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Inflation Targeting and the Sacrifice Ratio*

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Contents: 1. Introduction; 2. Literature; 3. Data and methodology; 4. Results; 5. Final Remarks; A. Tables.
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Neste artigo mostramos que os países que adotaram o regime de Metas de Inflação (IT) lograram desinflar suas economias com menores custso. O efeito da dummy IT é estatística e economicamente bem significativo. Ao reduzir significativamente os custos das desinflações, este sistema pode tornar níveis mais baixos de inflação politicamente mais factíveis.

In this paper we show that economies that adopted the inflation targeting (IT) regime have been able to "disinflate" less costly. The effect of IT on the sacrifice ratio is not only statistically significant, but also economically very important. This result is all the more interesting given the lack of robust empirical evidence in favor of IT. By significantly reducing the short-run costs of disinflation, IT may render the attainability of lower inflation levels politically more feasible.

1. INTRODUCTION

Following in New Zealand's footsteps, many countries (developed and developing alike) have opted in the last sixteen years to implement formal inflation targeting regimes (IT) in order to attain – or lock in – price stability. But in spite of its growing popularity among policy makers and academics, empirical are not unanimous in corroborating its alleged benefits. In this paper, we present evidence in favor of IT. Specifically, we show that inflation targeters experience lower disinflation costs.

Since long, the choice of an economy's nominal "anchor" has been central in the debate about price stability. Because the increase in money demand volatility in the 80's rendered the targeting of monetary aggregates unreliable, and the heightened capital flows in the 90's brought hindered the strategy of pegging the exchange rate in order to "import" inflation credibility, many countries currently use the interest rate as their main monetary policy instrument. Within this latter group, some economies gave one further step and adhered to a full-fledged IT regime in which inflation itself plays the role of the economy's nominal "anchor".

In general, IT's advocates claim the system has a greater ability to coordinate inflation expectations than other monetary arrangements because of its announced commitment to a clear and verifiable

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target.[1] If that is true, a simple expectations-augmented Phillips curve would suggest that countries adopting this system should be able to attain lower inflation rates with smaller output losses. But not only Bernanke et al. (1999) did *not* find evidence that developed economies who adopted the IT framework experienced smaller output losses during disinflationary periods but, moreover, Ball and Sheridan (2003) showed that whether a OECD economy inflation targets or not doesn't seem to make any difference in terms of various other economic indicators such as average inflation, inflation volatility, interest rate volatility or growth volatility.[2]

Here, we are concerned about the effects of IT on sacrifice ratios. Isolating episodes of disinflation since the 90's for a group of developing and developed economies, we show that the accumulated falls in GDP (relative to its trend) during disinflationary periods are milder for those who had an inflation target regime in place for at least six months.[3]

The rest of the paper is structured as follows: Section 2 briefly revises the literature on the determinants of the sacrifice ratio, Section 3 describes our data set and methodology, Section 4 presents our main result and, finally, Section 5 briefly concludes.

2. LITERATURE

Empirical work has shown high inflation rates are detrimental to long run growth (Bruno and Easterly, 1998) and entail non-negligible welfare costs (Lucas, 2000). But bringing inflation down is no free-lunch either and is usually associated with non-trivial short run output losses (Ball, 1994). It is therefore important to understand what determines the so-called "sacrifice ratio" (accumulated loss in output during disinflations divided by the overall fall in inflation) and, in particular, to assess whether it varies across different monetary regimes.

Following Ball (1994), empirical research on this topic has shown that the degree of nominal rigidity and the velocity of the disinflationary process help to explain the variation in sacrifice ratios. Usually, inflation at the beginning of the disinflationary period is employed as a proxy for nominal rigidity: since nominal contracts tend to be shorter the higher the inflation rate, the initial level of inflation is expected to be negatively correlated nominal rigidity and hence with the sacrifice ratio. On the other hand, the velocity of the disinflationary process has in principle a dubious effect on the sacrifice ratio. Whereas Sargent (1986) argues that rapid disinflations render them more credible and hence entail smaller output losses, Taylor (1983) emphasizes that the presence of pervasive nominal rigidities makes gradualism a less costly option.

Using velocity and some nominal rigidity index as basic regressors, subsequent studies have focused on the role of central bank independence. Given more independent central banks are supposedly more shielded against politicians seeking short run political benefits from monetary policy, one would expect more independent central banks to have a greater ability in anchoring private sector's inflation expectations. More independent central banks should therefore be capable of disinflating less costly. Surprisingly, however, Posen (1995) and Debelle and Fischer (1995) – using different proxies for CB independence and different samples – both find that more independent central banks are associated with *higher* sacrifice ratios.

[1] Credibility is also enhanced under IT because the system usually provides the central banker with appropriate incentives to keep inflation under control.

[2] Gonçalves and Salles (2008) show, however, that applying Ball and Sheridan's strategy of running difs-in-difs regressions to a group of Emerging Economies yields opposite results. Targeters in this sample do seem to have performed better than non-targeters.

[3] We find the restriction that a country is considered a targeter only if IT is in place for more than six months as highly plausible. It is reasonable to expect that some time is needed for a new monetary policy *modus operandi* to build credibility. This same argument is put forth by Bernanke et al. (1999).

