies – an inflation decline could be due to favourable supply shocks, for example. As noted, Calvo and Vegh's dates are based on announcements of stabilization plans by policy-makers. Of the ten Calvo–Vegh stabilizations that are in my sample, we have the same dates for stabilization in seven cases; two of my stabilizations begin one year earlier (Chile and Israel) and one of mine begins one year later (Brazil in 1965 instead of 1964). Shifting from my dates to theirs has no effect on the median; the shift of the huge 1975 Chilean contraction from year 2 to year 1 shifts the mean in those years by about 0.5 of a percentage point.

I could also check my dates against base money growth, a relevant albeit not really exogenous indicator of stabilization efforts. Of the 26 episodes for which I have base money data, 15 have money growth peak in the same year as inflation, 5 have money growth peak earlier, and 6 have money growth peak

later. The behaviour of money is too noisy, and too endo-
genous, to be itself the defining characteristic of stabilization
timing. But the information I have on money growth timing
does not seem to contradict my inflation-based stabilization
timing.

The reader may also worry that the peak of inflation may be
influenced by large nominal devaluations, which sometimes
accompany the beginnings of a stabilization effort. But many of
Calvo–Vegh's announced stabilizations involved such devalua-
tions, and we have seen that their timing is close to mine.
(According to Calvo–Vegh's and my convention, a devaluation-
cum-stabilization in the year of peak inflation would shift the
year classified as year 1 of stabilization only if the devaluation
occurred in the first half of the year.) Virtually all African
inflation stabilizations include such devaluations, but all of the 6
African cases on which I have data had these devaluations in
year 1.

In any case, we can see from the pattern in Figure 2 that
shifting the dating of stabilization back by a year would not
change the basic story. The strongest negative growth takes
place in years -2 and -1; the peak year of inflation already
shows some improvement in growth. Finding the thin blue line
between the negative-growth/high-inflation period and the
stabilization period is not a precise science. But the data do not
leave any obvious room for the stabilization period to overlap
with the negative-growth period.

3.4. Other measures of growth performance and significance checks

I now turn to further checks on the basic growth pattern. Figure
3 shows the median growth in the sample relative to two
possible controls. The first is simply the per-capita growth in
each country g_{it} (where i indexes countries and t indexes
calendar years) relative to world average growth in that year γ_t.

$$g_{it}^d = g_{it} - \gamma_t \tag{1}$$

Defining growth relative to the world average is relevant because
a country's boom may be less meaningful if it is booming at the
same time that all countries, including non-inflationary econ-
omies, are booming.

The second measure of relative growth performance is the

Note: Year 0 is year of peak inflation (stabilization year).
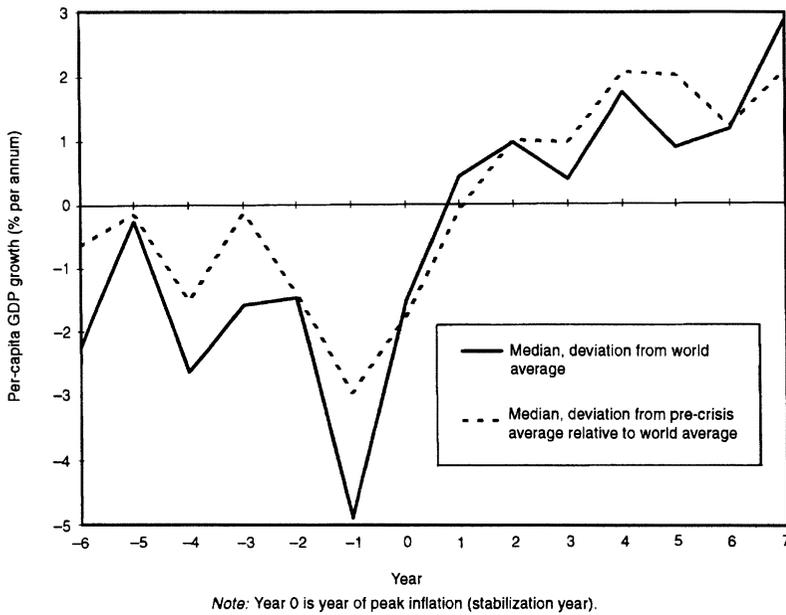
Figure 3. Other measures of per-capita growth pattern during stabilization

same growth deviation g_{it}^d relative to the country's *pre-crisis* growth deviation from the world average:

$$g_{it}^{dc} = g_{it}^d - \sum_{t=1960}^{n} g_{it}^d/(n-1960) \qquad (2)$$

where n is the last pre-crisis year (i.e. the last year before the country entered annual inflation above 40%).

Growth is sharply below the world average and the pre-crisis growth rate during the high-inflation crisis. In the first year of stabilization, growth returns to both the world and pre-crisis country average. In the second and later years, growth is above the world and pre-crisis averages, as found over the medium run by Bruno and Easterly (1995). The deviation from the world average is substantial because world average per-capita growth was near zero in the late 1980s and in the 1990s, when most of my cases were stabilizing and experiencing output recoveries.

Table 1 tests the significance of these short-run growth effects. I calculate sample averages for each pre- and post-stabilization year in the sequence. I then test whether these averages are significantly different from zero. (This procedure is similar to that followed by Reinhart and Vegh (1995), who test

year-by-year dummies for a panel of seven countries with exchange-rate-based stabilizations. I am extending this test to *any* country that had a high inflation.)

GDP growth is significantly positive in years 1, 2 and following. Excluding one extreme observation that reinforces this result (Uganda had a huge recovery in year 1 during its 1974–83 crisis and stabilization episode) does not change this

Table 1. Average growth during and after high inflation

	GDP growth				Per-capita growth difference			
	Aggregate		Per capita		World average		Pre-crisis deviation	
	$\bar{x}\%$	t	$\bar{x}\%$	t	$\bar{x}\%$	t	$\bar{x}\%$	t
Rest of sample, 1961–94	3.7	38.9	1.7	17.6				
Stabilization years								
−3 and before	1.5	2.8	−0.5	−1.0	−2.0	−3.6	−1.0	−1.9
−2	−0.4	−0.4	−2.7	−2.3	−3.9	−3.2	−3.0	−2.8
−1	−1.5	−1.3	−3.8	−3.2	−4.9	−4.0	−3.9	−3.5
0	0.7	0.8	−1.5	−1.8	−2.4	−2.9	−1.5	−1.6
1	3.8	3.3	1.5	1.3	0.8	0.7	1.7	1.3
2	3.1	3.1	0.9	0.9	0.0	0.0	0.9	1.0
3	3.9	5.5	1.8	2.5	0.8	1.1	1.6	2.3
4 and after	4.8	14.9	2.7	8.6	1.9	6.6	2.6	8.2
Stabilization years, excluding Uganda 1974 − 83								
−3 and before	1.5	2.7	−0.5	−0.8	−1.9	−3.3	−1.0	−1.9
−2	−0.3	−0.2	−2.5	−2.0	−3.6	−2.9	−2.9	−2.6
−1	−0.7	−0.8	−3.0	−3.2	−4.0	−4.3	−3.2	−3.6
0	0.6	0.7	−1.6	−1.7	−2.4	−2.8	−1.6	−1.7
1	2.8	4.4	0.5	0.9	−0.2	−0.3	0.6	0.8
2	3.7	4.2	1.5	1.7	0.5	0.6	1.3	1.6
3	3.9	5.2	1.8	2.4	0.7	1.0	1.4	2.0
4 and after	4.8	14.9	2.7	8.6	1.9	6.6	2.6	8.2
Changes (excluding Uganda 1974 − 83)								
0 to 1	2.1	1.9	2.1	1.9	2.2	2.1	2.2	1.8
(−1, 0) to (1, 2)	3.2	3.9	3.3	3.8	3.3	4.1	3.3	3.8
(−2, 0) to (1, 3)	3.5	4.9	3.5	4.8	3.6	5.1	3.6	4.9

Note: Stabilization years refer to years since peak inflation (year 0). Negative years prior to peak inflation include only consecutive high-inflation years (above 40%). *t*-statistics are calculated with heteroskedasticity-consistent standard errors. $\bar{x}\%$: averages in per cent. Uganda 1974–83 is excluded as a robustness check since it had a very large contraction in year − 1 and a very large expansion in year 1. Results are stronger if Uganda is included. World average: growth difference from world average. Pre-crisis deviation: growth difference from pre-crisis deviation relative to world average.

significance. Expansionary stabilization seems to pass the standard statistical tests. The positive per-capita growth in years 1 and 2 is not statistically significant, indicating that the mean outcome is swamped by the wide dispersion of outcomes. Excluding the big Uganda outlier reduces the mean per-capita growth in year 1 considerably, from 1.5% to 0.5%. The differences in growth in years 1 or 2 from the world averages or pre-crisis averages in the right-hand columns of Table 1 are also not significant. This lack of significance has a different interpretation from that for per-capita growth, since now it means that the stabilizing countries in years 1 or 2 were not growing any more slowly than the world average, or than their pre-crisis growth relative to the world average.

