Disinflations in Latin America and the Caribbean: A Free Lunch?

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Abstract

This paper challenges the conventional view according to which disinflations in LAC–even from low and moderate peaks– have been carried out at no cost to output. After suggesting a new methodology that allows for long-lived effects and inflation inertia when measuring costs of disinflations, large sacrifice ratios are obtained for the 1970s and 80s. Nevertheless, a new puzzle arises: disinflation costs in the 90s are negative, even with the new methodology. It is shown that an unusual combination of circumstances – i.e. capital inflows, structural reforms and the peculiar recent inflation history– can explain that fortunate result. Moreover, it is shown that LAC episodes exhibit a larger speed than G7 experiences. That speed differential explains why disinflation costs in developed nations are on average larger than LAC's.

Keywords: Inflation, Growth, Disinflation costs.

JEL Classifications: E31, E32, E52, F43 and E00

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"The evidence suggests that...such [moderate] inflations can be reduced only at a substantial short-term cost to growth." [13, Dornbusch, R. and S. Fischer (1993) p.1]

"There are little evident output costs of disinflation in the stabilization from moderate inflation".[6, Burton, D. and S. Fischer (1997) p.18]

1 Introduction

Driven by the infamous inflation history of the 70s, 80s and early 90s in Latin-America and the Caribbean (LAC)[1], economists studied exhaustively the region's stabilization attempts from *high* inflation rates[2]. Nevertheless, during the 1990s, LAC countries undertook what would turn out to be a very successful disinflationary process. The accomplishment is better appreciated when noting that, since 1997, more than half of the countries have had annual inflation rates below 10% and the average has been below 15%, –a combination of events that had not occurred since 1971. With this new inflation scenario, the relevant scope of present and near future disinflations in LAC will be in the low to moderate inflation peak range. Given this fact, it is striking to observe how little attention has been devoted by the literature to the behavior of LAC economies during such disinflations.

Furthermore, some papers that include LAC disinflations in their analysis, find a puzzling result: disinflations have been, on average, a costless process in terms of output. This outcome challenges the conventional wisdom shared by most economists: *" When economies reduce their rate of inflation, they almost always experience a period of high unemployment and low output"* (Mankiw, 2004, p. 523). Indeed, multiple theoretical models embrace the view that reducing inflation is a costly process, starting with contributions by Fischer (1977) and Taylor (1980), and going up to more recent ones like Mankiw and Reis (2002). At the empirical level, costless disinflations are also inconsistent with the results obtained for OECD countries by Ball (1994) or more recently Zhang (2001) and Boschen and Weiss (2001), where substantial output costs are associated to disinflations. Disentangling the puzzle of costless disinflations, crucial for LAC policy-makers, is one of the main goals of this article. More generally, the focus of the paper is on the reaction of

[1] In this paper "LAC", the "sample of countries" or the "region" corresponds to 18 countries: Argentina, Bolivia, Brazil, Costa Rica, Chile, Colombia, Dominican Republic, Guatemala, Honduras, Nicaragua, Jamaica, Peru, Uruguay, Paraguay, Venezuela, Ecuador, El Salvador and Mexico.

[2] For an excellent literature review see Calvo and Végh (1999).

output during disinflations and the (output based) costs' quantification of bringing down inflation rates from moderate and low peaks in LAC.

The remainder of the paper begins by discussing the inflationary background of LAC in section 2; A sample of disinflations is obtained and analyzed. Evidence showing that disinflations in LAC were much faster than G7 episodes will be one of the crucial conclusions.

Section 3 focuses on the behavior of the GDP *growth* rates during the episodes. A significant growth slowdown during the disinflations of the 70s and 80s, but not in the 90s, is found. Interestingly, the evidence for the 90s does not point at a downturn in output. Moreover, I find that in the earlier decades the disinflationary shocks had long-lived effects on output and that the initial growth slowdown occurred simultaneously with the inflation peak.

In section 4, the last two facts are studied in more detail: They are important because the traditional method to calculate the disinflation costs (Ball 1994) omits them, leading to an underestimation of the sacrifice ratio (SR), that is, the output losses per inflation point. In particular, Ball's method (i) does not allow for long-lived effects on the output level and (ii) accounts only for the output losses in the periods *following* the inflation peak, which is problematic if the recession starts earlier[3]. Here, I propose a new methodology to calculate the disinflation costs allowing for those characteristics.

In the final part of section 4, it is shown that with the alternative technique the cost of disinflations is not negligible in the 70s and 80s. The relevance of such finding is highlighted under the optic of the puzzling inference provided elsewhere in the literature, suggesting that LAC SRs are insignificant. Moreover, I also find that the disinflation costs of the 90s are negative, independently of the technique used to calculate them. A new puzzle emerges: why are the disinflation costs of the 90s negative? The answer to that question is deferred to section 6.

In section 5, I assess what variables explain the SRs. The speed of the disinflation, some measures of structural reforms, the inflation history and the real exchange rate are found to be significant determinants of the SR's variability.

In the first part of section 6, the puzzling negative SRs of the 90s are further explored. The explanation I give to this puzzle consists of two parts. First the SR are corrected for the mismeasurement caused by part of the structural reforms. The idea is that if those reforms affected potential output (as well as actual output), the standard methodologies would lead to an additional

[3]Point (ii) is not likely to be quantitatively important with quarterly data, which is the main frequency used by Ball (1994). With annual data, used in our LAC sample, not using (ii) constitutes a more substantial omission.

underestimation of the SR. Correcting for this factor leads to disinflation costs that are on average positive, although still very small. Second, a particular initial condition and a common external shock –represented respectively by the recent inflation past and the huge capital inflows to the region during the early 90s–, are able to explain the remaining part of the puzzle. Intuitively, the recent inflation past (i.e. very high inflation rates) reduces the disinflation costs by eroding the nominal rigidities, whereas the capital inflows appreciate the real exchange rate facilitating the disinflations through the effect on the inflation of tradable goods.

Nevertheless, even after the methodology for calculating disinflation costs is corrected, LAC SRs are consistently smaller than G7's. In the final part of section 6, I suggest that the speed differential among the regions is a plausible explanation to the contrasting magnitudes in the disinflation costs of the two regions. The hypothesis is also quantitatively tested.

Finally, part 7 concludes and provides policy-implications.

2 Disinflations in LAC

In this section, a brief historical background on LAC's inflation is given as a prelude to a discussion on the methodologies to select episodes. Based on the lessons from that analysis, a selection rule to identify disinflations is proposed and the episodes are identified. The relevant stylized facts and summary statistics that emerge from that sample are then analyzed.

2.1 Selection of Episodes I: General framework and LAC's inflation background

Has LAC really entered a new inflationary era? Since 1997 –and for the first time since 1971–, LAC's average inflation has been below 15% and the median has remained in single digits. As figure 1 shows, the dark inflation period peaked in 1990 when half of the nations had inflation rates above 40%, the average was 1152% and all the countries had annual price increases above 15%.

In 2002, three countries of South America –Argentina, Uruguay and Venezuela– underwent enormous economic and political crises. Nevertheless, their inflation rates at the end of the year did not resemble the horrific statistics of the earlier decades: Argentina experienced an inflation rate of 25.9%, Uruguay ended up with a price increase rate of 14%, whereas Venezuela's reached 22.4%.[4] All the remaining nations of LAC had inflation rates below 15% and, in fact, more than a

[4] Annual averages as calculated by the IFS.

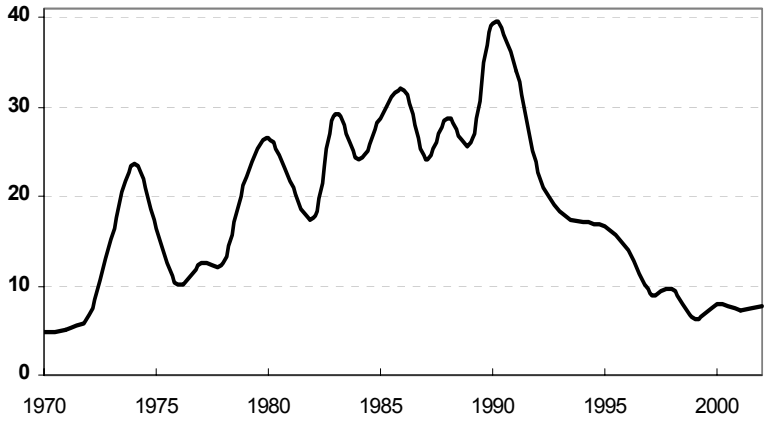

Figure 1: Median Inflation rate in LAC 1970-2002. Source: Author's calculations based on International Monetary Fund, *International Financial Statistics*, various issues.

dozen exhibited rates below 10%. Even after three countries experienced crises of a very important magnitude, triple digit inflation rates have not made a comeback[5]. Furthermore, Hofstetter (2003b) shows that the percentage of disinflations that remained sustainable –defined as the ability to maintain inflation below the episode's inflation peak, during the 4 years following the end of the disinflation– was 85.7% in the 90s, compared with the 37.4% of the 70s and 80s[6]. This statistic, combined with the historical description summarized above, suggest that indeed the relevant present and near future disinflationary range will mostly be constrained to low and moderate peaks.

So far, the terms "low" and "moderate" have been used very loosely. But, what exactly are low and moderate inflation rates? There is no agreement among economists on the exact cut-off point between moderate and high or crisis inflation rates. Dornbusch and Fischer (1993, updated by Burton and Fischer 1998), define *moderate* episodes as periods of at least 3 years with inflation in the 15-30% range. Fischer *et al.* (2002) regard the 25-50% range as *moderate to high*, whereas Bruno and Easterly (1998) define *inflation crisis* episodes as cases where annual inflation is above 40% for two consecutive years. This paper –consistent with both the *upper* limit for moderate inflations set by Dornbusch and Fischer and with the *lower* bound set as the starting point of inflation crises by Bruno and Easterly – will consider disinflation episodes with peaks of up to 30%, using a trend version of inflation[7]. "Low" and "moderate" disinflation peaks will be bounded by

[5] Moreover, the *high inflation crisis* threshold (40%) was not reached by any of the countries which, according to Bruno and Easterly (1998), means that the probability of returning to inflation crisis rates is very slim.

[6] This result is obtained with the same sample of episodes defined below.

[7] Bruno and Easterly (1998) stress that their definition of *above moderate* inflation is roughly consistent with Dornbusch and Fischer's moderate rates. The reason is that the former use December to December inflation rates,

that limit.

Having set the upper limit to inflation, the disinflations have to be selected. The literature has followed two alternative approaches: The first one, or *episodic approach*, consists of identifying disinflations (or stabilizations) based on the announcement by the economic authorities of an *attempt* to disinflate, independently of the outcome of those policies. The second alternative, or *rules-based approach*, grounds the episode's definition on the *actual* behavior of the inflation rate[8]. The main drawback of the former is that –in the search for periods where the authorities might have put in place (or announced) anti-inflationary programs– it implies often controversial verdicts, especially if the programs are short-lived or not-credible[9]. In addition to that, the definition of the starting and ending dates is also extremely subjective. On the other hand, the main critique to the rules-based perspective is that it does not allow to study what happens when economic authorities try to disinflate but do not succeed.

