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ASSESSING THE IMPACT OF DIFFERENT NOMINAL ANCHORS ON THE CREDIBILITY OF STABILISATION PROGRAMMES

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Abstract

The paper compares the impact of announcing exchange-rate-based versus money-based stabilisation programmes in a cross-section of countries. The analysis finds that the effect of announcing exchange-rate-based programmes is more credible, in terms of reducing inflation inertia, than the outcome associated with implementing money-based programmes. However, the gap between the magnitudes of the impacts from implementing the different strategies has been falling since the 1970s.

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1. Introduction

Deteriorating macroeconomic fundamentals lead governments to adopting formal stabilisation programmes. Credibility is important in designing and implementing macroeconomic policies, and particularly stabilisation programmes. The reason is that if stabilisation policies lack credibility they are likely to fail in achieving the desired objectives.[1] But deciding on the exact features of a plan to curtail weakening macroeconomic fundamentals is a difficult task for policymakers.

The paper focuses on determining the performance of economies adopting different stabilisation programmes. The investigation asks the following question: Are exchange-rate-based stabilisation (ERBS) programmes more credible than money-based stabilisation (MBS) programmes?

The literature on the topic is substantial and predicts that ERBS will have a larger effect than MBS. Calvo and Végh (1994) survey the theory and empirics on the topic; see also Rebelo and Végh (1995). The finding that ERBS are more credible matches the empirical regularity showing that such plans produce a boom followed by a bust, while MBS work in the opposite order. Assuming that the fiscal authorities are impatient, Tornell and Velasco (1998) show that MBS will yield better outcomes, in term of fiscal discipline and welfare, than ERBS programmes. There is also evidence that political

[1] In Flood's (1983) model agents' anticipation of a possible abandonment of the stabilization programme feeds a self-fulfilling process.

opportunism plays a role in the government's choice of nominal anchor (e.g., Aisen, 2007).

In measuring the impact of stabilisation it is critical to account for the announcement effect. The announcement effect measures the impact on inertia observed following the introduction of the programme and is expected to capture the perception of agents on the authorities' ability to stabilize inflation. Depending on how people behave, various elements could determine the impact of announcing a programme, including the IMF's reputation, the type of package being proposed, and the time remaining to the next political elections.

The paper contributes by estimating the impact of ERBS vis-à-vis MBS using a panel of 19 countries with a history of stabilisation episodes. The analysis pays particular attention to measuring the announcement effect and its impact on credibility as captured by inflation inertia.[2] Since inflation inertia is known to be closely related to the credibility on the stabilisation programme (Agénor and Taylor, 1992), the paper uses cross-section data to assess the impact that each nominal anchor has on reducing inertia at the time the programme is announced. The reduction in inertia is then compared among the different nominal anchors and among different regions to investigate the existence of regime-specific effects and region-specific characteristics linked to the stabilisation episodes.

[2] The selection of countries follows from previous studies on stabilization. In particular, Hamann (2001) and Easterly (1996) have used and extended this base of countries for the purpose of comparing IMF's registered dates of stabilization and the dates the programmes are announced. The paper uses Hamann (1991) criteria for the selection of stabilization dates.

The rest of the paper proceeds as follows: Section 2 explains a model for measuring credibility. Section 3 runs econometric exercises for determining the impact of ERBS and MBS in a cross-section of countries. Section 4 concludes.

2. **Measuring credibility**

This section extends Edwards (1998), using interaction dummy variables for measuring the impact of credibility on inflation inertia in a panel of countries. In a cross-sectional setting, inflation can be represented by the following stacked stochastic process:

$$X_{it} = \alpha + \beta X_{it-1} + \gamma Y_{it} + \nu_{it} \qquad (1)$$

where X_{it} represents inflation, Y_{it} is GDP growth and ν_{it} is the error term capturing supply side shocks for $i = 1,2, \dots, M^k$ cross-sectional units observed for periods $t = 1,2, \dots, T$, where the k represents a subsample of cross-sectional units. The α parameter represents the overall constant in the model, while the β and γ represent inflation inertia and the impact of GDP growth respectively.[3] If a stacked representation of these equations is employed and the specification is organized as a set of cross-section equations, it then