I also look at the change in growth from the one or two years before/during peak inflation to the one or two years after inflation declined. The change from the peak year to year 1 is not quite significant, but the swing for two-year or three-year periods is strongly significant (see Table 1). For the three-year period, 23 of the 28 episodes have higher growth in the stabilization period than in the high-inflation period. Per-capita growth in year 3 and later years is significantly positive. It exceeds significantly pre-crisis growth relative to the world average beginning in year 3, and significantly the world average in general beginning in year 4.

These significance checks are for the means. I illustrate the significance of medians by showing confidence intervals for the median of GDP growth in Figure 4.[7] One sidelight of this calculation is that the timing of the growth trough in year -1 is no longer particularly clear when we look at the wide bands in years -2 and 0. As for growth after stabilization, the median growth in year 1 is significantly above zero. And the median growth in years 2 and 3 (I show confidence intervals only for years -2 to 3, since they all have at least 20 observations) is clearly above the pre-stabilization median growth.

The results in this section are also closely related to an interesting exchange 16 years ago between Harberger and Dornbusch at the 1979 Pinhas Sapir Conference at the Bank of Israel (published as Harberger, 1981; Dornbusch, 1981).

Expansionary stabilization passes standard statistical tests

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[7] I use the normal approximation for confidence intervals, in which the observation numbers of the 95% confidence bands for the median will be $0.5n \pm (1.96)\ 0.5 \times \sqrt{n}$, in which n is the number of observations.

Note: Year 0 is year of peak inflation (stabilization year).
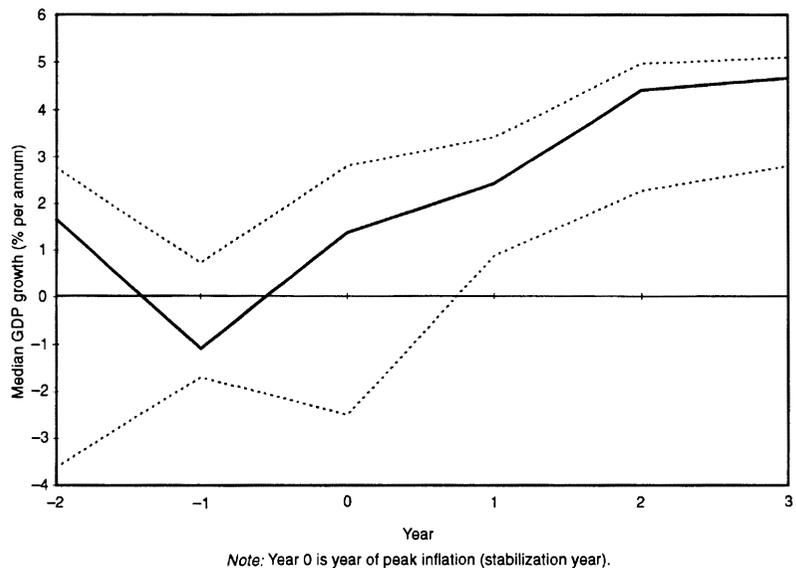
Figure 4. Confidence intervals for median GDP growth before and after stabilization

Harberger apparently pointed out that real growth rates during periods of declining inflation were respectably positive (I say 'apparently' because this section of Harberger's paper was omitted from the published version and can only be inferred from Dornbusch's comments). Dornbusch criticized Harberger for the 'amazing conclusion that even during disinflation growth performance was laudable' (p. 466), suggesting that he should also have included the year before inflation declined. As we have seen, Dornbusch's criticism would not change the confirmation of Harberger's basic finding in my dataset; nor is the year before declining inflation strongly supported as year 1 of stabilization by the evidence in my dataset. Harberger (1988) reaffirmed his finding in a later study of five inflation episodes (as well as finally describing for publication, albeit still rather tersely, the original finding that turned out to be based on ten inflation episodes).

4. UNDERLYING COMPONENTS OF OUTPUT BEHAVIOUR

In this section, I will discuss the supply side of output behaviour (total factor productivity), the demand side (consumption), fiscal and monetary trends, and the effect of war and debt crises.

4.1. Capital and productivity

How much of the growth pattern before and after the fall in inflation is due to changes in capital growth, as opposed to capacity utilization or total factor productivity (TFP) growth? To address this question, I use a cross-country dataset of capital stocks, labour force and TFP growth constructed by Nehru and Dhareshwar (1993), which they have recently updated through 1993. These authors constructed capital stocks from investment flows using the perpetual inventory method, with assumptions about initial stocks based on the steady-state capital/output ratios implied by the same investment flows, and assuming a depreciation rate of 7%. Nehru and Dhareshwar did not have data on employment for a large sample of countries (nor does anyone else to my knowledge), so they used the population between the ages of 15 and 64 as a proxy for employment. Data on capacity utilization are also not available. The total factor productivity growth residual is defined as: output growth per worker $-0.4 \times$ capital growth per worker. It is clear from the foregoing that 'TFP growth' will include the effect of changes in the utilization of both labour and capital as well as true productivity changes.

Figure 5 shows the year-by-year pattern for the medians of TFP and capital growth per worker (means show a similar
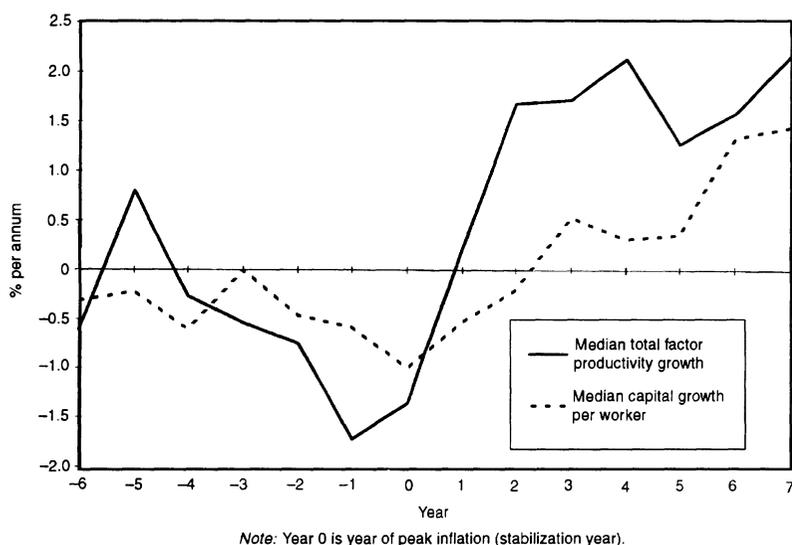

Note: Year 0 is year of peak inflation (stabilization year).

Figure 5. TFP and capital growth

pattern). The recovery of growth is led by TFP growth rather than by capital growth per worker. Capital growth recovers very late in the process of stabilization (again, caution is required in interpreting these numbers because of the changing sample and the small number of observations as the recovery period lengthens – there are only 11 observations in year 6, and 9 in year 7).

Capacity utilization and productivity explain recovery

These data suggest that a combination of increased capacity utilization and productivity improvements explains the early years of growth recovery after stabilization; only later does capital growth come in. This result is consistent with what Bruno and Easterly (1995) found over the medium run. It is also consistent with a body of literature about the slow response of investment to policy adjustments or, more generally, the slow recovery of investment after a recession (Pindyck and Solimano, 1993; Serven and Solimano, 1993; Caballero *et al.*, 1995; Blomstrom *et al.* (1993) have a related finding that investment lags but does not lead growth). The literature rationalizes the slow response of investment as reflecting the value of waiting when the permanence of the policy change is uncertain (Pindyck and Solimano, 1993; Dixit and Pindyck, 1994), or as reflecting non-linearities in the minimum scale of investments needed to make any adjustment to capital stocks (Caballero *et al.*, 1995).

4.2. Consumption growth

Many of the theories surveyed above stress the responses of private consumption to stabilization. It is therefore of interest to see if the pattern of consumption growth is different from that of output growth. Figure 6 shows the growth of private consumption per capita before and after stabilization, compared to per-capita output growth. The figure exhibits a broadly similar pattern to output growth per capita. But there are a couple of intriguing wrinkles. First, the trough of consumption growth is indeed in year 0, unlike the puzzling trough of output growth in year -1. Perhaps it is the consumption growth trough that finally motivates stabilization, although this could be stretching the data. Second, consumption growth booms a bit more than output growth in the early years of the stabilization, which is consistent with some theories of stabilization expansions.