This paper will follow the rules-based approach. Given that the paper's focus is on less well studied disinflations and that the timing will be crucial in the analysis, such strategy appears to be the optimal. From an interpretative standpoint, however, it is important to keep in mind that the disinflations will be identified by their *outcome*; Any failed disinflationary attempt will not be registered in the sample.

2.2 Selection of Episodes II: The rule

The 30% peak will be identified on a trend version of the inflation rate, built following the method proposed by Ball (1994), with the purpose of smoothing out short-run supply shocks: trend inflation in year t is the average of the annualized inflation rates of the four quarters in that year, the two last quarters of year $t-1$ and the two first quarters of $t+1$.

Next, using the trend inflation series, the peaks and troughs marking the starting and ending dates of the epsiodes are identified. In terms of notation, the starting dates (inflation peaks) will be labeled as period 0 and the ending dates (inflation troughs) as period T. The peaks (troughs) are years where annual inflation is larger (smaller) than the adjacent observations. A disinflation episode starts at the peak (0) and ends at the trough (T) under three premises: (i) The maximum

whereas the latter work with a smoother version, namely the average year over year inflation rate.

[8] The first approach has been followed among others by Kiguel and Leviatan (1992) and Calvo and Végh (1999), whereas the second one is used in Ball (1994), Bruno and Easterly (1998), Easterly (1996) and Hamman (2001).

[9] That explains why most studies using this strategy rely on the same well examined set of episodes, leaving out of the sample other less well known stabilizations.

peak allowed is 30%; (ii) the inflation rate must drop by at least 1.5% points between peak and trough, and (iii) the inflation has to fall 1/4 or more from its initial level (that is if the peak is 28% we require inflation to drop at least to 21%).

This disinflation definition is similar to Ball's (1994). One main difference is that Ball only considers peaks below 20%. Nevertheless, given this paper's interest in studying moderate peaks, I have opted for a higher peak limit. Furthermore, Ball does not include requirement *iii.* That omission might be irrelevant with low peaks, but with a 30% peak, a fall in inflation to 28.5% would be classified as a disinflationary episode; This can hardly reflect any attempt by authorities to bring inflation down and might be the consequence of short-run supply shocks. To address this concern, condition *iii* is imposed[10]. This constraint plays an important role with higher inflation peaks, whereas for low peaks, *ii* will still be the determinant factor[11].

2.3 Selection of Episodes III: Application of the rule

The rule is applied to a sample of 18 countries of LAC, covering the period 1973-2000. The countries are: Argentina, Bolivia, Brazil, Costa Rica, Chile, Colombia, Dominican Republic, Guatemala, Honduras, Nicaragua, Jamaica, Peru, Uruguay, Paraguay, Venezuela, Ecuador, El Salvador and Mexico. Besides the geographical constraint of belonging to LAC, they were selected for being not-dollarized, market driven economies with populations above 2 million[12]. The choice of 1973 was motivated on the basis of avoiding structural changes related to the oil shock and the fall of the Bretton-Woods exchange rate system[13].

The application of the rule leads to a sample of 41 episodes. Nevertheless, 3 of them were not over yet in 2000 (Colombia 97-, Chile 1990- and Honduras 1995-). They are discarded for the analysis as it will be crucial to have data on what happens during and after each episode. On the remaining 38, a detailed historical research was performed with the goal of establishing whether

[10] I have experimented with different numbers for this requirement. A1/4 fall in inflation appears to be the right choice to separate price variations that are unrelated to traditional disinflations. Episodes that would be included under less stringent requirements are available from the author upon request. For the LAC case we are discarding 7 (out of 48) disinflations by the inclusion of *iii.* For G7 nations, 1 out of 24 episodes is discarded when *(iii)* is introduced.

[11] In particular, condition *(ii)* is only binding for inflation peaks below 6%. In our LAC sample, this requirement would not be necessary, as all episodes have inflation peaks above 6%. Nevertheless, for the G7 sample, which will be used throughout the paper as a benchmark, the condition is operative in various episodes.

[12] The dollarizations of El Salvador and Ecuador occurred late in the sample and do not interfere with the analysis. On the other hand, despite complying with all requirements, Haiti is not included in the sample. The extreme low income of the country, political instability and questionable reliability of the data, make it hard to analyze in a pooled crossed country sample.

[13] Reinhart and Rogoff (2002) suggest that the impact of the "Regime change" of the early 70's has been overstated. It might be interesting for future research to extend the sample to a longer period.

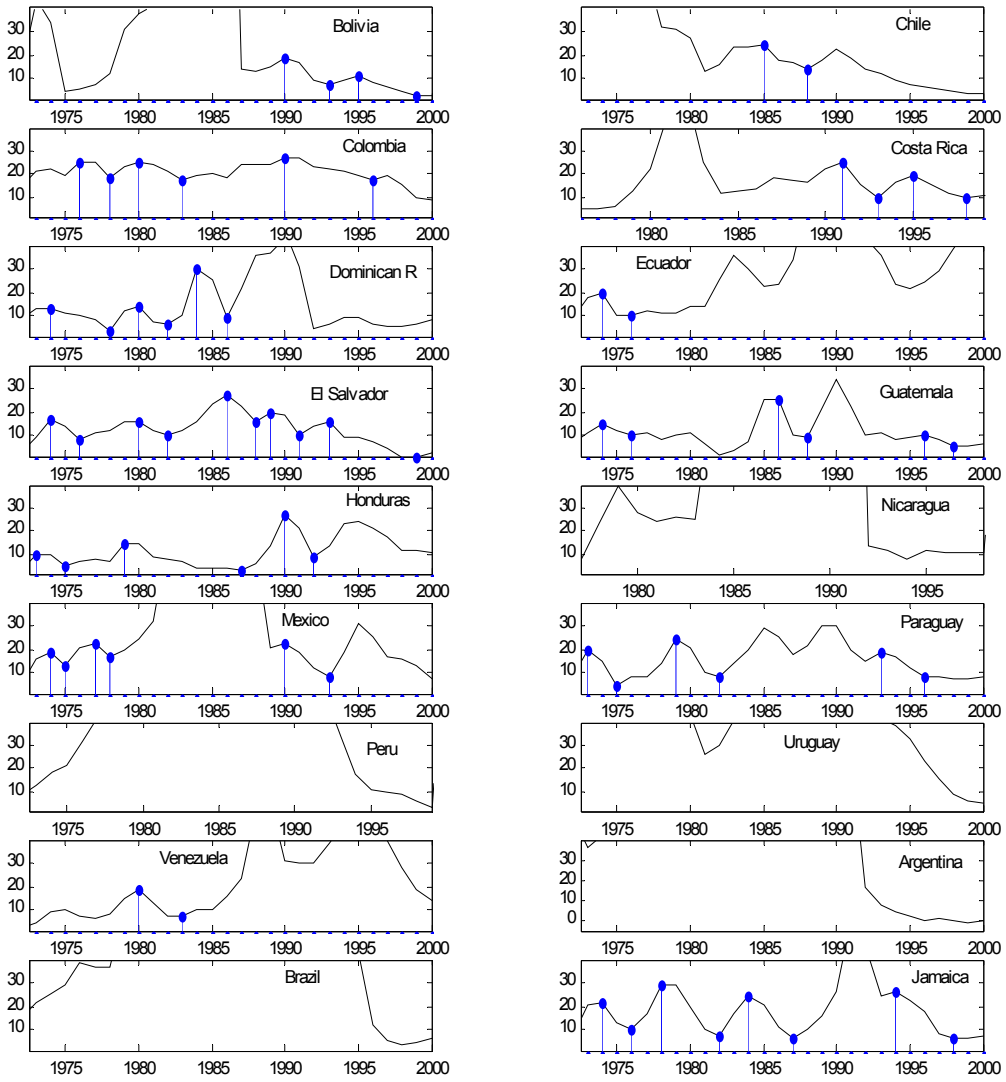

Figure 2: Disinflation episodes in LAC, 1973-2000. Source: See appendix.

the monetary authorities were indeed pursuing disinflationary policies. The objective is that the rule to identify episodes, combined with the historical revision, will discard disinflations driven by supply shocks or, in general, not propelled by the actions of monetary authorities. Based on that goal, 4 episodes were discarded after the historical records revision. Including them would obscure the phenomena this paper is interested in studying, i.e., what happens when monetary authorities disinflate from low or moderate peaks. The 4 discarded episodes are: (i) Paraguay 85-87: there does not even appear to be a disinflation, when measured with end of year inflation rates; the smoothing technique in this case joined two adjacent peaks into one, generating a non-existent disinflation. (ii) Venezuela 75-77: The disinflation is purely driven by temporary subsidies put in place after the

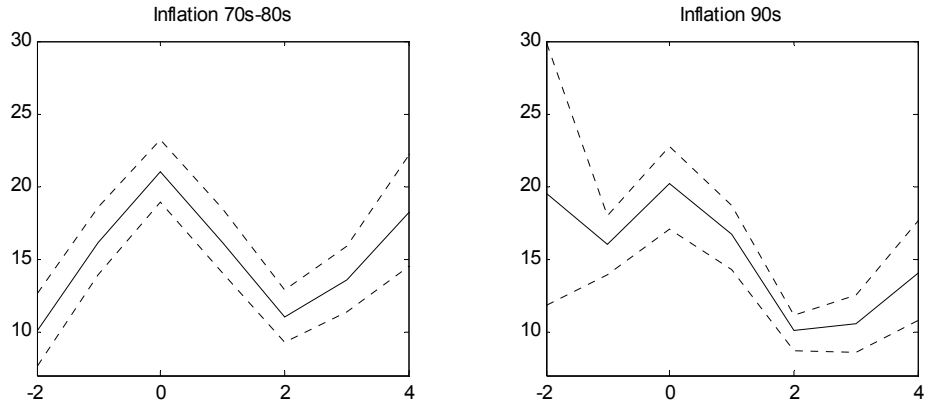

Figure 3: Inflation in 2-3 year long episodes. Dotted lines are 90% confidence intervals (see appendix for details).

oil boom. (iii) Dominican Republic 94-98: strong supply shocks, particularly weather shocks, are driving the results; (iv) Guatemala 80-82: the methodology of measuring the CPI was changed at the time, triggering a mis-measurement of the inflation rate.

Figure 2 presents the 34 final episodes on the trend inflation of the countries. Note that not all countries in the sample have disinflations in the range addressed by the paper.

2.4 Analysis of Episodes

Figure 3 plots the average inflation across episodes for the periods (-2,4), where again period 0 corresponds to the inflation peak. So, for instance, the inflation rate in period 1 of that figure is obtained by averaging the inflation rates in period 1 across episodes. Furthermore, the graphs are built only with 2-3 year long episodes. This allows to focus on the "representative disinflation" –almost 3/4 of the episodes in LAC last between 2 and 3 years–, and does not mix the data of what happened *during* and *after* the disinflations (at least not as much as would occur if we were to mix, for example, 1 and 5 year long episodes).