More related to our paper is Bernanke et al. (1999) finding of no credibility bonus coming from the adoption of IT. They run a standard "Ball regression" and with the estimated coefficients in hands, project what should have been the expected out-of-the-sample sacrifice ratios for targeting and non-targeting countries in future actual disinflations. For three out of the four inflation targeters in their sample, the actual sacrifice ratio in the first disinflation episode after adoption is *greater* than the number projected using the coefficients of their estimated Ball's regression (and the actual realization of initial inflation and velocity). They thus go on to conclude that: "Disinflation under inflation targeting – *or at least the first disinflation under targeting* – does not appear to be less costly than it would have been absent inflation targeting".

We see, however, two problems with this conclusion. First, it is necessary to stress that their exercise says only that the *first* disinflation under the new regime was not less costly than expected.[4] Secondly, the sample they study is very small: they use data from 9 developed economies and identify only 25 disinflation episodes, which raises serious robustness doubts.

Here we dispute the claim that IT does not matter. Specifically, we show that those opting for it have witnessed significantly smaller output losses during disinflations. This result has an important policy implication: from a political economy perspective, since governments may shun from pursuing a policy-induced disinflation by fear of the associate short run loss in output, the adoption of IT, by attenuating the costs of disinflation, may render the attainability of lower levels of inflation politically more palatable.

3. DATA AND METHODOLOGY

From IMF's International Financial Statistics (IFS), we collect quarterly data on real GDP (level) and consumer price inflation (CPI) for OECD and developing economies which experienced at least one disinflation episode during the 1990/2006 period (see table 1). Data on central government debt comes from the OECD database and from the World Bank.

We employ two methodologies to identify a disinflationary episode. First we use Ball's methodology (also employed by Posen (1995) and Bernanke et al. (1999)). Specifically, we construct a 9-quarter moving average trend for inflation and consider declines from "peak" to "trough" greater than 2 percentage points as disinflation episodes. Peaks are points where the moving average is bigger than both the previous and subsequent four quarters and, likewise, troughs are points where the moving average is smaller than both the previous and subsequent four quarters. As in Ball (1994), we discarded the cases where initial inflation was above 20%. Finally, disinflationary processes are labelled as under IT only if at the beginning of the disinflation IT was already in place for at least two quarters.[5] As a robustness check we experiment with another identification criterion in which any fall in quarterly CPI inflation of at least 2 percentage points constitutes a disinflation.[6] In this second criterion the end of any disinflationary period is determined by the first quarter in which the process of inflation decline is interrupted. For instance, a country displaying annualized inflation rates (in consecutive quarters) of 10%, 6%, 3%, 2% and 4% has one disinflationary episode (of 8 percentage points) lasting for 3 quarters. Applying this criteria, we end up 54 episodes in the first case and 98 in the second (see tables 5 and 6).

We also experiment with two different measures of output cost when constructing the sacrifice ratio index. Again, we first follow the traditional measure employed in Ball's work and consider that output is at potential when the disinflation begins and assume it is back to potential four quarters after the end of the episode. The output cost is measured by accumulating the deviation of actual GDP (in

[4] Bernanke et al. (1999) claim the system is unlikely to yield concrete benefits shortly after its adoption. They argue it may take some time before the private sector: (a) is fully aware of its features and, (b) deems it credible.

[5] Hereafter we will refer to this criterion as identification procedure 1.

[6] Identification procedure 2.

logs) from the output trend (the line uniting GDP at the peak and GDP four quarters after the trough). The sacrifice ratio index (sr) is simply this number divided by the total inflation decline. Our second measure is the accumulated deviation of the log of the seasonally adjusted quarterly GDP from its HP filter trend. To get to the sacrifice ratio we divide this number by the total inflation decline experienced.

Following the pattern in this literature, in this study we use the inflation rate (CPI) at the beginning of the episode (proxy for nominal rigidity) and the inverse of the numbers of quarters in disinflation (a velocity measure) as our basic controls.[7] To these "Ball's variables" we add an IT dummy equal to 1 if the disinflation takes place in a targeting country, and 0 otherwise. The idea is that if after controlling for velocity and initial inflation the dummy remains significant, we have an indication of a credibility bonus associated with IT. We thus run the following basic regression using the two different criteria to identify a disinflation and the two proposed measures of the sacrifice ratio:[8]

$$sr = c + \alpha.\pi_0 + \beta.\frac{1}{d} + \gamma.IT + \epsilon \tag{1}$$

where:
sr is the sacrifice ratio.
c is a constant.
π_0 is inflation at the beginning of the episode.
d is number of quarters under disinflation, and IT is a dummy variable which equals 1 if the country inflation targets, and 0 otherwise.

Before presenting the formal econometric results we close this section with figures 1 and 2 which show, respectively, that (i) the average sacrifice ratio – using Ball's selection criterion and measure of output loss – is much smaller in IT countries (approximately 1/3 of the average for non-inflation targeters), and (ii) the usual controls in sacrifice ratio regressions do not differ much between the two groups, hinting IT may have played an important role during disinflations.

