A Cross Country Empirical Analysis of Inflation Persistence

Fernando N. de Oliveira[1]

(Central Bank of Brazil and IBMEC/RJ)

Abstract

We analyze inflation persistence in several industrial and emerging countries in the recent past by implementing unit root tests in the presence of unknown structural breaks and by estimating reduced-form models of inflation dynamics. We select a very representative group of 23 industrial and 17 emerging economies. Our sample period is comprised of quarterly data and differs for each country. Our results indicate that inflation persistence is decreasing over time for the great majority of industrial economies. Many emerging economies, however, show increasing persistence. Even some, such as Argentina, Peru, Bolivia, Hungary and Check Republic, have highly persistent inflationary processes. We also observe structural breaks in all inflation processes we study with the exception of the inflation processes of Germany and Austria. Our results are robust to different reduced forms of the inflation processes and different econometric techniques.

Keywords Inflation Persistence, Hyperinflation, New Keynesian Phillips Curve

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[1] Research Department Rio de Janeiro and Assistant Professor
IBMEC/RJ.e.mail:fernando.nascimento@bcb.gov.br

1 Introduction

One of the most important characteristics of the dynamics of inflation is its degree of persistence. It is related to how quickly inflation reverts to its initial level after a shock. As Mishkin (2007) points out, if inflation is persistent, it increases the costs of monetary policy (in terms of product or unemployment) to keep inflation under control.[2]

In the last years, both industrial and emerging economies have experienced important changes in the degree of their inflationary persistence. As Cechetti et al (2007) show both the volatility and level of inflation has decreased in industrial economies. In these economies, the decades of 1960 and 1970 were considered periods of high and persistent inflation, while the more recent decades, 1990 and 2000, have low levels of inflation as well as low persistence.

Contrary to industrial countries, emerging economies have experienced high levels of inflations for a longer period. Some of these countries, such as Brazil, Argentina, Bolivia, Peru, Mexico, Israel, Poland and Turkey, have had periods of hyperinflation in the last thirty years.[3] Only recently, in the decade of 1990, the levels of inflation have started to decrease in these countries. This, in part, is due to the important changes in the conduct of their macroeconomic policies.[4] However, it is not clear if the decrease of the level of inflation has been accompanied by a reduction of their inflationary persistence.

Our objective in this paper is to analyze empirically the inflation persistence of several industrial and emerging countries in the recent past. We select a very representative group of 23 industrial and 17 emerging economies. We want to answer the following questions: Has inflation persistence decreased and been stable for industrial economies? Has it decreased and been stable for emerging economies that had and had not experienced hyperinflation in the recent past? [5][6][7][8]

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[2] In a more formal way, we can define inflation persistence as the propensity of inflation to converge slowly towards its long run equilibrium following a shock that has taken inflation away from this equilibrium.

[3] To define a hyperinflation country, in the first place, we chose a sample of countries that had prolonged periods of inflation over 15% a year. Then we looked at the recent monetary history of the country, searched IMF country reports and anecdote facts about the country, so as to pinpoint a subsample of them that we believe experienced hyperinflation episodes.

[4] As examples of some macroeconomic policies we can list: inflation targeting adoption, reduction of budget deficits, improvement of financial regulation, trade liberalization and flexible exchange rate policies among others. It is also important to add that for Latin American countries the renegotiation of the external debt was a pre-condition and basis for inflation stabilization, particularly in Brazil.

[5] Our sample of emerging economies is Argentina, Brazil, Bolivia, Chile, Colombia, Czech Republic, Hungary, Israel, Korea, Mexico, Peru, Philippines, Poland, South Africa, Slovak Republic, Thailand, and Turkey. Our sample of industrial countries is: Austria, Australia, Belgium, Canada, Denmark, Finland, France, Germany, Greece, Iceland, Ireland, Italy, Japan, Luxembourg, Netherlands, Norway, New Zealand, Portugal, Spain, Sweden, Switzerland, United Kingdom and United States.

[6] See Stock and Watson (2003) for a brief analysis of monetary policy in some industrial countries in the last years.

[7] Low persistence of inflation occurs when the parameter is significantly lower than 1. Stability means that the persistence parameter is stable in a statistical sense across different subsamples of our data.

[8] Various factors can explain persistence: persistence may be inherited from persistent fluctuations in the determinants of inflation, like marginal cost or output gap (this is called extrinsic persistence); the dependence of inflation on its own past, also called intrinsic persistence and persistence due to the formation of inflation expectations. Each one of this persistence can be associated with one of the three terms of a new Keynesian Phillips curve.