The most prominent fact that emerges from figure 3 is that the inflation rate does pick up considerably in the 70s and 80s after the episodes are over, whereas in the 90s the post-episode inflation rate appears to stabilize below the starting point. This is obviously another manifestation of the gains in the sustainability of disinflations in the latter decade (see Hofstetter 2003b for a closer look at the disinflation's sustainability).

Country	Initial Year	Final Year	Length	Initial Inflation	Drop of Inflation	% drop of Inflation	Speed
Honduras	1973	1975	2	9.7	4.3	45	2.2
Paraguay	1973	1975	2	19.6	14.6	74.5	7.3
Dominican Rep	1974	1978	4	13.3	9.6	72.2	2.4
Ecuador	1974	1976	2	19.4	9.2	47.7	4.6
El Salvador	1974	1976	2	17.3	8.4	48.6	4.2
Guatemala	1974	1976	2	14.7	4.1	28.2	2.1
Mexico	1974	1975	1	19.1	5.4	28.5	5.4
Honduras	1979	1987	8	14.5	11.4	78.8	1.4
Dominican Rep	1980	1982	2	14.3	8.1	56.6	4
El Salvador	1980	1982	2	15.9	5.1	32.2	2.6
Venezuela	1980	1983	3	18.6	10.6	56.8	3.5
El Salvador	1989	1991	2	19.5	9.6	49	4.8
Bolivia	1990	1993	3	19.3	11.7	60.7	3.9
El Salvador	1993	1999	6	15.7	14.9	94.6	2.5
Paraguay	1993	1996	3	18.9	10.1	53.5	3.4
Bolivia	1995	1999	4	11.2	8.1	72.3	2
Costa Rica	1995	1998	3	19.5	9.4	48.3	3.1
Guatemala	1996	1998	2	10	4.6	45.8	2.3
Jamaica	1974	1976	2	21.6	11.6	54	5.8
Colombia	1976	1978	2	25.2	7.1	28.4	3.6
Mexico	1977	1978	1	22.6	5.9	26.3	5.9
Jamaica	1978	1982	4	29	21.2	73	5.3
Paraguay	1979	1982	3	24.1	15.9	66.2	5.3
Colombia	1980	1983	3	24.9	7.7	31	2.6
Dominican Rep	1984	1986	2	29.6	20.4	69	10.2
Jamaica	1984	1987	3	24.9	18	72.1	6
Chile	1985	1988	3	24.1	9.6	39.7	3.2
El Salvador	1986	1988	2	27.3	11.2	41.1	5.6
Guatemala	1986	1988	2	25.6	15.7	61.4	7.9
Colombia	1990	1996	6	27	9.4	34.7	1.6
Honduras	1990	1992	2	26.7	17.8	66.7	8.9
Mexico	1990	1993	3	22.8	14.6	64.1	4.9
Costa Rica	1991	1993	2	24.8	14.7	59.4	7.4
Jamaica	1994	1998	4	26.2	19.2	73.3	4.8

Table 1. Disinflationary episodes in LAC.

Other characteristics of disinflations are more precisely explored in tables 1 and 2: Table 1 contains the length, initial inflation, change in the inflation rate and speed of each disinflationary episode. The top panel includes the disinflations from low peaks (<20%) and the bottom part the ones with peaks in the "moderate" range (20-30%). Complementing that, table 2 presents summary statistics that condense the most relevant aspects of average disinflations. There are two dimensions worth highlighting from the results in figure 3 and tables 1 and 2:

1. LAC vs G7. (based on peaks below 20%)[14]**.** G7 episodes are on average more than a year longer than LAC's. Moreover, given that the peaks of inflation in the countries of the G7 are on average lower, it is not surprising that the disinflation's size (in points) is also smaller in that region. As a corollary, the speed of G7 disinflations is dramatically smaller: 1.4 point per year

[14] "G7 episodes" referes to a sample of disinflations, identified using the same method applied to the LAC countries. It includes the following nations: France, Germany, Japan, UK, USA, Italy and Canada, covering the period 1973-2000. Application of the rule leads to a sample of 23 episodes.

compared to the 3.4 of LAC. In section 6, it will be shown that those speed differentials have real implications in terms of the disinflationary costs.

	LAC 1973:2000		G7 1973:2000
	Inflation Peaks Below 20%	Inflation Peaks 20%-30%	Inflation Peaks Below 20%
Number of episodes	18	16	23
In the 70's and 80's	11	11	14
In the 90's	7	5	9
Average Length of Episodes (in years)	2.9	2.8	4.2
In the 70's and 80's	2.7	2.5	4.3
In the 90's	3.3	3.4	4.1
Maximum Peak	19.6	29.6	19.3
Average Peak	16.1	25.4	9.3
In the 70's and 80's	16.0	25.4	12.2
In the 90's	16.3	25.5	4.7
Average drop in inflation	8.8	13.8	5.8
In the 70's and 80's	8.3	13.1	7.4
In the 90's	9.8	15.1	3.2
Percentage Average drop in inflation	55.2	53.8	68.2
In the 70's and 80's	51.7	51.1	62.5
In the 90's	60.6	59.6	77.0
Average Speed	3.4	5.6	1.4
In the 70's and 80's	3.6	5.6	1.8
In the 90's	3.1	5.5	0.8

Table 2. Disinflation's summary statistics.

2. The 70s and 80s versus the 90s: LAC countries were engaged in deep structural reforms during the late 80s and early 90s[15]. By separating the sample at that time, an important insight on the impact of those reforms and other shocks (not necessarily related to the reforms but in any case unique to the 90s) on the characteristics of disinflations is gained.

Table 2 shows that LAC disinflations of the 90s were longer and stronger. Indeed, without peak distinctions, episodes in the earlier decades lasted 10 quarters whereas in the 90s the average jumped to 13. Disinflations were also more pronounced in the 90s; This is manifested both in points dropped during the episode and in relative terms with respect to the initial peak. The fact that the peaks are virtually identical suggests that this difference in strength is not explained by distinct starting points.

[15] For a good review and quantification of that process, see Lora (2001).

3 The GDP growth during disinflations

Do disinflations actually cause output contractions? If they cause a GDP slowdown, what is its timing in relation to the disinflation's and how is the GDP growth recuperated? These questions, faced in this section, will shed light on how the disinflation costs should be calculated. The answers to them are crucial inputs for section 4, where a new methodology to estimate SRs is proposed.

Economists have propounded multiple theoretical models to explain the widely believed fact that disinflations are mainly contractionary. The origins of that view of disinflations is closely related to the Phillips curve literature, where an explicit (usually short-run) trade-off between inflation and unemployment is established. Some classic attempts to rationalize the trade-off include Fischer (1977) and Taylor (1980), who based their result on the notion of staggered contracts. Fischer (1986) extended the lessons to an open economy[16], whereas more recently Mankiw and Reis (2002) have built a model where the driving force of the result is the slow dissemination of information.

In the past decade, mainly motivated by the inflation history of LAC, a parallel branch of the literature studied the effects of stabilizations from high inflation rates. The conclusions of part of that literature, questioned the view that disinflations (from high inflation rates) are recessionary: Kiguel and Leviatan (1992) and Végh (1992)[17], claimed that the output's path during Exchange Rate Based Stabilizations (ERBS) followed a boom-recession cycle, that is, in the initial phases of the stabilization the economy boomed, and only later the recession occurred. According to those authors, money based stabilizations do exhibit the traditional simultaneous recession and disinflation. Nevertheless, subsequent papers by Bruno and Easterly (1998) and Hamann (2001) suggest that once the sample is extended outside the Southern Cone, the stabilizations from high inflation rates generate output expansions independently of the anchor used[18]. In section 5, it will be tested if our sample of disinflations gives support to any of those positions. For now, the lesson in terms of the GDP growth rate, is that the recessionary view of disinflations is not necessarily extended to stabilizations from higher inflation rates. Given that the separation between high and moderate rates is diffuse, this results should be kept in mind throughout the paper.

[16] The initial recession occurs even if the exchange rate, rather than the money supply, is used as a nominal anchor

[17] Succesive follow-ups of that literature, with the same hypothesis as the original 1992 papers include Calvo and Végh (1994, 1999), Reinhart and Végh (1994), De Gregorio, Guidotti and Végh (1998), and Fischer, Sahay and Végh (2002) among others.

[18] The debate is not settled yet. Fischer *et al* (2002) argue once more that the initial expansionary stabilizations are a phenomena mainly attached to ERBS.

3.1 Evidence on GDP growth I: the impulse response approach

The top panels of figure 4 depict the average real GDP growth rate. In particular, the plots show the average growth rate across (2 to 3 year long) episodes, with period 0 corresponding to the year when the inflation peak occurred. The left panel focuses on the 70s and 80s, while the right one deals with the 90s. The dashed line in those top panels represents a weighted average of LAC's median growth rate in period -1, in the corresponding decades[19]. It is included to provide a threshold to compare the output evolution to.

As figure 4 shows, in the 70s and the 80s there is an important reduction in the GDP growth rate, corroborating the conventional wisdom that disinflations are contractionary. Indeed, at the trough, there is a 2.2% gap between the dashed line and the average growth rate. Moreover, the GDP growth rates peak prior to inflation, with obviously important implications in terms of the way the disinflation costs should be measured. In fact, this finding is shown to extend to G7 disinflations too (see figure 8 in the appendix). In terms of interpretation, one can think of this pattern as another manifestation of inflation inertia: in the presence of (policy induced) demand contractions, output falls prior to the reaction of inflation due to the inertia of the latter.

In contrast to the GDP slowdown of the 70s and 80s, the story in the 90s suggests that the GDP growth rates jump *during* the episodes, after facing a small trough in period 0. Contradicting conventional wisdom, there is no evidence of a slowdown during those episodes.

The bottom panels of figure 4 present the "de-meaned growth rates". They are constructed by substracting to each episode (periods -2 to 4) its own average growth rate of periods -1 and -2. Such strategy allows to control for the differences in the initial growth rates across episodes. With the de-meaned growth rates, 90% confidence intervals have been built as explained in the appendix. The dashed lines now go through 0, that is, through the average de-meaned growth rates of periods -1 and -2. This approach allows to establish the statistical significance of the findings outlined above[20]. Two important conclusions are reached:

[19] The weights are the number of episodes in each year. That is, suppose we had n_1 episodes starting in t_1 and n_2 episodes starting in t_2. Then, letting g_t be the average growth of LAC in t, the dashed line would be constructed as: $\frac{(n_1 * g_{t_{1-1}}) + (n_2 * g_{t_{2-1}})}{n_1 + n_2}$

[20] It is conceivable that the average growth of periods -1 and -2 is not the right threshold to compare output evolution to. In those periods inflation was reaching its peak, suggesting that the economies could be overheated. One way to correct for this is the following: The dotted line of the top left panel (LAC weighted median growth in period -1) goes through 4.5; The average growth of period -1 and -2 in that plot is 4.9. The latter number represents how much we have shifted down (on average) the output growth in the bottom left panel. If we correct for the possible overheating, the dotted line in that panel should go through -0.4 (i.e. $4.5 - 4.9$), rather than trough 0. The slowdown remains statistically significant in period 1, and loses marginally its significance in periods 0 and 2.