Note: Year 0 is year of peak inflation (stabilization year).
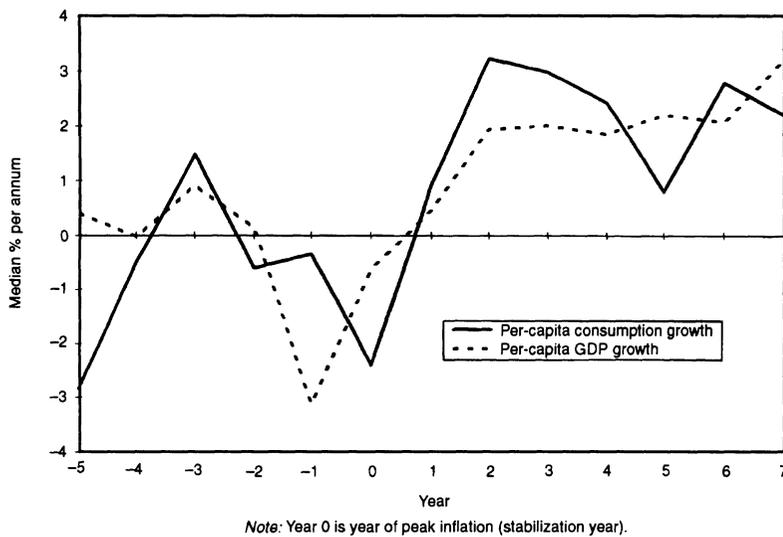
Figure 6. Consumption growth per capita compared to GDP growth per capita before and after stabilization

4.3. Fiscal and monetary trends

Virtually all researchers stress the key role of budget deficits in high inflations, and fiscal stabilization as a prerequisite to lasting inflation stabilization. I document this aspect of inflation stabilization with data on consolidated public sector budget deficits, collected mainly from International Monetary Fund (IMF) and World Bank reports, and from Easterly and Schmidt–Hebbel (1994). Although these data could have problems of comparability across countries, I still feel they are preferable to standard budget deficit data like those in the International Finance Statistics of the IMF. The latter often miss the story because they omit state-owned enterprises, a major drain on the public treasury in many developing countries.

Figure 7 shows the evolution of budget deficits during stabilization. To no one's surprise, inflation stabilization is also fiscal stabilization – the fall in the budget deficit begins in the peak year of inflation, and then a further reduction takes place in year 1. Hence, any surprise about inflation stabilization being associated with positive growth must also include surprise about fiscal contraction being associated with growth recovery, just as in Giavazzi and Pagano (1990).

Of course, the interpretation of movements in the budget

Inflation stabilization is also fiscal stabilization

Note: Year 0 is year of peak inflation (stabilization year).
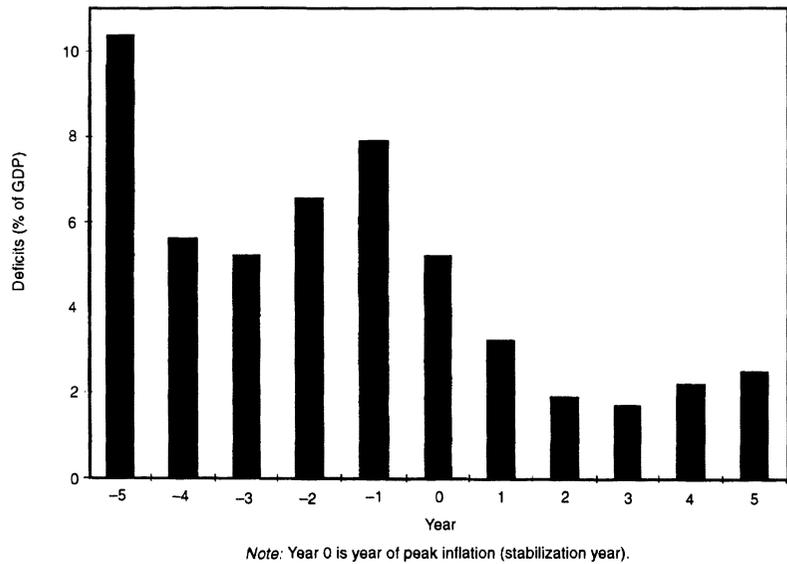
Figure 7. Budget deficits during stabilization

deficit is plagued by endogeneity. Dornbusch *et al.* (1990) note the process during high inflations by which inflations can initially increase deficits by lowering real tax revenues (the Tanzi effect), a process which is sharply reversed when inflation falls. However, the financeable (and actual) deficit may eventually fall during high inflation because of the collapse of money demand and thus seigniorage revenues, with smaller and smaller deficits continuing to fuel higher and higher inflation. The relationship between the deficit and inflation could also become subtly non-linear as movements in the deficit change the probability of anticipated stabilization and the expected form of stabilization (Drazen and Helpman, 1988, 1990). After stabilization, if a boom does take place, the boom itself will increase revenues.

The other fiscal/monetary dimension that is often stressed is the collapse of real money balances during high inflations and the recovery of real money balances after stabilization. Figure 8 confirms that this holds in my dataset – the median shows a deep decline in real money balances in the year of peak inflation, then positive growth afterwards.[8]

[8] Both CPI and base money are defined as end of period, so we do not have the usual timing problems about evaluating annual real money balances during high inflation.

Note: Year 0 is year of peak inflation (stabilization year).
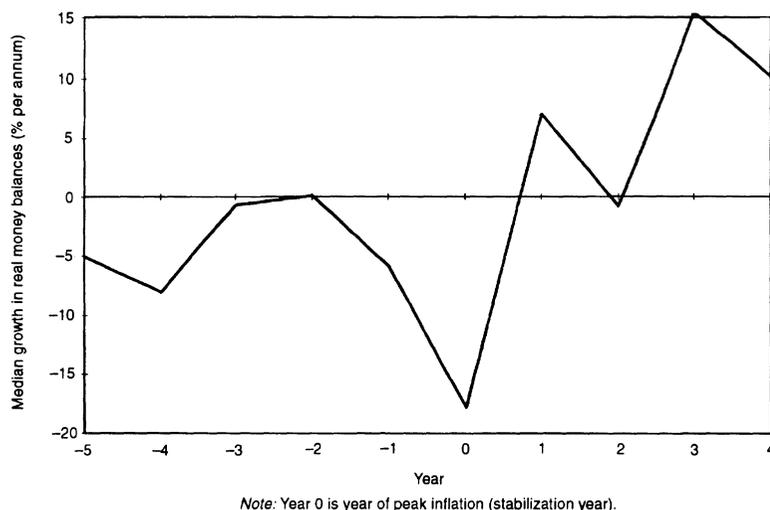
Figure 8. Growth in real money balances during and after high inflations

4.4. Debt and war

War has been the traditional breeding ground for high inflation; debt crises have been added to the inflation pantheon more recently (Sachs, 1989, 1994). To examine the role of war and debt, I use data on the existence of wars taking place on the national territory of each country from Sivard (1993) and Center for Defense Information (1995). Note that this definition of 'war' is rather broad and includes violent civil disturbances of any kind. Table 2 shows the share of countries at war in the sample of countries with inflation crises, recorded year by year in the stabilization sequence. Wars are definitely part of the story in some countries – Chile, Indonesia, Nigeria, Nicaragua, Peru, Turkey and Uganda (twice) all had wars or civil disturbances around the time of their inflation crisis; Bangladesh had a war shortly before its crisis. War was absent from the other 19 crises in the sample. In general, around 20% of the high-inflation years took place at the same time as a war. (The sample average for all countries is about an 8% probability of being at war in any given year.) It is notable that wars dwindle rapidly during stabilization, and that wars in years 2 and after of successful stabilizations are no more common than at the sample average.

There is an association between inflation and external debt problems. Twenty of the 28 high-inflation and stabilization

Table 2. Growth patterns controlling for debt and war

	War %	Debt %	Per-capita growth			
			Full sample		Partial sample	
			$\bar{x}$%	t	$\bar{x}$%	t
Rest of sample, 1961–94	8	5	2.0	20.3	2.0	20.5
Stabilization years						
− 3 and before	24	19	0.5	0.9	0.5	0.9
− 2	29	14	− 1.6	− 1.4	− 1.5	− 1.3
− 1	20	8	− 3.1	− 2.7	− 2.4	− 2.6
0	18	39	− 0.2	− 0.2	− 0.2	− 0.2
1	11	46	2.9	2.3	1.7	2.9
2	7	32	1.8	1.9	2.3	2.5
3	8	38	2.9	3.5	2.8	3.3
4 and after	8	15	3.3	9.7	3.3	9.8
Debt rescheduling			− 2.3	− 6.9	− 2.3	− 7.2
War			− 2.5	− 6.9	− 2.5	− 7.1

Note: The first column refers to the percentage of countries at war, the second column to the percentage of countries with debt rescheduling during the given years. The partial sample excludes Uganda 1974–83. Stabilization years refer to years since peak inflation (year 0). Negative years prior to peak inflation include only consecutive years (above 40%). Debt: shift in average for debt rescheduling (dummy = 1 if debt rescheduling, 0 otherwise). War: shift in average for war (dummy = 1 at war, 0 otherwise). *t*-statistics are calculated with heteroskedasticity-consistent standard errors; $\bar{x}$%: averages in per cent.