[3] Equation (1) follows from the traditional definition of inflation (e.g. Dornbusch, 1976; and Dornbusch and Simonsen, 1988).

follows that $\nu \sim N(0, \Omega)$ and the general form of the unconditional error covariance matrix would be given by:

$$\Omega = E(\epsilon\epsilon') = E\begin{pmatrix} \epsilon_1\epsilon_1{}' & \epsilon_2\epsilon_1{}' & \cdots & \epsilon_{M^k}\epsilon_1{}' \\ \epsilon_2\epsilon_1{}' & \epsilon_2\epsilon_2{}' & & \vdots \\ & & \ddots & \\ \epsilon_{M^k}\epsilon_1{}' & \cdots & & \epsilon_{M^k}\epsilon_{M^k}{}' \end{pmatrix} \quad (2)$$

According to the literature, credibility on a stabilisation attempt can be approximated by changes in β at the time the stabilisation programme is announced (e.g. Edwards, 1996). This provides an approximation of the probable success that agents attribute to the programmes.[4] The argument, pioneered by Sargent (1982), suggests that the effectiveness and cost of disinflation will depend on the credibility in the stabilization package.

If stabilisation is credible, persistence will fall and β will drop when the programme is announced. If stabilization lacks credibility the β will not respond to the announcement of the programme. Consequently, the evolution of β can offer relevant information about the performance and success of stabilisation.

The announcement effect of stabilisation can be measured by using an impact dummy variable on inflation persistence:[5]

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[4] The change in δ reflects the announcement effect of stabilization. However, the implementation effect can be evaluated by looking at the recursive evolution of δ after the programme is introduced (see Edwards, 2001).

[5] See Obstfeld (1995) for a discussion on inflation persistence and the use of dummy variables in evaluating the impact of regime changes on inertial inflation.

$$X_{it} = \alpha + \beta X_{it-1} + \delta X_{it-1} D_{it} + \gamma Y_{it} + \epsilon_{it} \quad (3)$$

where D_{it} are dummy variables that take the value of one in the year a specific country enters in a stabilisation programme and zero otherwise. The δ coefficient measures the change in inflation persistence, assumed to capture the credibility impact of the stabilisation programme. The larger the value of δ the greater the credibility on the programme and the smaller the value of δ the lower the credibility on the stabilisation attempt.

In addition, the framework allows measuring the credibility of alternative nominal anchors within specific regions. For example, the cross-sectional unit k can be limited to include selected countries within a region and the dummy variables can be restricted to a specific type of anchor.

Looking at the credibility between ERBS and MBS programmes for selected regions, would require extending the model as follows:

$$X_{it} = \alpha + \beta X_{it-1} + \delta_j X_{it-1} D_{jit} + \gamma Y_{it} + \epsilon_{it} \quad (4)$$

where the subscript j represents the type of anchor been evaluated. In particular, δ_{ERBS} measures the impact on inertia of ERBS whereas δ_{MBS} measures the impact of MBS programmes. For example, if δ_{ERBS} is statistically larger than δ_{MBS} would imply that ERBS is more credible than MBS programmes. If one of the coefficients is not statistically significant, however, the credibility impact of that specific anchor is negligible. If both coefficients are significant but not statistically different from each other, would imply that no additional impact can be attributed to a specific nominal anchor.

3. Empirical modelling

Equation (4) was estimated using pooled IV two-stages least squares. The instruments include the constant, lagged values of inflation and GDP growth rates. An ordinary coefficient covariance method was used provided that is unlikely to observe cross-equation correlations and heteroskedasticity across regions.[6]

Following Hamann (2001), the analysis employs a panel of 19 countries with a total of 16 ERBS and 23 MBS episodes. The stabilization dates and type of nominal anchor follow from the IMF classification. In particular, IMF programs that fall within a *stand-by* agreement or structural adjustment programs where selected.[7] Other form of stabilization, including unorthodox programs, where disregarded.