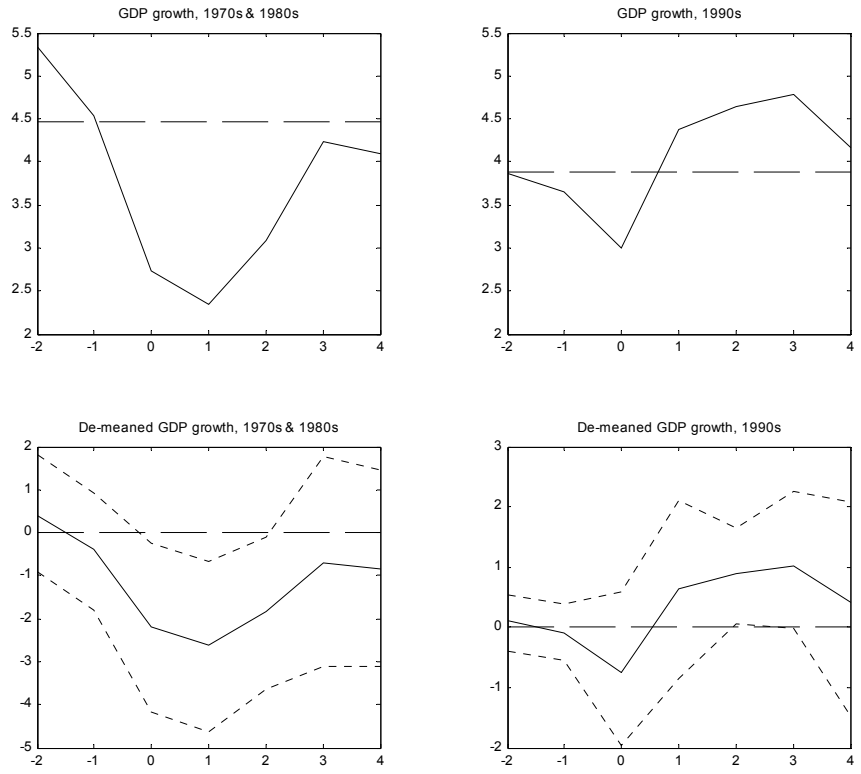

Figure 4: Top Panels: Average GDP growth rates during disinflations. Botom Panels: De-meaned GDP growth rates with 90% confidence intervals (see appendix for details).

First, for the earlier decades, there is a statistically significant slowdown in the GDP growth during disinflations. That slowdown is large: If the countries that disinflated had kept growing during periods [0,4] at the weighted median growth rate of LAC in period -1, their average GDP in period 4 would have been 6% higher that it actually was.

Second, in the 90s, the growth rate during the episodes is not statistically different form the one preceding them. The implication is that the GDP growth rate does not exhibit a significant slowdown nor a boom during the disinflation.

Of course, the conclusions from this plots are based only on 2-3 year long episodes. In the next subsection, the conclusions are tested with techniques that include all episodes.

3.2 Evidence on the GDP growth II: statistical results using the whole sample

Based on the impulse responses just depicted, there are a couple of hypotheses worth testing for the earlier decades: Is the "recession" observed during the episodes corroborated from a statistical point of view when using the whole sample? Is the growth rate that prevails after the episode different from the one prior to the disinflation? The latter is important as it establishes whether the GDP *level* returns to trend after the episode. Failure to find a catching-up period would be consistent with long-lived effects on output, which has important consequences for the literature measuring disinflation costs (see Zhang, 2001).

1970 & 1980			Robustness			
	Numb. of Observ.	Mean GDP Growth	(1)	(2)	(3)	(4)
Before peak [-3,-1]	66	4.82	0.50	5.29	4.82	0.96
During Episode [0, T]	79	2.71	-0.53	2.71	2.73	-0.66
After Trough [T+1,T+3]	66	4.33	0.81	4.85	4.33	1.35
H_0: Before = During, t-stat		2.69 ***	1.46	2.83 ***	2.58 ***	1.93 *
H_0: After = During, t-stat		2.06 **	1.89 *	2.50 **	1.97 **	2.54 **
H_0: Before = After, t-stat		0.60	0.41	0.44	0.60	0.43

* Significant at 10% level; ** Significant at 5% level; *** Significant at 1% level
(1): Annual Output growth rate measured in deviations w.r.t LAC annual median
(2): Y growth. Sample excluding observation if: inflation surpasses 40% or they hit a neighboring episode
(3): Y growth. "During" sample restricted to [0, 3] length
(4): Y growth. All restrictions (1)-(3) simultaneously in place

Table 3. Output growth during disinflations in LAC. 70s & 80s

To test those hypotheses, the data is divided in three different groups and the mean of each of them is calculated. With those results, I test whether the mean in each category is statistically different from the others. The groups are: (i) *The before group*: Includes 3 observations preceding the episode, that is, years $[-3, -2, -1]$[21]. (ii) *The During group*: Goes from period 0 to T, including both extremes. (iii) *The after Group.* This includes the observations following the troughs, specifically periods $[T+1, T+2, T+3]$. Based on this categorization, the hypotheses outlined above are tested and the results presented in table 3.

The first important result for the 70s and 80s (looking at the column under the heading "Mean GDP Growth") is that the growth rate *during* the episodes is smaller than both *after* and *before,* and that those differences are significant: *Output growth indeed significantly slowed down during the disinflations in the 70s and 80s.*

On the other hand, I do not find any statistically significant difference between the growth rate *after* and *prior* to the peaks. Hece, there is no catching-up period, i.e. one where the growth rate

[21] Period 0 is not included in this group given that the plots suggest that the slowdown starts in period 0 rather than in period 1.

after the episode picks up and brings the output *level* back to the trend. The implication is that, *for the 70s and 80s the GDP growth path is consistent with long-lived effects on the output level.*

1990			Robustness				
	Numb. of Observ.	Mean GDP Growth	(1)	(2)	(3)	(4)	(5)
Before peak [-3,-1]	36	3.92	0.17	3.96	3.92	0.22	3.68
During Episode [0, T]	52	3.69	-0.07	3.69	3.81	-0.07	3.77
After Trough [T+1,T+3]	29	2.80	-0.50	2.34	2.80	-0.82	2.80
H_0: Before = During, t-stat		0.42	0.45	0.42	0.20	0.43	0.15
H_0: After = During, t-stat		1.53	0.75	2.18**	1.66*	1.15	1.58
H_0: Before = After, t-stat		1.79*	1.09	2.2**	1.77*	1.38	1.30

* Significant at 10% level; ** Significant at 5% level; *** Significant at 1% level
(1): Annual Output growth rate measured in deviations w.r.t LAC annual median
(2): Y growth. Sample excluding observation if: inflation surpasses 40% or they hit a neighboring episode
(3): Y growth. "During" sample restricted to [0, 3] length
(4): Y growth. All restrictions (1)-(3) simultaneously in place
(5): During defined as [1,T] and before as [-2,0]

Table 4. Output growth rates during disinflations in LAC. 1990s.

Table 4 performs a similar exercise for the 90s. In line with the implications derived from the impulse responses, there is no evidence supporting that the growth rate *during* the episodes is significantly different than *prior* or *after* them. So the conclusion for the 90s is: *there is no growth slowdown during the episodes, but it is not possible either to characterize the behavior as a statistically significant boom.*

Finding that disinflations (in the 90s) are not contractionary is certainly a striking result. Indeed, for policy makers it poses the question of whether they can count on such a behavior in the future, i.e. if the conditions that allowed costless disinflations are the new *status quo*. In section 6 that question will be formally addressed.

Robustness: The last four columns of table 3 perform some robustness tests. Column (1) controls for the general GDP growth of the region. Notice, for instance, that if the episodes were all concentrated in the early 1980s, we would observe invariably important recessions during the disinflations. Nevertheless, one could argue that those recessions were the consequence of common shock (the debt crisis), rather than the result of the attempts by monetary authorities to disinflate. To control for those exogenous shocks I obtain, for each country and year, the deviations of output from the LAC annual median growth rate. The results under (1) indicate that even though the *during* group is on average smaller than the others, the significance of the result is lost in one of the cases.

Column (2) verifies the impact of excluding observations (in the *after* of *before* groups) when the economies hit inflation crisis levels (40%) or if they coincide with the *during* part of an adjacent

disinflation. Both factors would affect output performance and I attempt to test if the results are changed by that: The results under (2) show that the recession *during* the episode remains statistically significant.

Columns (3) controls for the episode's length. The strategy followed up to this point was to include in the *during* group, any observation between 0 and T but this biases the sample against short episodes. (3) only includes observations in the *during* group up to year 3, and omits those between 4 and T for the longer episodes; This robustness check does not altere the significance levels of the recession.

Finally, (4) puts in place all the robustness controls, i.e. (1) to (3). The recession results remain significant.

Similar robustness test are performed for the 90s. There is one additional test in the 90s (column 5): I experimented shifting one period ahead the definition of *before* and *during*, to make sure that the results are not driven by the trough in period 0. In general, the robustness tests for the 90s do not change the interpretation presented above. There is no evidence whatsoever suggesting a recession during the disinflations. If anything, there is some weak evidence that the output during the episodes is higher than after them.

4 Costs of Disinflations: The Sacrifice Ratio

The widely believed fact that disinflations are mostly contractionary gave rise to an important empirical literature that tries to quantify the costs of reducing inflation. The sacrifice ratio, studying the output losses –expressed as % deviation from trend output– per inflation point, is the most well known manifestation of those measurement efforts. The first part of this section discusses the traditional technique used to calculate the SRs, describes the main stylized facts found in the scarce LAC literature and proposes a new methodology that takes into account some of the regularities emphasized earlier. The second part calculates the disinflation costs. It challenges the puzzling conclusion of costless LAC disinflations. It will be shown that once the methodology is corrected to take into account the lessons from the previous section, the SR of LAC –at least in the 70s and 80s– are not negligible. Nevertheless, the puzzle is shifted to the 90s where, independently of the methodology, the SRs remain negative. The final part of the section proposes some robustness measures.

4.1 The methodologies and the empirical regularities

The SR is defined as the output loss due to a one point drop in the inflation rate. The crucial element to calculate SRs, is the estimation of the output loss. It requires a measure of trend output, usually interpreted as the income that would have occurred, had there not been a disinflation. Ball's (1994) method is the most popular one used in this literature. His strategy is to assume that actual and trend output are equal at the time the disinflation starts (0) and that output returns to its trend level one year after the episode is over $(T + 1)$. He also assumes that trend output grows log-linearly between the two points. The sacrifice ratio is then defined as the sum of the output losses, –that is, the sum of the differences between trend and actual output–, divided by the change in inflation during the corresponding episode. Applying this strategy to OECD countries, Ball (1994) finds that the average SR is 1.4 with quarterly data and 0.8 with annual data.