Expansion is stronger with controls for war/debt rescheduling

episodes involved debt rescheduling during the episode.[9] (Debt reschedulings are from the comprehensive list published by the World Bank's World Debt Tables for 1980–94, backdated with country accounts for pre-1980 inflation crises.) The peak for debt rescheduling is precisely in stabilization year 1, with high probability also in the year before and the two years following. (Countries usually reschedule more than once.)

Is the output pattern during and after high inflation simply a reflection of the obvious output shocks associated with debt and war, for which inflation may be proxying? Could the output recovery with stabilization simply reflect the end of a war, or the resolution of a debt crisis? To examine this, I add shift variables for debt and war to the calculations of the year-by-year averages reported in Table 1. (In effect, this involves calculating the averages for the countries experiencing war and inflation crises relative to other countries at war but not involved in inflation

[9]The eight missing episodes occurred in six countries, some of which may have had exogenous reasons why they were not prime candidates for debt crises (or they had debt rescheduling later) – Bangladesh, Ghana, Iceland, Israel, Somalia and Uruguay.

crises). Table 2 indicates that dummies for war and debt rescheduling are indeed highly significant and negative. However, the pattern of output expansion with declining inflation is actually stronger than before: per-capita growth is now significantly positive in year 1 after controlling for debt and war, regardless of whether the extreme Uganda war and recovery is included. [10]

5. TWO OTHER POSSIBLE STORIES

This section examines two other possible explanations for the expansionary stabilization phenomenon by examining the patterns within the set of stabilizations: (1) Is the phenomenon driven by temporary booms following exchange-rate-based stabilizations? (2) Is it just a recovery following a large one-time shock to the level of output?

5.1. Exchange-rate-based versus money-based stabilizations

A large literature (reviewed in section 2) discusses the pattern of output behaviour associated with exchange-rate-based stabilizations (ERBS). The stylized fact emphasized in this literature is that there is an initial expansion after an ERBS, followed by a later contraction (Kiguel and Liviatan, 1992b; Calvo and Vegh, 1994; Rebelo and Vegh, 1995). Money-based stabilizations, in contrast, are said to have an initial contraction, followed by a later contraction. The main purpose here is not primarily to confirm or refute these stylized facts, which were intended to describe a particular set of chronic inflation countries in Latin America (counting Israel as part of Latin America for the moment). Rather my purpose is to examine whether such stylized facts underlie the patterns detected here in a broader sample of inflation stabilizations. Does the output expansion in years 1 and 2 in this paper reflect mainly the booms during exchange-rate-based stabilizations?

I classify stabilizations as exchange rate based if they are so classified by Calvo and Vegh (1994). For those in this sample that are not covered by Calvo and Vegh (1994), I checked

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[10] I also experimented with a terms-of-trade change variable, but it had no effect on the pattern of output decline and recovery during and after high inflation.

World Bank and IMF reports (and OECD surveys in the case of
Iceland) to discern whether fixing the exchange rate was part of
the stabilization package at the time of the inflation decline. I
follow Calvo and Vegh's rule that a country must have at least
current account convertibility to be classified as exchange rate
based. This excludes several low-income economies like Bang-
ladesh and Ghana that had fixed official exchange rates at
times, but also had large black market premia on foreign
exchange and hence nothing resembling current account
convertibility.[11] There are 9 exchange-rate-based stabilizations
out of the 28 episodes according to these criteria: Argentina,
Brazil, Ecuador, Iceland (second), Israel, Mexico, Nicaragua,
Uruguay (both). Reinhart and Vegh (1995), in a sample of
ERBS that includes all of these except Ecuador, Iceland and
Nicaragua, find that output growth is positive in the first several
years of stabilization.

Figure 9 shows the pattern of median aggegrate GDP growth
for the sample with and without the exchange-rate-based
stabilizations. I show only the interval (−3,3) because the
sample gets uncomfortably small for the non-ERBS sample
outside of this interval, but the other years show nothing to

Note: Year 0 is year of peak inflation (stabilization year).
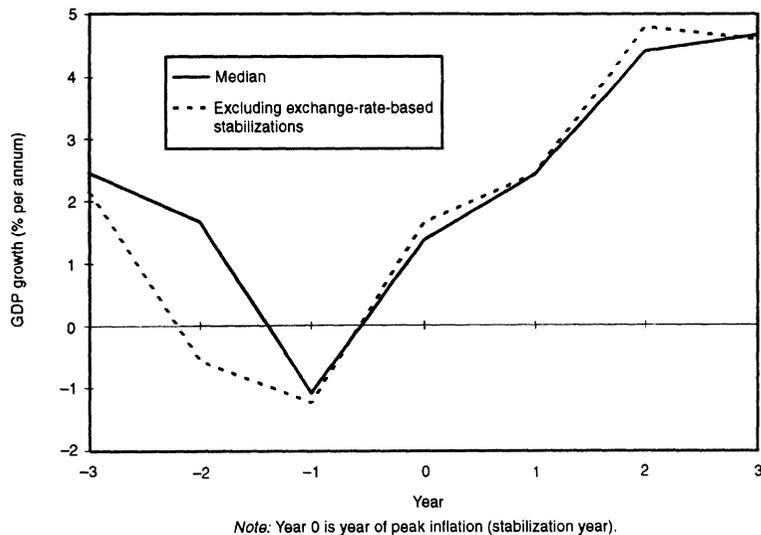
Figure 9. Median growth with and without exchange-rate-based stabilizations

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[11] Black market premia were checked using data from Levine and Zervos (1993) and
International Currency Analysis (various years).

contradict the message of Figure 9. It is hard to discern a difference in the pattern of contraction and then expansion in this figure between exchange-rate-based and money-based stabilizations. A quick check of ERBS dummies on the coefficients in Table 1 shows that the differences in the year-by-year mean growth in ERBS and non-ERBS are not statistically significant. The pattern of output expansion in the initial years of stabilization from high inflation is *not* explained by the exchange-rate-based stabilization boom phenomenon noted by Calvo and Vegh (1994), Rebelo and Vegh (1995), and others; output expansion also holds for money-based stabilizations.

The other stylized fact from the ERBS literature that might be relevant is the later recession hypothesis, sometimes described as 'recession now versus recession later'. Is the short-run expansion in ERBS merely postponing the inevitable recession? This stylized fact as applied to *successful* stabilizations seems to be based on the case of Israel (Kiguel and Liviatan, 1992b). Rebelo and Vegh (1995) note that it is the most fragile of the ERBS stylized facts. Hoffmaister and Vegh (1995) find some evidence for it in vector-autoregressions run for Uruguay. Reinhart and Vegh (1995) find some evidence for it in the last stabilization programme year of their sample of seven attempted and successful ERBS; this is generally immediately before the stabilization programme collapses. It is certainly plausible that there is a boom–recession cycle associated with unsustainable exchange rate pegs. But in this paper's scheme of chronicling post-stabilization years in which inflation remains under control, there is no evidence for a late recession or even a growth slowdown in either the exchange-rate-based or money-based stabilizations.

5.2. Do expansions always follow contractions?

Is output just snapping back after a particularly disastrous but temporary collapse, perhaps due to a war or some other exogenous cause? As one of my colleagues at the World Bank likes to put it, even dead cats bounce.

Trying to resolve the time-series properties of output is a big subject, and one beyond the scope of this paper. But I can check whether all countries with negative growth, regardless of whether they had inflation crises, subsequently had the same

kind of output recovery as the 'expansionary stabilizations'. To do this, I define a 'growth crisis' to pick out all countries with negative growth, analogous to the negative growth of the pre-stabilization years for countries with inflation crises. I pick out all countries, apart from the inflation crisis countries, that have had three straight years of negative per-capita growth. This criterion picks out no fewer than 63 countries with negative growth episodes, where years -2 to 0 are the three years of negative growth. Figure 10 shows the recovery, or more accurately the non-recovery, of output following these negative growth episodes. For comparison, Figure 10 overlays the pattern of output recovery following inflation reduction. Growth following stabilization is higher than growth following generic output declines. There is no mechanical tendency for rapid positive growth after an episode of negative growth.

6. OTHER EVIDENCE: HISTORICAL AND EX-COMMUNIST EXAMPLES

How widespread is the experience of expansionary stabilization from high inflation? The results in the previous section were based mainly on experiences in what used to be called the Third World. What about the First and Second Worlds' experiences with high inflation?