Our results show that inflation persistence is decreasing over time for the great majority of industrial economies in our sample. Many emerging economies in our sample, however, show increasing persistence over time and even some, such as Argentina, Peru, Bolivia, Hungary and Check Republic, have very persistent inflationary processes. We also find that, with the exception of inflation in Germany and Austria, all others inflation processes present structural breaks, which indicates that they have not been stable through time.

To obtain our results, we first follow Perron et al (2009) and test for the presence of unit roots in the inflation processes of all countries in our sample, taking in consideration possible unknown structural breaks in these series.

For the countries in our sample period for which we reject the unit root, we estimate several reduced models of inflation.[9] The following types of models are estimated: models with lags of inflation with and without GDP gap; new Keynesian Phillips curves; and a model that is a reduced-form inflation dynamics of structural models that incorporates some form of wage rigidity in the spirit of Blanchard and Gali (2005).

We use quarterly data of inflation, GDP and unemployment for each of our countries. The sample period for each country differs, depending of the availability of these data. For most countries, we have very long span of inflation data. For some we have almost 50 years of quarterly data.[10]

For many of the countries we consider, substantial shifts in monetary policy have occurred over the past two decades. In the case of European countries, the introduction of the Euro is a very important milestone. In the case of emerging economies, we can cite more sound macroeconomic policies including, for many of them, the choice of inflation targeting as a framework for monetary policies.

Our results, in general, confirm the results of a vast literature that shows that inflation persistence has been decreasing for industrial economies, such as: Dossche and Everaert (2005), Taylor (1999), Altissimo et al (2006), Benati (2008) and Batini (2002).

Our paper contributes to the literature by looking at a greater and more diversified group of countries, including several emerging ones, by considering a more recent period and by estimating various inflation dynamics specifications, taking in consideration possible unknown structural breaks in these dynamics.[11]

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[9] We also look at the inflations correlograms and decompose all inflation series in trend and cycle. Both analysis, in general terms, confirm the results we present in this paper.

[10] The following countries have inflation series starting at the second quarter of 1960: Australia, Canada, Finland, Greece, Luxembourg, France, Japan, New Zealand, Switzerland, United Kingdom and United States.

[11] Other papers look at how inflation persistence has evolved over time also estimating reduced form inflation processes. For example, Mishkin (2007) studies inflation persistence in the United States in the last 40 years, using auto regressive models and decomposing inflation in cycle and trend as in Stock and Watson (2006). Mishkin confirms the results of Stock and Watson (2006), showing that inflation persistence is decreasing worldwide since the 1990s, compared with persistence observed in the 1960 and 1970s. Nason (2006) describes the dynamics of inflation in the United States with several different models of inflation and confirms the results of Mishkin (2007) and Stock and Watson (2006) that inflation persistence is decreasing in the United States in the last years. Rudd and Whelan (2005) estimate a new Keynesian hybrid Phillips curve with lags in inflation and show that inflation persistence in the United States is decreasing and is much more backward-looking than forward-looking. Fuhrer (2005) also

The rest of the paper is the following. Section 2 describes the data. Section 3 presents the empirical analysis. Section 4 concludes.

2. Data

Our data are quarterly and differs depending on the country. We select 40 countries: 23 industrial and 17 emerging. Our data source is the International Financial Statistics of the International Monetary Fund. Our measure of inflation is headline Consumer Price Index inflation, CPI. We use as exogenous the following variables: the GDP gap, which is the difference between nominal GDP and potential GDP obtained through Hodrick-Prescott filtering and the unemployment rate.

For the purpose of our analysis, we separate our sample of countries in three groups: one group is comprised of industrial countries (Austria, Australia, Belgium, Canada, Denmark, Finland, France, Germany, Greece, Iceland, Ireland, Italy, Japan, Luxembourg, Netherlands, Norway, New Zealand, Portugal, Spain, Sweden, Switzerland, United Kingdom and United States), emerging countries that did not experienced "hyperinflation" in the recent past (Chile, Colombia, Czech Republic, Hungary, Korea, Philippines, South Africa, Slovak Republic and Thailand), and emerging economies that have had hyperinflation recently in our view, such as Argentina, Brazil, Bolivia, Peru, Mexico, Turkey, Israel and Poland.