To my knowledge, there are no papers that focus on LAC SRs. Nevertheless, there are various articles that add some episodes of that region to their samples. For example, in Partow and Yuravlivker's (1998) dataset, –composed of disinflations from intermediate inflation cases[22]– more than half of the episodes in LAC have negative SRs. Of course, it is conceivable that various of their episodes are actually stabilization attempts (from higher inflation rates) and consequently it should not be surprising to find output expansions. Nevertheless, the average SR of their LAC episodes with peaks below 30% is 0.07, a tiny number when compared to OECD results. In another representative paper, Junguito (1998), argues that LAC SRs are insignificant[23]; In his results more than half of the countries in the region present, on average, negative SRs. Sanchez *et al* (2001) arrive to similar conclusions.

At a theoretical level, Zhang (2001) shows that Ball's method underestimates the SR if disinflations have long-lived effects. The idea is that if the disinflationary measures affect output beyond the duration of the episode, then it is incorrect to assume that trend output catches-up with actual output in $T + 1$. Zhang (2001) proposes a new methodology where trend output is assumed to grow at a constant rate during the disinflation, calculated as the growth of the HP filtered series of output, at the episode's peak. The main point is that trend output is not required to catch-up with actual output at any point after the disinflation, avoiding the underestimation of the costs if there are long-lived effects. Zhang (2001) obtains that the average SR for the G7 countries is 2.5 (quarterly data), much larger than the 1.4 obtained by Ball.

[22] That is, countries that endured at least 3 consecutive years of inflation in the 15-50% range.

[23] The data in the paper does not allow to discriminate the episodes with peaks above 30% from those below that number. Again, stabilizations and disinflations from low and moderate peaks are mixed.

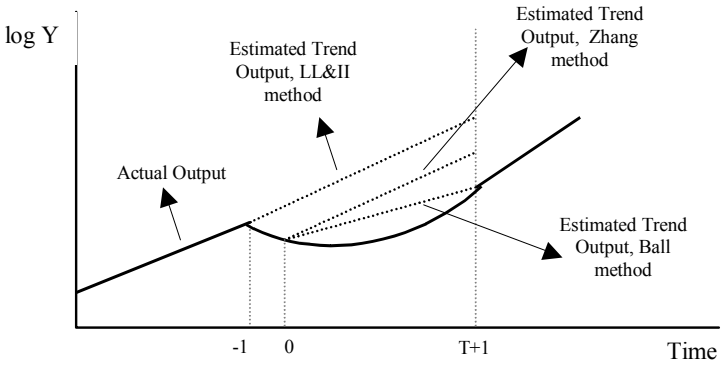

Figure 5: SR under the alternative methodologies.

In section 3, it was shown that for the 70s and 80s there is evidence consistent with long-lived effects in LAC disinflations. That finding indicates that the use of a Zhang-like technique might be more appropriate than Ball's method in LAC. Moreover, it was also noted that the output peak occurs in period -1 rather than in 0 (due to inflation inertia). The regularity is crucial because it highlights another source of SRs' underestimation: Assuming that trend and actual output are equal in period 0 (as Ball and Zhang do) introduces a downward bias to the SR, if the slowdown is already under way at that time. The method can be easily corrected by lagging 1 year the equality between trend and actual output. It is worth pointing, though, that this timing issue is most likely not as important with quarterly series. Nevertheless, with annual data, as in this paper, the bias is potentially significant.

Based on that discussion, results using the following three methods will be presented: (i) Ball's method; (ii) Zhang's method to correct for potential long-lived effects; (iii) Long-lived effects and inflation inertia method (LL&II): allows the output losses to begin in period 0, (in addition to *ii)*. Figure 5 illustrates how the different methods would work under a scenario where both inflation inertia and long-lived effects are present.

4.2 The SR results

4.2.1 Ball's Method

Table 5 presents the average SR across episodes, calculated with Ball's (1994) method. When using the whole sample without peak or time distinctions, the average SR is very low (0.27). This

is not unexpected. In fact it corroborates the results found elsewhere in the literature pointing at virtually costless disinflations in LAC. Nevertheless, when focusing on peaks below 20% (as most OECD studies do) the average SR is 0.48. It is certainly not surprising to find higher SR associated to lower peaks. Intuitively, at higher inflation rates the role of nominal rigidities is eroded reducing the output losses. On the other hand, higher peaks tend to represent episodes with a larger fall in inflation, which mechanically also reduces the SR.

	Peaks <30%	Peaks 20-30%	Peaks <20%
Whole sample	0.27	0.04	0.48
70s & 80s	0.47	0.08	0.86
90s	-0.10	-0.06	-0.12

Table 5. Sacrifice Ratios, Ball's Method.

Finally, the average SR in the 70s and 80s is 0.86. This number is very similar to the results obtained by Ball (1994) when using annual data in OECD countries, suggesting that the conclusion of average costless disinflations in LAC might be a fallacy: Even without allowing for long-lived effects or inflation inertia, large SRs for the 70s and 80s are obtained. The puzzling result now is that in the 90s the SRs are on average negative. In fact 7 out of 12 episodes in that decade present negative SRs.

4.2.2 The role of long-lived effects

The SR averages using Zhang's method are presented in table 6. The same general patterns as in Ball's case emerge in the sense that SRs for the whole sample are small; The results for the 70s and 80s are larger than in the 90s where we find mostly negative numbers; And finally, the SRs in the lower peak range are again larger.

	Peaks <30%	Peaks 20-30%	Peaks <20%
Whole sample	0.34	0.00	0.64
70s & 80s	0.75	0.11	1.39
90s	-0.40	-0.22	-0.53

Table 6. Sacrifice Ratios, Zhang's Method.

More interestingly, allowing for long-lived effects increases the SRs in the 70s and 80s: In fact, the average SR jumps to 1.4 when focusing on peaks below 20%, a number that following Ball's paper is often cited as proof that there are important output costs during disinflations. Moreover, the results confirm that indeed the application of Ball's method to the early decades of LAC implies an underestimation of the true SRs.

4.2.3 The role of inflation inertia

Table 7 presents the results when the method allows both for inflation inertia and long-lived effects (LL&II). The general patterns described in tables 5 and 6 are maintained. More importantly though, in the 70s and 80s the LL&II method leads to an average SR of 1.68 for peaks below 20%. This result doubles the one obtained with Ball's technique, confirming the suspicions that the traditional method underestimates the disinflation costs. Even when including all the episodes, a SR of 0.98 is obtained. The crucial conclusion is that the SRs, once the methodology is adjusted to give room to long-lived effects and inflation inertia, are substantial for the 70s and 80s. The results are also compatible with the large SRs found in OECD disinflations although, as shown below, it remains true that OECD SRs are substantially larger. Finally, with any of the methodologies, the average SR of LAC in the 90s are negative. The costless disinflation puzzle has been shifted away from the 70s and 80s but reappears in the 90s.

	Peaks <30%	Peaks 20-30%	Peaks <20%
Whole sample	0.42	0.10	0.67
70s & 80s	0.98	0.22	1.68
90s	-0.61	-0.18	-0.92

Table 7. Sacrifice ratios, LL&II method.

4.3 Robustness

When noting that LAC SRs are lower than G7's (for instance Zhang's average SR for the latter is 2.4), one obvious interpretation is that the result is simply driven by the fact that disinflations in LAC start from higher peaks and therefore present a larger fall in the inflation rate. In other words, that hypothesis would sustain that the differential is driven by the denominator of the SR, and not by smaller output costs. In this final part of the section, three alternative ways of measuring the disinflation costs are proposed. They will illustrate that the smaller average SRs of LAC (in the 70s and 80s) are not a fallacy driven by that argument. Moreover, the G7 results discussed below are calculated with annual data, so that there are no methodological differences in the way the SRs are obtained. The three alternative measures are:

1. Pure output costs: They are calculated by taking the output losses but without dividing by the fall in inflation. Of course, the drawback of that statistic is that it does not permit a balance of the gains with respect to the losses of the disinflation. It serves though, the purpose of testing if LAC costs are below G7's when omitting the fall in the inflation rate.

2. Output costs per year: Another option is to express the pure output costs as a ratio with

respect to the length of the episodes. This measure would then be interpreted as the output losses per year, during a disinflationary episode. The advantage with respect to the pure output costs is precisely that it controls for the length: Given that G7 episodes are on average longer, one could think –if the pure output costs of LAC are smaller–, that the results hinge crucially on that factor.

3. Half Sacrifice ratios: The final method I propose is to divide the pure output costs by the *percentage* change in the inflation rate (that is if a peak's rate is 20% and the trough's 12%, then the percentage inflation rate change 40%). To facilitate the interpretation of the ratio, the outcome is multiplied by 50. Then, the result represents the *output cost associated to cutting the inflation rate by half with respect to the episode's peak*. That expression is very appealing because it retains the advantage of taking into account the gains in reducing the inflation rate while not skewing the outcomes against SRs with higher peaks[24].

Average Output Costs		Output costs per year		Output cost of reducing Inf by 1/2	
LAC 70&80	G7	LAC 70&80	G7	LAC 70&80	G7
3.5	7.8	1.1	1.8	3.6	6.6

Table 8 Alternative costs. LAC & G7, Ball method

As table 8 shows, the disinflation costs of LAC are almost half the size of their counterparts in G7 countries with any of the three proposed methods. The half SR results show that cutting inflation by half costs 6.6 points in G7 episodes and 3.6 in LAC. Even the output costs per year are substantially larger in the G7 case; of course, given that the episodes in the developed countries are longer, the differential is proportion-wise even bigger for the pure output costs' case.

Complementing that information, table 9 presents the results for LAC, discriminated by decades and allowing for LL&II. Three messages are reinforced with the alternative disinflation costs measures in table 8 and 9: (i) LAC disinflation costs are lower than G7s'. (ii) When allowing for LL&II the costs are far from negligible in the 70s and 80s, rebating the conventional view that disinflations in LAC are close to costless. (iii) Disinflation costs of the 90 in LAC are on average negative with any of the methods.

	Average Output Costs		Output costs per year		Output cost of reducing Inf by 1/2	
	Ball	LL&II	Ball	LL&II	Ball	LL&II
70s & 80s	3.5	6.3	1.1	2.6	3.6	7.3
90s	-1.3	-9.8	-0.1	-2.0	-0.5	-5.0

Table 9 LAC Alternative Disinflation costs Ball vs LL&II

[24] If there are two episodes with identical pure output costs and one cuts the inflation from 20% to 10% and the other from 10% to 5%, this technique will yield identical half sacrifice ratios, whereas the original measure would conclude that the first episode presented disinflation costs half as big as the second one.

5 Determinants of the SR

Knowing what determines the SR provides important tools to policy-makers, who need to assess what circumstances and strategies are associated with lower costs of disinflation. This section studies what variables explain the SRs in LAC. In particular, the first part deals with the variables usually included in the literature. The second one is devoted to other factors more specific to the LAC experience, that could potentially help explaining the variations across SRs.

