Banco Central de Chile
Documentos de Trabajo

Central Bank of Chile
Working Papers

N° 491

Octubre 2008

WHAT DRIVES INFLATION IN THE WORLD?

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Working Papers of the Central Bank of Chile
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Documento de Trabajo
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WHAT DRIVES INFLATION IN THE WORLD?

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Resumen

Este artículo evalúa el impacto de los factores no monetarios en la inflación para una muestra de 97 países en el período 1975-2005, complementando y ampliando la literatura existente en las siguientes dimensiones: (i) se conforma un conjunto exhaustivo de determinantes de la inflación clasificados en 5 grupos: inflación alta y persistencia, regímenes monetarios y cambiarios, apertura, variables estructurales e instituciones, y variables relativas al ciclo económico. (ii) Estimamos una especificación amplia usando técnicas econométricas y frecuencias de datos alternativas (por ej.: promedios anuales y quinquenales) para evaluar la dinámica inflacionaria de corto y de largo plazo por separado. (iii) Testeamos la sensibilidad de nuestros resultados a distintos grupos de países y a través del tiempo. Nuestras conclusiones muestran que: (a) las medidas que fomentan la disciplina y la credibilidad son esenciales para reducir la inflación. Encontramos que los países que adoptan regímenes de metas de inflación o de tipo de cambio fijo consiguen reducir la tasa de inflación. La apertura financiera y saldos fiscales saludables también ejercen un efecto disciplinario en la inflación de corto plazo. (b) Los países con mayor ingreso per cápita tienen tasas de inflación más bajas. (c) Curiosamente, la brecha de producto interna tiene un efecto positivo que es mayor en los países industrializados que en las economías en desarrollo. (d) No encontramos un efecto significativo de la globalización —medida a través de la brecha de producto externa— en la inflación interna.

Abstract

This paper evaluates the impact of non-monetary factors on inflation for a sample of 97 countries over the period 1975-2005. We complement and extend the existing literature in the following dimensions: (i) we assemble a comprehensive set of inflation determinants classified in 5 groups — high inflation and persistence, monetary and exchange rate regimes, openness, structural variables and institutions, and business-cycle-related variables. (ii) We estimate broad specification using alternative econometric techniques and frequencies of data (e.g. annual and 5-year-averages) to assess separately for short -term and long-term inflation dynamics. (iii) We test the sensitivity of our results to different country groups and over time. Our findings mainly show that: (a) discipline and credibility enhancing effects are crucial in lowering inflation. We find that countries that adopted either inflation targeting or fixed exchange rate regimes attain lower inflation rates. Financial openness and healthy fiscal balances also exerted a disciplinary effect on inflation in the short run. (b) Countries with higher income per capita have lower inflation rates. (c) Interestingly, domestic output gap has a positive effect that is higher in industrial countries than in developing ones. (d) We fail to find a significant effect of globalization —as proxied by the foreign output gap— on domestic inflation.

We thank Mauricio Calani for outstanding research assistance. Klaus Schmidt-Hebbel gratefully acknowledges financial support provided by Fondecyt research project No. 1060175. This work was completed while K. Schmidt-Hebbel was affiliated to the Central Bank of Chile. E-mail: ccalderon@worldbank.org ; Klaus.SCHMIDT-HEBBEL@oecd.org.

Introduction

The idea of inflation being ultimately a monetary phenomenon and that the monetary authority is the final responsible agent of inflation is hard to rebate. A similar general consensus is reached about the deleterious impact on economic performance and social welfare of high inflation (Fischer, Sahay and Végh, 2002). In this context, why do some monetary authorities have incentives to inflate? Why do we experience episodes of sustained high inflation? The answer lies mostly on the short-run gains that might be accomplished through the creation of inflation; such as seigniorage and the financing of fiscal deficits, attempts to exploit a negative relationship between unemployment and inflation, or the alleviation of the nominal debt burden of the public sector. Such time-inconsistency problems are more likely to arise in countries with weak institutions that lack of the discipline to prevent monetary authorities from focusing on short-run objectives.[1] By institutions, we here convey the notion of a sound macroeconomic policy framework, the quality of the bureaucracy, and the sustainability of monetary and fiscal arrangements that transcend the political business cycle. This paper seeks to asses the effects of such non-monetary factors on inflation.

Inflation rates are very different across countries and over time, due to various historical country-specific causes. Figure 1 plots the heterogeneity of such inflationary outcomes.[2] While some regions experience mild positive inflation, others (especially developing countries) display very high inflation rates. Nevertheless, in spite of this heterogeneity of inflation rates, we can distinguish two well-known periods. The first one is the *Great Inflation* of the mid-seventies and eighties. While industrial countries had abnormally persistent two-digit inflation rates, several developing countries experienced disastrous hyperinflation episodes (see Fischer *et al*., 2002). On the other hand, the last fifteen years, have been characterized by a cross-regional disinflationary process that converged to one digit inflation in most countries in the world by the year 2001 and has been referred to as the *Great Disinflation* (see IMF 2007, Summers 2005)[3]. The beginning of such convergence

[1] The question about the welfare preference between long-run and short-run objectives of monetary policy has been well debated in the literature, and therefore not discussed in this paper. For a more detailed discussion on the positive theory of time inconsistency see Barro and Gordon (1983) and Kydland and Prescott (1977). Implications of such trade-off are discussed in Chari (1988).

2 Inflation for each region and for the World is calculated as the PPP-GDP weighted average of country individual inflation data for each year.

[3] This period (and our sample) does not account for the recent months of persistent high inflation. Inflation rates across the world however, although high, are not comparable to inflation rates in the of the *Great Inflation* era.

process in developing countries began with stabilization programs and reform agendas implemented in the late 80s and early 90s that dealt with crisis episodes marked with hyper and high-inflation and financial stress. Weak institutions and policy practices were severely questioned and frequently replaced with stronger and better-defined ones. This sharp shift in macroeconomic policy conduct, along with support programs from supra-national institutions achieved macroeconomic stabilization through the years, such that world inflation was below 3.5 percent in 2005 (see Figure 2)

Previous empirical literature attempting to document the non-monetary determinants of inflation in a cross-country setup is broad and diverse in its conclusions. However, most of it usually addresses few determinants of inflation at the time, and does so for a limited number of countries or for restrictive periods of time and does not check for robustness of results with alternative estimation techniques.

This paper extends the preceding literature in several dimensions. First, we consider a broad and comprehensive specification that attempts to encompass previous partial specifications. We assemble a large dataset of 97 countries for 31 years (1975-2005). This period includes both, the rising and the declining periods known as the "great inflation" and the "great disinflation". Second, we estimate the inflation dynamics for two sets of data with different frequency —annual and five-year average data— that attempts to determine the factors driving short- and long-run inflation. Third, we examine the sensitivity of our results to the use of alternative estimation techniques and compare their results. Finally, we test the robustness of these results to alternative specifications that allow for slope heterogeneity across country groups and over time.

Following the abundant theory and empirics on the determinants of inflation, we classify our comprehensive set of determinants into five groups of variables: (a) high inflation episodes and persistence, (b) monetary and exchange rate regimes in place, (c) institutional and structural variables, (d) external and openness-related variables and (e) cyclical variables that affect inflation in the short-run.

This paper is divided in 5 sections. Section 2 presents a detailed discussion of each of the included variables in our inflation regression equation as classified in the groups mentioned above. Section 3 describes the equation specification and the different econometric

approaches used for estimation. Section 4 describes the statistical properties of our data and discusses our empirical assessment. Finally, section 5 concludes

2. Related Literature

Table 1 summarizes previous cross-country studies on the determinants of inflation. There is abundant literature on the assessment of differences in inflation performance across countries. However, some of the earlier research has focused on particular institutional — say, central bank independence (Cukierman, Webb and Neyapti, 1992)— and on country-case studies. In Table 1, we focus mainly on recent cross-country and panel-data evidence.

Our dependent variable is the rate of inflation, π, which is normalized as $\pi_{i,t} = {\Delta\% \text{ CPI}}/{1+\Delta\% \text{ CPI}}$ to avoid giving excess weight to outlier episodes of high inflation and hyperinflation in the distribution of errors. Our set of explanatory variables is divided in the following categories: (a) high inflation episodes, (b) monetary regimes, (c) structural and institutional variables, (d) cyclical variables, and (e) openness.

High Inflation Episodes. We distinguish three variables in this category. We control here for episodes of high inflation and hyperinflation using binary variables; we follow Dornbusch and Fischer (1993) to define them. *Hyperinflation* is defined as the episode in which annual inflation exceeds 1000 percent, *high inflation* refers to those episodes of annual inflation exceeding 50 percent on an annual basis.[4] Fischer, Sahay and Végh (2002) point out that there are several reasons to isolate these extreme but infrequent episodes: (a) hyperinflations are very costly and countries are not willing to tolerate them for more than very few years or even for only some months. Hence, some hyperinflation episodes may not be accounted for by annual datasets. (b) Linear estimation models tend to severely over-estimate the impact of inflation on macroeconomic performance compared estimations using samples of countries where this phenomenon is absent. [5]

[4] Cagan (1956) defined hyperinflation episodes as beginning in the month when monthly inflation first exceeds 50 percent and ending in the month before the monthly inflation drops below 50 percent for at least a year. This yields an annual inflation that exceeds 12875 percent.

[5] Even after relaxing such definition, our definition of hyperinflation accounts for hyperinflation episodes in Argentina, Bulgaria, Bolivia, Brazil, Croatia, Nicaragua, Peru and the Democratic Republic of Congo.

We also account for inflationary inertia. There are several reasons as for which inflation would not be *time-independent*. First, if prices are set optimally in a forward looking manner and there exists some kind of nominal rigidity then it is optimal for firms to set higher prices in advance when they rationally expect overall price level to rise. Second, literature on the effect of indexation mechanisms shows that there is a self-perpetuating component of inflation in the presence of such adjustment mechanisms. For instance, if wages or other prices (*e.g.* regulated service tariffs, home rents and others) are indexed to past inflation then it is incorrect to neglect such a component. Both sets of reasons can not be ruled out a priori, especially when working in a panel data setup.

Monetary Regimes. We control for two types of monetary arrangements which have been extensively studied in the literature. First, we create a binary variable that takes the value of 1 for countries have adopted *inflation targeting* (IT) regimes, and 0 otherwise. Inflation targeting is an operational framework for monetary policy aimed at achieving a numerical value (or range) for the inflation rate; therefore, its adoption should undoubtedly be incorporated. Empirical evidence on the effect of adopting IT regimes mostly concludes that IT lowers inflation and inflation expectations and reduces its volatility (Truman, 2003; Hyvonen, 2004 and Vega and Winkelried, 2005 among others). IT has some detractors though; Ball and Sheridan (2005) argue that IT makes no difference among industrial countries and that the apparent success of ITers in the period of global disinflation —when inflation experiences a reversion towards the mean— is sample-dependent. On the other hand, Mishkin and Schmidt-Hebbel (2007) find that the largest benefits of inflation reduction among ITers is experienced by emerging market economies and converging-to-target ITers, and show that the choice of the control group is key for finding any effect of IT on inflation. In our large data set the control group would be comprised by most countries of the world and for a time-period that nests converging-to-target ITers. A priori we could expect a negative, or at least non-significant, effect of IT regime on inflation level.

Second, we account for the effects of the exchange rate regime in place on the differences in inflation performance. We expect inflation to be lower in countries that adopted fixed exchange rate regimes —with the impact being even stronger in countries with hard pegs (Levy-Yeyati and Sturzenegger, 2001). Usually, countries that adopt fixed exchange rate regimes are precisely those that suffer high inflation and that eventually lower it. Second, fixed exchange rate regimes operate as a disciplinary tool for monetary authorities, limiting

their ability to indefinitely expand monetary base at the risk of causing a balance of payments crisis. Third, fixed exchange rate regimes also have a signaling effect that enhances credibility of lower future inflation. This credibility would help anchor inflation expectations thus lowering actual inflation. Evidence on the negative association between inflation and pegs can be found in Cottarelli *et al.* (1998), Levy-Yeyati and Sturzenegger (2001), and Husain, Mody and Rogoff (2005).

Structural and Institutional Variables. Inflation can be self-perpetuating because it entails the accomplishment of some short-run objective for monetary authorities. Among such incentives we have the ability to exploit a negative relationship between unemployment and inflation, financing public deficit through inflation tax or alleviating the real value or public nominal debt burden. These motives to create inflation are heterogeneously used in accordance to the institutional framework in place. High quality institutions would prevent such time-inconsistent policies to be adopted and thus lower inflation (Cukierman 1992a, Aisen and Veiga 2007). We include two measures of quality of institutions in our general specification; a measure of democratic accountability, which reflects the strength of the government to endure short-run demands in favor of long-run welfare-enhancing policies, and per capita income which should be a proxy of a more general group of institutional arrangements.[6]

A third structural variable is the ability of the government to collect taxes. The fiscal theory of inflation predicts that, the weaker the revenue system is, or the more excessive public spending is, the more likely it is that a country will choose to make use of seigniorage to finance public spending beyond tax revenue (Sargent and Wallace 1981, Cukierman 1992b, Phelps 1973, Végh 1989). Thus, we include in our specification the fiscal surplus to GDP ratio. Although theoretically appealing, there has not been much empirical success supporting this theory. Most of the literature attempting to study this relation finds no significance of fiscal indicators on inflation. An exception is Catao and Terrones (2005) who find evidence of a positive association between fiscal deficits and inflation.