Tables 3(a) and 3(b) summarize a collection of data from secondary sources on the famous historical hyperinflations after
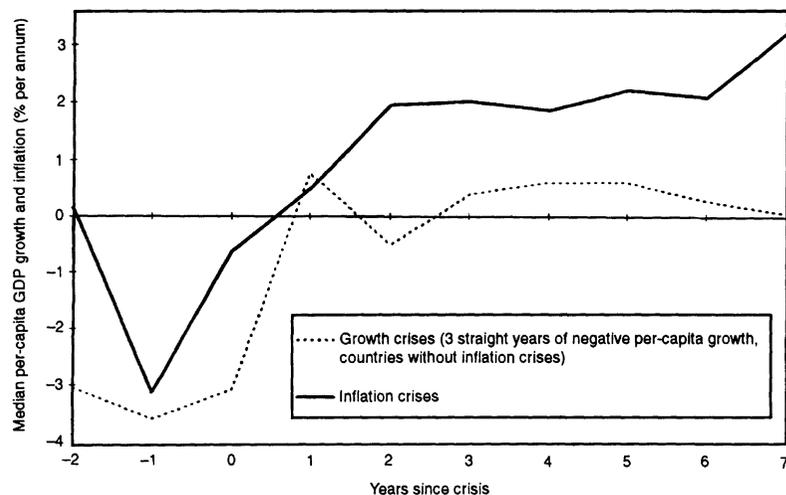

Figure 10. Inflation crises and growth crises

Table 3(a). Hyperinflations after the First World War (%)

	Austria 1921–2	Germany 1922–3	Hungary 1923	Poland 1923	European average
Inflation	1219	19 012 790	3047	40 985	
Annualized output change, 1913–20	−10	−7	−10	−14	−4
Annual growth during hyperinflation	25.8	−13.8	−15.9	−3.7	7.7 (1921–3)
Annual growth, two years after stabilization	3.8	30.8	16.4	−20.2	
Annual growth, 1924–9	7.5	7.5	11.3	8.6	5.4
Revenues to expenditure during inflation crisis	23	33	74	38	
Revenues to expenditure two years after stabilization	90	103	93	100	

Table 3(b). Hyperinflations after the Second World War (%)

	China 1946–9	Greece 1943–5	Hungary 1945–6	Taiwan 1947–8	European average
Annual inflation rate in years of hyperinflation	30 912	21 quintillion	380 octillion	2108	
Annualized change in output pre-war to post-war (1938–45)	−1.7	−4.3	−9.6	−14.0	−1.1
Annualized output growth in years of hyperinflation			−63.9	24.9	
Output growth first two years after hyperinflation	14.4	47.3	23.9	19.2	
GDP growth per capita, 1950–5		3.6		5.8	
Ratio of government revenue to expenditure in years of inflation	28		7		
Ratio of government revenue to expenditure after stabilization (average of first two years)			87	73	

Note: European average in Table 3(b): average of 6 European non-inflationary countries (1938–47).

Sources: Chang (1958; China), Chou (1963; China, Taiwan), Dornbusch and Fischer (1986), League of Nations (1926; Poland), Maddison (1989; real GDP) and Mitchell (1978; real GDP and government revenue/expenditure), Makinen (1986; Greece), Nogaro (1948; Hungary 1945–6), Sargent (1982; Austria, Germany), Svennilson (1954; European output after the First World War), Vegh (1992; Hungary 1923–4, Austria, Germany, Taiwan).

the two world wars.[12] The historical experience after the wars is obviously a prime candidate for the bounce-back effect and/or reverse causality – the severe drop in output had a lot to do with the generation of the inflation crisis, and it was inevitable that output would recover at some point. Despite all this, the post-war stabilizations have attracted some attention in the literature as a laboratory for the output effects of stabilization, so perhaps it is worth pointing out that in Table 3 the pattern of output growth is quite similar to that in the previous section. This pattern is severely negative growth during the high inflation (certainly with an exogenous component, perhaps aggravated by inflation), then output recovery with stabilization of inflation (perhaps including a bounce-back effect, but such an effect may have been assisted by getting inflation under control).

The last rows of Tables 3(a) and 3(b) show the well-known fiscal dimension to the hyperinflations. The path by which war and output collapse led to hyperinflation passed through the budget deficit. Stabilization was achieved and output bounced by reversing the process and achieving a large fiscal improvement.

Transition countries confirm previous findings

Transition countries (the current jargon for countries moving from a planned to a market system) also provide a fresh perspective on inflation crises. Many transition countries fit my definition of an inflation crisis since 1989, and six have already stabilized from such a crisis (Table 4). The output crises in transition countries also have a patently exogenous component, and the recovery of growth with stabilization certainly includes a rubberband effect. (Albania is one obvious example.) Still it is of some interest that Table 4 shows the same combination of inflation reduction, fiscal adjustment and early output recovery in these countries as there was in the international results.

Moreover, the stabilization of inflation distinguishes the six

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[12] I looked at descriptions of historical high inflations in Sargent (1982; Austria, Germany), Vegh (1992; Hungary 1923–4, Austria, Germany, Taiwan), League of Nations (1926; Poland), Schwartz (1954; Russia), Chang (1958; China), Makinen (1986; Greece), Nogaro (1948; Hungary 1945–6), Dornbusch and Fischer (1986; they also mention Italy, as do De Cecco and Giazazzi (1993), but it was not a true hyperinflation) and Chou (1963; China, Taiwan). For the data after the First World War, I use two cross-country datasets to assess the medium-run output pattern in response to the inflation crises. The first is a compilation of industrial indices for European economies by Svennilson (1954), which is consistent with individual country estimates for the countries shown here. The second is the well-known international long-run datasets of Maddison (1989) and Mitchell (1978), which is what I also use for the comparisons after the Second World War.

Table 4. Inflation stabilization in transition economies (%)

Country	Years	Inflation	Per-capita growth	Investment/ GDP	Public sector balance/GDP	Case
Albania	1989–90	1	− 12	30	− 15.4	
	1991–92	162	− 17	7	− 26.4	
	1993–94	23	9	14	− 14.8	II, IV
Estonia	1989–90	17	− 7	31		
	1991–92	549	− 21	27	− 2.5	
	1993–94	39	1	30	0.8	III
Latvia	1989–90	8	− 2	38		
	1991–92	519	− 22	37	2.8	
	1993–94	30	− 6	12	− 1.8	IV
Poland	1989–92	173	− 6	25	− 3.7	II
	1993–94	33	4	15	− 2.6	II, III
Slovenia	1989–92	353	− 6	17	1.4	
	1993–94	21	3	19	− 0.2	IV
Vietnam	1985–91	225	3	14	− 7.3	I
	1992–94	12	6	19	− 4.1	II, IV

Note: Case I: war, II: debt relief, III: exchange rate based, IV: money based.
Sources: Money-based versus exchange-rate-based classification from Sahay and Vegh (1995), Dollar (1994; Vietnam), and World Bank reports (Albania).

Table 5. Inflation and growth in transition economies

Average for transition countries with	Inflation (%)	Per-capita growth (%)	Investment/ GDP (%)	Public sector balance/ GDP (%)	Observations
No high-inflation crises	18	− 0.9	27.5	− 3.4	24
High-inflation crises	240	− 10.6	25.0	− 7.5	146
Before crisis	6	− 5.7	31.3	0.0	35
During crisis	510	− 13.4	22.9	− 8.9	96
After crisis	22	1.1	25.0	− 4.7	15

Note: Period 1989–94. High-inflation crisis is defined as over 40% for two years or more, stabilization is defined as below 40% for two years or more. 4 countries did not have high-inflation crises: China, Czech Republic, Hungary, Slovakia. 6 countries had stabilized from high inflation: Albania, Estonia, Latvia, Poland, Slovenia, Vietnam. 18 countries had high-inflation crises that had not stabilized: Armenia, Azerbaijan, Belarus, Bulgaria, Croatia, FYR Macedonia, Georgia, Kazakhstan, Kyrgyzstan, Lithuania, Moldavia, Mongolia, Romania, Russia, Tajikstan, Turkmenistan, Ukraine, Uzbekistan.

economies in Table 4 from other transition economies, as shown in Table 5. Growth during the high-inflation crises has been much worse than the negative growth before inflation broke out, and growth has improved markedly in those countries that have stabilized compared to those that have not.[13]

7. INTERPRETATIONS AND POLICY IMPLICATIONS

The evolution of ideas:
First Stage: 'How absurd; can any sensible person believe such things?'
Second Stage: 'These ideas are dangerous; they must be suppressed.'
Third Stage: 'Of course, everyone knows that; whoever doubted it?'

(Hansen, 1947; courtesy of Wolf, 1993)

When stabilizing from *high* inflation, a short answer to the question 'when are stabilizations expansionary?' is: most of the time. The experience of expansionary stabilization is now sufficiently widespread that the traditional assumption that stabilization is generally contractionary seems no longer viable. The formerly bold suggestion that stabilization is neutral now looks timid in the light of recent experience. Even the politics of stabilization looks like a winner, if the electoral landslides of Menem and Fujimori are any guide.