Annual data was used in computing inflation and aggregate demand for each country.[8] The data ranges from 1960 up to 2004 with a total of 812

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[6] Nevertheless, various robust covariance methods where tested without any meaningful changes in the result.

[7] Reported stabilization dates come from the IMF website, and are cross- referenced with Tornell and Velasco's (1998) samples.

[8] Inflation is approximated by the change in the log of the consumer price index (CPI), and aggregate demand by the change in the log of nominal gross domestic product (GDP). Data

unbalanced pooled observations. The set is unbalanced provided that some countries such as Brazil, Nicaragua, and Zambia, have different sample lengths.

An important challenge of the exercise is in determining the dates of stabilisation. As indicated by Easterly (1996), the IMF reported dates of a stabilisation programme differ from the dates inflation is actually stabilize. As a benchmark, Table 1 shows the actual dates of stabilisation and those under Hamann (2001) and Easterly (1996). The data confirms an average delay of one year for stabilisation to bringing down inflation when the programme is regarded as successful. For example, out of the 39 stabilisation episodes only 14 where successful under Easterly (1996), and 24 under Hamann (2001). The exercise uses Hamann (2001) as the reference.[9]

4. Cross-section analysis

Table 2 presents the results of estimating equation (4) in the selected sample. There are four regression groups based on the different regions and two regressions per group relating to ERBS and MBS programmes.

The FULL sample includes the complete set of countries. The Latin American (LATAM) sample includes Argentina, Bolivia, Brazil, Chile, Costa

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for CPI and GDP comes from the International Monetary Fund (IMF) International Financial Statistics (IFS).

[9] This paper extends the sample to include the Dominican Republic 1985, Chile 1964, Ecuador 1983 and 1984, Mexico 1995, Nigeria 1993, Turkey 1999, and Venezuela 1993 stabilization episodes.

Rica, Dominican Republic, Ecuador, Jamaica, Mexico, Nicaragua, Peru, Uruguay and Venezuela. The NONLATAM sample includes Israel, Iceland, Turkey, Zambia, Nigeria and Uganda, whereas the Caribbean (CA) sample includes the Dominican Republic and Jamaica.

In the FULL sample, the regressions have 52 observations, 19 cross-sections and 745 pooled unbalanced observations. The LATAM sample has 52 observations, 13 cross-sections and 563 pooled unbalanced observations. For the NONLATAM sample, the regressions have 52 observations, 6 cross-sections and 182 pooled unbalanced observations. Finally, the CA sample has only one regression for MBS episodes with 48 observations, 2 cross-sections and 89 pooled observations. All of the pooled cross-section regressions show adequate statistics and fit. In addition, the variables are significant and with the correct signs. Lagged inflation and GDP growth variables where expected to be positive, while the interaction dummy variables where expected to be zero or negative.

Looking at inflation inertia alone, a Wald test on the coefficients of lagged inflation indicates that there are no significant differences among countries and between nominal anchors.[10] For the FULL sample, the test cannot reject the null of equal inertial coefficients among ERBS and MBS ($\chi^2(1) = 1.004, p = 0.316$). Similarly, for the LATAM and NONLATAM samples, the test cannot reject the null of equal coefficients ($\chi^2(1) = 0.402, p = 0.526$ and $\chi^2(1) = 0.454, p = 0.502$).

[10] See Davidson and MacKinnon (1993) for a general discussion on Wald test.

The results imply that the choice of the nominal anchors in not associated with the level of inflation persistence prior to launching the stabilization programme.

There are, however, significant differences among inertia levels between regions. For example, the NONLATAM and the CA regions have higher levels than the LATAM and the FULL sample regressions regardless of the nominal anchors being pursue. None of the regions showed unit roots suggesting mean reversion within these inflation processes.