5.1 The traditional determinants

Starting with Ball (1994), there have been at least 3 variables consistently included in the empirical literature as SR's determinants: the speed of disinflations, the initial inflation and openness. Here I begin by pointing at the theoretical underpinnings explaining why they might affect SRs and the results obtained in the empirical literature. In the final part of the subsection, I describe their explanatory power in our LAC sample.

One of the robust results from Ball's (1994) analysis is that the SR decreases as the speed of disinflation increases (speed is defined as points of inflation dropped per year). That result is important because it gives an empirical answer to the theoretical deliberation on the optimal speed of disinflation. In the debate, one school of thought argues that slow disinflations are less costly because they allow for prices and wages to adjust to the monetary tightening[25]; The alternative view, or *cold turkey* approach, argues that fast disinflations should be less costly, as they are associated with greater credibility: a sharp policy can change the mindset of price and wage setters and the way expectations are formed (see Sargent, 1983). At the empirical level, Zhang (2001) corroborates that Ball's finding is robust to the inclusion of long-lived effects to the SR calculation. Nevertheless, Partow and Yuravlivker (1998), find no relation between the speed and the SRs.

A second variable widely seen as a SR determinant is the initial inflation rate. The hypothesis has its basis on a New Keynesian idea suggesting that higher inflation reduces nominal rigidities weakening the inflation-output trade-off (see Ball, Mankiw and Romer, 1988). Nevertheless, in Ball (1994) this theoretical prediction receives only weak support. A similar result is obtained by Partow and Yuravlivker (1998), while Boschen and Weiss (2001) obtain the wrong sign. Finally, Zhang (2001) finds that, after allowing for long-lived effects, there is indeed a significant and negative

[25] In Taylor's (1983) model, slow disinflations are costless whereas fast disinflation, in the presence of staggered wages, produce output reductions.

non-linear relation between initial inflation and the SRs. His result, though, is not robust to the inclusion of speed in the same regression.

The openness of the economy –usually measured by the imports to GDP ratio– has also been suggested as a SR determinant. The variable is intuitively appealing: the appreciation of the exchange rate that follows the disinflationary shock will have a larger effect in more open economies, hence reducing the SR (Romer, 1993). Despite its theoretical appeal it has performed poorly in the empirical literature; Ball (1994) does not find it to be significant; Temple (2002) devotes a paper to the topic where he reinforces that message; Finally, Partow and Yuravlivker do not find a significant relation either.

For our LAC sample, the results are presented in tables 10 and 11; Table 10 uses Ball's traditional method to calculate the SRs whereas table 11 allows for long-lived effects and inflation inertia (LL&II). Furthermore, those tables include, for robustness purposes, regressions with time and country effects[26] (Note: I will use the name "country effects" and "fixed effects" interchangeably). In any case, the regressions with fixed effects should be interpreted with caution, as the degrees of freedom are very low.

Dependent Variable: SR (Ball's Method)						
Method	Independent Variables					
	constant	speed	speed^2	Inflation 0	Openness	Adj R^2
Simple	1.53	-0.62	0.05	-0.01	0.02	0.09
	(1.76)	-(2.02)	(1.80)	-(0.33)	(1.49)	
time effects	1.83	-0.70	0.05	-0.01	0.03	0.22
	(2.20)	-(2.46)	(2.17)	-(0.32)	(2.32)	
fixed effects	2.26	-0.52	0.04	-0.01	-0.004	0.04
	(1.38)	-(1.32)	(1.07)	-(0.10)	-(0.17)	
time & fixed e.	1.57	-0.49	0.04	-0.03	0.04	0.26
	(1.09)	-(1.50)	(1.35)	-(0.51)	(1.65)	
Simple	1.40	-0.65	0.05		0.02	0.11
	(1.81)	-(2.22)	(1.84)		(1.48)	
time effects	1.69	-0.74	0.06		0.03	0.24
	(2.38)	-(2.77)	(2.27)		(2.33)	
fixed effects	2.18	-0.52	0.04		-0.005	0.09
	(1.52)	-(1.37)	(1.07)		-(0.20)	
time & fixed e.	1.16	-0.54	0.04		0.03	0.30
	(0.96)	-(1.70)	(1.34)		(1.58)	

Table 10. *t-statistics* in parentheses

In table 10, with the exception of the regressions with country effects, speed is a significant determinant. With the LL&II method (table 11), speed remains significant regardless of those

[26] The former is a dummy variable for the decades the episodes are in; the latter controls for country specific effects.

effects. That is particularly true in the regressions that do not include initial inflation. Collinearity between speed and initial inflation is most likely the explanation for the smaller significance of speed when both variables are included in the regression. The correlation between them is 0.63.

Even though it has always the expected sign, initial inflation is not a significant variable. It appears that the information within the initial inflation is dominated by the one in speed. Given that the variable is not even close to significant, it has been dropped in the regressions on the bottom half of the tables 10 and 11.

Dependent Variable: SR (Long-Lived effects+Inflation inertia Method)						
Method	Independent Variables					
	constant	speed	speed^2	Inflation 0	Openness	Adj R^2
Simple	2.91	-0.80	0.07	-0.04	0.01	-0.02
	(1.83)	-(1.43)	(1.35)	-(0.58)	(0.28)	
time effects	4.00	-0.87	0.07	-0.06	0.02	0.24
	(2.81)	-(1.77)	(1.65)	-(0.97)	(1.11)	
fixed effects	4.87	-1.42	0.10	0.001	-0.09	0.05
	(1.73)	-(2.11)	(1.77)	(0.01)	-(2.24)	
time & fixed e.	4.43	-1.27	0.10	-0.07	-0.02	0.27
	(1.79)	-(2.25)	(2.11)	-(0.88)	-(0.64)	
Simple	2.49	-0.90	0.07		0.01	0.00
	(1.75)	-(1.67)	(1.42)		(0.26)	
time effects	3.28	-1.04	0.08		0.02	0.25
	(2.67)	-(2.26)	(1.85)		(1.14)	
fixed effects	4.89	-1.42	0.10		-0.09	0.10
	(1.99)	-(2.15)	(1.77)		-(2.28)	
time & fixed e.	3.24	-1.41	0.10		-0.03	0.30
	(1.55)	-(2.56)	(2.09)		-(0.80)	

Table 11. *t-statistics* in parentheses.

The results for the openness variable –measured as the ratio of imports to GDP– are very erratic. The sign and significance change frequently. Country effects might be particularly important for this variable: Since the sample contains a wide range of country sizes, the openness changes a lot across countries. When focussing on fixed effects regressions (and omitting initial inflation) there is only one case where openness appears with the right sign and with a significant coefficient (country effects, table 11). Nevertheless, once time effects are accounted for, the significance collapses. As in the previous literature, the message with LAC disinflation costs seems to be that they are, at most, weakly related to the countries' openness.

5.2 Some alternative determinants

The only traditional determinant that remained mostly significant is the speed; In this subsection the rest of the traditional determinants are dropped from the analysis. Here, I propose a set of

complementary explanatory variables that appear, *a priori*, as good candidates to rationalize the SR results within the LAC context. For each variable, I first explain the reasons supporting their potential impact on SRs. Then I state how the variable is measured and finally discuss the results, based on the regressions presented in table 12. Regressions with time and fixed effects are included for purposes of checking robustness. For the latter, the results should again be viewed with caution as the degrees of freedom become very low.

The real exchange rate: LAC's economic faith has been to a large extent dependent on the behavior of capital inflows. For instance, in the early 90's, a rapid recuperation of the capital inflows was "accompanied by an appreciation in the real exchange rate...[and] faster economic growth" (Calvo, Leiderman and Reinhart, 1993)[27]. As for the real exchange rate, economists have proposed a theoretical link between that variable and the SR (see Fischer, 1988). The idea is that the appreciation may cause a reduction in the price of tradeable goods denominated in domestic currency. In that sense, the real exchange rate appreciation will capture an additional channel that reduces the SR, in an analogous manner as it does in the open economy Phillips curve literature.

Measurement and expected sign: I measure the variable as the log difference of the average real exchange rate *during* the episode, i.e. periods [0, T-1], and the average real exchange rate *prior* to the disinflation, i.e., [-2,-1].[28] Negative numbers will reflect appreciation rates and positive numbers devaluation rates. Given the intuition provided above, the expected sign of the coefficient is positive. Finally, the variable is premultiplied by the import to GDP ratio to control for the different degrees of openness in the sample[29].

Results: The sign in all 6 regressions is invariably the correct one. Appreciations of the exchange rate are indeed associated to smaller SRs. The result is very significant and robust with Ball's SRs. With the LL&II method, even though the direction is the right one, the significance levels are low.

Inflation history: In Ball's (1994) paper, one variable that appears to be a significant determinant of the SR is a measure of nominal wage rigidities: Flexible wage regimes are associated with lower SRs. Similar conclusions were obtained by Posen (1998) or Boschen and Weiss (2001). Nevertheless, Zhang finds that the result is weaker when allowing for long-lived effects.

Wage rigidity indices' for our LAC sample do not exist (at least to my knowledge). One way around that hurdle is to consider the recent inflation history of the country as a proxy for nominal

[27] See also follow-ups in Calvo, Leiderman and Reinhart, 1994 and 1996.

[28] In a sense, this real exchange variable is lagged. This is consistent with models *a la* Ball (1999) or Mishkin and Savastano (2001). The results are similar if the definition is changed to a contemporaneous version.

[29] This is not essential. The Real exchange rate variable on its own yields very similar results.

rigidities. The idea is that countries with recent high inflation develope mechanisms that allow prices and wages to adjust frequently and therefore should exhibit lower nominal rigidities.

Measurement and expected sign: Inflation history will be defined as an average of the (log) inflation rate of the 10 years preceding the episodes. The expected sign is negative: The larger the inflation rate in the past the smaller the nominal rigidities and the SRs.

Results: The first two columns of table 12 show that the inflation history has the right sign and presents significant coefficients. Inflation histories characterized by high average rates do decrease the output costs associated with disinflations. Including time effects does not change the conclusion, but in the fixed effects regression the variable is insignificant. But again, given the degrees of freedom of that regression, this result should be viewed with caution.

Structural reforms: Since the mid 1980's, LAC's development model based on protecting national markets and state intervention was replaced by policies seeking to improve efficiency, facilitate the operation of markets, and reduce the distorting effects of state intervention in economic activities. Moreover, in many cases those structural reforms occurred simultaneously with the beginning of disinflationary episodes, in part because granting independence to the Central Bank was a typical element of the reform packages. Even though, conceptually, the reforms should not affect the true SR, they might introduce a mismeasurement of trend output:

Suppose, as in figure 6, that in period 0 a disinflation starts and the reforms are introduced[30]. The latter will boost trend output (dashed line); At the same time, actual output (continuous line) starts catching-up, that is, it also increases but remains below the new trend during the disinflation generating a positive true SR[31]. Nevertheless, as the chart illustrates, the methodologies used to calculate the SR adjust very slowly to changes in trend output. Indeed, the *estimated* trend output (dotted lines) are well below the actual trend, generating an underestimation of the SRs that could potentially lead to negative outcomes. Moreover, under Zhang's method the bias would be even larger, for it does not require a catching-up with actual output as Ball's method does. The results obtained for the SRs of LAC in the 90s are consistent with the latter argument.