Table 1 Panel A shows the sample periods for the inflation series of all countries we analyze. For several of them, the sample period starts at the second quarter of 1960. The countries in which the samples periods are lower are lower are Czech Republic and Slovak Republic, in which the data starts at the second quarter of 1993.
Table 1 Panel B shows the sample periods for the GDP of all countries in our sample. For most countries, the series of GDP are much smaller than the series of inflation. In the case of unemployment, as Table 1 Panel C shows the sample are even much shorter than both the samples of inflation and GDP for almost all countries except for the United States, where the series starts in the first quarter of 1960.

In Table 2, we present descriptive statistics of the inflation processes. Table 2 Panel A 1 shows that average quarterly inflation in industrial economies is 1.24% and that the average standard deviation is 1.30%. The country with the highest average inflation is Portugal, 2.42%, and with the highest standard deviation is Iceland with 2.89%.

Table 2 Panel B shows descriptive statistics of inflation for the group of emerging economies that did not have hyperinflation episode in the last thirty years. One can see that average inflation is 2.08% and average standard deviation is 2.07%. The economy with the highest average inflation is Colombia, 3.67%, and with the highest standard deviation is Hungary, 2.85%.

Table 2 Panel C shows descriptive statistics of inflation for the group of emerging economies that experienced a hyperinflation episode in the last thirty years. We can see that average inflation is 10.45% and average standard deviation is 20.72%. The

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models inflation using a hybrid Keynesian Phillips curve. He separates persistence in two types: one related to the dynamics of the output gap and the other to marginal cost and that depends on lags of inflation. Fuhrer shows that the more relevant part of inflation in the last years is due to intrinsic inflation and not to output gap.

economy with the highest average inflation and standard deviation is Brazil, 23.78%, and 35.88% respectively.

It is clear from Table 2 Panel B that inflation is higher in emerging economies that have had hyperinflation in the recent past. The average inflation in these economies is 9.03% higher than average inflation in the industrial economies and 8.37% higher than average inflation in emerging economies that did not have hyperinflation. Not only the average inflation, but also volatility is much higher in the emerging with hyperinflation when compared with the other economies in our sample.

In the next section, we will present our empirical analysis of inflation persistence based on unit root tests in the presence of unknown structural breaks and the estimation of reduced form inflation dynamics for the groups of countries in our sample.

3. Empirical Analysis

3.1 Unit Root Tests

The overall degree of inflation persistence can be measured in several ways. The results reported in this section are based on the methods that are most frequently used in the literature. In order to show how fast inflation returns back to its mean following a disturbance, or its persistence, we measure the dependence of inflation on its past values.

As it is well known, a process that has a unit root is a highly persistent one. To verify if any of our inflation processes has a unit root and structural breaks, we follow two steps. In the first step, we test for the presence of a unit root with Aumengted Dick Fueller, ADF tests, and for the presence of structural breaks with Quandt-Andrews and Andrews-Ploberg (1994).[12] Only in the case of the inflation processes of Germany and Austria, we reject the null of a unit root as well as the presence of structural breaks.[13]

In the second step, following Perron (2009) we test for the presence of a unit root in the presence of unknown structural breaks for all inflation processes with the exception of Germany and Austria. Perron allows for the possibility of an unknown structural break both for the Hypotheses of a unit root process, the null Hypotheses, as well as for the Hypotheses of stationary process, the alternative Hypotheses.

In all our tests, we consider the possibility of an unknown structural break both at the intercept and at the trend. To allow for the possibility of various structural breaks, we use rolling samples.

Table 3 presents the results. In the case of some emerging economies- Argentina, Peru, Bolivia, Hungary and Check Republic - we accept the null hypothesis of a unit root in the presence of unknown structural breaks. For all other inflation processes, we reject the null.

3.2 Auto Regressive Processes

For all other inflation dynamics in which we reject the unit root in the presence of unknown structural breaks, we estimate reduced form specifications. We will explore

[12] We use the trimmings 10%, 15%, 25% and 35% for the Quandt-Andrews and Andrews-Ploberg tests.
[13] In the case of Austria, the p-value of the ADF test is 0.083 and in the case of Germany the p-value of the ADF is 0.00.

several possibilities. They range from autoregressive dynamics to different specifications of new Keynesian Phillips curves.

One these possibilities, which is one of the most obvious way of measuring inflation persistence is to regress inflation on several of its lags as in equation (1) and then calculate the sum of coefficients on lagged inflation. If the sum of coefficients is close to 1, then shocks to inflation have long lived effects on inflation. The higher the sum of the coefficients of inflation lags, the longer it takes for inflation to return back to its mean, or the more persistent is the inflationary process.

$$(1)\ \pi_t = \beta_0 + \beta_1 \pi_{t-1} + \sum \phi_k \pi_{t-k} + \varepsilon_t, E[\varepsilon_t] = 0, \text{var}(\varepsilon_t) = \sigma_\varepsilon^2,$$

where π_t is headline consumer inflation.