4. RESULTS

In this section, we present our econometric evidence that IT matters. For all specifications tested, we run four different models. Models 1 and 2 use the identification criterion that considers the raw quarterly inflation data, whereas models 3 and 4 use the more widely employed Ball's moving average criterion. In models 1 and 4 the output cost is measured with a HP filter and in models 2 and 3 we again resort to Ball's methodology discussed in the previous section.

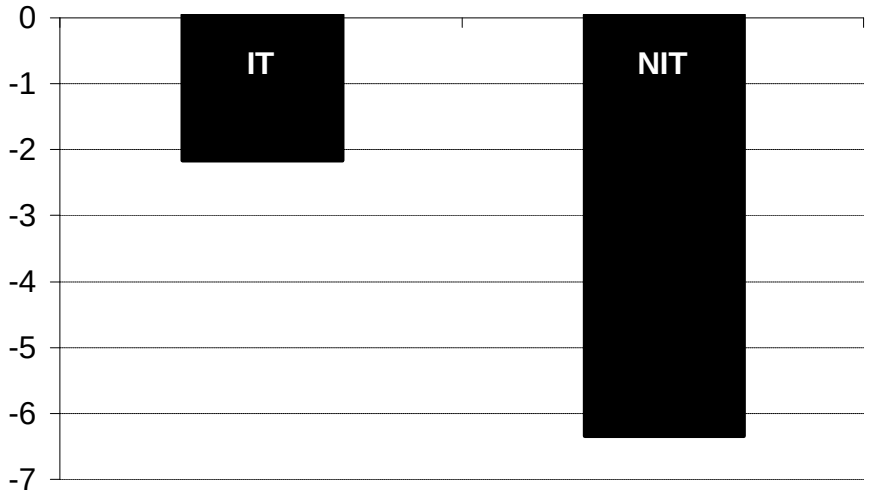
Before investigating the relevance of IT, we run a bare-bones specification including only initial inflation and duration. The results are shown in table 1 below: initial inflation is highly significant in all models. Velocity is borderline significant only in models 1 and 3. Model 3 – which we will see is the best model for all regressions presented here (and the preferred specification in the literature) – explains 23% of the variation in the sacrifice ratio. Judging by the point estimate of initial inflation in this model, a country entering a disinflation with initial inflation ten percentage points higher than another would experience, *ceteris paribus*, a sacrifice ratio approximately four percentage points smaller. Hence, nominal rigidity does seem to matter greatly for the output cost of disinflations.

Now we add our IT dummy variable to the bare-bones specification above. The results are shown in table 2 below. For the whole sample of countries, the IT dummy appears as statistically significant in models 1 and 3. Model 3, again the best fit, explains 34% of the variation in data, an increase of

[7] As pointed out by a referee, it would be interesting to add as an additional regressor the degree of central bank independence. Nevertheless, we could not find measures of central bank independence for most of emerging economies in our sample. And even for the OECD economies, there is the difficulty of finding measures for different points in time. In the next section we carried out another of his/her suggestions: to investigate the effect of a fiscal variable on the sacrifice ratio.

[8] This is our basic specification to which we'll add also public debt and an interactive dummy variable as robustness checks.

Figure 1: Sacrifice ratios – Ball's criterion



roughly 50% in relation to the baseline specification. Note the IT dummy is very precisely estimated in this model and its economic relevance is of considerable size. All else equal, an inflation targeter suffers much less – more than four percentage points in foregone output for each percentage point of inflation decline – than a non-targeter. Finally, the other coefficients are little altered after including the IT dummy in the models.

We are aware that this kind of cross-section regression is always subjected to a reverse causality criticism. But we do not think this particular objection weakens our results here for a simple reason: we find a *negative* partial correlation between IT and the sacrifice ratio. If it is true that countries lacking credibility – and hence displaying greater sacrifice ratios – are precisely the ones adhering to IT (this is the reverse causality argument), we should find a *positive* partial correlation between these variables. Indeed, the fact that we find negative partial correlations means that the impact of IT on the sacrifice ratio may actually be stronger than the ones we report.

Since our sample includes both developed and emerging economies, we can investigate whether the IT dummy effect is due to the influence of a particular group of countries. For that, we add to our regressors an interactive dummy equal to 1 if the country inflation targets *and* is an emerging economy, and 0 otherwise.[9] Table 3 presents the outcome of this regression for our four different models.

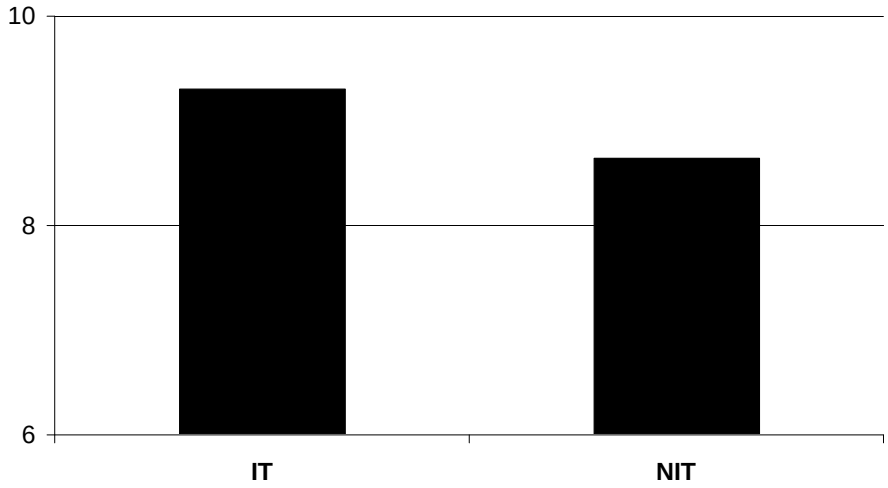
As shown, the pure IT dummy coefficient increases in size and is still better estimated than before. Interestingly, the interactive dummy is of negative sign, meaning that the effect of IT on the costs of disinflation is stronger for the sub-sample of *developed* economies. Since the pure IT dummy is greater than the interactive dummy (and in model 3 they are both very precisely estimated), one still can argue that IT helped emerging economies to disinflate less costly (but the gains seem to be more moderate for this group of countries).