But how should we interpret these results? How could stabilization be such a free lunch? Why do policy-makers shrink from stabilization if it is such a win–win situation? How much are expansionary stabilizations exploitable by policy-makers?

It is important to be clear about what results like those in this paper do *not* say. These results have absolutely nothing to do with the policy choices facing officials in most industrial economies, with inflation in a range far below what I am considering. These results do not say that it is easy to lower inflation, because the results here were *conditional* on plans that eventually got annual inflation below 40% for two years or more. The history of failed stabilization efforts in the Southern Cone shows that getting to this point is not so easy. Nor do these results say that it is easy to keep inflation down even after it has

Results are inapplicable to industrial economies

[13] Recent stabilizations of hyperinflation in Croatia and the part of the former Yugoslavia consisting of Serbia and Montenegro seem to fit the pattern of rapid recovery following a major output shock, possibly assisted by a rapid reduction in inflation. See Hayri (1994) and Bogetic *et al.* (1995).

been reduced for two years. We know that countries extricating themselves from prolonged macroeconomic crises are at high risk of more trouble: just read Sachs *et al.* (1996) and say *Mexico*.

Moreover, not all countries have expansions with high-inflation stabilization; they only do so *on average*. Chile 1975 did really happen. One direction that further research should pursue is why some countries recover less well than others (Mexico again). Shock versus gradualist therapy is one obvious issue to address here. There may be something to the insightful interpretation of mid-1970s Chile by Edwards and Edwards (1987) that some countries get trapped in a no-man's land between inflation and stabilization:

> Chile was in the worst of worlds. On one hand, the gradualism of the stabilization effort was clearly failing to reduce inflation, and on the other hand the measures undertaken on the fiscal side were negatively affecting production and employment. The Chilean economy was paying the costs of a stabilization program without getting any of its benefits. (p. 30)

These results also do not really say that stabilization is a free lunch. Rather it is just the return of the lunch that was taken away yesterday, during the high-inflation crisis, probably with your bread more stale. And underlying the ups and downs there may be all kinds of different winners and losers. Some fragmentary evidence about the historical hyperinflations suggests that employment does not recover as well as output after inflation crises; it is worth investigating further whether this is a general phenomenon with the recent crises.

Stabilization is no free lunch

Causality is a general problem with interpreting high-inflation and stabilization experiences, and it is certainly a problem with interpreting expansionary stabilization. Causality problems are broader than just the possible two-way feedback between inflation and growth. One of the insights of Dornbusch *et al.* (1990) was that everything becomes endogenous in high inflations – budget deficits, money supply, length of pay period, indexation mechanisms, financial technology, etc. It is hard under such circumstances to be very confident about identifying structural relationships between policy levers and economic outcomes.

In any case, observing a consistent direction of association helps us to narrow the set of possible stories that explain these

outcomes, and thus gives some guide to policy. For example, the evidence is inconsistent with the traditional view that high inflation is an expansionary shift of aggregate demand, and that stabilization is a contractionary shift back of aggregate demand.

To the question of why policy-makers are not exploiting the win–win opportunities of stabilization from high inflation more often, one possible answer is that they in fact already do so whenever such opportunities exist. One interpretation of the war of attrition models, as already noted, is that interest groups wait until the gains from stabilization (equivalently, costs of further delay) are so large that one group will willingly bear the redistributive sacrifice associated with a stabilization. Since my results are based on stabilizations that do actually happen, I may be picking up these large gains that the Alesina–Drazen model predicts are necessary for stabilization to happen at all. I think this is a plausible story for the facts established here.

However, even if this is the correct interpretation, it looks like there would be short-run gains from stabilization if policy-makers could find a way to end the war of attrition *before* getting to the growth trough. Even if I am cautious about causality, I think that disinflation is a pretty good bet for countries presently experiencing high inflation.

████████

Discussion

Tryphon Kollintzas
Athens Institute of Economic Policy Studies, Athens

This paper discusses several stylized facts of prolonged, high-inflation episodes followed by prolonged, low-inflation periods, using annual data from 1960 to 1994 for a large number of countries. The major finding is that there is a strong negative correlation between inflation and output growth, with the former leading the latter by more than a year. The same seems to be true of a measure of total factor productivity. Capital growth (investment), while also negatively related, seems to lag inflation by more than two years. There is weaker evidence that deficits and money growth are reduced in the year of peak inflation.

The author then attempts to explain the phenomenon by a number of simple statistical tests. They seem to suggest that

there is no difference between exchange-rate-based stabilizations and money-based stabilizations, which implies that policy changes may not be the primary cause of real economic activity. Wars and debt shocks seem to play an important role in the negative growth of output prior to stabilizations, which suggests that the mean reserval effect may be at play here.

I have no doubt about the validity of the stylized fact recognized in this paper. On the contrary, I think that the problem with the paper is that this stylized fact characterizes non-stabilization periods as well. There is considerable evidence from the real business cycle literature (Kydland and Prescott, 1990; Bachus and Kehoe, 1992; Fiorito and Kollintzas, 1994; Christodoulakis *et al.*, 1995) that output growth and inflation are negatively related, with a lead of inflation, and that output and prices are negatively related, with a lead of prices. Moreover, the above-mentioned findings of the ineffectiveness of policy measures and the mean reversal effect confirm my prior that supply shocks are the main force at work behind the stylized fact identified by the author.

To confirm the analysis, I have the following recommendations. Study data in non-stabilization periods. Use a fuller set of statistics: for instance, investigate serial correlation between the variables at various leads or lags. Get the concept of discretionary stabilizations into the picture, perhaps along the lines of Alesina and Perotti (1995). The effects of wars and heavy debt crises should be considered as supply shocks in the interpretation.

José Viñals
Banco de España and CEPR

I enjoyed reading the paper by Bill Easterly and find his results on output performance during successful inflation stabilization episodes most interesting and relevant. My comments will be divided into three parts. First, I will discuss how the paper fits into the literature on inflation stabilizations. Second, I will examine the robustness of the empirical results. And finally, I will deal with the interpretation of the results.

One of the key issues in modern macroeconomics is the optimal design of disinflationary policies, both in moderate- and in high-inflation countries. While all macro theorists agree that there is not yet a fully satisfactory theory of money that can adequately explain why society finds it costly to live with

inflation, there is nevertheless the common perception that, other things being equal, low rates of inflation are preferable to high rates of inflation. Of course, the problem is that other things are not equal and that bringing inflation down may affect for a period of time the behaviour of certain real variables (like output) about which society also cares.

The literature on the optimal design of disinflationary policies has reached the general conclusion that in moderate-inflation countries it is hard to avoid enduring some short-run output costs when trying to lower inflation. Nevertheless, some research and experience suggests that forceful, rapid and credible disinflationary strategies are more successful in bringing down inflation at lower short-term output costs. As far as high-inflation countries are concerned, there is some consensus that stopping chronic inflation is costly either earlier or later in the disinflationary period, depending on whether there are 'money' or 'exchange rate' based stabilizations. Only in extreme cases of hyperinflation does it seem possible to bring inflation down significantly, with zero or little short-run output cost.

The paper by Easterly challenges the traditional pessimistic view about the short-run costs of bringing down inflation, and concludes, at least for high-inflation countries, that: (1) in practice, durable disinflation has been accompanied by better, not worse, output performance; (2) this effect has been fairly immediate, following the implementation of stabilization plans; and (3) the initial output expansion has not been followed by a contraction later on, as inflation was being abated.

These results come from analysing a sample containing 28 successful inflation stabilization episodes, where success is defined as inflation falling below 40%, during at least two consecutive years. The methodology used is based not on sophisticated econometrics, but rather on the presentation of a number of graphs describing the average behaviour of certain variables over time, and several regressions.

I think that, in spite of this simple methodology, the author has been very careful in taking into account some of the most important criticisms that might be made, ranging from the dating of inflation stabilization episodes to accounting for relative growth effects. Still, while I believe that the empirical evidence provided by Easterly is convincing overall, I would like to raise a few points about the robustness of his results.

A first point concerns the sample selection procedure used in the paper. The author selects those episodes where disinflationary programmes were successful in bringing down inflation over a certain period, and the result that stopping inflation comes with better (and not worse) output performance relies on this selection. Consequently, he explicitly excludes those episodes where stabilization programmes were introduced and subsequently abandoned (thus leading to an inflation rebound) because they caused short-run output costs that made them politically unsustainable.

While taking these excluded episodes into account would certainly not alter Easterly's conclusion that successful inflation stabilizations are expansionary, it might increase our doubts that attempting to lower inflation will be expansionary in the short run. In this regard, an interesting issue is what makes some stabilization programmes more successful than others in bringing high inflation down at low output costs.