To the extent that lagged inflation captures true persistence in the price setting process the model implies that rapid reductions of inflation can only be produced at the cost of substantial increase in unemployment or decrease in product. Hence, the model points to a gradualist approach as providing the best way to effect a large reduction in inflation.

An equivalent approach for analyzing persistence (and the one we will follow in this paper) is to estimate ρ in equation (2) as Reilly and Whelan (2005) show.

$$(2)\quad \pi t = \beta 0 + \sum_{j=1}^{D} d\,j + \rho \pi t - 1 + \sum_{j=1}^{D} \rho d_j \pi t - 1 + \sum \phi k \Delta \pi t - k + \varepsilon t,$$

$$E[\varepsilon t] = 0, \text{var}(\varepsilon t) = \sigma \varepsilon^2$$

There are a number of good reasons for focusing on ρ as our main measure of inflation persistence. For example, in this model, ρ is a crucial determinant of the response to shocks over time. It can also be shown that 1/(1-ρ) gives the infinite-horizon cumulative impulse response to shocks.

In equation (2), we also use as regressors level dummies and dummies interacting with the first lag of the inflation process.[14] The dummies for most countries indicate structural breaks that we observe with the Perron (2009) unit root tests. However for a few countries the dummies of structural breaks are found using Quandt-Andrews with rolling samples.[15]

[14] Dummies are represented by d and D is to total of dummies indicating a structural break that varies depending on each country.

[15] The countries for which we include other dummies indicating other structural breaks different from those that we obtain with Perron (2009) are: Chile, Israel, Mexico and Netherlands. We analyse the inflation process of these countries graphically and also look at possible economic reasons for a break and consider that for these countries the break Perron found are not structural in nature. So we use quandt-Quandt to find other breaks that we think make more sense in economic terms.

We choose the number of lags of first difference of headline consumer inflation in (2) so as the residuals do not present serial correlation, using LM test to identify serial correlation. We also check for heteroskedasticity with White and Breush-Pagan. If there is evidence of heteroskedasticity, we correct it with the Newey-West robust errors. We do a Wald test of $\rho=1$ for all estimations of the traditional models and we rejected $\rho=1$ for all estimations.

Table 4 Panel A shows the estimated ρ for this specification for industrial economies including the dummies of structural breaks. The majority of industrial countries (78%) show decreasing persistence over time, as one can see.[16] For all industrial countries, we reject the null hyphoteses of sum of the persistence coefficients equal to one.

Tabel 4 Panel B shows the estimation of equation (2) for emerging economies. As one can see, some countries like Chile, Israel, Mexico, Poland, Turkey and Slovak Republic show increasing persistence. Of these, Turkey and Poland are hyperinflation countries. The other hyperinflation countries show decreasing persistence. This is the case of Brazil for instance.[17]Once more, we reject the null hypotheses of sum of the persistence coefficients equal to one.

We repeat the estimation above including in equation (2) the output gap calculated using Hodrick-Prescot filter. Again, we test for serial correlation, heteroskedasticity, and in their presence we correct using Newey-West.

The results for the industrial economies are very similar to the ones described above (see Table 5 Panel A). However for emerging economies, the results differ somewhat from the previous ones. No emerging economy presents increasing persistence. We think that this result has to do with fact that our series of GDP for each country is shorter than the series of inflation for most countries in our sample, particularly for emerging ones. Therefore, we believe that the results that we present in Table 4 are more representative of the inflation dynamics of these emerging economies.

To capture if monetary policy has anchored inflation expectations more solidly in the last years, that could have important implication to inflation persistence we will estimate in the following section new Keynesian models of inflation that incorporate inflation expectations.

3.3 New Keynesian Phillips Curves Estimation

The most important implication of the pure new Keynesian model of inflation is that there is no intrinsic persistence in inflation in the sense that there is no structural dependence of inflation on its own lagged values. Instead, inflation is determined in a completely forward-looking manner. One implication of this model in contrast to traditional ones is that it is much easier to quickly reduce inflation in this model than in

[16] This can be observed by the looking at the sum of the persistent coefficients alone and interacting with dummies of structural breaks.