There are also significant regional differences when measuring the impact of GDP growth over inflation. For example, the impact is much lower in the NONLATAM and in the CA regions compared to the full sample. The Wald test rejected the null of equal coefficients when comparing the coefficients of GDP growth among the NONLATAM and the FULL sample within the EBRS group ($\chi^2(1) = 37.45, p < 0.01$). Similar results are obtained when comparing the LATAM with the CA region. It appears that inflation is more sensitive to demand pressures in the LATAM countries than in the rest of the regions.

The analysis moves on to the issue of credibility as measured by an impact dummy variable on lagged inflation. According to the literature, if inflation inertial drops when stabilisation is announced, the programme can be regarded as credible. The impact dummy measures the credibility impact of stabilisation, and allows comparing it among different nominal anchors and within different regions.

Looking at the FULL sample, the impact dummy on both ERBS and MBS where negative and statistically significant indicating that both types of nominal anchors had a meaningful credibility effect. When comparing the credibility impact in absolute terms, however, the Wald test cannot reject the null of equal coefficients among nominal anchors ($\chi^2(1) = 1.766, p = 0.183$. This implies that the announcement effect is similar among stabilization strategies. However, the correct way to compare among programs is by evaluating the relative impact that the stabilization program has on inertia, which can be measures dividing the coefficient of the impact dummy by the coefficient of lagged inflation. This provides a measure of how much inflation inertia drops relative to its level prior to stabilization when the programme is introduce.

Table 2 also presents this calculation under the row named "relative LI drop".[11] Using this approach on the FULL sample, the Wald test shows that ERBS produces a higher drop in inertia than MBS ($\chi^2(1) = 3.765, p = 0.051$). The drop is substantial with a 76% under ERBS vs. 56% under

[11] The standard errors for these relative coefficients can be obtained by adapting Bårdsen's (1989) formulae for calculating the variance of ratio coefficients in standard LE and IV regressions:

$$\text{var}(RC) \cong \left(\frac{1}{y}\right)^2 \text{var}(x) + \left(\frac{x}{y}\right)^2 \text{var}(y) + 2\left(\frac{1}{y}\right)\left(\frac{x}{y}\right)\text{cov}(x, y)$$

where $RC = x/y$ is the ratio coefficient for the variables x and y. In this setup, x is the dummy variable coefficient on lagged inflation and y is the coefficient of lagged inflation.

MBS.[12] This result confirms the conventional wisdom that ERBS is more credible than MBS at the time of announcement.

Similar results are obtained for the LATAM group in which the drop in inertia is significantly but similar in absolute terms among both anchors. In relative terms, however, Wald test rejected the null of equal coefficients ($\chi^2(1) = 6.927, p = 0.009$), indicating that ERBS has a higher credibility impact with a relative drop of 79% vs. 56%. For the NONLATAM countries, however, the inertia effect is significant but the Wald test cannot reject the null of equal coefficient among both anchors in either absolute or relative terms ($\chi^2(1) = 0.166, p = 0.684$).

The Caribbean countries only include MBS episodes.[13] The degree of inflation persistence in the Caribbean countries was on average higher than in the rest of the sample, and the impact of credibility is also the highest both in absolute and relative terms. For example, in absolute terms the coefficient of the dummy variable shows a drop of about 49%, significantly larger than the full sample MBS coefficient with an average drop of about 12.5% ($\chi^2(1) = 25.21, p < 0.001$). In relative terms, the drop in inertia is above 90%, which is also the highest among the regions. It appears that stabilization has a more profound effect in the Caribbean countries than in other parts of the world.[14]

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[12] The Wald test is performed on the ratio of the impact dummy coefficient to the coefficient of lagged inflation, which is a measure of the percentage that inertia drops at the time of announcement relative to average inertia. Average inertia in this case is measured by the coefficient on lagged inflation.

[13] It has been argued that the IMF lends limited support for ERBS programmes to countries that have less substantial influence in the world economy (Stiglitz, 2003).

[14] It should be noted that this result could be influenced by the fact that the Caribbean sample only includes the Dominican Republic and Jamaica.