A second point is that, while the author relies on 'averaging procedures' to support his conclusions, he is careful to point out that disinflations are not always associated with an early output expansion. I would like to shed some light on what 'not always' means with the help of the individual country-specific data, so as to extract some of the 'country-by-country' richness which gets obscured when averaging. I find that the output response in year 1 is favourable (relative to output performance before the introduction of the stabilization plan) in 18 out of the 28 cases considered, and unfavourable in 10 cases. This suggests that a short-run worsening of output conditions happened more often than the means and medians represented in the figures lead us to believe. Furthermore, when we investigate what happens not just in year 1 but, say, over the first three years after the introduction of the stabilization programme, the outcome is still unfavourable in 6 out of the 10 cases mentioned above.

My third point relates to the averages or regressions in Tables 1 and 2. The 'equation' behind Table 1 has only dummies as explanatory variables. This approach can be criticized as using an unspecified equation which is subject to the omitted variables bias problem. This is, I think, exemplified by the fact that the inclusion of 'war and debt' variables in Table 2 changes the coefficients of the dummy variables (although in a direction favourable to the author's results). The problem is that we do not know how the coefficients would change if other economic

variables were included in the equation. In short, my point is that country-specific effects could be important, and that the averaging procedure used by Easterly does not fully exploit the wealth of information contained in his dataset.

Let me turn now to the interpretation of Easterly's results. Even if we were to accept the result that successful inflation stabilizations in high-inflation countries are expansionary in the short run, this would help policy-makers in high-inflation countries to design stabilization programmes only if it were clearly understood why this happens. Thus, the key question is what sort of causality is embodied in the results and, in particular, what are the specific channels through which aggregate demand and supply are affected during inflation stabilization episodes?

It is evident that, if Easterly's results are correct, whatever aggregate demand does, supply must expand, and furthermore this expansion must dominate any demand effects so as simultaneously to deliver better inflation and output performance. In the latter part of the paper, the author tries to shed some light on this important issue by exploring how the aggregate supply and demand schedules are affected during inflation stabilization episodes. Nevertheless, his findings, although informative, fall short of being a complete and fully satisfactory explanation.

As far as the supply side is concerned, his main conclusion is that the immediate output supply expansion is due to an increase in total factor productivity. Still, since total factor productivity is derived as a residual, it is a sort of black box, and while we can conjecture that ending high inflation helps economic efficiency, we do not know exactly why. As for demand, neither consumption nor investment is found to lead the recovery after inflation stabilization, and while there is some evidence of the favourable effects associated with the 'end of wars' and 'debt relief', this is not enough to explain all cases.

My own impression is that a more successful method of identifying the main channels through which stabilization programmes operate is the systematic comparison of in-depth case studies. For this, it is necessary to investigate in detail in each of the selected countries the nature of the inflationary process and the key components of stabilization programmes, and to incorporate several other macroeconomic variables in the analysis (e.g. real exchange rates and real interest rates).

To conclude, Easterly's empirical results are very interesting

by themselves. They help us to narrow the set of models linking inflation and output behaviour in the short run which are consistent with the data, and they are certainly good news for policy-makers. However, the results still need to be explained satisfactorily if policy-makers are to benefit from them when designing inflation stabilization programmes.

▬

General discussion

A substantial part of the discussion was on methodological issues. The definition of a crisis as a period of sustained inflation above 40% per annum drew considerable attention. Klaus F. Zimmermann thought that the choice of the 40% threshold was arbitrary and the sample size small, especially in the face of a potential selection bias generated by concentrating on successful stabilizations. Alan Kirman pointed out that choosing a lower threshold would have picked up more observations in the sample, making the results more robust. Paul Geroski felt that, while stabilizations from crises of this magnitude may well be expansionary, it was worth examining whether this relationship was preserved if alternative thresholds, especially lower ones, were used to identify crises. William Easterly responded by drawing upon some previous research, which suggested that the results were not as strong if lower thresholds were used.

Alan Manning questioned the quality of the data for some of the countries in the sample, and drew attention to the possibility of large measurement errors. These, he felt, could have biased the results in a significant way. For instance, if real output growth is derived as nominal output growth minus the inflation rate, and there are large measurement errors in each, the correlation between real output growth and inflation could be spuriously negative. As the method of sample selection, looking at episodes in which there are sharp upswings in inflation, is likely to pick up precisely those countries for which the problem of measurement error is particularly severe, this was a serious shortcoming. Alan Kirman argued that the statistical problems of measurement are compounded by the actual disruption of some production activity in high-inflation economies. Frequently shops suspend trading, and people hold on to resources rather than produce, when inflation is high and uncertain. He

was also concerned about the averaging process used in the analysis, which attached equal weights to all observations in a sample that included some peculiar cases.

Andres Velasco argued that it is stabilizations that are *ex ante* non-credible, and for that reason eventually unsuccessful, which tend to be most expansionary. This could happen if the interest rate effect associated with the supposedly temporary fall in inflation prompts people to bring consumption forward in time. Some of the episodes in the sample (in particular Chile) were instances of unsuccessful stabilization, and could have been expansionary purely for that reason. This should lead us to look at the expansionary effect as a sign of failure rather than a virtue of stabilization programmes.

André Sapir wondered if the main result (that stabilizations tend to be expansionary) could be an artefact of the manner in which the model located the origin of stabilization programmes in relation to the time series of macro variables. In the model, the initiation of a stabilization programme was taken to coincide with the peak in the inflation series. Suppose, instead, that stabilization programmes begin earlier or, equivalently, that inflation peaks one or more periods after a stabilization programme is put in place. Given the statistically observed decline in output in the years just before the inflation peak, one might then legitimately conclude that stabilizations are contractionary, at least in the initial stages. William Easterly clarified that other information on the timing of stabilization programmes, such as the date of new policy announcements, did not suggest that stabilizations start very much earlier than the analysis claimed.

Moving on to the policy implications, Francesco Giavazzi noted that the suggested relationship between inflation reduction and output growth was similar in spirit to the idea that public debt reduction tends to boost output. The empirical verification of these claimed relationships was interesting as a statistical exercise, but their policy significance was not very clear. The more interesting policy issue was how one reduces inflation. In a similar vein, Paul Grout thought that the result was akin to finding out that winning a lottery makes one rich: that, by itself, says little about the wisdom of buying lottery tickets. For a more complete judgement, one needed to look not only at successful stabilizations, but at the unsuccessful ones as well. He also speculated on the difficulty of determining if the

success of a particular stabilization was due to sound policy, or just to good fortune.

Axel Weber felt that, when considering inflation reduction, it was important to examine the underlying causes of inflation. Was it systemic in the sense of being a consequence of wage indexation schemes and the like, or did it have monetary or fiscal origins? Further, the analysis showed that inflation reduction from very high levels to moderate levels is expansionary, but that further reduction from intermediate to low levels could be costly in terms of output: this implies that there must exist some optimal degree of inflation reduction from the viewpoint of maximizing output. William Easterly concurred, and pointed out that many stabilization programmes eased their anti-inflationary efforts after they succeeded in reducing inflation below 20%.

REFERENCES

Aghion, P. and G. Saint-Paul (1993). 'Uncovering Some Causal Relationships Between Productivity Growth and the Structure of Economic Fluctuation: A Tentative Survey', NBER Working Paper No. 4603.

Alesina, A. and A. Drazen (1991). 'Why Are Stabilizations Delayed?', *American Economic Review*.

Alesina, A. and R. Perotti (1995). 'Fiscal Adjustment: Fiscal Expansions and Adjustments in OECD Countries', *Economic Policy*.

Bachus, D. K. and P. J. Kehoe (1992). 'International Evidence on the Historical Properties of Business Cycles', *American Economic Review*.

Ball, L. (1993). 'What Determines the Sacrifice Ratio?', NBER Working Paper No. 4306.

Barro, R. J. (1995). 'Inflation and Economic Growth', *Bank of England Quarterly Bulletin*.

Bertola, G. and A. Drazen (1992). 'Trigger Points and Budget Cuts: Explaining the Effects of Fiscal Austerity', *American Economic Review*.

Blomstrom, M., R. E. Lipsey and M. Zejan (1993). 'Is Fixed Investment the Key to Economic Growth?', NBER Working Paper No. 4436.

Bogetic, Z., D. Dragutinovic and P. Petrovic (1995). 'Anatomy of Hyperinflation and the Beginning of Stabilization in Yugoslavia 1992–1995', mimeo.

Bruno, M. and W. Easterly (1995). 'Inflation Crises and Long-run Growth', NBER Working Paper No. 5209.

Caballero, R., E. Engel and J. Haltiwanger (1995). 'Plant Level Adjustment and Aggregate Investment Dynamics', paper presented at the Brookings Panel on Economic Activity.

Calvo, G. A. and C. A. Vegh (1994). 'Inflation Stabilization and Nominal Anchors', *Contemporary Economic Policy*.