[17] We compare the average of persistence coefficient of the three groups by doing Wald tests in a system of equations estimated with OLS in which each equation is the same one we estimated individually.

the traditional one. In fact, according to the new Keynesian model, inflation can be costless controlled by a credible commitment to keep output close to its potential. [18]

Due to the difficulty of fitting the data with new Keynesian pure forward-looking model, a vast literature that incorporates lags of inflation in the new Keynesian Phillips curve (NKPC) has emerged[19]. For many, this class of models represents a sort of common-sense middle ground that preserves the insights of standard rational expectations models while allowing for better empirical fit by dealing directly with a well known deficiency of the pure forward looking model of inflation. As a result this class of models has been widely used in applied monetary policy analysis.

The structural equation for inflation that we estimate is in the spirit of hybrid new Keynesian Phillips curve as in (3). These models add a dependence of inflation on its lagged values to otherwise purely forward looking models. Such models are often considered as a compromise between the need for rigorous micro foundations of the sort underlying the pure new-Keynesian Phillips curve and the need to fit the data empirically.

$$\pi_t = \sum_{j=1}^{D} d_j + \rho\pi_{t-1} + \sum_{j=1}^{D} \rho d_j \pi_{t-1} \rho\pi_{t-1} +$$

$$(3)\ (1-\rho) E_t[\pi_{t+1}] + \beta_2 h_{t-1} + \gamma X_{t-1} + \varepsilon_t,$$

$$E[\varepsilon_t] = 0,\ \mathrm{var}(\varepsilon_t) = \sigma^2_{\varepsilon}$$

where h_t is output gap and X_t is foreign exchange rate.

The parameter that measures inflation persistence is ρ. Again, we interact this parameter with dummies indicating structural breaks (d are the dummies and D is the total number of dummies).

We use two different instruments for the expectation of inflation one period ahead. One instrument is the lag of current inflation. The other instrument is the residual of the inflation equation of a VAR with inflation and GDP gap as dependent variables. In this case, the number of lags is chosen using Akaike information criteria.

We also check for serial correlation with LM test and for heteroskedasticity with White test. In the presence of serial correlation, we include more lags of regressors, until there is no more evidence of serial correlation. In the presence of heteroskedasticity, we corrected with Newey-West robust matrix.

[18] The most popular formulation of the new Keynesian framework is based on Calvo (1983) model of price random adjustment. The model assumes that in each period a random fraction of firms reset their price while all other firms keep their prices unchanged. Calvo assumes an imperfectly competitive market structure as well. These two hypotheses generate the basic new Keynesian model of inflation.

[19] See Fuhrer and Moore (1995), Gali and Gertler (1999) and Christiano et al (2005) for some theoretical models that justify the inclusion of lags of inflation in the new Keynesian Phillips curves.

Table 6 Panels A and B shows the estimated persistence with the lag of current inflation as an instrument for industrial and emerging economies respectively. Table 6 Panels C and D shows the estimated persistence with the residuals of the inflation equation of the VAR as instruments.

The results for estimations with both instruments are somewhat different from the ones we find before. Very few industrial economies have the sum of the persistent significant. For those that are significant, we observe a decrease in persistence. In the case of emerging economies, the results are mixed. Some of these countries show significant and increasing persistence while others have decreasing persistence. Again, these results may be related to the very different sample periods of GDP data for all countries, particularly for emerging ones.

After gauging all the empirical evidence that we present above- considering several unit root tests with unknown structural breaks and the estimation of reduced form inflation dynamics- we ponder that in general terms, our results show that most industrial economies experience decreasing persistence over time, while in the case of emerging economies some show deceasing, others show increasing and even some present highly persistent inflationary processes.

In terms of macroeconomic policies, we think that these results are important for emerging economies. Despite some recent improvements in macroeconomic policies in some of these countries, inflation persistence is still an important issue for them. This means that macroeconomic policies should continue to focus in targeting both low levels and low volatilities of inflation in these countries to diminish the importance of inflation persistence in the next years.

4. Conclusion

We analyze inflation persistence in several industrial and emerging countries in the recent past by implementing unit root tests in the presence of structural breaks and by estimating reduced-form models of inflation dynamics. We select a very representative group of 23 industrial and 17 emerging economies.

Our results show that inflation persistence is mostly decreasing over time for the industrial economies. Many emerging economies, however, show increasing persistence over time and even some, such as Argentina, Peru, Bolivia, Hungary and Check Republic, have very persistent inflationary processes. We also find that all inflationary processes present structural breaks in their sample periods, which indicates that they have not been stable.