Tables 3 and 4 show the persistence coefficients of both ERBS and MBS for the full sample over ten years windows.[15] The results indicate that through time, ERBS has been more credible than MBS programmes supporting the most of the results found in the literature. However, the impact was substantially higher in the 70's than in the 80's and the 90's. The results suggest that the credibility gap related to the announcement effect associated with MBS and ERBS programmes, has gradually disappeared. This is perhaps because the design and implementation of stabilization strategies have improved over time. The biggest jump happened between the 1970s and the 1980s.

5. Conclusion

The analysis shows that ERBS is, on average, more credible than MBS. The finding confirms the conventional wisdom at least when evaluating the announcement effect of the programs over inflation inertia. The credibility gap is substantial among nominal anchors and among regions.

The LATAM region has the largest credibility gap between ERBS and MBS while the gap is not meaningful within the NONLATAM countries. The analysis also reveals that the gap varies over time. The gap was larger during the 70's than in the 80's and 90's. In general, the cross-sectional evidence

[15] Table 3 uses the absolute inertial impact as measured by the coefficient on the stabilization dummy variable. Table 4 uses the relative impact on inertial inflation calculated as the ratio of the coefficient on the stabilization dummy variable to the coefficient on inflation inertia. The first estimation restricts the sample to a range from 1960 up to 1979, and adds 10 year windows to each subsequent calculation until the complete set is used.

suggests that IMF stabilization programs do have a significant announcement effect over inertia, with the largest effect in the CA followed by LATAM region.

From a policy perspective, countries could benefit from negotiating and implementing ERBS type programmes. However, the evidence suggests that recently the gap coming for the announcement effect of each type of strategy has substantially disappeared. There is also evidence that the choice of the nominal anchor is not associated with the level of inflation persistence prior to stabilization and is perhaps linked to the size and relative importance of the country or region in relation to the rest of the world.

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Table 1: IMF stabilization dates, anchor type and success criteria

Country	Region	Beginning date	Stabilization date 1, 2	Stabilization date 3	Exchange rate anchor	Successful Criteria 1	Successful Criteria 2
Argentina 1	Latin America	1976	1977	1977		Yes	Yes
Argentina 2	Latin America	1980	1980		Yes		
Argentina 3	Latin America	1985	1986	1986	Yes		Yes
Argentina 4	Latin America	1991	1991	1991	Yes	Yes	Yes
Bolivia	Latin America	1985	1986	1986		Yes	Yes
Brazil 1	Latin America	1965	1966	1966	Yes	Yes	Yes
Brazil 2	Latin America	1990	1991	1991			Yes
Chile 1	Latin America	1964	1965	1965		Yes	Yes
Chile 2	Latin America	1974	1975	1976		Yes	Yes
Chile 3	Latin America	1977	1978	1978	Yes		Yes
Costa Rica	Latin America	1982	1983	1983		Yes	Yes
Dominican Republic 1	Caribbean	1985		1986			Yes
Dominican Republic 2	Caribbean	1991	1992	1992			Yes
Ecuador	Latin America	1983					
Ecuador	Latin America	1984		1984			Yes
Ecuador	Latin America	1988	1990	1990			Yes
Ecuador	Latin America	1992	1994	1994	Yes		Yes
Iceland	Other	1976	1976	1976			Yes
Iceland	Other	1983	1984	1984	Yes		Yes
Israel	Other	1985	1986	1986	Yes	Yes	Yes
Jamaica	Caribbean	1992	1993	1993			Yes
Mexico	Latin America	1983	1984				
Mexico	Latin America	1987	1989	1989	Yes		Yes
Mexico	Latin America	1995		1997	Yes		Yes
Nicaragua	Latin America	1991	1991	1992	Yes	Yes	Yes
Nigeria	Other	1990	1990				
Nigeria	Other	1993	1994	1994			Yes
Peru	Latin America	1985	1986	1986	Yes		Yes
Peru	Latin America	1990	1991	1991		Yes	Yes
Turkey	Other	1980	1981	1981			Yes
Turkey	Other	1999		2000	Yes		Yes
Uganda	Other	1981	1982				
Uganda	Other	1988	1989	1989		Yes	Yes
Uruguay	Latin America	1969	1969	1969	Yes		Yes
Uruguay	Latin America	1975	1976	1978			Yes
Uruguay	Latin America	1980	1981		Yes	Yes	Yes
Uruguay	Latin America	1990	1992		Yes	Yes	Yes
Venezuela	Latin America	1989		1990			Yes
Zambia	Other	1993	1994	1994		Yes	Yes

Sources: Haman (2001), Easterly (1996), Tornell and Velasco (1998), IFS, National Sources and authors' calculations.