We include the ratio of domestic credit to private sector to GDP as a proxy of financial depth. This variable contains information that is expected to be negatively related to inflation. First, it is a proxy of the institutional quality of a country. Second, the more

[6] Dollar and Kraay (2003) find that cross-country differences in institutions mirror the differences in the levels of GDP per capita.

developed financial markets are, the easier it is for a government to finance temporary (and sustainable) deficits through borrowing from national residents, making it less likely to incur in seigniorage-based revenue. In addition, Posen (1993, 1995) argues that the opposition to inflation from the financial sector —which reflects the financial sector's distaste for inflation and its ability to express that distaste— is a significant predictor of inflation. Finally, to our knowledge there is no panel data or cross section study that accounts for such effect.

Cyclical Variables. We account for the domestic and oil price gap. The latter variable influence on production costs requires no further explanation. The first variable finds empirical and some theoretical support in the preceding literature. When using annual data, it seems appropriate to account for some sort of domestic demand-led inflationary pressure. The neo-keynesian framework predicts that there should exist a short-run Phillips Curve that relates some measure of economic activity (relative production capacity), to inflation (Gali 2007, Gali and Gertler 2004). Furthermore, Clark and McCracken (2006) find evidence that output gap does indeed contain valuable information to predict inflation in the short-run; thus a priori we do not rule out such relationship.

Openness. We account for the impact of openness on domestic inflation through three different dimensions: trade openness, financial openness and the likely effects of global shocks.

Regarding *trade openness*, Romer (1993) finds that OECD countries with a more open trade regime have lower inflation. This finding may suggest that trade liberalization strategies around the world in recent decades have important monetary consequences, reducing inflation along with barriers to trade. Lane (1997) argues that the mechanism that links openness to incentives to inflate does not rely on a large-country-effect on terms of trade as Romer (1993) suggested, but instead it relies on imperfect competition and nominal price rigidity in the non-traded sector. On the other hand, Terra (1998) finds that the negative association between trade openness and inflation is stronger among severely-indebted countries since they have less pre-commitment in monetary policy. Several subsequent papers have also found such relationship but mostly for much reduced specifications (Gruben and McLeod 2004, Temple 2004 and Borio and Filardo, 2007).

Capital account openness affects inflation through a different channel. First, according to the theory of optimal taxation, financial integration lowers the cost of foreign financing of temporary fiscal deficits, making it less likely for governments to use seigniorage and creating inflation (Phelps 1973, Aizenman 1992). Second, capital account openness is one of the final steps of macroeconomic reforms after improvements in the macroeconomic policy framework. Such improvements include fiscal discipline, central bank independence and sound monetary policies. Finally, capital account openness by itself exerts disciplinary effects against inflationary monetary policy by neutralizing it under fixed exchange-rate regimes or inducing currency substitution and currency depreciation under floating exchange-rate regimes. Thus, these consequences raise the costs associated to it and enhance credibility of the monetary authority, helping lower inflation (Tytell and Wei, 2004).

The third dimension of openness included in our regression analysis is the impact of *global factors* on inflation. Recent developments in the world economy have brought to the fore the likely influence globalization on domestic inflation —see Helbling et al. (2006). First, it has been argued that China and India have exported deflation through their increasing trade of non-skilled-labor intensive goods. Although intuitively appealing, this hypothesis has also been criticized. Ball (2006) argues that these two countries have changed relative prices and not absolute ones so that their entrance in world trade should not affect inflation in the long run. Furthermore, if Asian goods are cheaper, consumers are wealthier and this income effect would exert inflationary pressures on other markets changing, again, relative prices[7]. Second, openness comes along with higher competition and market flexibility. This would make local firms more prone to put extra effort on cost-control to avoid foreign competition to finding it attractive to enter local markets (Rogoff 2004, Sbordone 2007). Third, increased competition and integration to world markets can foster productivity growth; persistently lowering costs (Grossman and Helpman 1991). Fourth, there is the political economy argument of a steeper Phillips Curve, which would make it less attractive for central banks to try to exploit the negative relationship between unemployment and inflation. If all mechanisms sketched above are operational, nominal rigidities are less relevant and the likelihood of price revisions is higher resulting in a diminished effect of these on real variables. This makes it less tempting to pursue inflationary monetary policy (Rogoff, 2004).

[7] Surprisingly this is a candidate explanation, at least partially, to the current inflationary world-wide episode.

In this context, the literature includes the world inflation and the foreign output gap. These variables are supposed to exert an analogous influence on domestic inflation through imports and exports, by making the first more expensive in world markets and raising factor prices necessary to produce the latter. It has even been argued that such factors are becoming predominant in inflation dynamics determination (Borio and Filardo 2007). Thus, we test for the influence of these global factors on national inflation.

3. Specification and Econometric Approach

In this section we describe our general specification and the econometric approaches we use to estimate such inflation equation and test the robustness of results. We begin by focusing on estimation techniques more suitable for annual data (the "*short-run*" model) and then we concentrate on econometric methods for five-year averages data.

Our general specification is,[8]

$$\pi_{i,t} = \alpha_o + \mathbf{B_1}'\mathbf{INFR} + \mathbf{B_2}'\mathbf{MERR} + \mathbf{B_3}'\mathbf{OPN} + \mathbf{B_4}'\mathbf{STIN} + \mathbf{B_5}'\mathbf{CYC} + \mu_i + \varepsilon_{i,t} \qquad (1)$$

denoting our five groups of variables; inflation-related variables, monetary and exchange-rate regimes, openness, structural and institutional variables and cyclical variables respectively; μ_i stands for the inclusion of country-specific fixed effects and $\varepsilon_{i,t}$ is assumed to be a well-behaved stochastic error.

We estimate equation (1) using three different econometric techniques. The first two approaches use annual data and the third uses five-year averages.

Annual Estimation Techniques

We first assume slope homogeneity across countries and estimate a standard fixed effects panel data equation with instrumental variables to account for likely endogeneity of explanatory variables. We instrument the lagged dependent variable, the overall fiscal

[8] Again, we define our dependent variable as normalized inflation: $\pi_{i,t} = \dfrac{\Delta\%\mathrm{CPI}_{i,t}}{1+\Delta\%\mathrm{CPI}_{i,t}}$.

surplus,[9] national output gap and the inflation targeting regime. We perform the IV estimations using fixed- and random-effects and test the validity of the latter vis-à-vis the former.

Second, we distinguish between long-run and short-run components of inflation dynamics. We impose slope homogeneity only the long-run parameter vector and allow complete heterogeneity, across countries, for the short-run parameters. For this purpose we use the Pooled Mean Group estimator proposed by Pesaran, Shin and Smith (1999).

It seems reasonable to assume, theoretically, that inflation is a monetary phenomenon in the long-run for all countries, but that the adjustment in the short-run may differ across them due to the different degrees of rigidities in goods, labor and asset markets. We run our equation (1) as an auto-regressive distributed lag (ARDL) where dependent and independent variables enter the right-hand side with lags of order *p* and *q* respectively:[10]

$$\pi_{i,t} = \mu_i + \sum_{j=1}^{p} \lambda_{i,j} \pi_{i,t-j} + \sum_{l=0}^{q} \mathbf{\Gamma}'_{i,l} \mathbf{X}_{i,t-l} + \varepsilon_{i,t} \qquad (2)$$

where $\pi_{i,t}$ stands for the observed (normalized) inflation rate in group *i* at time *t;* μ_i represents fixed effects; and $\mathbf{X_{i,t}}$ stands fort the vector of the five-group explanatory variables outlined above. As outlined by Calderon *et al.* (2003), in order to be able to derive a long run relationship between $\pi_{i,t}$ and $\mathbf{X_{i,t}}$ we must obtain a dynamic regression equation in which; first, the regression residual is serially uncorrelated and, second, $\mathbf{X_{i,t}}$ is strictly exogenous, meaning that it is independent of the residuals at all leads and lags. It is in the fulfilling of these conditions that ARDL specification renders its greatest advantage. All right hand side variables enter the equation with sufficient lags so as to ensure the second exogeneity condition. Another advantage of the method is that standard estimation and inference can be used regardless of the integration order of the variables in $\mathbf{X_{i,t}}$ and $\pi_{i,t}$. We just need to assume that there exists a single long-run relationship and that the error vector behaves properly. Then, equation (2) can be re-parameterized using simple algebra as shown by Pesaran *et al.* (1999) yielding the following specification[11]

[9] If we consider that nominal interest rate payments of public debt burden are contingent upon inflation rate, then our fiscal surplus variable is correlated to $\varepsilon_{i,t}$.

[10] The reader interested in the asymptotic properties is referred to Pesaran *et al.* (1999).In this section we provide just the necessary intuition and elements to understand the benefits of such estimation technique.

[11] Assuming a general ADRL $p=q=1$.

$$\Delta\pi_{i,t} = \mu_i - \Gamma'_{i,1}\,\mathbf{\Delta X}_{i,t} - (1-\lambda_{i,1})(\pi_{i,t-1} - \frac{\Gamma'_{i,0}+\Gamma'_{i,1}}{1-\lambda_{i,1}}\mathbf{X}_{i,t}) + \varepsilon_{i,t} \qquad (3)$$

Equation (3) is the equation we estimate. We are especially interested in the long-run relationship in which we impose coefficient-homogeneity. The rest of the terms of the right hand side of equation (3) are allowed to vary freely across countries.

Briefly, the PMG estimator proceeds as follows. The estimation of the long run coefficients is done jointly across countries through a (concentrated) maximum likelihood procedure. Then the estimation of short-run coefficients (including the speed of adjustment: $1-\lambda_{i,1}$), country-specific intercepts, and country-specific error variances is done on a country-by-country basis, also through maximum likelihood and using the estimates of the long-run coefficients previously obtained.[12]

Five-year period estimation

To assess the long-run determinants of inflation we aggregate our annual data to obtain five-year averages. This reduces our time dimension relative to our cross-country dimension from 31 to 6 periods of observations. We perform such exercise to check for robustness of results and to assess the long-run process of inflation determination. On this new database we estimate our model using the system-GMM estimator proposed by Arellano and Bover (1995) and Blundell and Bond (1998), which has been shown to be more efficient than the traditional Arellano and Bond (1991) GMM difference estimator, in the presence of persistent data. We exclude from these estimations the fifth group of variables (cyclical) because, by definition, these should exert influence on inflation only in the short-run.

On a second stage we extend our general specification in equation (1) allowing for possible slope heterogeneity for country group and time clusters. We augment equation (1) with interactive grouping dummy variables. Thus equation (1) is a particular case of equation (4) shown below.

[12] In order to ensure the independence of residuals across countries, which is fundamental to ensure consistency of our PMG estimates, we allow for time-specific effects in the estimated regression. This is done through introducing each variable as deviation with respect to the cross sectional mean for every period.

$$\pi_{i,t} = \alpha_o + \mathbf{B_1}'\mathbf{INFR} + \mathbf{B_2}'\mathbf{MERR} + \mathbf{B_3}'\mathbf{OPN} + \mathbf{B_4}'\mathbf{STIN} + \mathbf{B_5}'\mathbf{CYC} + \Psi_1'\mathbf{INFR} \otimes Dc + \Psi_2'\mathbf{MERR} \otimes Dc + \Psi_3'\mathbf{OPN} \otimes Dc + \Psi_4'\mathbf{STIN} \otimes Dc + \Psi_5'\mathbf{CYC} \otimes Dc + \mu_i + \varepsilon_{i,t} \quad (4)$$

The grouping-dummy (Dc) clusters observations in three different ways, which are estimated separately. First, it separates countries according to their income level: low and middle-income-countries vis-a-vis high-income-countries, and low-income-countries with respect to high and middle-income-countries. Second, it separates observations according to time periods, contrasting the period before and after 1995. Next section details such results as well as the general specification estimations.

4. Empirical Assessment

Before we present the analysis of our results, we briefly describe some statistical properties of the data, focusing primarily on the characteristics of inflation. Figure 3 depicts the cross-country kernel density plot of the distribution of inflation rates around the world for each year. The vertical axis shows the density function value and the horizontal axis shows levels of inflation. We find that first, second and third moments of the distribution of inflation rates are larger for the late 1970s than their equivalent measures for the early 2000s. This means that more and more countries are gathering around low levels of inflation; a phenomenon that does not seem to have reached an end to date.