In interpreting our results, we must first recognize that all of them are based on reduced-from relationships. Thus, they are about correlations and not necessarily about true structural relationships. Explanatory variables in our inflation estimations are themselves influenced by changes in economic conditions. So, changes in the underlying monetary policy regime are likely to be a source changes in reduced-form inflation dynamics. This problem is especially acute for structural relationship involving expectations or other factors that are not directly observable and so cannot be included in reduced form regressions. In such cases, we cannot use the reduced form equations to

disentangle the effects of such unobserved factors which themselves may be driven by changes in monetary policy from that of other influences.

Mishkin (2007) makes it clear that inflation expectations must be a key driving force behind inflation. This dependence has long been implicit in traditional Phillips curve analysis but now expectations are explicit and are also a central feature of new Keynesian Phillips curves in which current period inflation is a function of expectations next period and output gap.

Anchoring of inflation expectations must be related to monetary policy. During the past years several central banks have increased their commitment to price stability in both words and action. The Federal Reserve, the European Central Bank and other central banks of industrial and some of emerging economies have been committed to keep inflation under control.

For many emerging economies, however, our empirical evidence indicates that anchoring of inflation expectations is problematic still because of high inflation persistence that we observe in these economies. The increase of monetary policy effectiveness in these countries thus is related to the capacity their central banks will have to decrease inflation persistence in the next years.

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Table 1 Sample Periods

Our data are quarterly and differs depending on the country. We select 40 countries: 23 industrial and 17 emerging. Our data source is the International Financial Statistics of

the International Monetary Fund. Our measure of inflation is headline Consumer Price Index inflation, CPI. We use as exogenous the following variables: the GDP gap, which is the difference between nominal GDP and potential GDP obtained through Hodrick-Prescott filtering and the unemployment rate. Panel A presents the sample periods for inflation. Panel B presents the sample periods for GDP and Panel C shows the sample periods for unemployment.

Panel A: Inflation Sample Periods

Emerging Economies		Industrial Economies	
Argentina	1987Q2-2011Q2	**Austria**	1962Q3-2011Q2
Bolivia	1983Q3-2011Q1	**Australia**	1960Q2-2011Q1
Brazil	1980Q1-2011Q1	**Belgium**	1968Q4-2011Q2
Chile	1976Q3-2011Q1	**Canada**	1960Q2-2011Q1
Colombia	1960Q2-2011Q2	**Denmark**	1967Q2-2011Q2
Czech Republic	1993Q2-2011Q2	**Finland**	1960Q2-2011Q2
Hungary	1976Q2-2011Q2	**France**	1960Q2-2011Q2
Israel	1977Q2-2011Q2	**Germany**	1991Q2-2011Q2
Mexico	1960Q2-2011Q2	**Greece**	1960Q2-2011Q2
Peru	1988Q3-2011Q2	**Iceland**	1983Q2-2011Q2
Phillipines	1960Q2-2011Q2	**Ireland**	1998Q4-2011Q2
Poland	1988Q2-2011Q2	**Italy**	1970Q1-2011Q2
South Africa	1960Q2-2011Q2	**Japan**	1960Q2-2011Q1
South Korea	1970Q2-2011Q1	**Luxembourg**	1960Q2-2011Q2
Slovak Republic	1993Q2-2011Q2	**Netherlands**	1972Q3-2011Q2
Thailand	1965Q2-2011Q2	**Norway**	1960Q2-2011Q1
Turkey	1983Q3-2011Q2	**New Zealand**	1960Q2-2011Q1
		Portugal	1970Q1-2011Q2
		Spain	1975Q1-2011Q2
		Sweden	1960Q2-2011Q2
		Switzerland	1960Q2-2011Q2
		United Kingdom	1960Q2-2011Q2
		United States	1960Q2-2011Q2

Panel B: Sample Period for GDP

Emerging Economies		Industrial Economies	
Argentina	1993Q1-2010Q4	**Austria**	1964Q1-2010Q4
Bolivia	1995Q1-2009Q3	**Australia**	1960Q1-2010Q4
Brazil	1993Q3-2010Q4	**Belgium**	1980Q1-2010Q4
Chile	1996Q1-2010Q4	**Canada**	1960Q1-2010Q4
Colombia	1990Q1-2010Q4	**Denmark**	1977Q1-2010Q4
Czech Republic	1990Q1-2010Q4	**Finland**	1970Q1-2010Q4
Hungary	1995Q1-2010Q4	**France**	1965Q1-2010Q4
Israel	1971Q1-2010Q4	**Germany**	1960Q1-2010Q4
Mexico	1981Q1-2010Q4	**Greece**	2000Q1-2010Q4
Peru	1979Q1-2010Q4	**Iceland**	1997Q1-2010Q4