As a final robustness check we add the average central government debt during the disinflationary periods.[10] The rationale is that smaller indebtedness should lead to lower inflation expectations independently of the monetary arrangement, and hence to smaller output costs. As table 4 shows, this

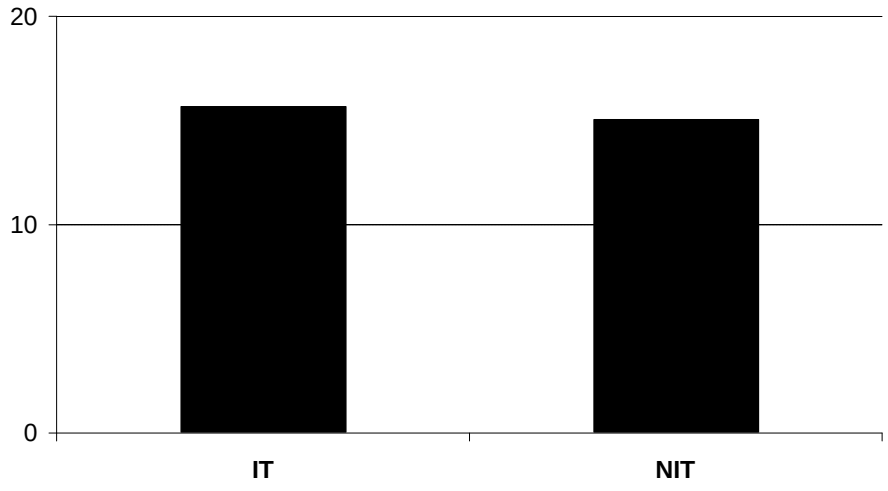
[9] This interactive dummy was suggested to us by an anonymous referee.

[10] As suggested by a referee, we tested if the size of the disinflation episode is a meaningful variable and find it isn't. Results not reported.

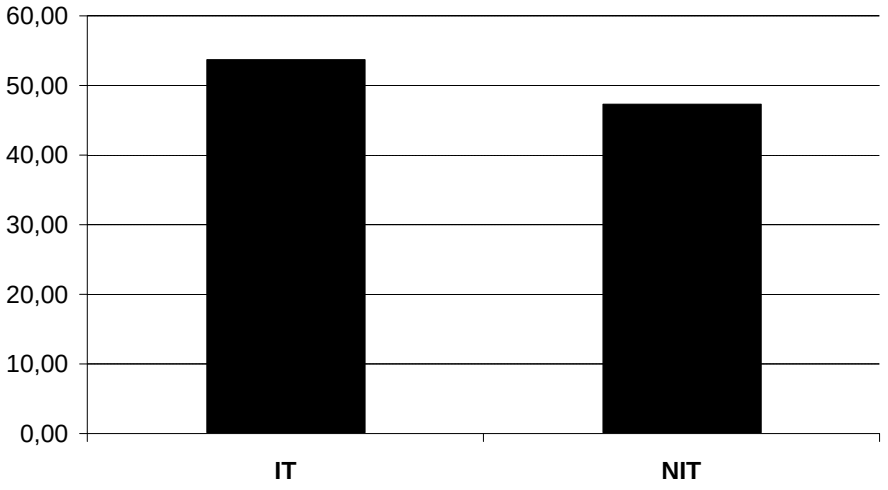
Figure 2: Usual controls



(a) Initial inflatio (%)



(b) Duration



(c) Debt/GDP

Table 1: Ball's controls only

	Model 1	Model 2	Model 3	Model 4
C	-2,79	-2,00	-12,44	-2,58
	(4.7)	(2.55)	(4.85)	(4.6)
Initial Inflation	0,09	0,10	0,42	0,13
	(3.57)	(2.72)	(3.24)	(2.29)
Velocity	3,21	-1,79	39,20	-1,30
	(1.86)	(0.40)	(1.93)	(0.35)
Adj.R^2	0,14	0,08	0,23	0,09

White Heteroskedasticity-Consistent Standard Errors & Covariance.

T-statistics in parenthesis.