Figure 4 plots medians, percentile 25th and 75th for four relevant variables included in our regression model: inflation, capital account openness, fiscal surplus and domestic credit to private sector for each year. It also shows the evolution of the number of countries under the different exchange rate regimes (pegs, intermediates and floats) and under inflation targeting regimes for all years in our sample.

An important issue, relevant to the estimation of the inflation regressions, is the potential co-linearity between our regressors. For instance, per capita income is a variable that summarizes many features of institutional quality and is very likely to be highly correlated with other variables that contain information on institutions and regimes such as democratic accountability, the adoption of inflation targeting, domestic private credit, trade openness and capital openness. Table 2 reports pair-wise correlation coefficients for inflation and its determinants. Cross-section and panel correlations are reported in the

upper- and lower-diagonal of the correlation matrix, respectively. We find that although many variables are significantly correlated with each other, indicators that capture institutional strength display the highest correlations – normally above 0.5. Therefore, in our estimations we are especially careful when including all variables at the same time, checking for robustness if one of such (institutional) variables is not included.

We organize our results in 4 groups of tables. First we estimate equation (1) with three different estimation techniques which we define in section 3; tables 3 to 5. Then, we restrict ourselves to using Fixed Effect Instrumental Variables estimation approach for annual data and System-GMM for five-year averages data for three sets of modifications to equation (4)[13]. The difference between such sets of estimations is the definition we give to the grouping dummy variable (**Dc**); first it clusters non-high-income versus high-income economies for the FEIV estimator (Table 6) and for the System-GMM estimator (Table 9), then it clusters low income versus non-low-income economies (Tables 7 and 10), and finally it clusters observations in time periods; before and after 1995 (Tables 8 and 11).

In Tables 3 to 5 we report different estimations that begin with general specifications and end up with particular reduced ones. Then, for the tables in which we use the grouping dummy variable, we report only our particular reduced form equations so as to make comparisons to our baseline model. For each equation we separate in two columns the estimation parameters of equation (1) (nested in equation 4) and in the same row we show the differential effect associated to the interaction of the respective variable and the grouping dummy variable (Dc).

4.1 Fixed-Effects IV Estimation

Table 3 reports our main results for equation (1). Columns (1A) and (1B) report the results for the same specification assuming fixed-effects (FE) and random-effects (RE), respectively. We perform a standard Hausman test to verify the validity of such assumptions. This test favors the FE estimator. Such procedure is performed and not reported for the rest of the columns in this table. Column (4) reports our final specification

[13] We do not use the PMG estimation approach due to the requirement of large T and large N it demands. Equation 4 more than doubles the number of parameters to be estimated and would require a longer period of time than the one we can use. See Pesaran et al. (1999) for more details on such requirements.

in which we have excluded non-significant explanatory variables found in columns (1A, B), (2) and (3)[14]. We deal with the likely endogeneity of the explanatory variables by using lagged values of all potentially-endogenous variables —that is, the adoption of inflation targeting, fiscal surplus, per capita income and national output gap.

Our subsequent discussion will focus on the estimations presented in columns (3) and (4) of Table 3 —our preferred specifications. After controlling for hyperinflations and high inflations, inflation does present a persistence component, although it tends to be non-significant in the final estimation. On average, Inflation Targeters have lower inflation of approximately 5-6 percent. This result remains unchanged after controlling for reverse causality. Also, countries with fixed exchange rate regimes usually display lower rates of inflation. This confirms the prior that *de-facto* fixed exchange rate regimes foster monetary discipline and enhance the credibility of the monetary authority.

Trade openness does not seem to affect inflation at standard significance levels, in contrast to the negative association found in previous studies. However, it is likely that the negative association may be found for specific country groups as suggested by Terra (1998). On the other hand, capital account openness does seem to play an important role in lowering the level of inflation and its estimated coefficient is robust to changes in specification[15].

As expected, fiscal deficits are associated to higher inflation. This result seems robust to the inclusion and exclusion of other variables. A notable issue arises when comparing the estimates coefficients of fiscal balance reported in columns (2) and (3) —the former uses lagged fiscal surplus whereas the latter uses the instrumented contemporaneous fiscal surplus. We can see that controlling for such endogeneity is crucial in order to find support to the fiscal theory of inflation, and that the latter coefficient roughly doubles our initial estimation. This result has only been previously found by Catao and Terrones (2003). Finally, the cyclical component of oil price does have a positive effect on inflation, as well as the domestic output gap. However, the coefficient of the latter is lower when accounting for endogeneity, although still significant and positive.

[14] In this sense, columns (2) and (3) are shown only to support our preferred specification in column (4).
[15] An anonymous referee suggested including this two variables (trade and capital account openness) one at the time. This did not change the robustness of the coefficient capital account parameter. Trade openness, however, remained non-significant or mildly positive (and very sensitive to other variables included). Table 2, which contains pair-wise correlations, shows a low (but significant) correlation of 0.3 between these two variables.

4.2 Pooled Mean Group Estimation (PMGE)

This subsection discusses our estimation of equation (3). In contrast to the econometric technique of section **4.1**, we use the pooled mean group estimator (PMGE) developed by Pesaran, Shin and Smith (1999) which accounts for the heterogeneity in the short-run inflation dynamics and (unlike FE or FEIV estimators) only imposes long-run parameters homogeneity, after testing the validity of this assumption.[16]

Table 4 shows the results of estimation of equation 1 using the pooled mean group (first four columns), the mean group estimator (second four columns) and the Dynamic Fixed-Effects estimator (third set of four columns). We report four different specifications that run from general to particular and repeat such estimation for every estimation procedure so that the equations are comparable across econometric techniques. The mean group (MG) estimator, which is the average of country estimates, is also consistent but is less efficient than the PMG estimator under the null hypothesis of long run slope homogeneity. Finally, the dynamic fixed-effects (DFE) estimator assumes perfect homogeneity in long-run and short-run coefficients. The last four columns in table 3 show the Hausman test that assesses the validity of the null hypothesis of long run slope homogeneity. Thus, a high enough *p-value* allows us to not reject the null and prefer the PMG estimator over the MG estimator.

The regressions in columns (1) and (2) set our initial general specifications. Column (3) shows a particular estimation in which we have left aside non-significant variables and column (4) differs from (3) in the rejection of slope homogeneity for all coefficients. The Hausman test rejects slope homogeneity for the national output gap so that not all countries have the same Phillips Curve slope. Thus, column (4) imposes long-run homogeneity of coefficients for all parameter in the long-run vector but not for the

[16] As discussed in section 3, one must choose between different assumptions when deciding which econometric technique to use. On the one hand one can fully neglect slope heterogeneity by using fixed effects models (Panel IV or GMM) or one can accept complete heterogeneity by estimating any model on a country-by-country basis. The latter approach, however, takes no advantage of the richness of a panel dataset. Thus the choice among these estimators faces a general trade-off between consistency and efficiency. Estimators that impose homogeneity dominate heterogeneous estimators in terms of efficiency but are inconsistent if the null hypothesis of slope homogeneity is not true. (Pesaran et al 1999). In the middle of such extreme choices is the PMG estimator which, assumes that there exists heterogeneity in short-run dynamics but homogeneity in the long-run dynamics. This is very likely to be true in our case. The theory of inflation cannot be country-specific, but one cannot expect every country (with different institutional setups and market development) to behave identically.

national output gap. After allowing for such heterogeneity, we can be certain that the PMG estimator is consistent. Notably, coefficient estimations are practically unchanged, which reflects the robustness of the results.

The estimated parameters of our inflation equation show that our estimations are robust and very similar to those found with the FE-IV estimator.[17] Again, inflation targeting lowers inflation by 5-6 percent and fixed exchange rate regime induces lower inflation. Interestingly the latter effect is half as important as that of IT. Trade openness is positively related to inflation, although its effect is mild. Capital account openness has a negative and robust effect, thus confirming the hypothesis that financial openness may bring discipline to monetary policy and, hence, lower inflation. The fiscal surplus and the level of domestic inflation have a long-run negative relationship, supporting the fiscal theory of inflation, though our estimates show a little higher elasticity value than the one reported (*0.14*) in Catao and Terrones (2005).

Per capita income does not have a robust coefficient estimate in our model, and the same holds for domestic private credit. Domestic output gap exerts positive and significant influence on inflation, denoting that these are mostly induced by aggregate demand. In contrast, the coefficient of the gap in oil prices is statistically not different from zero. Finally, the adjustment velocity is very similar to that reported in previous studies and is negative and highly significant.

4.3 GMM-IV System Estimator

Our model of inflation determinants is finally estimated using a different approach to control for the endogeneity that accounts for the dynamic nature of inflation and the presence of unobservable (country- and time-) effects. We apply the Arellano and Bover (1995) and Blundell Bond (1998) system-GMM estimator to five-year averages of the data,

[17] The careful reader can notice that our specification is not exactly the same as in the FE IV model. This is due to dropping the hyperinflation indicator. We do not choose such specification arbitrarily, but because of sample properties. The ARDL specification requirement is large T and large N. In contrast to system GMM which requires large N and short T and IVFE that requires moderate T. In the ARDL specification T should be large enough for every variable so as to allow for the numerous variables in levels and in some cases also in differences. After dropping countries for which not even the MG estimator can be computed and dropping data properly as in any unbalanced panel estimation, we are left with four observations of hyperinflation in our whole sample that happen to have missing observations for other important variables, the Peruvian and Nicaraguan hyperinflations of the late 80's.

and the results for the full sample of countries are reported for different specifications in Table 5.

The estimated coefficients are very similar to those reported in Tables 3 and 4 for the high inflation binary variable, inflation targeting, exchange rate regime, and openness variables. However, some differences arise. First, trade openness, which was found to be positively correlated to inflation, is not significant in the long-run. Second, the relevant measure of external inflation, which controls for global shocks, has an important effect on global inflation. Finally, income per capita and domestic credit are not significant when included together in our regression analysis —see regression (3) in Table 5. However, when included separately —see regressions (4) and (5)— they are both significant and have the expected sign. Both variables are highly correlated as described in this section 4 and note that the inclusion of one or the other does not change out estimation of the rest of the parameters, which remain robust to the election of proxies of institutional variables.

4.4 Sensitivity analysis

We test the robustness of our baseline specification on the determinants of inflation to changes in: (a) the sample of countries, and (b) the sample period under analysis. To test the differences directly we nest our model in such a way that the specification accounts for either country-group heterogeneity or time-heterogeneity as shown in equation (4)

Heterogeneity across country groups. We test whether the parameters of our inflation equation are equal between high-income countries and non-high income countries, with the latter group including low- and middle-income countries. Hence we define a dummy variable that takes the value of 1 for non-high income countries and we allow for interaction of this binary variable with all the explanatory variables in our regression equation.[18] Our regression equation contains the determinants of inflation as well as the interaction between the binary variable and each inflation determinants. These results are shown in Table 6 and 9 for the FE-IV estimation and the system-GMM estimation, respectively. We also test whether the parameters of the inflation equation are equal between low-income and non-low income countries by defining a dummy variable that takes the value of one only for low-income countries and zero otherwise. Tables 7 and 10 shows the results for

[18] The detail of countries included in such groups follow empirical classifications made by The World Bank. Groupings can be fount in the Data Appendix

the FE-IV estimation and the system-GMM estimation, respectively.[19] In the context of our nested regressions —see equation (4)— we will be able to surely find point estimates for the parameters in the $\mathbf{\Psi}_i'$ coefficient matrix that are *statistically* different from zero and, hence, find direct evidence of heterogeneity across groups of countries.

We run and report the nested regression in line with the general equation (4) for our preferred estimations: (i) regressions (3) and (4) of Table 3, and (ii) regressions (4) and (5) of Table 5. From tables 6 through 10, we present 2 columns for each equation: the left hand side column —labeled as *baseline*— shows the parameter estimates of the $\mathbf{B}_i'$ matrix while the next column —labeled as *differential*— shows the estimates of $\mathbf{\Psi}_i'$ matrix associated to the variable in the same row. Therefore this column shows the incremental effect of belonging to the group for which the dummy variable is set to be equal to one.

