

## Inflationary Persistence

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For the monetary policy makers, one of the most relevant characteristics of the inflation dynamics is its degree of persistence. Monetary Policy acts in the sense of decreasing it. One way of doing this is by anchoring expectations. This is because the more anchored the expectations the less persistent will be inflation. In the last years, both mature and emerging economies have experienced important changes in the persistence degrees of their inflations. Besides making a little summary of relevant literature, this box aims to analyze the inflationary persistence from 1995 up to the present in some mature and emerging economies<sup>1</sup>.

According to the Cecchetti et al. (2007), both volatility and inflation's persistence have been decreasing in the last years in mature economies. In these economies, the decades of 1960's and 1970's were marked by monetary policies not so active in combating inflation. On the other hand, the most recent decades (1990's and 2000's) are distinguished by active monetary policies and levels of moderate inflation. In the United States of America, in particular, the decade of the 1990's is known as the period of great moderation, with growing output and decreasing inflation<sup>2</sup>.

Unlike the mature economies, the emerging markets lived for much longer with high levels of inflation. Some countries – such as Brazil, Argentine and Turkey – experienced long periods of hyperinflation in the last 40 years. Only recently, inflation rates in these countries started falling. To some extent, this may be attributed to important modifications in the

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1/ The sample of emerging countries is composed by Brazil and Chile, while Germany, Canada, United States of America, French, Italy and United Kingdom make up the sample of mature economies.

2/ See Stock and Watson (2003) for a short analysis of the monetary policy in mature economies in recent years.

conduct of their macroeconomic policies<sup>3</sup>. Even so, it is not clear if the reduction of the inflationary levels in these countries was accompanied by the reduction in the persistence of their respective inflations.

In the specific case of Brazil, there are two aspects especially linked to inflation's persistence. First, taking into account the extremely high levels of inflation, which the country experienced during decades, the inflationary memory is perhaps still relevant. Besides, to a large extent the Brazilian inflation linked to prices of goods contract-administered and monitored services are still formally indexed in view of contractual clauses. Even in the set of market prices, there are some items, such as rental and condominium tariffs, which suggest indexation practices.

The literature on the subject is diversified. For example, Stock and Watson (2007) show that the inflation upturn in the USA is well described by the sum of latent factors, cycle and tendency, the former being a stationary process and the latter a non-stationary process. The authors sustain that inflation's persistence, represented by the tendency, has decreased considerably in the latest years. These results are confirmed by Mishkin (2007).

Cechetti et al. (2007) also used the Stock and Watson (2007) methodology to study inflation behavior in the countries of the G7<sup>4</sup> in the last 30 years, and obtained similar results.

The semi-structural models, such as the neo-Keynesian Phillips' curve, also evaluate persistence. For example, Rudd and Whelan (2007) use a neo-Keynesian Phillips' hybrid curve (with inflation lags) and conclude that the North-American inflation is much more forward-looking than backward-looking, suggesting that inflationary persistence has been decreasing.

Now returning to this box's main target, that is, compare the inflation persistence in emerging and mature economies, the following approaches were selected: the auto-regressive model with  $p$  lags to

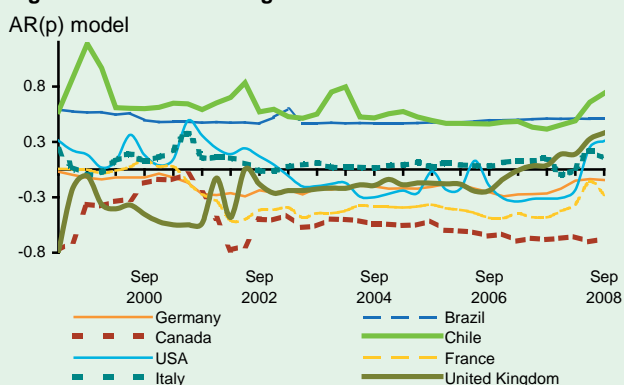
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3/ It can be mentioned as examples, the introduction of the inflation targeting system, the reduction of budgetary deficits, the adoption of floating foreign exchange regimes and trade opening, among others.