From an empirical standpoint, there is evidence that indeed some of the reforms did boost output in LAC. For example, Escaith and Morley (2001) find that tax reforms affected significantly the region's growth performance both in the short and the long-run. Encouraged by that finding,

[30] The events do not need to be simultaneous.

[31] Consistent with depicted shape of trend and actual output, Lora and Panizza (2002) find that effects of the reforms on growth were strong in the initial phases and then diluted over time. In particular, they find that at the high point of reforms, they increased GDP growth by 1.3%. Later, the reforms only accounted for an increased growth rate of 0.6%.

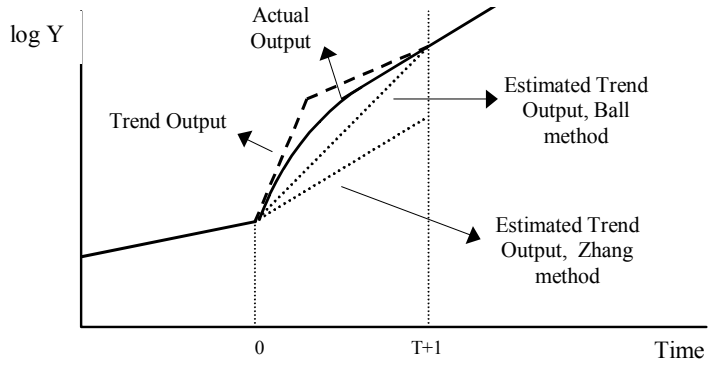

Figure 6: Structural reforms and the SR measurement.

which is also consistent with the reasoning outlined above, I test the hypothesis that the tax reform might be a determinant of the SR. The underlying hypothesis is that it would not affect the true SR but since it boosts output growth –and our method does not capture the corresponding shift in trend output–, it induces an underestimation of SRs.

On the other hand, one of the main reforms of LAC was the foreign trade liberalization, characterized by reductions both in the tariff's rates and their dispersion. This aspect of the reforms is potentially important as it presents a channel that could directly affect the SR. A trade liberalization might impact the domestic prices of imports reducing inflation without a short-run trade-off with output. This would reduce the true SR.

Measurement and expected sign: Lora (1997, 2001) and Morley *et al* (1999) have built a series of indices that measure the strength of reforms in different areas, as taxes, trade, financial sector and privatizations among others. For each category (trade and tax reforms for our purposes), the indices go from 0 to 1, and are increasing in the depth of reforms (see Lora 1997 and 2001 and Morley *et al*, 1999, for measurement details). Here, I calculate the changes in the average index during the episode against the average of 4 years preceding it. Large numbers in that variable will mean substantial reforms whereas low numbers will imply that no steps have been taken to reform the system. Therefore negative signs are expected in the reform coefficients.

Results: The trade liberalization is insignificant and has the wrong sign throughout all regressions. Nevertheless, consistent with Escaith and Morley's results, the tax reforms do have an impact on the SRs. As expected, the sign is negative and the coefficients are significant (or very close) in all regressions.

	Ball	LL&II	Robustness			
			Ball (+time effect)	LL&II (+time effect)	Ball (+fixed effect)	LL&II (+fixed effect)
constant	3.76	4.98	4.17	6.15	3.23	3.11
	(5.26)	(3.71)	(5.75)	(4.94)	(2.52)	(1.19)
Speed	-0.85	-1.10	-0.83	-1.16	-0.51	-1.02
	-(3.38)	-(2.34)	-(3.27)	-(2.66)	-(1.45)	-(1.42)
Speed sqd.	0.05	0.07	0.05	0.08	0.03	0.07
	(2.30)	(1.75)	(2.27)	(2.08)	(0.96)	(1.13)
Tax Ind.	-3.48	-9.22	-3.26	-7.86	-6.93	-11.88
	-(1.99)	-(2.81)	-(1.84)	-(2.58)	-(3.16)	-(2.65)
RER	0.09	0.06	0.08	0.03	0.11	0.06
	(3.75)	(1.43)	(3.30)	(0.66)	(3.85)	(1.06)
Inf. Hist.	-0.30	-0.55	-0.29	-0.44	0.14	0.02
	-(3.07)	-(2.96)	-(2.59)	-(2.27)	(0.65)	(0.04)
Regime	-0.06	-0.01	-0.08	-0.08	-2.21	-0.06
	-(1.23)	-(0.06)	-(1.77)	-(0.98)	-(0.17)	-(0.38)
ERBS	0.78	0.93	0.78	1.10	0.45	0.46
	(2.12)	(1.34)	(2.08)	(1.70)	(1.24)	(0.62)
Trade Ind.	1.74	1.66	2.03	2.55	3.39	4.82
	(0.81)	(0.41)	(0.98)	(0.72)	(1.35)	(0.94)
R2 adj	0.38	0.27	0.38	0.39	0.25	-0.04

Table 12. Determinants of the SR. t-statistics in parentheses.

The exchange rate regime: For openness to affect the SR through a channel *a la* Romer (1993) it is necessary to observe some nominal appreciation of the exchange rate following the disinflationary shock. Of course, this appreciation will only occur if the exchange rate regime is flexible. The more rigid the regime, the less important will Romer's argument be. That is, all other things equal, more rigid regimes will be associated with larger SR, as the exchange rate appreciation channel is shut down.

Measurement and Expected sign: Reinhart and Rogoff (2002) have put together a series of exchange rate regime indices based on the *de facto* nominal exchange rate. Using that information, I have constructed an average exchange rate regime index for each episode. Larger numbers imply more flexible regimes. Under the intuition described above the expected sign of the coefficient is negative.

Results: The sign of the coefficient is negative suggesting that indeed flexible regimes lead to smaller SRs. Nevertheless, its statistical significance is low both in the main regressions and in the robustness analysis.

ERBS: In section 3, the potential impact of exchange rate based stabilizations (ERBS) on output *vis a vis* other methods was highlighted. Under that perspective, I test if a separation of the episodes according to the disinflationary strategy explains the SR variations.

Measurement and Expected sign: The issue of defining whether the episodes are ERB or not is

not trivial, especially in a sample like this, where I am filling a gap of less well known moderate episodes. I have chosen a simple way of testing this, using Rogoff and Reinhart's (2002) index of exchange rate regimes. I have constructed a dummy variable that takes the value of 1 if during periods [–1,1] the exchange rate regime was switched to a more fixed version. Such a change could be evidence of a disinflationary strategy based on the exchange rate, and therefore is classified as an ERB disinflation[32]. Under that definition we would expect a negative coefficient when regressing this dummy against the SRs.

Results: The coefficients in all regressions have a positive sign. If anything, it appears that ERBD increase the SR rather than decreasing it. The variable is though only significant with Ball's method as long as fixed effects are not included.

Other supply shocks? It is conceivable that the SRs are affected by supply shocks. For instance, Boschen and Weiss (2001) include oil shocks as an explanatory variable of SRs. They find that the variable has the right sign, indicating that increases in the oil prices make disinflations more costly. Moreover, they obtain that the coefficient is statistically significant. I have tested the impact of oil shocks in our sample but found that they are not even close to significant and usually have the wrong sign (not reported in the table).

6 What solves the puzzles?

The results of sections 3 and 4 raised a couple of puzzles regarding costs of disinflations inLAC: Why was it possible for LAC to disinflate during the 90s without paying the cost of a growth slowdown? The second unanswered issue is related to the size of disinflation costs in the 70s and 80s: even though it was shown that they were not negligible, it is still true that they are considerable smaller than G7 costs (see table 8). This section uses some of the lessons from section 5 to propose possible solutions to those puzzles.

[32] The method might underestimate the number of ERBD, for it is possible for a country to remain in the same regime and yet persue a disinflationary strategy based on the exchange rate: Suppose a country's regime is an exchange rate band; The monetary authorities could attempt an "ERB" disinflation by changing the slope of the band to reduce the devaluation rate. Such a change would not be contabilized as a change in the regime if the *de facto* exchange rate remaines within the band and the band's width does not present an important change either. Such episodes would be missed from our dummy variable. The results should be viewed keeping in mind this potential problem.

6.1 Correcting for the mismeasurement in the 90s

With the LL&II method, the average SR is -0.61 in the 90s, and *all* the individual SRs are negative. With Ball's method the average SR is -0.1 and 7 out of 12 episodes present negative costs. This subsection estimates the magnitude of the true SR's mismeasurement caused by the structural reforms.

As was discussed in section 5, the reforms are not likely to affect the true SRs but they will lead to an underestimation of them if the shift in trend output is not taken into account. Moreover, if the reform indeed shifted potential output, Ball's method will perform better than the long-lived effects method. The reason for that is that Ball's technique forces potential and actual output to be equal in $T + 1$. Contrary to that, the essence of the long-lived effects story lies precisely on not forcing this equality, causing a larger mismeasurement under the presence of a shock like the reforms (see figure 6). If that hypothesis is right, one should observe a larger coefficient (in absolute value) on the tax reform index in table 12 when using LL&II than in Ball's case. Indeed, consistent with that story, table 12 confirms that the coefficient in LL&II are almost 3 times larger and have stronger significance levels.

But how big is actually the underestimation? One way to test the quantitative impact of the reforms on the disinflation costs of the 90s, is to obtain the SR that would have prevailed in that decade had the reforms behaved, on average, as in the 70s and 80s. Using the coefficients from table 12, I have estimated the fitted values that emerge if the average reform indices of the 90s take the value of the 70s and 80s and present the results in table 13, under column (1). With Ball's method the corrected average SR jumps from -0.1 to 0.16, whereas with LL&II it goes from -0.61 to 0.2. The impact of the tax reform alone is enough to overturn the negative sign but the numbers remain small, even when compared against the SRs of the 70s and 80s in LAC.

What do those numbers imply in terms of the reforms' impact on trend growth in the 90s? To get a better sense of that, one can estimate the trend growth that would have been consistent with a SR of the same size as the corrected one in table 13, and compare it to the trend growth that actually occurred. In other words, I calculate, (for the LL&II method) the trend growth rate that we should have observed to obtain a SR of 0.2. It can be shown that a 3.7 trend growth rate would have lead to such a result; Given that the estimated average growth rate of trend output in the 90s (for the LL&II method) is 3.25%, the reforms account for an increase of 0.45 points (i.e. $3.7 - 3.25$) above the actual estimate. The implication is that the reforms boosted the trend GDP growth by slightly less than 1/2% per year, which is a reasonable estimate (see IDB, 2003).