We find that estimation of our specifications do not change drastically. However, some results emerge from a closer look to the regressions in Tables 6 and 9. For the sake of simplicity we will call developing countries (industrial countries) to all the non-high (high) income economies. We first find that inflation in developing countries tends to be less persistent and that the disinflationary effects of inflation targeting are higher compared to industrial countries. On average, IT reduces inflation by more than 7% in developing countries, while the reduction in inflation is lower than 1% for industrial economies. Second, fixing exchange rates has significant deflationary effects for developing countries while the impact on inflation is negligible in industrial economies. Third, capital account openness plays a similar role (a deflationary one) for industrial and developing countries, whereas there is no evidence of heterogeneity for local financial development (and the significance of the latter variable disappears when controlling for country heterogeneity). Fourth, the relevant external inflation and the foreign output gap show no different effect across groups and these variables lose their statistical significance. This result confirms our finding that the effect of the latter variables is not as robust as the rest of inflation determinants. Finally, heterogeneity plays an important role when analyzing the coefficient of domestic output gap. Table 6 shows that the coefficient of output gap for developing countries is positive but lower than that of industrial economies. This finding reflects the

[19] The simplicity of this exercise is also enhanced by the powerful conclusions we can extract from it. An alternative approach would be to re-estimate our models for different samples. We would surely find different point-estimates but they would say nothing about the statistical difference across country (or time) clusters because of the inexistence of a covariance matrix to perform such test.

fact that the inflationary output gap in industrial countries may be primarily determined by aggregate demand, while that of developing countries may be countervailed by more frequent or more intense supply shocks.

Tables 7 and 10 show the estimation results for equation (4) when defining the country groups into poor (low-income) and non-poor countries (middle- and high-income). In contrast to the results presented in Tables 6 and 9, we find greater heterogeneity in the estimation results. First, we find that inflation is as persistent in poor countries as it is in non-poor ones. When comparing with our previous results, we can infer that the differences in persistence of developing countries vis-à-vis industrial countries are driven by the behavior of middle-income countries. Second, we find that IT contributes significantly to reduced inflation in both groups but the contribution is larger among poor countries. An analogous conclusion can be found for the exchange rate regime in place. Poor countries re more benefited from fixing exchange rates than non-poor countries (see Table 10). Finally, capital account openness has no additional effect for the poor relative to the non-poor, and the same holds true for the domestic output gap.

Heterogeneity over time. We test whether the regression coefficients of the inflation equation remain constant over time. Hence we define a binary variable that takes the value of 1 after 1995 and 0 otherwise. Tables 8 and 11 show the results of the inflation equation that includes interaction terms between the time dummy (as defined above) and all explanatory variables for the FE-IV and the GMM-system estimator, respectively.

The FE-IV estimation shows that our main specification remains practically unchanged. First, the effect of the inflation targeting regime on inflation is concentrated in the earlier sample period (1990 to 1995), supporting the finding that the contribution of IT is the largest for converging-to-target countries. Second, the effect of capital openness has apparently reverted in the last 10 years, suggesting that we should not expect a deflationary contribution of higher financial openness..

5. Conclusions

In this paper we have analyzed the non-monetary determinants of inflation from the experience of large sample of countries. We have tried to disentangle the incidence of five groups of variables suggested by the theoretical and empirical literature: (a) very high

inflation episodes and persistence, (b) monetary and exchange-rate regimes, (c) openness, (d) structural variables and institutions, and (e) business-cycle-related variables. We extend the existing literature in five dimensions. First we assemble a large data set that comprises 97 countries for the period from 1975 to 2005 for a wide variety of macroeconomic variables. Second, we estimate a broad specification that encompasses previous literature attempting to assess determinants of inflation through partial specifications. Third, we estimate such equations using annual and five-year-averages data to assess separately for short -term and long-term determinants of inflation, respectively. Fourth, we check for robustness of our results using different estimation econometric techniques that make different assumptions on the properties of our data and specification. Finally, we test for the sensitivity of our coefficient estimates across country groups and over time.

Our results show the relevance of disciplinary effects in lowering inflation. First, inflation targeting is estimated to lower inflation when taking as control group all non-inflation targeters for which there is available information on macroeconomic variables, even after controlling for persistence and several other determinants of inflation. The same is true for countries adopting fixed exchange-rate regimes. For both regimes, we find that the disciplinary effect they exert on monetary authorities seems to be larger in developing countries than in industrial countries. These findings do not change when we use our samples 5-year average data (long-run inflation model). Second, we find support to the hypothesis that financial integration would help lower inflation through the disciplinary effect it exerts on monetary authorities; as predicted by the Mundell – Flemming model, under fixed exchange rate there is no point in pursuing inflationary monetary policy as it is ineffective. On the other hand, under floating exchange rate regimes, persistent depreciation of national currency ultimately leads to currency substitutions that are costly and that limit the operational framework of inflationary monetary policy (and monetary policy as a whole). Additionally capital openness serves as alternative source for public debt financing, alleviating the need for seigniorage and making central banks less enthusiastic about incurring into inflationary monetary policy. Third, we find robust support for the fiscal theory of inflation in the short-run using several alternative specifications and econometric approaches. Such evidence seems to be generalized for industrial and developing countries: fiscal discipline helps lower inflation. However, in the long-run specification, we are unable to find such a strong finding. This may seem natural if we presume that countries cannot persistently run fiscal deficits or surpluses in the long-run

and that the fiscal accounts should be balanced in the long-run. Fourth, we also find that wealthier countries, which are generally associated to having better institutions, exhibit better inflation performance: the richer a country gets, the lower its inflation rate is. Fifth, output gap —as expected in the literature— exhibits, on average, a positive influence on inflation. This finding highlights the fact that its demand-led component dominates the effect of positive supply shocks in the short-run. Interestingly, we find that industrial countries are more likely to experience inflationary episodes caused by aggregate demand forces than emerging market economies. A different interpretation would conclude that positive supply shocks that help lower inflation are more prone to be found in developing countries, which is also very appealing. Finally, we fail to find robust support to the idea that foreign output gap would influence local inflation for either the short-run or long-run inflation regression models.

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Table 1
Previous Empirical Results
Restricted to Cross Section or Panel Data estimations

Variable	Author (s)	Conclusion	nel Data / Cross Secti	Observations
	Alfaro (2005)	+ / -	Panel Data	Imports and Exports
Openness	Campillo and Miron (1996)	(-)		Trade Openness
	Catao and Terrones (2005)	n.s.s.	Panel Data	
	Gruben and McLeod (2004)	(-)	Panel Data	Trade Openness
	Kamin, Marazzi and Schindler (2006)	(-)	Panel Data	Trade Openness
	Romer (1993)	(-)	Panel Data	Trade Openness (OECD)
	Temple (2002)	(-)	Panel Data	Trade Openness
	Terra (1998)	+ / -	Panel Data	Trade Openness (OECD)
	Tytell and Wei (2004)	(-)	Panel Data	Financial Openness
Institutions	Aisen and Veiga (2006)	(-)	Panel Data	Political Instability
	Cotarelli et al. (1998)	(-)	Panel Data	Transition Economies
Oil Price Inflation	Catao and Terrones (2005)	(+)	Panel Data	
Exchange Rate Regime	Alfaro (2005)	(-)	Panel Data	Unflexibility of Exchange-Rate R.
	Catao and Terrones (2005)	n.s.s.	Panel Data	
	Cotarelli et al. (1998)	(-)	Panel Data	Transition Economies
Fiscal Variables	Alfaro (2005)	(-)	Panel Data	
	Catao and Terrones (2005)	(-)	Panel Data	
	Cotarelli et al. (1998)	(-)		Transition Economies
	Fischer, Sahay and Vegh (2002)	(-)	Both	Focus on hyperinflation episodes

Note: n.s.s. stands for not statistically significan effect found
Source: own elaboration

Table 2
Simple Correlation Analysis
Correlation and Statistical Significance
Cross Section Correlation (upper diagonal) and Panel Correlation (lower diagonal)

	Inflation		Inflation Targeting		Exchange Rate Regime		Trade Openness		Capital Openness		Fiscal Surplus		Dom. Private Credit		Dem. Accountability		Income per capita		Relevant Ext. Inflation		National Output Gap		Cyc. Comp. oil price		Foreign output gap	
Inflation	1		-0.147	***	-0.563	***	-0.233	***	-0.355	***	-0.281	***	-0.039		-0.224	***	-0.196	***	0.185		-0.007		-0.024		-0.029	
			(0.00)		(0.00)		(0.00)		(0.00)		(0.00)		(0.34)		(0.00)		(0.00)		(0.00)		(0.86)		(0.57)		(0.47)	
Inflation Targeting	-0.021		1		-0.163	***	-0.002		0.19	***	0.197	***	0.013		0.268	***	0.247	***	-0.19		-0.014		-0.036		-0.045	
	(0.23)				(0.00)		(0.96)		(0.00)		(0.00)		(0.74)		(0.00)		(0.00)		(0.00)		(0.72)		(0.35)		(0.25)	
Exchange Rate Regime	-0.143	***	-0.152	***	1		0.236	***	0.196	***	0.046		0.014		-0.048		0.01		-0.088		0.047		0.042		0.029	
	(0.00)		(0.00)				(0.00)		(0.00)		(0.33)		(0.74)		(0.26)		(0.82)		(0.04)		(0.26)		(0.31)		(0.49)	
Trade Openness	-0.04	**	0.005		0.214	***	1		0.303	***	0.051		0.005		0.073	*	0.303	***	-0.069		0.004		-0.018		-0.028	
	(0.03)		(0.76)		(0.00)				(0.00)		(0.27)		(0.89)		(0.07)		(0.00)		(0.08)		(0.93)		(0.66)		(0.49)	
Capital Openness	-0.073	***	0.179	***	0.181	***	0.288	***	1		0.249	***	0.521	***	0.376	***	0.565	***	-0.163		-0.023		-0.018		-0.042	
	(0.00)		(0.00)		(0.00)		(0.00)				(0.00)		(0.00)		(0.00)		(0.00)		(0.00)		(0.57)		(0.65)		(0.30)	
Fiscal Surplus	-0.126	***	0.17	***	0.044	**	0.053	**	0.22	***	1		-0.021		0.117	***	0.222	***	-0.219		0.045		-0.071		0.000	
	(0.00)		(0.00)		(0.03)		(0.01)		(0.00)				(0.64)		(0.00)		(0.00)		(0.00)		(0.33)		(0.12)		(1.00)	
Domestic Private Credit	-0.006		0.008		0.058	**	-0.002		0.496	***	-0.004		1		0.021		0.044		0.000		-0.061		0.000		0.037	
	(0.75)		(0.64)		(0.02)		(0.91)		(0.00)		(0.84)				(0.61)		(0.28)		(1.00)		(0.13)		(1.00)		(0.36)	
Democratic accountability	-0.048	**	0.248	***	-0.046	**	0.075	**	0.359	***	0.116	***	0.004		1		0.602	***	-0.184		0.024		-0.018		-0.034	
	(0.01)		(0.00)		(0.01)		(0.00)		(0.00)		(0.00)		(0.82)				(0.00)		(0.00)		(0.56)		(0.65)		(0.40)	
Income per capita	-0.047	**	0.235	***	-0.001		0.3	**	0.553	***	0.191	***	0.029		0.583	***	1		-0.065		0.046		-0.012		-0.008	
	(0.01)		(0.00)		(0.95)		(0.00)		(0.00)		(0.00)		(0.10)		(0.00)				(0.10)		(0.24)		0.77		(0.85)	
Relevant External Inflation	0.000		-0.160	***	-0.068	***	-0.061	***	-0.14	***	-0.19	***	-0.005		-0.148	***	-0.055	***	1		-0.042		0.329	***	-0.115	***
	(0.99)		(0.00)		(0.00)		(0.00)		(0.00)		(0.00)		(0.78)		(0.00)		(0.00)				(0.29)		(0.00)		(0.00)	
National Output Gap	-0.070	***	-0.002		0.052	***	-0.007		0.01		0.064	***	-0.005		0.021		0.038	**	0.017		1		-0.026		0.258	***
	(0.00)		(0.92)		(0.00)		(0.68)		(0.58)		(0.00)		(0.78)		(0.25)		(0.03)		(0.34)				(0.51)		(0.00)	
Cyclical comp.of oil prices	0.012		-0.001		0.013		0.023		-0.003		0.049	**	-0.018		0.001		0.001		0.058		0.055	***	1		-0.367	***
	(0.52)		(0.93)		(0.47)		(0.19)		(0.86)		(0.01)		(0.30)		(0.95)		(0.93)		(0.00)		(0.00)				(0.00)	
Foreign output gap	0.005		-0.028	***	0.003		0.001		-0.022		0.028		-0.012		-0.008		0.002		0.073		0.101	***	0.024		1	
	(0.78)		(0.10)		(0.88)		(0.94)		(0.21)		(0.16)		(0.48)		(0.64)		(0.91)		(0.00)		(0.00)		(0.15)			

Table 3
Determinants of Inflation
Dependend Variable: Normalized Inflation
Estimation: Fixed Effects with Instrumental Variables
Sample. 1975-2005 (annual data)