Table 2: The IT dummy effect

	Model 1	Model 2	Model 3	Model 4
C	-3,15	-2,25	-13,30	-3,01
	(4.72)	(2.77)	(5.25)	(4.49)
Initial Inflation	0,11	0,11	0,44	0,15
	(3.75)	(2.46)	(3.64)	(2.38)
Velocity	3,06	-1,71	38,67	-2,04
	(1.96)	(0.39)	(2.02)	(0.48)
IT Dummy	0,66	0,41	4,85	0,91
	(2.20)	(0.90)	(4.50)	(1.23)
Adj.R^2	0,20	0,09	0,34	0,11

White Heteroskedasticity-Consistent Standard Errors & Covariance.

T-statistics in parenthesis.

variable is however not statistically significant in any regression. Its inclusion renders the interactive dummy statistically insignificant in our best preferred model 3, but other than that results are little altered.

Table 3: Adding the interactive dummy

	Model 1	Model 2	Model 3	Model 4
C	-3,19	-2,35	-1,35	-3,07
	(4.8)	(2.93)	(5.16)	(4.50)
Initial Inflation	0,13	0,12	0,47	0,15
	(3.98)	(2.73)	(3.70)	(2.43)
Velocity	2,55	-1,84	37,87	-2,00
	(1.61)	(0.43)	(1.94)	(0.64)
IT Dummy	1,01	1,03	7,45	2,57
	(2.63)	(1.98)	(6.02)	(4.40)
IT Dummy*EM Dummy	-0,69	-0,96	-3,45	-2,05
	(1.85)	(1.80)	(3.57)	(3.20)
Adj.R^2	0,23	0,11	0,35	0,13

White Heteroskedasticity-Consistent Standard Errors & Covariance.

T-statistics in parenthesis.

Table 4: Adding a fiscal variable

	Model 1	Model 2	Model 3	Model 4
C	-2,97	-1,98	-10,27	-2,97
	(4.1)	(1.97)	(3.51)	(3.32)
Initial Inflation	0,12	0,13	0,12	0,18
	(3.29)	(2.60)	(2.99)	(2.50)
Velocity	2,76	-2,10	26,23	-2,42
	(1.73)	(0.47)	(1.40)	(0.55)
IT Dummy	0,97	0,98	6,60	2,51
	(2.27)	(1.80)	(5.04)	(3.45)
IT Dummy*EM Dummy	-0,41	-1,16	-1,43	-1,95
	(1.02)	(1.96)	(0.88)	(3.35)
Dívida	0,00	-0,01	-0,04	-0,01
	(0.40)	(0.75)	(1.19)	(0.73)
Adj.R^2	0,24	0,13	0,36	0,14

White Heteroskedasticity-Consistent Standard Errors & Covariance.

T-statistics in parenthesis.

5. FINAL REMARKS

In this paper we took on the task of assessing if IT matters for reducing the costs of disinflation. Our results suggest it does.

Judging by the coefficient of our most preferred specification, countries adopting IT save roughly 4 percentage points in GDP (level) relative to its trend for each point of inflation decline. This is an economically important effect. Further, adding an emerging market interactive dummy to our model reveals that the benefits from IT appear to be greater for developed economies. This finding, however, is not robust to the inclusion of a fiscal variable among the regressors and thus warrants further investigation.

Wrapping up, by significantly reducing the short-run costs of disinflation IT may render the attainability of lower inflation levels politically more feasible.

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A. TABLES

Table 5: Data

Country	Episode	SR-Ball	SR-HP	INFI	DUR	VAR	Dummy	Debt/ GDP	Dummy IT.EM
South Africa	1991:4 - 1993:1	-1,794	-1,507	16,107	6	6,711	0	40,24	0
South Africa	1994:1- 1994:2	-	-1,000	9,67	2	2,516	0	49,72	0
South Africa	1997:1 - 1998:2	-0,523	-	9,61	6	4,489	0	48,84	0
South Africa	1998:4 - 1999:4	0,000	-0,696	9,08	5	7,124	0	45,27	0
South Africa	2001:1 -2001:4	-0,953	-0,229	7,42	4	3,116	1	45,12	1
South Africa	2002:4 - 2004:1	-0,556	-0,249	12,754	6	12,317	1	37,92	1
Argentina	1995:1 - 1996:2	-5,251	-4,576	4,837	6	5,053	0	-	0
Argentina	1998:2 - 1999:3	-2,440	-	1,165	6	2,956	0	-	0
Argentina	2003:2 - 2004:1	-0,023	-0,747	14,534	4	12,109	0	-	0

continue

Table 5: Data (continuation)