Phillipines	1980Q4-2010Q4	**Ireland**	1997Q1-2010Q4
Poland	1995Q1-2010Q4	**Italy**	1960Q1-2010Q4
South Africa	1960Q1-2010Q4	**Japan**	1960Q1-2010Q4
South Korea	1960Q1-2010Q4	**Luxembourg**	1995Q1-2010Q4
Slovak Republic	1993Q1-2010Q4	**Netherlands**	1977Q1-2010Q4
Thailand	1993Q1-2010Q4	**Norway**	1961Q1-2010Q4
		New Zealand	1987Q2-2010Q4
		Portugal	1977Q1-2010Q4
		Spain	1970Q1-2010Q4
		Sweden	1980Q1-2010Q4
		Switzerland	1970Q1-2010Q4
		United Kingdom	1960Q1-2010Q4
		United States	1960Q1-2011Q1

Panel C: Sample Period for Unemployment

	Sample Period		
Emerging Economies		**Industrial Economies**	
Brazil	2001Q4-2011Q1	**Austria**	1998Q1-2011Q1
Chile	2007Q1-2011Q1	**Australia**	1982Q2-2011Q1
Colombia	2001Q1-2011Q1	**Belgium**	1993Q1-2011Q1
Czech Republic	1995Q1-2011Q1	**Canada**	1993Q1-2011Q1
Hungary	1998Q1-2011Q1	**Denmark**	1993Q1-2011Q1
Peru	2007Q1-2011Q1	**Finland**	1993Q1-2011Q1
Poland	1993Q1-2011Q1	**Germany**	1993Q1-2011Q2
South Korea	1993Q1-2011Q1	**Iceland**	1991Q1-2011Q1
Slovak Republic	1997Q1-2010Q4	**Italy**	2007Q1-2011Q1
Thailand	2001Q1-2011Q1	**Japan**	1993Q1-2011Q1
Turkey	2005Q1-2011Q1	**Luxembourg**	1993Q1-2011Q1
		Netherlands	1992Q1-2011Q1
		Norway	1997Q1-2011Q1
		Sweden	1991Q1-2011Q1
		Switzerland	1993Q1-2011Q1
		United Kingdom	1992Q2-2011Q1
		United States	1960Q1-2011Q1

Table 2 Descriptive Statistics of Inflation

Our data are quarterly and differs depending on the country. We select 40 countries: 23 industrial and 17 emerging. Our data source is the International Financial Statistics of the International Monetary Fund. Our measure of inflation is headline Consumer Price Index inflation, CPI. Panel A presents the descriptive statistics of inflation for industrial economies. Panel B presents the descriptive statistics for emerging economies that did

not have hyperinflation. Panel C presents the descriptive statistics of inflation of countries that experienced hyperinflation.

Panel A Industrial Economies

	Average	Max	Stand. Dev.	No. Obs
Austria	0.84%	8.50%	1.14%	196
Australia	1.26%	5.82%	1.09%	204
Belgium	0.97%	4.29%	0.88%	171
Canada	1.00%	3.67%	0.91%	204
Denmark	1.23%	5.72%	1.18%	177
Finland	1.26%	5.86%	1.27%	205
France	1.12%	4.14%	0.99%	205
Germany	0.49%	2.72%	0.50%	81
Greece	2.12%	13.24%	2.66%	205
Iceland	2.31%	20.25%	2.89%	113
Ireland	0.65%	2.10%	0.93%	51
Italy	1.73%	6.94%	1.51%	166
Japan	0.83%	8.09%	1.27%	204
Luxembourg	0.88%	3.47%	0.80%	205
Netherlands	0.81%	3.11%	0.95%	156
Norway	1.18%	6.81%	1.17%	205
New Zealand	1.48%	8.54%	1.38%	204
Portugal	2.42%	11.85%	2.51%	166
Spain	1.72%	7.84%	1.56%	146
Sweden	1.18%	6.33%	1.21%	205
Switzerland	0.70%	5.62%	0.83%	205
UK	1.43%	9.96%	1.44%	205
USA	0.99%	4.22%	0.91%	205
AVERAGE	**1.24%**		**1.30%**	

Panel B Emerging Economies without Hyperinflation

	Average	Max	Stand. Dev.	No. Obs
Chile	2.57%	10.37%	0.0237	120
Colombia	3.67%	14.39%	0.0282	205
Czech Republic	1.10%	4.72%	0.0118	73
Hungary	2.62%	15.82%	0.0285	141
Phillipines	2.21%	14.85%	0.0261	205
South Africa	2.01%	6.35%	0.0140	205
South Korea	1.82%	13.03%	0.0217	164
Slovak	1.53%	6.66%	0.0162	73