	Fixed Effects and Random Effects Instrumental Variables Estimates									
	(1)				(2)		(3)		(4)	
	FE IV		RE IV		FE IV		FE IV		FE IV	
Inflation Related Variables										
Lagged Inflation	0.160	***	-0.033		0.196	*	0.141		0.139	
Normalized and Instrumented value	(1.97)		(0.22)		(1.87)		(1.42)		(1.39)	
Hyper Inflation	0.348	***	0.488	***	0.357	***	0.363	***	0.364	***
	(9.29)		(6.54)		(8.24)		(8.83)		(8.82)	
High Inflation	0.232	***	0.308	***	0.226	***	0.230	***	0.232	***
	(14.02)		(8.29)		(11.14)		(11.85)		(11.72)	
Monetary and Exchange-Rate Regime										
Inflation Targeting	-0.051	***	-0.045	***	-0.051 †	***	-0.054 †	***	-0.055 †	***
Lagged († Not lagged but Instrumented)	(5.41)		(4.25)		(3.80)		(4.16)		(4.27)	
Exchange Rate Regime	-0.029	***	-0.037	***	-0.031	***	-0.033	***	-0.033	***
Lagged († Not lagged but Instrumented)	(7.70)		(5.97)		(6.77)		(7.70)		(7.82)	
Openness										
Trade Openness	-0.009		-0.012	**	-0.019		-0.010			
Lagged († Not lagged but Instrumented)	(0.81)		(2.15)		(1.43)		(0.73)			
Capital Openness	-0.013	***	-0.011	***	-0.013	***	-0.013	***	-0.013	***
Lagged († Not lagged but Instrumented)	(5.94)		(4.90)		(4.79)		(5.09)		(5.06)	
Relevant External Inflation	0.210	***	0.412	***	0.169	**	0.080		0.127	
Normalized	(3.11)		(4.77)		(2.10)		(0.96)		(1.57)	
Structural / Institutional Variables										
Fiscal Surplus	-0.204	***	-0.179	***	-0.251	***	-0.459 †	***	-0.427 †	***
Lagged († Not lagged but Instrumented)	(5.30)		(4.46)		(5.17)		(5.15)		(5.00)	
Income per capita	-0.040	***	0.012	***	-0.045	***	-0.051 †	***	-0.047 †	***
Lagged († Not lagged but Instrumented)	(3.67)		(3.09)		(3.46)		(4.06)		(4.20)	
Domestic Private Credit	0.018	*	-0.059	***	0.028	**	0.025	**	0.024	**
Lagged († Not lagged but Instrumented)	(1.87)		(4.65)		(2.37)		(2.26)		(2.29)	
Democratic accountability	-0.002		-0.003	*	-0.002		-0.002			
	(1.22)		(1.65)		(1.05)		(0.74)			
Cyclical Domestic and Foreign Variales										
Cyclical component of oil prices	0.019	**	0.017		0.013		0.026	**	0.021	**
	(2.01)		(1.48)		(1.14)		(2.34)		(2.05)	
National Output Gap	0.238	***	0.057		1.182 †	***	0.724 †	**	0.709 †	**
Lagged († Not lagged but Instrumented)	(3.60)		(0.55)		(3.06)		(2.07)		(2.02)	
Foreign output gap (weighted by GDP)	-0.204		-0.406		-0.565	**	-0.366			
	(0.93)		(1.40)		(2.11)		(1.45)			
Constant	0.467	***	0.086	***	0.504	***	0.557	**	0.512	***
	(4.80)		(3.68)		(4.47)		(5.09)		(5.22)	
Hausman test (RE vs FE) *p-value*	0.00				0.00		0.00		0.00	
Observations	1574		1574		1574		1570		1619	
Number of Country number	65		65		65		65		65	
R2 Overall	0.75		0.79		0.71		0.68		0.69	

Note 1 : Absolute value of t statistics in parentheses
** significant at 10%, ** significant at 5%, * significant at 1%*
Note 2: The Hausman test favors FE regressions in all cases. Thus RE, being inconsistent, is no reported from equation 2

Table 4
Determinants of Inflation
Dependend Variable: Normalized Inflation
Estimation: ADRL-based estimation techniques
Sample. 1975-2005 (annual data)

	Pooled Mean Group				Mean Group			
	(1)	(2)	(3)	(4)	(1)	(2)	(3)	(4)
LONG RUN PARAMETERS								
Inflation Related Variables								
High Inflation	0.307 ***	0.324 ***	0.300 ***	0.295 ***	0.400 ***	0.258 ***	0.342 ***	0.451 ***
	(22.77)	(22.40)	(22.13)	(21.09)	(4.69)	(4.08)	(6.77)	(7.45)
Monetary and Exchange-Rate Regime								
Inflation Targeting	-0.053 ***	-0.038 ***	-0.054 ***	-0.063 ***	-0.120	-0.045	-0.031	-0.02
	(8.17)	(5.86)	(8.30)	(8.67)	(1.63)	(-0.80)	(0.59)	(0.42)
Exchange Rate Regime	-0.025 ***	-0.028 ***	-0.024 ***	-0.035 ***	-0.029 ***	-0.025 ***	-0.029 ***	-0.036 ***
	(10.26)	(10.51)	(9.84)	(13.07)	(3.11)	(2.81)	(4.12)	(5.83)
Openness								
Trade Openness	0.022 **	0.016 *	0.021 **	0.019 ***	0.153 **	0.131 ***	0.103 **	0.081 **
	(2.51)	(1.86)	(2.45)	(2.67)	(2.45)	(3.20)	(2.23)	(2.03)
Capital Openness	-0.013 ***	-0.013 ***	-0.013 ***	-0.012 ***	0.008	-0.001	-0.02 *	-0.016 **
	(8.32)	(8.44)	(8.37)	(8.02)	(0.48)	(0.19)	(1.75)	(2.03)
External relevant inflation	0.015	0.051			-0.241	0.159		
Normalized	(0.23)	(0.68)			(0.84)	(0.74)		
Foreign Output Gap		-0.17				-1.107		
Trade Weighted Average		(0.86)				(1.54)		
Structural / Institutional Variables								
Fiscal Surplus	-0.122 ***	-0.139 ***	-0.143 ***	-0.201 ***	-0.489 *	-0.246 *	-0.31	-0.363 *
(% to GDP)	(3.09)	(3.29)	(3.78)	(4.81)	(1.87)	(1.72)	(1.63)	(1.85)
Income per capita	-0.007	0.002	-0.006		-0.056	-0.121 *	-0.046	
Logarithm	(0.64)	(0.26)	(0.61)		(0.49)	(1.76)	(0.63)	
Domestic Private Credit	0.001				0.025			
	(0.41)				(0.87)			
Democratic accountability								
Cyclical Domestic and Foreign Variales								
National Output Gap	0.394 ***	0.432 ***	0.409 ***	0.399†	-0.18	0.242	-0.083	0.009
Pooling († Pooling not imposed)	(5.09)	(4.64)	(5.18)	(0.68)	(0.88)	(1.33)	(0.46)	(0.06)
Foreign output gap (weighted by GDP)								
ERROR CORRECTION								
Adjustment Velocity	-0.513 ***	-0.462 ***	-0.511 ***	-0.451 ***	-0.861 ***	-0.877 ***	-0.83 ***	-0.708 ***
	(18.52)	(17.62)	(18.05)	(14.74)	(21.60)	(18.06)	(21.99)	(23.31)
SHORT RUN PARAMETERS								
Oil Price Gap	-0.009	-0.001	-0.005		-0.015	-0.002	-0.011 *	
Deviation (%) from trend	(1.25)	(0.23)	(0.94)		(1.62)	(0.38)	(1.69)	
Δ Cap Openness	0.006 *	0.005	0.007 **	0.005	0.015	-0.009	0.003	-0.001
	(1.72)	(1.52)	(2.08)	(1.39)	(1.12)	(1.47)	(0.49)	(0.22)
Δ Per Capita Income	-0.069		-0.102		-0.364 *		-0.279	
In logarithms	(0.57)		(0.84)		(1.91)		(1.54)	
Δ Fiscal Surplus	0.203 ***	0.234 ***	0.225 ***	0.217 ***	0.499 ***	0.283 ***	0.364 ***	0.318 ***
	(3.42)	(3.91)	(3.96)	(4.13)	(5.18)	(2.88)	(4.24)	(3.96)
Δ National Output Gap	-0.331 **	-0.444 ***	-0.34 **	-0.455 ***	0.195	-0.211 **	0.105	-0.247 ***
	(2.46)	(8.48)	(2.47)	(5.81)	(0.92)	(2.47)	(0.50)	(3.12)
Δ Foreign Output Gap		-0.37 *				-0.187		
		(1.90)				(0.56)		
Constant	-0.001	0.001	-0.001	0.001	0.107	-0.001	0.055	0.004
	(0.27)	(0.36)	(0.48)	(0.44)	(1.39)	(0.02)	(0.84)	(0.32)

Note 1 : Absolute value of t statistics in parentheses
** significant at 10%, ** significant at 5%, * significant at 1%*
Note 2: Hausman Test's Null Hypothesis: Parameter Homogeneity
Note 3: † denotes that parameter homogeneity is not imposed

Table 4 (cont.)
Determinants of Inflation
Dependend Variable: Normalized Inflation
Estimation: ADRL-based estimation techniques
Sample. 1975-2005 (annual data)

	Dynamic Fixed Effects				Hausman Test			
	(1)	(2)	(3)	(4)	(1)	(2)	(3)	(4)
LONG RUN PARAMETERS								
Inflation Related Variables								
High Inflation	0.346 ***	0.3483 ***	0.3467 ***	0.3483 ***	1.21	1.15	0.73	7.06
	(29.63)	(29.79)	(29.85)	(29.76)	(0.27)	(0.28)	(0.39)	(0.01)
Monetary and Exchange-Rate Regime								
Inflation Targeting	-0.0455 ***	-0.0451 ***	-0.0442 ***	-0.046 ***	0.83	0.02	0.2	0.78
	(4.28)	(4.29)	(4.22)	(4.38)	(0.36)	(0.90)	(0.66)	(0.38)
Exchange Rate Regime	-0.0362 ***	-0.0368 ***	-0.0362 ***	-0.0369 ***	0.18	0.09	0.56	0.02
	(9.70)	(9.85)	(9.78)	(9.91)	(0.67)	(0.76)	(0.45)	(0.88)
Openness								
Trade Openness	0.0502 ***	0.0437 ***	0.0515 ***	0.0431 ***	4.49	8.21	3.24	2.5
	(2.95)	(2.60)	(3.04)	(2.61)	(0.03)	(0.00)	(0.07)	(0.11)
Capital Openness	-0.0113 ***	-0.0114 ***	-0.0112 ***	-0.0115 ***	1.62	2.48	0.4	0.22
	(4.05)	(4.09)	(4.08)	(4.14)	(0.20)	(0.11)	(0.53)	(0.64)
External relevant inflation	0.1103	0.1004			0.84	0.29		
Normalized	(0.89)	(0.80)			(0.36)	(0.59)		
Foreign Output Gap		-0.0212				1.83		
Trade Weighted Average		(0.07)				(0.18)		
Structural / Institutional Variables								
Fiscal Surplus	-0.3216 ***	-0.3269 ***	-0.3119 ***	-0.334 ***	2.02	0.6	0.8	0.72
(% to GDP)	(4.45)	(4.56)	(4.37)	(4.67)	(0.15)	(0.44)	(0.37)	(0.40)
Income per capita	-0.018	-0.0104	-0.0182		0.19	3.28	0.29	
Logarithm	(1.09)	(0.65)	(1.12)		(0.66)	(0.07)	(0.59)	
Domestic Private Credit	0.0024				0.72			
	(0.77)				(0.40)			
Democratic accountability								
Cyclical Domestic and Foreign Variales								
National Output Gap	0.2261 *	0.2349 *	0.2254 *	0.218 *	9.22	1.49	8.97	†
Pooling († Pooling not imposed)	(1.77)	(1.83)	(1.78)	(1.74)	(0.00)	(0.22)	(0.00)	
Foreign output gap (weighted by GDP)								
ERROR CORRECTION								
Adjustment Velocity	-0.507 ***	-0.5038 ***	-0.5068 ***	-0.5027 ***				
	(34.53)	(34.59)	(34.73)	(34.77)				
SHORT RUN PARAMETERS								
Oil Price Gap	-0.0055	-0.0036	-0.0037					
Deviation (%) from trend	(0.83)	(0.56)	(0.57)					
Δ Cap Openness	0.0036	0.0031	0.0032	0.0032				
	(1.34)	(1.13)	(1.18)	(1.18)				
Δ Per Capita Income	-0.1088 *		-0.1265 **					
In logarithms	(1.92)		(2.22)					
Δ Fiscal Surplus	0.2213 ***	0.2153 ***	0.2203 ***	0.2172 ***				
	(5.45)	(5.35)	(5.49)	(5.42)				
Δ National Output Gap	-0.2866 ***	-0.4187 ***	-0.2707 ***	-0.4182 ***				
	(3.43)	(8.28)	(3.25)	(8.29)				
Δ Foreign Output Gap		0.0375						
		(0.28)						
Constant								