Country	Episode	SR-Ball	SR-HP	INFI	DUR	VAR	Dummy	Debt/ GDP	Dummy IT.EM
Brazil	2003:2 - 2004:2	-	-0,427	16,858	5	11,366	1	54,77	1
Brazil	2005:2 - 2006:1	-0,911	-	7,795	4	2,285	1	50,9	1
Chile	1994:1 - 1995:2	-0,832	-1,244	13,362	6	5,58	1	22,57	1
Chile	1997:4 - 1999:1	-5,644	-	6,291	6	2,471	1	13,28	1
Chile	2003:1 - 2004:1	-1,650	-1,758	3,777	5	3,771	1	15,72	1
Colombia	1998:3 - 1999:3	-1,742	-0,753	18,997	5	9,865	0	-	0
Colombia	2001:3 - 2002:2	-0,980	-2,684	8,03	4	2,119	1	-	1
Costa Rica	2001:2 - 2002:2	-1,230	-1,638	12,446	5	4,632	0	38,31	0
Ecuador	2002:1 - 2005:2	-0,785	-	14,709	14	13,216	0	-	0
Peru	1998:2 - 1999:3	-	-0,964	8,108	6	5,324	1	-	1
Peru	2000:4 - 2002:1	-0,545	-2,977	4,001	6	5,011	1	-	1
Israel	1991:4 - 1993:2	-0,646	-	18,523	4	9,889	0	138,21	0
Israel	1994:4 - 1995:4	-4,900	-0,982	14,196	5	6,122	1	121,36	1
Israel	1996:2 - 1997:2	0,000	-0,592	12,316	5	3,684	1	110,85	1
Israel	1997:3 - 1998:3	-	-0,544	9,06	5	5,442	1	108,55	1
Israel	2002:4 - 2004:1	-1,051	-1,318	6,708	6	9,193	1	98,12	1
India	1997:1 - 1997:3	-1,308	-0,722	10,632	3	5,563	0	51,12	0
India	2000:2 - 2001:2	-	-0,617	5,263	5	2,536	0	57,87	0
Indonesia	1999:3 - 2000:1	-0,564	-1,274	6,586	3	7,159	0	45,21	0
Indonesia	2002:1 - 2004:1	-0,092	-	14,541	9	9,659	0	29,98	0
Malaysia	1992:3 - 1993:4	-0,549	-	5,189	6	2,544	0	60,03	0
Malaysia	1998:2 - 2000:2	-	-5,990	5,728	9	4,315	0	36,84	0
Phillippines	1991:3 - 1993:2	-0,866	-0,701	19,783	8	13,579	0	43,7	0
Phillippines	1994:2 - 1995:1	-1,130	-0,818	9,442	4	3,198	0	56,41	0
Phillippines	1998:4 - 2000:1	-	-0,513	10,55	6	12,015	0	-	0
Phillippines	2001:1 - 2002:4	-0,590	-0,342	7,491	8	4,995	0	66,17	0
Singapore	1997:4 - 1998:3	-4,152	-1,259	2,295	5	3,751	0	80,67	0
Singapore	2001:2 - 2002:1	-	-1,513	1,691	4	2,538	0	93,72	0
Thailand	1998:2 - 1999:3	-	-2,638	10,363	6	11,291	0	17,97	0
Thailand	2001:2 - 2002:2	-2,200	-2,894	2,5	5	2,266	1	28,82	1
Morocco	1992:1 - 1992:2	-2,085	-0,433	8,341	3	4,441	0	83,66	0
Morocco	1995:2 - 1996:3	-	-3,066	6,783	6	4,788	0	80,71	0
Morocco	1996:4 - 1997:2	-9,863	-	3,158	3	3,181	0	75,52	0
Tunisia	2002:1 - 2003:1	-2,671	-3,056	3,776	5	2,467	0	61	0
Tunisia	2004:1 - 2005:2	-0,862	-	4,887	5	3,483	0	59,82	0
Korea	1991:4 - 1993:1	-2,127	-0,636	9,054	6	4,429	0	11,85	0
Korea	1998:1 - 1999:2	-1,264	-3,634	8,934	6	8,339	0	15,85	0
Czech Republic	1998:1 - 1999:3	-0,851	-0,872	13,31	7	12,109	0	10,54	0
Czech Republic	2001:3 - 2003:1	-0,963	-0,788	5,38	7	5,737	1	16,86	1
Hungary	1997:4 - 1999:2	-0,385	-0,407	18,14	7	8,987	0	61,02	0
Hungary	2001:2 - 2002:3	-0,409	-	10,549	6	5,979	0	53,01	0
Hungary	2004:2 - 2005:1	-	-0,069	7,372	4	3,817	1	57,64	1
Poland	1996:4 - 1997:4	-	-0,092	18,835	5	5,368	0	43,47	0
Poland	1998:1 - 1999:1	-0,497	-	13,802	5	7,631	0	39,59	0
Poland	2000:3 - 2003:1	-2,296	-0,709	10,797	11	10,456	1	39,46	1
Poland	2004:3 - 2006:1	-1,191	-	4,658	7	3,991	1	44,32	1
United States	1990:4 - 1992:1	-1,63	-1,39	6,224	6	3,355	0	45,07	0
United States	2000:3 - 2002:1	-0,62	-	3,508	7	2,256	0	33,71	0
United Kingdom	1990:3 - 1992:1	-1,51	-0,14	10,434	7	6,332	0	32,98	0
United Kingdom	1992:2 - 1993:2	-1,64	-2,74	4,168	5	2,898	0	36,13	0
United Kingdom	1998:2 - 1999:3	0,00	-0,16	3,994	6	2,833	1	47,94	0
United Kingdom	2000:3 - 2001:4	-0,21	-	3,2	6	2,154	1	41,61	0
Germany	1992:2 - 1992:4	-0,89	-	6,129	3	2,752	0	20,5	0
Germany	1993:3 - 1996:1	-	-1,31	4,51	11	3,085	0	21,52	0
Italy	1995:3 - 1997:3	-0,95	-	5,685	9	3,863	0	112,54	0
Netherlands	2001:2 - 2003:2	-2,66	-	4,738	9	2,725	0	41,92	0
Norway	2003:1 - 2004:1	-	-0,68	4,543	5	5,943	1	20,11	0
Sweden	1991:1 - 1992:2	-0,09	-	11,283	6	9,125	0	51,13	0
Sweden	1993:2 - 1994:1	-0,80	-2,47	4,956	4	3,319	1	70,66	0
Sweden	1995:2 - 1996:4	-1,97	-	2,75	7	2,997	1	77,97	0
Sweden	1997:4 - 1998:4	-1,78	-0,80	1,563	5	2,666	1	74,22	0
Sweden	2003:1 - 2004:1	-	-1,46	2,985	5	2,932	1	48,81	0
Switzerland	1991:2 - 1992:4	-0,57	0,00	6,253	7	2,811	0	14,5	0
Canada	1991:1 - 1992:3	-0,83	-1,46	6,434	7	5,199	0	52,06	0
Canada	2001:2 - 2001:4	-0,73	0,00	3,598	3	2,495	1	39,71	0
Canada	2003:1 - 2004:1	-1,04	-1,04	4,475	5	3,602	1	33,94	0
Japan	1997:3 - 1998:3	-1,11	-	2,214	5	2,408	0	52,06	0
Finland	1990:3 - 1992:3	-6,38	-	5,925	9	3,44	0	20,2	0
Finland	1993:1 - 1994:1	-3,81	-6,64	2,592	5	2,303	0	54,81	0
Iceland	2002:1 - 2003:1	-2,21	-1,10	9,028	5	7,481	1	34,94	0
Ireland	2003:1 - 2004:1	-	-0,39	4,939	5	3,328	0	26,25	0