4/ United States, England, French, Japan, Italy, Germany and Canada.

the inflation, AR(p); a AR(P) including the lags of the output gap<sup>5</sup>; and neo-Keynesian Phillips' hybrid curve<sup>6</sup>. In all cases, the dependent variable is represented by headline consumer inflation in each economy. In the auto-regressive models, lags were chosen aiming to eliminate serial autocorrelation. In the case of the new hybrid Keynesian curve, autoregressive terms and a lag of the output gap were added. The sample considering the estimations to countries out of Europe comprise quarterly information for the period which goes from the second quarter of 1995 to the second quarter of 2008 (1995T2-2008T2), while to European countries, the period is shorter, from 1999T1 to 2008T2<sup>7</sup>. The persistence measure is given by the sum of the inflation's lagged coefficients in all the estimation process. In order to analyze the persistence's timely evolution, we have resorted to the technique of recursive minimum squares.

**Figure 1 – Sum of autoregressive coefficients**



**Figure 2 – Sum of autoregressive coefficients**

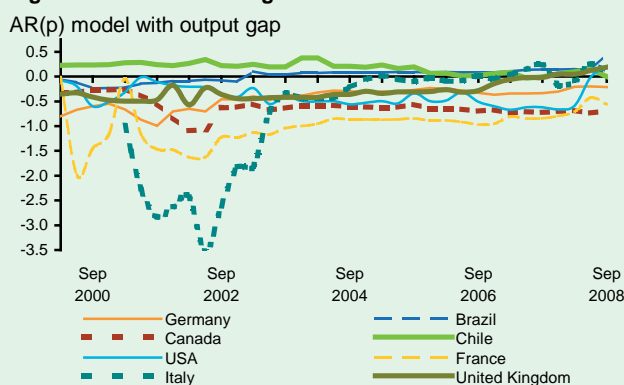


Figure 1 shows the results obtained by AR(p) models. One should note that, in Brazil and Chile, the inflationary persistence is greater than in the other countries. We observe greater stability of the Brazilian inflation persistence after adopting the inflation targeting system in 1999, except in the period of confidence crisis (the end of 2002 and the beginning of 2003). We can see that mature economies, except Italy, showed persistent negative measures, indicating that the inflation reverts to the mean in a few quarters. Finally, in a recent past these countries' inflation showed a greater degree of persistence.

According to Figure 2, which reproduces the results created by AR(p) models with lags of the output gap, the inflation's reversal to the mean is a pattern behavior. Brazil and Chile continue with the highest level of inflationary persistence, when compared to other economies.

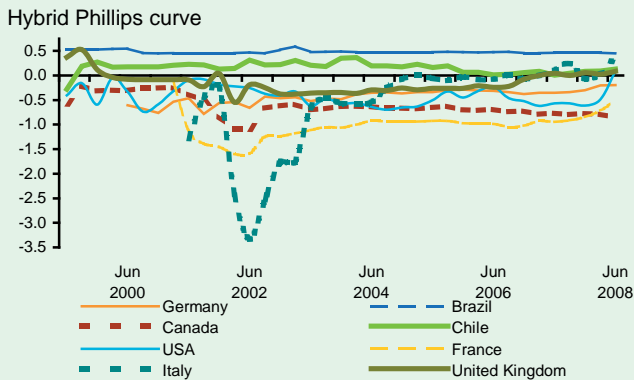
The results obtained with the estimation of a hybrid Phillips' curve (Figure 3) show that Brazil presents

5/ The output's gap is calculated by the difference between the seasonally adjusted Gross Domestic Product (GDP) and the GDP potential, calculated with Hodrick-Prescott's filter.

6/ The Phillips' curves are without the foreign exchange rate and include inflation's lagged terms.

7/ The inflation of consumer data and the GDP of Germany, Brazil, Canada, Chile, United States, French, Italy and United Kingdom were obtained in the International Financial Statistics of the International Monetary Fund (IFS-IMF)

**Figure 3 – Sum of autoregressive coefficients**



the consumer inflation most persistent among other analyzed countries, basically during the entire sample, followed by Chile, however in some other countries, such as the United States and the United Kingdom, inflation has showed greater persistence recently.

In general terms, we can conclude that, despite that in emerging countries the analyzed sample – Brazil and Chile – had reduced its inflationary persistence level in the last years, they still show levels of inflation persistence higher than those observed in mature economies.

Notwithstanding the recent efforts by Brazilian and Chilean monetary authorities in anchoring the inflationary expectations, it seems that decades of high inflation rates in these economies cause the preservation of formal and informal mechanisms of indexation, which is manifested in higher degree of inflationary persistence, in comparison to the ones observed in mature economies.

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