Note 1 : Absolute value of t statistics in parentheses
** significant at 10%, ** significant at 5%, * significant at 1%*
Note 2: Hausman Test's Null Hypothesis: Parameter Homogeneity
Note 3: † denotes that parameter homogeneity is not imposed

Table 5
Determinants of Inflation
Dependend Variable: Normalized Inflation
Estimation: System GMM
Sample. 1975-2005 (five-year averages)

	(1)		(2)		(3)		(4)		(5)	
	SGMM		**SGMM**		**SGMM**		**SGMM**		**SGMM**	
Inflation Related Variables										
Lagged Inflation	0.153	**	0.176	**	0.194	***	0.211	***	0.197	***
Normalized and Instrumented value	(2.13)		(2.52)		(3.51)		(4.14)		(3.55)	
Hyper Inflation	0.536	***	0.513	***	0.491	***	0.489	***	0.487	***
	(4.38)		(4.26)		(5.49)		(5.46)		(5.31)	
High Inflation	0.321	***	0.321	***	0.352	***	0.349	***	0.352	***
	(8.70)		(10.00)		(10.10)		(10.18)		(9.99)	
Monetary and Exchange-Rate Regime										
Inflation Targeting	-0.034	***	-0.032	***	-0.033	***	-0.033	***	-0.034	***
	(4.40)		(3.74)		(5.31)		(5.27)		(5.41)	
Exchange Rate Regime	-0.028	***	-0.027	***	-0.027	***	-0.027	***	-0.027	***
Lagged († Not lagged but Instrumented)	(7.82)		(7.61)		(7.77)		(7.51)		(7.77)	
Openness										
Trade Openness	-0.004		-0.004							
Lagged († Not lagged but Instrumented)	(0.42)		(0.53)							
Capital Openness	-0.010	***	-0.009	***	-0.008	***	-0.008	***	-0.008	***
Lagged († Not lagged but Instrumented)	(5.36)		(4.78)		(4.26)		(4.25)		(4.84)	
Relevant External Inflation	0.326	***	0.308	**	0.392	***	0.397	***	0.385	***
Normalized	(2.85)		(2.22)		(3.99)		(4.00)		(3.96)	
Structural / Institutional Variables										
Fiscal Surplus	-0.076		-0.109							
Lagged († Not lagged but Instrumented)	(0.40)		(0.44)							
Income per capita	-0.000		0.000		-0.004		-0.006	**		
Lagged († Not lagged but Instrumented)	(0.07)		(0.08)		(1.25)		(2.29)			
Domestic Private Credit	-0.021	*	-0.020	**	-0.011				-0.015	**
Lagged († Not lagged but Instrumented)	(1.84)		(2.24)		(1.25)				(2.03)	
Democratic accountability	0.001									
	(0.38)									
Constant	0.121	***	0.113	***	0.134	***	0.147	***	0.106	***
	(3.69)		(3.33)		(5.00)		(5.12)		(7.35)	
Observations	360		355		435		435		435	
Number of (mean) cnum	77		77		97		97		97	
Hansen Test	0.76		0.65		0.65		0.63		0.62	
Instrumentos	27.00		17.00		15.00		14.00		14.00	
AR1	0.00		0.00		0.00		0.00		0.00	
AR2	0.46		0.44		0.47		0.50		0.46	

Note 1 : Absolute value of Z statistics in parentheses
** significant at 10%, ** significant at 5%, * significant at 1%*

Table 6
Determinants of Inflation: Country Heterogeneity
Dependend Variable: Normalized Inflation
Estimation: Fixed Effects with Instrumental Variables
Sample. 1975-2005 (annual data)

	Fixed Effects and Random Effects Instrumental Variables Estimates			
	(1)		(2)	
	Baseline	***Differential***	***Baseline***	***Differential***
Inflation Related Variables				
Lagged Inflation	0.512 ***	-0.413 **	0.496 ***	-0.402 **
Normalized and Instrumented value	(4.16)	(2.50)	(4.32)	(2.55)
Hyper Inflation	0.372 ***		0.371 ***	
	(8.32)		(8.47)	
High Inflation	0.150 ***	0.086 **	0.176 ***	0.061
	(4.15)	(2.06)	(5.27)	(1.56)
Monetary and Exchange-Rate Regime				
Inflation Targeting	0.003†	-0.080† ***	-0.009†	-0.070† ***
Lagged († Not lagged but Instrumented)	(0.17)	(3.02)	(0.54)	(2.86)
Exchange Rate Regime	-0.014	-0.020	-0.006	-0.028 **
Lagged († Not lagged but Instrumented)	(1.11)	(1.45)	(0.57)	(2.33)
Openness				
Trade Openness	-0.069	0.068		
Lagged († Not lagged but Instrumented)	(1.27)	(1.21)		
Capital Openness	-0.003	-0.011 *	-0.004	-0.010 *
Lagged († Not lagged but Instrumented)	(0.51)	(1.81)	(0.71)	(1.72)
Relevant External Inflation	0.154	-0.103	0.078	0.032
Normalized	(0.67)	(0.42)	(0.37)	(0.14)
Structural / Institutional Variables				
Fiscal Surplus	-0.701† ***	0.207†	-0.435† **	-0.048†
Lagged († Not lagged but Instrumented)	(3.19)	(0.85)	(2.56)	(0.24)
Income per capita	-0.002†	-0.050	-0.015	-0.033
Lagged († Not lagged but Instrumented)	(0.04)	(1.30)	(0.65)	(1.23)
Domestic Private Credit	0.020	-0.010	0.012	0.001
Lagged († Not lagged but Instrumented)	(0.98)	(0.36)	(0.68)	(0.03)
Democratic accountability	-0.011	0.009		
	(1.31)	(1.01)		
Cyclical Domestic and Foreign Variales				
Cyclical component of oil prices	-0.009	0.042	-0.010	0.037
	(0.36)	(1.48)	(0.39)	(1.28)
National Output Gap	3.041† ***	-2.586† **	2.148† **	-1.706† *
Lagged († Not lagged but Instrumented)	(2.74)	(2.20)	(2.54)	(1.83)
Foreign output gap (weighted by GDP)	-0.472	-0.055		
	(0.62)	(0.07)		
Constant	0.473 ***		0.444 ***	
	(4.07)		(4.57)	
Observations	1570		1619	
Number of Country number	65		65	
R2 Overall	0.17		0.24	

Note 1 : Absolute value of t statistics in parentheses
** significant at 10%, ** significant at 5%, * significant at 1%*
Note 2: The Hausman test favors FE regressions in all cases.
Note 3: Country heterogeneity is accomplished thorough the inclusion of an interactive dummy variable which is set equal to zero for high income economies and equal to one for middle and low income economies

Table 7
Determinants of Inflation: Country Heterogeneity
Dependend Variable: Normalized Inflation
Estimation: Fixed Effects with Instrumental Variables
Sample. 1975-2005 (annual data)

	Fixed Effects and Random Effects Instrumental Variables Estimates			
	(1)		(2)	
	Baseline	***Differential***	***Baseline***	***Differential***
Inflation Related Variables				
Lagged Inflation	0.251 ***	-0.148	0.262 ***	-0.158
Normalized and Instrumented value	(4.48)	(1.07)	(4.80)	(1.16)
Hyper Inflation	0.422 ***	-0.071	0.415 ***	-0.063
	(7.30)	(0.91)	(7.42)	(0.81)
High Inflation	0.194 ***	0.049 *	0.194 ***	0.050 *
	(12.29)	(1.76)	(12.53)	(1.79)
Monetary and Exchange-Rate Regime				
Inflation Targeting	-0.035† ***	-0.050† *	-0.038† ***	-0.048† *
Lagged († Not lagged but Instrumented)	(2.95)	(1.70)	(3.37)	(1.73)
Exchange Rate Regime	-0.032 ***	0.001	-0.031 ***	-0.000
Lagged († Not lagged but Instrumented)	(6.33)	(0.07)	(6.33)	(0.07)
Openness				
Trade Openness	-0.017	0.014		
Lagged († Not lagged but Instrumented)	(0.87)	(0.48)		
Capital Openness	-0.011 ***	-0.002	-0.011 ***	-0.002
Lagged († Not lagged but Instrumented)	(3.58)	(0.48)	(3.62)	(0.45)
Relevant External Inflation	0.172	-0.244	0.169	-0.151
Normalized	(1.34)	(1.41)	(1.37)	(0.93)
Structural / Institutional Variables				
Fiscal Surplus	-0.435† ***	-0.175†	-0.398† ***	-0.166†
Lagged († Not lagged but Instrumented)	(3.70)	(0.94)	(3.71)	(0.94)
Income per capita	-0.054† ***	0.015†	-0.051† ***	0.016†
Lagged († Not lagged but Instrumented)	(2.67)	(0.57)	(3.06)	(0.68)
Domestic Private Credit	0.037 ***	-0.043 *	0.034 ***	-0.038
Lagged († Not lagged but Instrumented)	(2.68)	(1.65)	(2.67)	(1.50)
Democratic accountability	-0.003	0.002		
	(0.83)	(0.42)		
Cyclical Domestic and Foreign Variales				
Cyclical component of oil prices	0.013	0.027	0.008	0.023
	(0.74)	(1.17)	(0.49)	(1.09)
National Output Gap	1.275† ***	-0.912†	1.260† ***	-0.892†
Lagged († Not lagged but Instrumented)	(3.64)	(1.48)	(3.64)	(1.45)
Foreign output gap (weighted by GDP)	-0.383	-0.107		
	(0.90)	(0.20)		
Constant	0.511 ***		0.467 ***	
	(4.57)		(4.76)	
Observations	1570		1619	
Number of Country number	65		65	
R2 Overall	0.51		0.54	

Note 1 : Absolute value of t statistics in parentheses
** significant at 10%, ** significant at 5%, * significant at 1%*
Note 2: The Hausman test favors FE regressions in all cases.
Note 3: Country heterogeneity is accomplished thorough the inclusion of an interactive dummy variable which is set equal to zero for high and middle income economies and equal to one low income economies

Table 8
Determinants of Inflation: Country Heterogeneity
Dependend Variable: Normalized Inflation
Estimation: Fixed Effects with Instrumental Variables
Sample. 1975-2005 (annual data)

	Fixed Effects and Random Effects Instrumental Variables Estimates			
	(1)		(2)	
	Baseline	***Differential***	***Baseline***	***Differential***
Inflation Related Variables				
Lagged Inflation	0.219 **	-0.305 ***	0.193 **	-0.212 ***
Normalized and Instrumented value	(2.44)	(3.43)	(2.25)	(3.47)
Hyper Inflation	0.327 ***	0.000	0.337 ***	0.000
	(8.28)	(.)	(8.91)	(.)
High Inflation	0.222 ***	0.002	0.229 ***	-0.009
	(12.42)	(0.10)	(12.84)	(0.39)
Monetary and Exchange-Rate Regime				
Inflation Targeting	-0.063†	-0.004†	-0.063† *	-0.004†
Lagged († Not lagged but Instrumented)	(1.53)	(0.14)	(1.83)	(0.16)
Exchange Rate Regime	-0.029 ***	-0.006	-0.032 ***	0.002
Lagged († Not lagged but Instrumented)	(6.12)	(1.23)	(5.53)	(0.18)
Openness				
Trade Openness	-0.008	0.036		
Lagged († Not lagged but Instrumented)	(0.40)	(1.31)		
Capital Openness	-0.012 ***	-0.002	-0.011 ***	-0.004
Lagged († Not lagged but Instrumented)	(3.79)	(0.41)	(3.66)	(0.58)
Relevant External Inflation	0.093	0.190	0.025	0.344
Normalized	(0.40)	(0.55)	(0.23)	(0.93)
Structural / Institutional Variables				
Fiscal Surplus	-0.316†	-0.509†	-0.326† **	-0.448†
Lagged († Not lagged but Instrumented)	(1.35)	(0.78)	(2.14)	(0.96)
Income per capita	-0.073† *	0.060†	-0.060† *	0.042†
Lagged († Not lagged but Instrumented)	(1.75)	(0.74)	(1.91)	(0.86)
Domestic Private Credit	0.038	-0.063	0.030 *	-0.046
Lagged († Not lagged but Instrumented)	(1.47)	(0.91)	(1.72)	(0.95)
Democratic accountability	0.009	-0.017		
	(0.60)	(0.68)		
Cyclical Domestic and Foreign Variales				
Cyclical component of oil prices	0.033 **	-0.030	0.035 **	-0.019
	(2.01)	(1.10)	(2.49)	(0.76)
National Output Gap	0.791† **	-0.208†	0.728† *	-0.002†
Lagged († Not lagged but Instrumented)	(2.08)	(0.29)	(1.95)	(0.00)
Foreign output gap (weighted by GDP)	-0.179	1.104		
	(0.59)	(1.25)		
Constant	0.692 **	-0.418	0.620 **	-0.348
	(2.29)	(0.73)	(2.34)	(0.85)
Observations	1570		1619	
Number of Country number	65		65	
R2 Overall	0.67		0.69	