Center for Defense Information (1995). *The World at War Today*, Washington, DC.

Chang, K.-N. (1958). *The Inflationary Spiral: The Experience in China, 1939–1950*, Technology Press of MIT, Cambridge, MA.

Chou, S.-H. (1963). *The Chinese Inflation, 1937–1949*, Columbia University Press, New York.

Christodoulakis, N., S. Dimelis and T. Kollintzas (1995). 'Comparisons of Business Cycles in the EC: Idiosyncracies and Regularities', *Economica*.

De Cecco, M. and F. Giavazzi (1993). 'Inflation and Stabilization in Italy: 1946–1951', in R. Dornbusch, W. Nolling and R. Layard (eds.), *Postwar Economic Reconstruction and Lessons for the East Today*, MIT Press, Cambridge, MA.

De Gregorio, J. (1992). 'The Effects of Inflation on Economic Growth', *European Economic Review*.

—— (1993). 'Inflation, Taxation and Long-Run Growth', *Journal of Monetary Economics*.

—— and F. Sturzenegger (1994). 'Credit Markets and the Welfare Costs of Inflation', NBER Working Paper No. 4873.

Dixit, A. K. and R. S. Pindyck (1994). *Investment under Uncertainty*, Princeton University Press, Princeton, NJ.

Dollar, D. (1994). 'Macroeconomic Management and the Transition to the Market in Vietnam', *Journal of Comparative Economics*.

Dornbusch, R. (1981). 'Critique', in A. Razin and J. M. Flanders (eds.), *Development in an Inflationary World*, Academic Press, New York.

—— and S. Fischer (1986). 'Stopping Hyperinflations Past and Present', *Weltwirtschaftliches Archiv*.

Dornbusch, R., F. Sturzenegger and H. Wolf (1990). 'Extreme Inflation: Dynamics and Stabilization', *Brookings Papers on Economic Activity*.

Drazen, A. and V. Grilli (1993). 'The Benefit of Crises for Economic Reforms', *American Economic Review*.

Drazen, A. and E. Helpman (1988). 'Stabilization with Exchange Rate Management Under Uncertainty', in E. Helpman, A. Razin and E. Sadka (eds.), *Economic Effects of the Government Budget*, MIT Press, Cambridge, MA.

—— (1990). 'Inflationary Consequences of Anticipated Macroeconomic Policies', *Review of Economic Studies*.

Easterly, W. and K. Schmidt-Hebbel (1994). 'Fiscal Adjustment and Macroeconomic Performance: A Synthesis', in W. Easterly, C. A. Rodriguez and K. Schmidt-Hebbel (eds.), *Public Sector Deficits and Macroeconomic Performance*, University Press, New York.

Edwards, S. and A. C. Edwards (1987). *Monetarism and Liberalization: The Chilean Experiment*, Ballinger, Cambridge, MA.

Eichengreen, B., A. Rose and C. Wyplosz (1995). 'Speculative Attacks on Pegged Exchange Rates: An Empirical Exploration with Special Reference to the European Monetary System', CEPR Working Paper No. 1060.

Fiorito, R. and T. Kollintzas (1994). 'Stylized Facts of Business Cycles in the G7 from a Real Business Cycle Perspective', *European Economic Review*.

Fischer, S. (1993). 'The Role of Macroeconomic Factors in Growth', *Journal of Monetary Economics*.

Giavazzi, F. and M. Pagano (1990). 'Can Severe Fiscal Contractions be Expansionary? Tales of Two Small European Countries', *NBER Macroeconomics Annual*.

—— (1995). 'Non-Keynesian Effects of Fiscal Policy Changes: International Evidence and the Swedish Experience', mimeo.

Harberger, A. C. (1981). 'In Step and Out of Step with the World Inflation: A Summary History of Countries, 1952–76', in A. Razin and J.M. Flanders (eds.), *Development in an Inflationary World*, Academic Press, New York.

—— (1988). 'World Inflation Revisited', in E. Helpman, A. Razin and E. Sadka (eds.), *Economic Effects of the Government Budget*, MIT Press, Cambridge, MA.

Hayri, A. (1994). 'Croatia: Before and After Stabilization', mimeo.

Hoffmaister, A. and C. Vegh (1995). 'Disinflation and the Recession Now Versus Recession Later Hypothesis: Evidence from Uruguay', mimeo, IMF, October.

IMF (various years). *International Financial Statistics*, Washington, DC.

International Currency Analysis (various years). *World Currency Yearbook*, Brooklyn, New York.

Jones, L. E. and R. E. Manuelli (1993). 'Growth and the Effects of Inflation', NBER Working Paper No. 4523.

Kamin, S. (1987). 'Devaluation, External Balance and Macroeconomic Performance in Developing Countries', Ph.D. thesis, MIT, Cambridge, MA.

Kiguel, M. A. and N. Liviatan (1988). 'Inflationary Rigidities and Orthodox Stabilization Policies: Lessons from Latin America', *World Bank Economic Review*.

—— (1992a). 'Stopping Three Big Inflations (Argentina, Brazil, and Peru)', World Bank Policy Research Working Paper No. 999.

—— (1992b). 'Business Cycle Associated with Exchange Rate-Based Stabilization', *World Bank Economic Review*.

Krugman, P. (1994). *Peddling Prosperity: Economic Sense and Nonsense in the Age of Diminished Expectations*, Norton, New York.

Kydland, F. E. and E. C. Prescott (1990). 'Business Cycles: Real Facts and a Monetary Myth', *Federal Reserve Bank of Minneapolis Quarterly Review*.

League of Nations (1926). *Memorandum on Currency and Central Banks 1913–1925*, Vol. I, Geneva.

Levine, R. and S. J. Zervos (1993). 'What We Have Learned About Policy and Growth from Cross-Country Regressions', *American Economic Review* (Papers and Proceedings).

Maddison, A. (1989). *The World Economy in the 20th Century*, Development Centre of the OECD, Paris.

Makinen, G. E. (1986). 'The Greek Hyperinflation and Stabilization of 1943–46', *Journal of Economic History*.

Mitchell, B. R. (1978). *European Historical Statistics, 1750–1970*, Columbia University Press, New York.

Nehru, V. and A. Dhareshwar (1993). 'A New Database on Physical Capital Stock: Sources, Methodology, and Results', *Revista de Analisis Economico*.

Nogaro, B. (1948). 'Hungary's Recent Monetary Crisis and Its Theoretical Meaning', *American Economic Review*.

Pindyck, R. S. and A. Solimano (1993). 'Economic Instability and Aggregate Investment', *NBER Macroeconomics Annual*.

Rebelo, S. (1994). 'What Happens When Countries Peg Their Exchange Rates? The Real Side of Monetary Reforms', mimeo.

—— and C. A. Vegh (1995). 'Real Effects of Exchange-Rate-Based Stabilization: An Analysis of Competing Theories', mimeo., University of Rochester and International Monetary Fund.

Reinhart, C. and C. Vegh (1995). 'Do Exchange-Rate-Based Stabilization Plans Carry the Seeds of their own Destruction?' mimeo., International Monetary Fund.

Roldós, J. (1993). 'On Credible Disinflation', IMF Working Paper WP/93/90.

Sachs, J. (1989). 'Developing Country Debt and Economic Performance', National Bureau of Economic Research Project Report Series, University of Chicago Press, Chicago, IL.

—— (1994). 'Russia's Struggle with Stabilization: Conceptual Issues and Evidence', Proceedings of the World Bank Annual Conference on Development Economics.

——, A. Tornell and A. Velasco (1996). 'The Collapse of the Mexican Peso: What Have We Learned?', *Economic Policy*, this issue.

Sahay, R. and C. Vegh (1995). 'Inflation and Stabilization in Transition Economies: A Comparison with Market Economies', IMF Working Paper WP/95/8.

Sargent, T. J. (1982). 'The Ends of Four Big Inflations', in R. E. Hall (ed.), *Inflation: Causes and Effects*, University of Chicago Press, Chicago, IL.

Schwartz, H. (1954). *Russia's Soviet Economy*, Prentice Hall, New York.

Serven, L. and A. Solimano (1993). 'Debt Crisis, Adjustment Policies and Capital Formation in Developing Countries: Where Do We Stand?', *World Development*.

Sivard, R. L. (1993). *World Military and Social Expenditure 1993*, WMSE Publications, Leesburg, VA.

Svennilson, I. (1954). *Growth and Stagnation in the European Economy*, United Nations Economic Commission for Europe, Geneva.

Vegh, C. A. (1992). 'Stopping High Inflation: An Analytical Overview', *IMF Staff Papers*.

Wolf, H. C. (1993). 'The Lucky Miracle: Germany 1945–51', in R. Dornbusch, W. Nolling and R. Layard (eds.), *Postwar Economic Reconstruction and Lessons for the East Today*, MIT Press, Cambridge, MA.