6.2 The history of inflation and the real exchange rate

The early 90s were characterized by very large capital inflows that appreciated the exchange rate in most countries of the region. Moreover, the disinflations of the 90s were started after a decade of very high inflation rates. The results in section 5 suggest that those variables explain some of the variation in the SRs. The question now is whether the differences in the SR between the 70-80s and the corrected SR of the 90s can be explained by those "shocks". To estimate the impact that each of those variables had on the SRs, I calculate *potential SRs;* They represent the disinflation costs that would have occurred had each of those variables taken –in the 90s–, the same value they presented in the 70s and 80s. The results of this calculation are presented in table 13, under columns (2) and (3). The former accounts for the effect of the exchange rate appreciation, while the latter adds to that result, the impact of the inflation history. Both effects are calculated using the corrected SR for the 90s. Table 13 shows that when the role of the 2 variables is accounted for, the potential SR is 0.9 with Ball's method and 1.3 with the LL&II method. The implication is that if those variables had not changed as they did in the 90s, the SRs would have exhibited a similar size to the ones in the earlier decades, i.e., the two shocks are quantitatively enough to explain the differences across the decades.

Sacrifice ratios in the 90s				
	Actual SR	Corrected SR	Potential	
		(1)	(2)	(3)
Ball	-0.10	0.16	0.40	0.93
LL&II	-0.61	0.20	0.37	1.33
(1): SR if average tax reform in the 90s = average in the 70s and 80s				
(2): (1) + average RER appreciation in the 90s = average in the 70s and 80s				
(3): (2) + average inflation history in the 90s = average in the 70s and 80s				

Table 13

6.3 Why are the disinflation costs in LAC smaller?

One possible hypothesis to explain the differences is based on the fact that disinflations in LAC have been faster than in G7 countries. Given the well documented regularity that speed affects negatively the SR, it is conceivable that the differential could account for those contrasts. In figure 7, the right panel depicts the speed (horizontal axis) and the SR (vertical axis), combining G7 and LAC data. The left panel depicts the speed measured in % terms (that is, the change in inflation is measured as a % with respect to the peak) and the SRs. Notwithstanding how speed is measured, in figure 7, the G7 episodes are clustered in the high SR and low speed corner, while the episodes in LAC have high speeds and lower SRs. To assess the quantitative impact of this conjecture, I

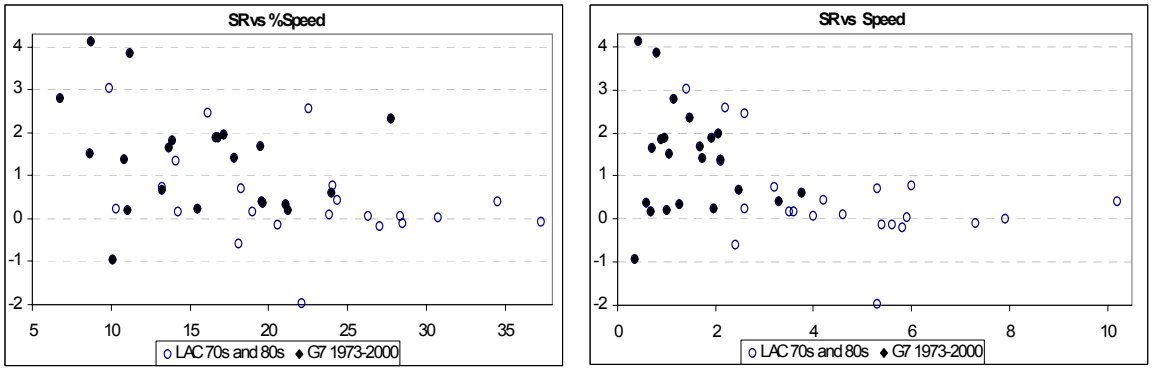

Figure 7:

calculate the potential SR that would have occurred in LAC, had the speed been of an analogous size as the G7 speed. Table 14 presents the results for the episodes with peaks below 20%.

SR in LAC: Role of Speed (peaks < 20%)		
	(1)	(2)
Ball, 70s & 80s	0.86	1.84
Ball 90s	0.77	1.77
LL&II, 70s & 80s	1.69	2.81
LL&II 90s	0.99	2.28
(1) For the 90s, SR corrected as in (3), in table 13, for 70s and 80s, the actual SR		
(2): (1)+ LAC's Speed=G7 Speed		

Table 14

The first column represents the actual SR for the 70s and 80s, and the potential SR for the 90s (as in column (3) of table 13). Then, under (2), I present the potential SR had the speed of LAC episodes been of the same average magnitude as the one in G7 episodes (calculated using the coefficients of table 12). For the 70s and 80s, the potential average SRs are between 1.8 and 2.8, i.e. close to the average disinflation costs of G7 countries. For the 90s, the results show potential SRs close to 2, again a relatively large number and similar to estimates for developed countries. The speed is therefore an appealing story to explain the disinflation costs differentials across the regions and seems to quantitatively enough to account for the gap.

7 Conclusions

During the 1990s, after almost a quarter of a century enduring high inflation rates, LAC countries were able to pursue successful disinflationary processes. The challenges faced by Central Banks in

the region in the present and near future will be attached to the handling of low and moderate inflation rates. Nevertheless, there is very little known on the past experiences that the region had when dealing with inflation rates in this range. Furthermore, the scarce information on such episodes pointed at the puzzling result of costless disinflations in terms of output: LAC seemed to have enjoyed a free lunch! This paper fills part of gap in the literature by studying the costs associated to LAC disinflations –with low and moderate peaks– and tackles the free lunch puzzle.

I identify 34 episodes for the period 1973-2000. In that sample, it is shown that there was a GDP growth slowdown in the 70s and 80s, coinciding with the disinflations. Moreover, I find that the disinflations have long-lived effects on output, that is, after they are over, the GDP level does not necessarily catch-up with trend output. It is also shown that the GDP growth rate slows down before the inflation rate does, in a manifestation attributable to inflation inertia. The relevance of those findings lies in the fact that the long-lived effects and the inflation inertia are factors ignored by the traditional methods to calculate disinflation costs. A new methodology incorporating those element is proposed. Based on the result of its application to the LAC sample, it is demonstrated that the disinflations in the 70s and 80s were achieved at the cost of large sacrifice ratios (no free lunch!). The result is particularly relevant under the optic of other papers of the literature, where average SRs of LAC were believed to be negligible.

Nevertheless, even after using the new methodology, the disinflation costs of the 90s are on average negative. The puzzling result contradicts the evidence for developed countries and stands in sharp contrast with the SR in LAC for the 70s and 80s. I show in this paper that three elements are quantitatively able to explain most of this puzzle: First, the structural reforms of the 90s increased trend output; Since the techniques used to calculate the SRs are likely to miss such a shift in trend growth, they mismeasure the SRs. Correcting for that underestimation, leads to SRs that are positive, though still very small (cheap lunch!). Second, the exchange rate appreciation –fueled by the huge capital inflows that the region received in the early 90s–, facilitated a less costly disinflation. Finally, the recent inflation history (i.e. much higher in the 90s than in the earlier decades) eroded the nominal rigidities and enabled inflation reductions with a lower output trade-off. This paper shows that, had all these elements remained at levels comparable to the ones in the 70s and 80s, the disinflation costs would have been similar across the different decades.

LAC SRs of the 70s and 80s (and even the "adjusted" version of the 90s) are smaller than those in developed countries. This paper proposes the speed differential between the two regions as the explanatory link that accounts for these differences. This result follows from the fact that SRs are

negatively associated to speed and LAC disinflations are much faster. I show that if episodes in LAC had a speed like that of the G7's, then the SR of both regions would be very similar.

Various important implications for policy-makers emerge: The most relevant is that they cannot count on the fact that future disinflations will be carried out a no cost to output: Indeed, given the new inflation scenario, the nominal rigidities are likely to become larger, reinforcing the output-inflation trade-off; Furthermore, spans of time with huge capital inflows will probably occur again, but it is hard for policy-makers to predict the length and the magnitude of those inflows and therefore very difficult to match the disinflations timing with that of the inflows.

Another policy implication is related to the reforms. If a new wave of structural reform is pursued by the region, our results suggest that matching the timing of disinflation with that of the reforms might mitigate the impacts on growth that emanate from disinflations, although they do not change the true SR. Finally, the evidence in this paper favors the *cold turkey* approach, that is, fast disinflations should be the preferable strategy.

LAC disinflations in the 70s and 80s were by no means a free lunch. A combination of events allowed the region to pursue a low cost disinflation process during the early 90s but it will be very hard in the future to encounter such a benign scenario to disinflate. Central Banks should be prepared to face trade-offs resembling the ones in the 70s and 80s rather than the expansionary disinflations enjoyed in the 90s. As Dornbusch and Fischer (1993) originally stated, *the evidence suggests that...such [moderate] inflations can be reduced only at a substantial short-term cost to growth.*

A Appendix

- The Bootstrap Method used to build the error bands is actually very similar to the one that used to calculate the bands in VARs impulse responses. Here is a brief description of how they are built:

  (i) Take the matrix of observations containing what happens (for instance) *during* the disinflations, and construct an analogous bootstrapped matrix, by resampling the original one with replacement. That is, if there is a matrix containing the response of the trade balance for 17 episodes, then construct a new matrix of 17 episodes by resampling the original one with replacement.

  (ii) Calculate the mean of the bootstrapped sample. Record the result.

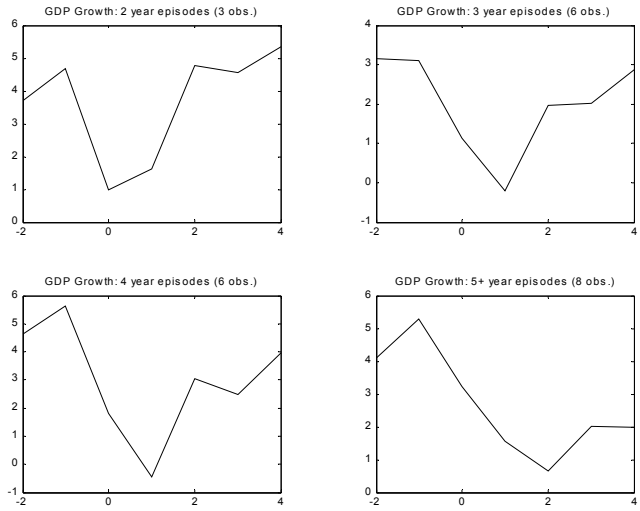

Figure 8: GDP growth rates during G7 disinflations, 1972-2000. Period 0 corresponds to the inflation peak.

(iii) Repeat (i) and (ii) 1000 times.

(iv) Sort the 1000 means, and chose observation 50 and 950, forming the 90% confidence interval bands.

- Data sources. Most of the variables come from the International Financial Statistics (IMF, various issues). The growth rates were complemented with data from the World Development Indicators (World Bank, various issues). The reform indices come from Lora (2001) and Morley at al (1999). Samuel Morley kindly provided the data used in the construction of the indices. The real exchange rate measure uses the data from the IFS which is available for most of the countries from 1980 on. When data on the effective real exchange rate was not available, the bilateral rate against the US dollar is used. ERBS and regime are build using the data from Reinhart and Rogoff (2002). For the oil prices, the Spot Oil Price (West Texas Intermediate) was used. That data comes from the IFS too.

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