Note 1 : Absolute value of t statistics in parentheses
** significant at 10%, ** significant at 5%, * significant at 1%*
Note 2: The Hausman test favors FE regressions in all cases.
Note 3: Country heterogeneity is accomplished thorough the inclusion of an interactive dummy variable which is set equal to one for the period comprising years 1995 to 2005 and equal to zero for the rest

Table 9
Determinants of Inflation
Dependend Variable: Normalized Inflation
Estimation: System GMM
Sample. 1975-2005 (five-year averages)

	(1)		(2)	
	Baseline	***Incremental***	***Baseline***	***Incremental***
Inflation Related Variables				
Lagged Inflation	0.371 ***	-0.169 *	0.391 ***	-0.213 **
Normalized and Instrumented value	(5.16)	(1.80)	(5.59)	(2.29)
Hyper Inflation	0.475 ***		0.479 ***	
	(5.03)		(4.85)	
High Inflation	0.431 ***	-0.089	0.401 ***	-0.057
	(5.64)	(1.05)	(7.27)	(0.87)
Monetary and Exchange-Rate Regime				
Inflation Targeting	0.001	-0.041 ***	0.006	-0.048 ***
	(0.11)	(3.25)	(0.80)	(4.20)
Exchange Rate Regime	0.001	-0.035 ***	0.002	-0.036 ***
Lagged († Not lagged but Instrumented)	(0.33)	(6.57)	(0.65)	(6.49)
Openness				
Capital Openness	-0.004	-0.003	-0.005	-0.003
Lagged († Not lagged but Instrumented)	(1.38)	(0.91)	(1.45)	(0.67)
Relevant External Inflation	0.424 **	0.032	0.484 ***	-0.021
Normalized	(2.47)	(0.15)	(3.06)	(0.10)
Structural / Institutional Variables				
Income per capita	0.006	-0.012		
Lagged († Not lagged but Instrumented)	(0.78)	(1.36)		
Domestic Private Credit			0.009	-0.031
Lagged († Not lagged but Instrumented)			(1.24)	(2.87)
Constant	-0.054	0.215 **	-0.006	0.129 ***
	(0.72)	(2.55)	(0.45)	(5.93)
Observations	435		435	
Number of (mean) cnum	97		97	
Hansen Test	0.12		0.15	
Instrumentos	27.00		27.00	
AR1	0.00		0.00	
AR2	0.33		0.29	

Note 1 : Absolute value of Z statistics in parentheses
** significant at 10%, ** significant at 5%, * significant at 1%*
Note 2: Country heterogeneity is accomplished thorough the inclusion of an interactive dummy variable which is set equal to zero for high income economies and equal to one for middle and low income economies

Table 10
Determinants of Inflation
Dependend Variable: Normalized Inflation
Estimation: System GMM
Sample. 1975-2005 (five-year averages)

	(1)		(2)	
	Baseline	***Incremental***	***Baseline***	***Incremental***
Inflation Related Variables				
Lagged Inflation	0.277 ***	-0.104	0.264 ***	-0.095
Normalized and Instrumented value	(3.52)	(1.02)	(3.10)	(0.88)
Hyper Inflation	0.252 ***	0.326 ***	0.254 ***	0.329 ***
	(2.91)	(3.09)	(3.30)	(3.28)
High Inflation	0.354 ***	-0.013	0.352 ***	-0.010
	(5.18)	(0.17)	(5.67)	(0.14)
Monetary and Exchange-Rate Regime				
Inflation Targeting	-0.021 ***	-0.031 **	-0.022 ***	-0.031 ***
	(3.06)	(2.33)	(3.41)	(2.73)
Exchange Rate Regime	-0.016 **	-0.019 **	-0.018 ***	-0.016 **
Lagged († Not lagged but Instrumented)	(2.53)	(2.31)	(2.86)	(2.12)
Openness				
Capital Openness	-0.008 **	0.002	-0.008 ***	0.003
Lagged († Not lagged but Instrumented)	(2.47)	(0.45)	(2.85)	(0.71)
Relevant External Inflation	0.260	0.231	0.281 **	0.223
Normalized	(1.76)	(1.11)	(2.07)	(1.12)
Structural / Institutional Variables				
Income per capita	-0.006	0.004		
Lagged († Not lagged but Instrumented)	(0.76)	(0.35)		
Domestic Private Credit			-0.006	-0.016
Lagged († Not lagged but Instrumented)			(0.72)	(1.12)
Constant	0.127	0.014	0.075 ***	0.049
	(1.34)	(0.13)	(3.10)	(1.59)
Observations	435		435	
Number of (mean) cnum	97		97	
Hansen Test	0.69		0.75	
Instrumentos	28.00		28.00	
AR1	0.00		0.00	
AR2	0.90		0.83	

Note 1 : Absolute value of Z statistics in parentheses
** significant at 10%, ** significant at 5%, * significant at 1%*
Note 2: Country heterogeneity is accomplished thorough the inclusion of an interactive dummy variable which is set equal to zero for high and middle income economies and equal to one low income economies

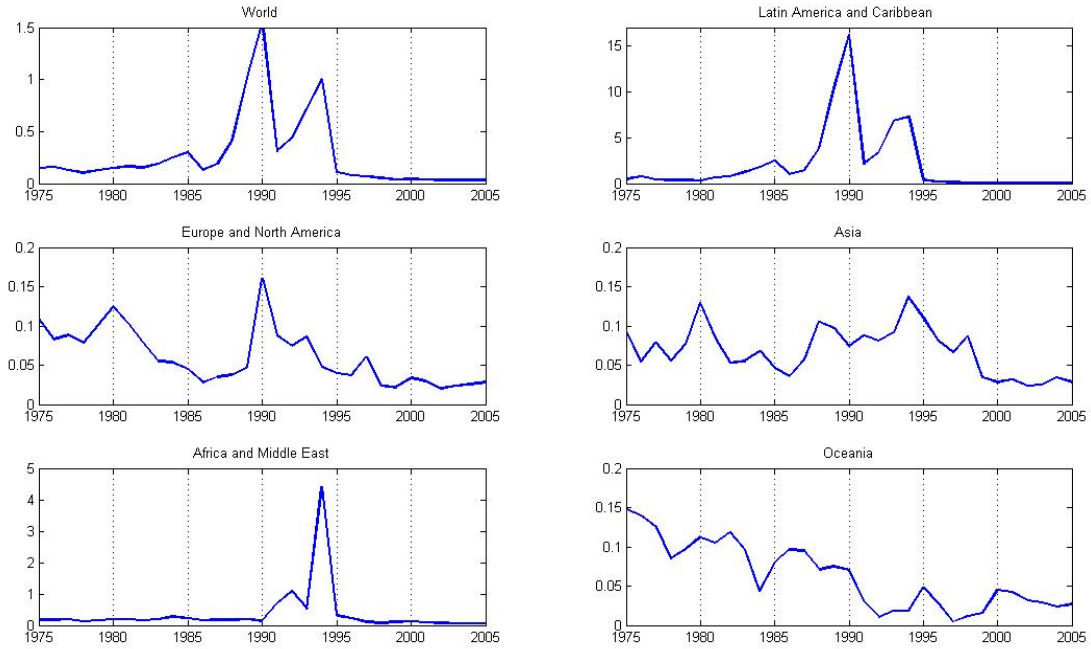
Table 11
Determinants of Inflation: Time Heterogeneity
Dependend Variable: Normalized Inflation
Estimation: System GMM
Sample. 1975-2005 (five-year averages)

	(1)				(2)			
	Baseline		***Incremental***		***Baseline***		***Incremental***	
Inflation Related Variables								
Lagged Inflation	0.185	***	0.045		0.179	***	0.010	
Normalized and Instrumented value	(3.88)		(0.41)		(3.73)		(0.08)	
Hyper Inflation	0.491	***	-0.018		0.479	***	-0.021	
	(6.02)		(0.18)		(5.34)		(0.19)	
High Inflation	0.344	***	0.033		0.347	***	0.016	
	(9.68)		(0.64)		(9.29)		(0.27)	
Monetary and Exchange-Rate Regime								
Inflation Targeting	-0.022	*	-0.007		-0.020	*	-0.010	
	(1.88)		(0.57)		(1.78)		(0.90)	
Exchange Rate Regime	-0.027	***	0.004		-0.026	***	0.002	
Lagged († Not lagged but Instrumented)	(5.85)		(0.65)		(5.74)		(0.33)	
Openness								
Capital Openness	-0.013	***	0.012	***	-0.013	***	0.011	***
Lagged († Not lagged but Instrumented)	(4.90)		(3.98)		(5.38)		(4.39)	
Relevant External Inflation	0.221	*	0.027		0.209	*	0.102	
Normalized	(1.91)		(0.08)		(1.79)		(0.29)	
Structural / Institutional Variables								
Income per capita	-0.005		-0.002					
Lagged († Not lagged but Instrumented)	(1.46)		(0.56)					
Domestic Private Credit					-0.015		-0.002	
Lagged († Not lagged but Instrumented)					(1.27)		(0.16)	
Constant	0.158	***	-0.012		0.120	***	-0.028	
	(4.18)		(0.29)		(6.69)		(1.27)	
Observations	435				435			
Number of (mean) cnum	97				97			
Hansen Test	0.57				0.50			
Instrumentos	22.00				22.00			
AR1	0.00				0.00			
AR2	0.37				0.40			

Note 1 : Absolute value of Z statistics in parentheses
** significant at 10%, ** significant at 5%, * significant at 1%*
Note 2: Country heterogeneity is accomplished thorough the inclusion of an interactive dummy variable which is set equal to one for the period comprising years 1995 to 2005 and equal to zero for the rest

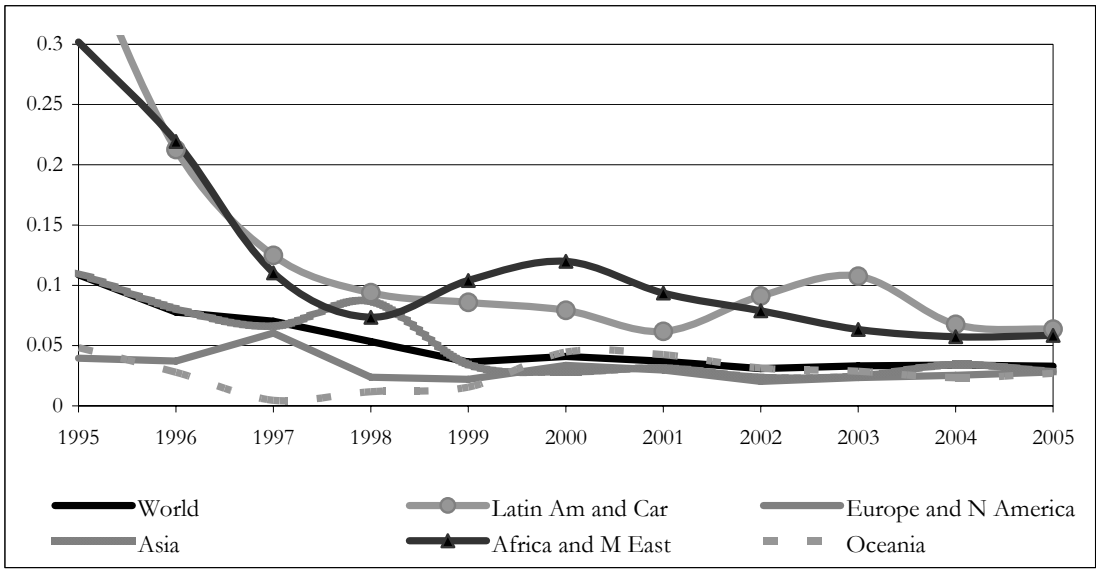
FIGURES

Figure 1
World and Regional Inflation



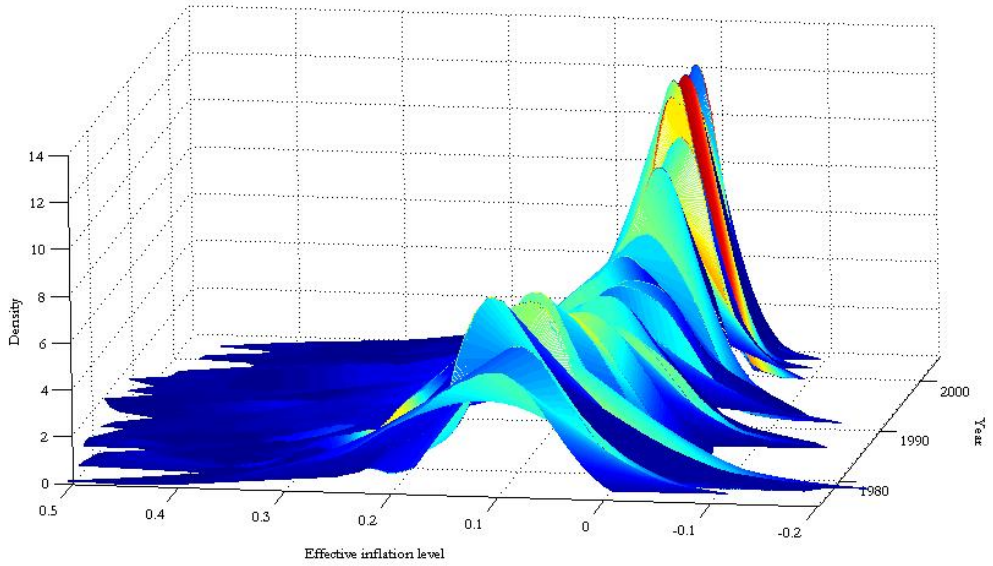
Source: Authors' calculation
Note: Regional and global inflation are defined as the PPP GDP weighted average of country inflations for each period