continue

Table 5: Data (continuation)

Country	Episode	SR-Ball	SR-HP	INFI	DUR	VAR	Dummy	Debt/ GDP	Dummy IT.EM
Spain	1992:1 - 1993:1	-4,92	-	6,553	5	2,32	0	43,53	0
Spain	1996:3 - 1997:2	-	-0,30	3,667	4	2,094	1	55,38	0
Australia	1990:1 - 1990:3	0,00	-	8,576	3	2,496	0	6,28	0
Australia	1990:4 - 1991:4	-2,17	-0,57	6,846	5	5,337	0	7,12	0
Australia	1995:3 - 1997:3	-0,81	-0,07	5,094	9	5,427	1	19,24	0
New Zealand	2001:2 - 2001:3	-	-0,46	6,022	2	3,501	1	30,39	0
New Zealand	1990:2 - 1992:1	-1,59	-	7,625	8	6,831	0	64,64	0
New Zealand	1995:2 - 1996:2	-2,04	-	4,59	5	2,605	1	46,17	0
New Zealand	1998:2 - 1999:3	-	-2,77	1,722	6	2,218	1	36,95	0
Slovak Republic	1994:1 - 1996:3	-0,32	-	15,455	11	10,095	0	19,67	0
Slovak Republic	2000:2 - 2001:1	-0,71	-0,41	15,795	4	8,781	0	30,2	0
Slovak Republic	2001:3 - 2002:3	-	-0,61	7,925	5	5,412	0	35,87	0
Slovak Republic	2003:4 - 2005:3	-0,05	-	9,531	8	7,441	0	36,43	0
Portugal	1992:2 - 1993:2	-2,23	-	9,597	5	3,78	0	55,06	0
Portugal	1993:4 - 1999:4	-0,09	-2,20	6,467	5	2,305	0	58,48	0
Portugal	1995:1 - 1996:1	-	-1,16	4,621	5	2,188	0	61,59	0
Portugal	1996:3 - 1997:3	-	-2,84	3,614	5	2,041	0	59,65	0
Average		-1,543	-1,340	7,938	5,742	5,197		48,120	
Std. Deviation		1,682	1,326	4,551	1,996	3,068	0,480	26,255	