Table 2: Cross-section regressions on inflation for selected regions.

	Full Sample (ALL)		LATAM		Non-LATAM		CARIB	
	ERBS	MBS	ERBS	MBS	ERBS	MBS	ERBS	MBS
Constant	-0.039*	-0.042*	-0.030*	-0.033*	-0.044*	-0.046*		-0.036*
	(0.005)	(0.005)	(0.006)	(0.006)	(0.011)	0.011		(0.009)
Lagged inflation (LI)	0.206*	0.223*	0.185*	0.201*	0.470*	0.446*		0.505*
	(0.014)	(0.015)	(0.023)	(0.035)	(0.045)	(0.044)		(0.063)
GDP growth	0.846*	0.841*	0.867*	0.863*	0.567*	0.591*		0.664*
	(0.015)	(0.015)	(0.020)	(0.027)	(0.045)	(0.044)		(0.059)
LI x ALL dum	-0.156*	-0.125*						
	(0.024)	(0.019)						
LI x LATAL dum			-0.147*	-0.112*				
			(0.047)	(0.030)				
LI x NONLATAM dum					-0.293*	-0.256*		
					(0.068)	(0.068)		
LI x CA dum								-0.490*
								(0.074)
Relative LI drop*	-0.759*	-0.561*	-0.791*	-0.559*	-0.622*	-0.575*		-0.970*
	(0.120)	(0.090)	(0.142)	(0.106)	(0.159)	(0.164)		(0.189)
Obs	52	52	52	52	52	52		48
Cross-sections	19	19	13	13	6	6		2
Pool Obs	745	745	563	563	182	182		89
R2	0.943	0.943	0.950	0.950	0.889	0.887		0.836
DW	1.319	1.436	1.272	1.419	1.788	1.738		1.928
SE	0.121	0.121	0.125	0.125	0.096	0.097		0.045

Source: Estimation of the author. Standard errors in parenthesis. * denotes significance at the 1% level.

Table 3: Announcement effect over sub-sample (absolute terms)

Sample	ERBS*	??	MBS*	Gap**	$\chi^2(1)$†
70's	-0.273	>	-0.150	0.123	8.475
	(0.12)		(0.04)	(8.48)	(0.00)
80's	-0.103	>	-0.040	0.063	4.64
	(0.05)		(0.04)	(4.64)	(0.03)
90's	-0.184	>	-0.125	0.059	3.8
	(0.04)		(0.03)	(3.80)	(0.05)
Full	-0.156	>	-0.125	0.031	3.478
	(0.02)		(0.02)	(3.48)	(0.06)

Source: authors' estimations. Notes: * figures in parentheses are t-statistics. ** figures in parentheses are χ^2 statistics. † figures in parentheses are p-values.

Table 4: Announcement effect over sub-sample (relative to average inertia)

Sample	ERBS*	??	MBS*	Gap	$\chi^2(1)$†
70's	-1.326	>	-0.510	0.816	52.57
	(0.12)		(0.04)	(52.57)	(0.00)
80's	-0.835	>	-0.311	-0.835	3.79
	(0.05)		(0.04)	(3.79)	(0.05)
90's	-0.767	>	-0.571	-0.767	2.69
	(0.04)		(0.03)	(2.69)	(0.10)
Full	-0.759	>	-0.561	-0.759	3.76
	(1.68)		(1.22)	(3.76)	(0.05)

Source: authors' estimations. Note: * figures in parentheses are t-statistics. ** figures in parentheses are χ^2 statistics. † figures in parenthesis are p-values.