Figure 2
World and Regional Inflation, 1995-2005
PPP-GDP Weighted Average



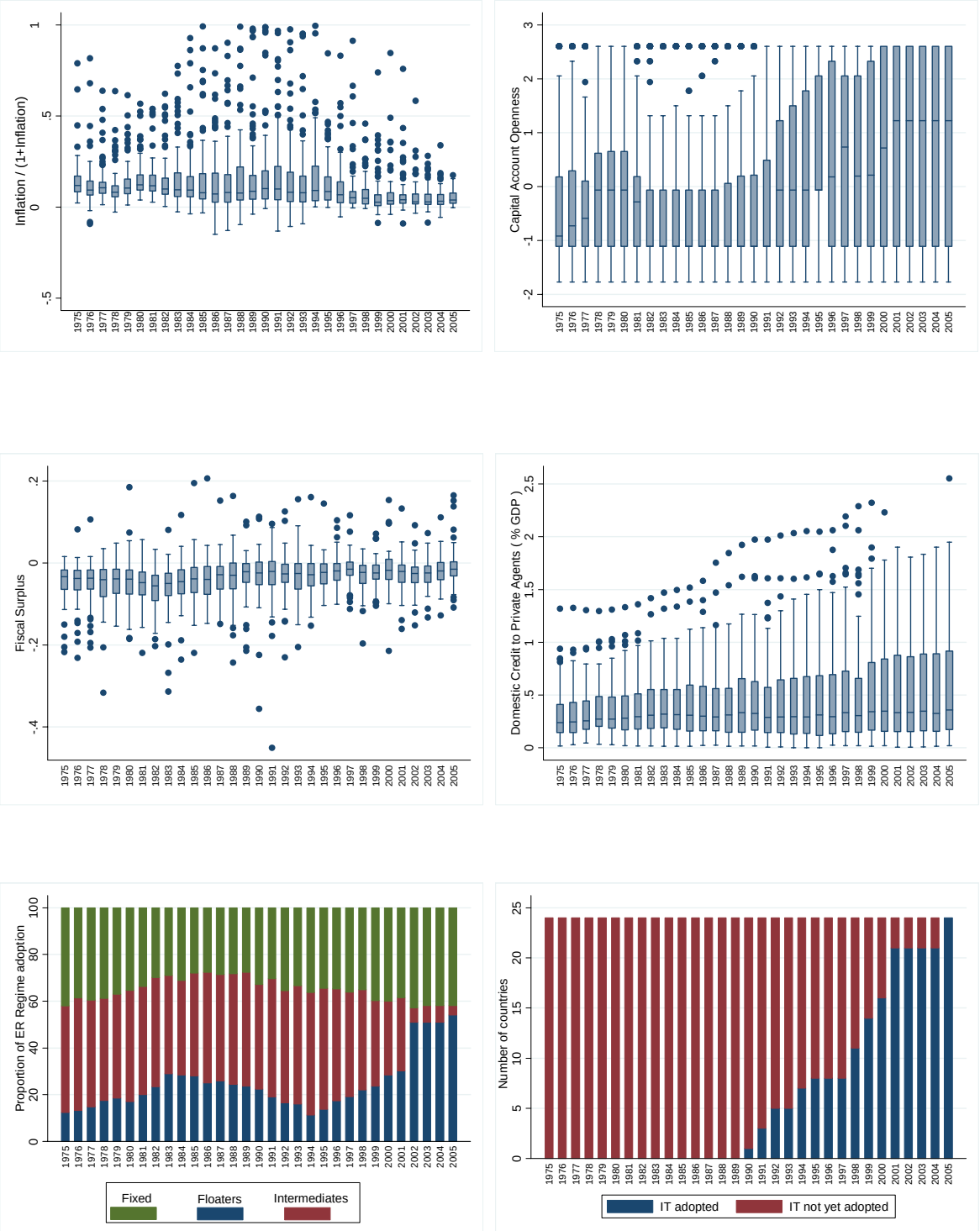
Source: Authors' calculation

Figure 3
Distribution of Cross Country Inflations



Source: Authors' calculation
Note: Kernel Density plots for the Distribution of Cross-Country Inflations for each period: 1975-2005.
Note 2: Inflation is defined on decimal basis, thus 1% is equivalent to 0.01.

Figure 4
Median and percentile distribution of relevant variables



DATA APPENDIX

Table A1
Descriptive Statistics

Variable	Obs	Mean	Std. Dev.	Min	Max
Inflation (normalized)	3044	0.119	0.153	-0.150	0.996
Trade Openness	3175	0.685	0.418	0.063	4.561
Capital Openness	3114	0.146	1.557	-1.767	2.603
Relevant External Inflation	3379	0.041	0.029	-0.001	0.143
Fiscal Surplus (% GDP)	2420	-0.035	0.049	-0.451	0.206
Per capita Income (in logs)	3243	8.510	1.157	6.130	10.889
Domestic Private Credit	3152	0.630	5.242	0.000	152.318
Democratic Accountability	3119	3.708	1.647	0.000	6.000
Cyclical component of Oil Prices	3379	-0.004	0.166	-0.384	0.296
National Output Gap	3243	0.000	0.028	-0.368	0.270
Foreign Output Gap (GDP weighted av.)	3379	-0.001	0.008	-0.021	0.017

Table A3
Foreign Monetary Policy Reference Countries

Name											
Algeria	3		El Salvador	8		Madagascar	3		Slovenia	4		
Argentina	8		Ethiopia	8		Malawi	8		South Africa	8		
Australia	8		Finland	4		Malaysia	8		Spain	4		
Austria	4		France	4		Mali	3		Sri Lanka	5	8	9
Bangladesh	8	9	Gabon	3		Mauritius	9		Sudan	8		
Belgium	4		Gambia, The	8	9	Mexico	8		Sweden	4		
Benin	3		Germany	8		Morocco	3		Switzerland	4		
Bolivia	8		Ghana	8		Netherlands	4		Syrian Arab Republi	8		
Botswana	8	10	Greece	4	8	New Zealand	1		Tanzania	8		
Brazil	8		Guatemala	8		Nicaragua	8		Thailand	8		
Bulgaria	4	8	Guinea	8		Niger	3		Togo	3		
Burkina Faso	3		Haiti	8		Nigeria	8		Trinidad and Tobag	8	9	
Cameroon	3		Honduras	8		Norway	4		Tunisia	3		
Canada	8		Hong Kong, China	8		Oman	8		Turkey	8		
Chad	3		Hungary	4	8	Pakistan	8		Uganda	8		
Chile	8		Iceland	4	8	Panama	8		United Arab Emirat	8		
China	8		India	8	9	Papua New Guinea	9		United Kingdom	4		
Colombia	8		Indonesia	8		Paraguay	8		Uruguay	8		
Congo, Dem. Rep.	8		Iran, Islamic Rep.	8		Peru	8		Venezuela, RB	8		
Congo, Rep.	3		Ireland	4	9	Philippines	8		Zambia	8		
Costa Rica	8		Israel	8		Poland	4		Zimbabwe	8		
Cote d'Ivoire	3		Italy	4		Portugal	4					
Croatia	4		Jamaica	8		Romania	8					
Cyprus	3		Japan	8		Rwanda	8					
Czech Republic	4		Jordan	8		Saudi Arabia	8					
Denmark	4		Kenya	8		Senegal	3					
Dominican Republic	8		Korea, Rep.	8		Sierra Leone	8	9				
Ecuador	8		Lebanon	8		Singapore	6					
Egypt, Arab Rep.	8		Luxembourg	2		Slovak Republic	4					

Base Countries

Australia (1)	Germany (4)	Portugal (7)	South Africa(10)
Belgium (2)	India (5)	United States (8)	
France (3)	Malaysia (6)	United Kingdom (9)	

Note 1: We use inflation of the base-country as our measure of Relevant External Inflation
Note 2: Numbers to the right refer to base country. A country may have multiple bases.
Note 3: Country base for the US is assumed to comprise EMU and Japan
Note 4: This table is based in Di Giovanni and Shambaugh

Table A3
Data Sources and definitions

Variable	Description	Source
(normalized) Inflation rate	CPI inflation rate/(1+CPI inflation)	WDI (2007)
Fiscal Surplus	Overall Government Budget Balance (surplus)/GDP	GFS and EIU
Financial development	Domestic credit to private sector /GDP	WDI (2007)
Exchange-rate regime	Discrete Variable	Reinhart and Rogoff (2004) + IMF (AREAER)
GDP per capita	GDP per capita (2000 US $)	WDI (2007)
Trade openness	(Exports + Imports) / GDP	WDI (2007)
Inflation Targeting	Dummy Variable	Corbo et al. (2002); Truman (2003); Mishkin and Schmidt-Hebbel (2007)
Capital Openness	Four Dummy variables reported in IMF's AREAER	Chinn and Ito (2002, 2005)
Relevant External Inflation	Own elaboration based on Di Giovanni and Shambaugh (2007)	See Table A2
Democratic Accountability	International Country Risk Guide	Political Risk Services
Oil Price	International oil price average (UK Brent, WTI, Dubai)	IMF's IFS
National Output Gap	Cyclical component (HP filtered) of real GDP as percent deviation from trend	WDI (2007)
Foreign Output Gap	GDP weighted average of foreign output gaps (excludes national output gap)	WDI (2007)

Source: own elaboration
Notes:
AREAER: Annual Report on Exchange Arrangements and Exchange Restrictions , several issues
EIU: The Economist Intelligence Unit
GFS: Government Financial Statistics
IFS : International Financial Statistics
WDI: Word Development Indicators

Table A4

Countries grouped by income level

World Bank 2007 Classification

1 Burkina Faso	1 Bulgaria	1 Argentina	1 Australia	1 Cyprus
2 Cote d'Ivoire	2 Bolivia	2 Botswana	2 Austria	2 Hong Kong, China
3 Ethiopia	3 Brazil	3 Chile	3 Belgium	3 Israel
4 Ghana	4 Cameroon	4 Costa Rica	4 Canada	4 Saudi Arabia
5 Gambia, The	5 Congo, Rep.	5 Gabon	5 Switzerland	5 Singapore
6 Haiti	6 Colombia	6 Croatia	6 Denmark	
7 India	7 Dominican Republic	7 Hungary	7 Spain	
8 Kenya	8 Algeria	8 Lebanon	8 Finland	
9 Madagascar	9 Ecuador	9 Mexico	9 France	
10 Malawi	10 Egypt, Arab Rep.	10 Mauritius	10 United Kingdom	
11 Niger	11 Guatemala	11 Malaysia	11 Greece	
12 Nigeria	12 Honduras	12 Panama	12 Ireland	
13 Pakistan	13 Indonesia	13 Poland	13 Iceland	
14 Papua New Guinea	14 Iran, Islamic Rep.	14 Trinidad and Tobago	14 Italy	
15 Rwanda	15 Jamaica	15 Turkey	15 Japan	
16 Sudan	16 Jordan	16 Uruguay	16 Korea, Rep.	
17 Senegal	17 Sri Lanka	17 Venezuela, RB	17 Luxembourg	
18 Sierra Leone	18 Morocco	18 South Africa	18 Netherlands	
19 Chad	19 Nicaragua		19 Norway	
20 Togo	20 Peru		20 New Zealand	
21 Tanzania	21 Philippines		21 Portugal	
22 Uganda	22 Paraguay		22 Sweden	
23 Congo, Dem. Rep.	23 El Salvador		23 United States	
24 Zambia	24 Syrian Arab Republic			
25 Zimbabwe	25 Thailand			
	26 Tunisia			

Note: This country sample comprises countries actually used in estimations.
Our complete data set contains data for 109 countries (incomplete for 12 of them)

Source: World Bank (2007)

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