Table 6: Data

Country	Episode	SR-Ball	SR-HP	INFI	DUR	VAR	Dummy	Debt/ GDP	Dummy IT.EM
Argentina	1993:1 - 1997:1	-1,10	-0,73	17,09	17	16,72	0	-	0
Argentina	2003:1 - 2004:3	-	-1,27	18,37	7	12,44	0	-	0
Brazil	2002:4 - 2005:1	-2,00	-0,70	11,15	11	4,54	1	52,83	1
Colombia	1999:1 - 2005:1	-9,07	-2,36	14,18	25	8,84	0	58,22	0
Czech Republic	1998:1 - 2000:1	-2,89	-2,14	8,85	9	5,71	0	11,52	0
Czech Republic	2001:1 - 2003:2	-3,53	-1,61	4,25	10	3,26	1	16,87	1
Ecuador	2002:2 - 2005:1	-0,80	-	17,84	14	15,11	0	-	0
Indonesia	2000:1 - 2000:3	-	-0,70	13,28	3	6,99	0	45,21	0
Indonesia	2001:4 - 2004:2	-0,11	-	11,39	11	4,83	0	29,98	0
Israel	1990:3 - 1991:4	-	-1,33	18,59	6	2,74	0	148,68	0
Israel	1994:1 - 2000:4	-0,29	-	11,79	28	10,58	1	110,05	1
Israel	2002:2 - 2004:2	-5,25	-4,07	3,72	9	4,04	1	98,12	1
Korea	1991:2 - 1993:2	-0,07	-0,77	8,81	9	3,37	0	11,86	0
Korea	1998:1 - 2000:1	-12,06	-8,35	5,40	9	3,63	0	16,38	0
Malaysia	1998:1 - 2001:1	-3,58	-9,13	3,97	13	2,50	0	36,84	0
Mexico	1992:1 - 1993:4	-1,59	-	18,28	9	9,37	0	26,59	0
Mexico	1999:1 - 2005:1	-0,69	-	15,64	25	11,38	0	23,54	0
Mexico	1997:4 - 1998:4	-2,65	-	19,44	5	3,05	0	26,77	0
Morocco	1991:1 - 1993:3	-4,71	-	7,55	11	2,57	0	81,07	0
Morocco	1994:3 - 2004:4	-6,65	-0,92	5,84	26	4,62	0	76,45	0
Peru	1995:1 -2002:3	-1,30	-	17,02	31	15,95	1	-	1
Phillippines	1990:4 - 1992:4	-4,56	-1,77	15,37	15	7,93	0	51,25	0
Phillippines	1998:3 - 2001:1	-	-1,68	8,24	11	4,91	0	-	0
Poland	1999:1 - 2003:2	-	-0,25	9,60	18	8,22	0	39,51	0
South Africa	1993:1 - 1997:2	-5,14	-0,83	14,95	24	7,40	0	48,30	0
South Africa	1997:4 - 2000:4	-3,31	-1,40	7,90	12	2,87	0	45,27	0
South Africa	2002:2 - 2004:4	-0,92	-0,43	7,84	11	5,63	1	37,92	1
Thailand	1997:3 - 2000:2	-10,65	-5,18	6,63	12	5,64	0	16,17	0
United States	1990:2 - 1994:4	-11,16	-0,98	5,13	19,00	2,42	0	46,72	0
United Kingdom	1990:1 - 1992:4	-5,39	-0,09	8,64	12,00	5,82	0	32,98	0
Austria	1993:1 - 1998:4	-5,92	-3,09	3,75	24,00	2,98	0	55,63	0
Belgium	1990:3 - 1998:4	-21,18	-2,72	3,43	34,00	2,37	0	111,38	0
Germany	1991:3 - 1996:2	-	-1,90	4,57	14,00	3,03	0	20,85	0
Italy	1990:2 - 1994:1	-16,65	-2,53	6,43	16,00	2,19	0	102,76	0
Italy	1995:1 - 1998:3	-2,38	-	4,69	15,00	2,88	0	111,59	0
Netherlands	2001:4 - 2005:1	-5,55	-	3,88	14,00	2,46	0	42,50	0
Norway	1990:1 - 1993:4	-10,37	-1,31	4,28	16,00	2,40	0	27,24	0
Sweden	1990:4 - 1992:4	-5,62	-	9,53	9,00	5,49	0	47,43	0
Sweden	1993:1 - 1997:4	-19,59	-2,85	3,35	20,00	3,20	0	74,48	0
Switzerland	1991:1 - 1998:2	-6,64	-1,29	5,53	30,00	5,28	0	21,17	0
Canada	1991:1 - 1994:1	-11,30	-3,56	4,80	13,00	3,73	0	54,19	0
Japan	1990:4 - 1995:3	-2,39	-	3,11	20,00	3,07	0	54,60	0
Finland	2001:1 - 2004:2	-6,20	-2,50	2,86	14,00	2,36	0	43,49	0

continue

Table 6: Data (continuation)

Country	Episode	SR-Ball	SR-HP	INFI	DUR	VAR	Dummy	Debt/ GDP	Dummy IT.EM
Finland	1990:1 - 1993:2	-16,67	-0,18	6,21	14,00	4,33	0	27,98	0
Iceland	2001:2 - 2003:3	-8,25	-2,39	6,16	10,00	3,80	0	36,49	0
Ireland	2001:2 - 2004:4	-0,37	-0,77	5,21	15,00	2,92	0	27,82	0
Spain	1994:4 - 1998:2	-16,89	-1,00	4,71	15,00	2,84	0	53,25	0
Australia	1990:1 - 1993:1	-6,57	-0,39	7,14	13,00	5,74	0	9,20	0
Australia	1995:3 - 1998:2	-1,18	-0,11	3,55	12,00	2,94	1	18,43	0
New Zealand	1990:1 - 1992:4	-8,44	-1,12	5,76	12,00	4,63	0	60,43	0
New Zealand	1995:4 - 1998:4	-1,82	-	3,00	13,00	2,40	1	40,76	0
Slovak Republic	2000:3 - 2002:1	-0,77	-1,35	11,07	7,00	5,48	0	31,92	0
Slovak Republic	2003:4 - 2005:1	-0,16	-0,41	7,50	6,00	2,46	0	36,43	0
Portugal	1990:1 - 1999:1	-7,30	-1,33	12,95	37,00	10,52	0	56,91	0
Average		-5,87	-1,89	8,71	15,09	5,42		48,08	
Std. Deviation		5,43	1,93	5,00	7,53	3,63		30,41	