Republic				
Thailand	1.20%	10.64%	0.0163	185
AVERAGE	**2.08%**		**2.07%**	

Panel C Emerging Economies with Hyperinflation

	Average	Max	Stand. Dev.	No. Obs
Argentina	11.45%	173.35%	0.2947	105
Bolivia	10.27%	178.75%	0.2863	116
Brazil	23.78%	225.67%	0.3588	126
Israel	5.69%	69.31%	0.1077	205
Mexico	4.42%	29.41%	0.0566	205
Peru	12.69%	222.29%	0.3238	92
Poland	6.39%	80.76%	0.1388	93
Turkey	8.88%	69.31%	0.0909	135
AVERAGE	**10.45%**		**20.72%**	

Table 3 Unit Root Tests with Structural Breaks

Our data are quarterly and differs depending on the country. We select 40 countries: 23 industrial and 17 emerging. Our data source is the International Financial Statistics of the International Monetary Fund. Our measure of inflation is headline Consumer Price Index inflation, CPI. The unit root test with unknown breaks both at the null at the alternative hyphoteses is based on Perron (2009).

	Unit Root Test Statistic	λ	Estimate Sample Break	Estimate Sample Break
Argentina	-1.3579	0.1	1990Q1	1990Q4
Australia	-4.1977**	0.3	1972Q4	1990Q3
Belgium	-3.7064*	0.2	1975Q4	1984Q4
Bolivia	-1.0092	0.1	1985Q3	1986Q2
Brazil	-5.6011***	0.2	1994Q2	1998Q3
Canada	-4.9123***	0.4	1982Q2	1991Q1
Chile	-14.1664***	0.9	2005Q1	2005Q3
Colombia	-3.7844*	0.6	1992Q2	1998Q1
Czech Republic	-2.5427	0.2	1998Q1	2006Q3
Denmark	-14.2674***	0.4	1982Q2	1989Q2
Finland	-4.0855*	0.3	1977Q3	1992Q4
France	-5.7291***	0.5	1983Q3	1985Q2
Greece	-5.2086***	0.2	1972Q3	1978Q2
Hungary	-3.2278	0.3	1989Q4	1990Q2
Iceland	-6.2535***	0.3	1991Q4	2007Q3
Ireland	-6.1440***	0.8	2008Q3	2010Q3
Israel	-5.4682***	0.2	1985Q3	1998Q3
Italy	-4.0838*	0.4	1983Q1	1986Q2
Japan	-4.8615***	0.3	1977Q2	1980Q2
Luxembourg	-4.7265**	0.5	1983Q4	1987Q1
Mexico	-4.81**	0.5	1988Q1	1994Q3
Netherlands	-5.1548***	0.4	1989Q1	2010Q3
Norway	-4.3167**	0.4	1983Q1	1987Q4

New Zealand	-8.837***	0.5	1987Q2	1990Q2
Peru	-0.6586	0.1	1990Q3	1993Q2
Phillipines	-6.3021***	0.5	1985Q1	1990Q4
Poland	-0.1322	0.1	1990Q1	1996Q4
Portugal	-5.2810***	0.4	1985Q1	1992Q1
South Africa	-4.5585*	0.6	1991Q4	2006Q4
South Korea	-5.3819***	0.3	1981Q3	1986Q3
Slovak Republic	-3.8941*	0.3	1998Q1	1999Q2
Spain	-4.9406***	0.3	1986Q3	2008Q1
Sweden	-4.5572**	0.4	1981Q1	1990Q3
Switzerland	-4.2955**	0.3	1974Q4	1978Q3
Thailand	-4.896***	0.4	1981Q2	2008Q1
Turkey	-10.0721***	0.4	1993Q3	2002Q4
United Kingdom	-4.9217***	0.4	1980Q2	1981Q1
United States	-6.279***	0.4	1981Q3	2008Q2

*** Rejects unit root hypothesis with 1%
** Rejects unit root hypothesis with 5%
* Rejects unit root hypothesis with 10%

Table 4 Autoregressive Processes of Inflation without Output Gap

Our data are quarterly and differs depending on the country. We select 40 countries: 23 industrial and 17 emerging. Our data source is the International Financial Statistics of the International Monetary Fund. Our measure of inflation is headline Consumer Price Index inflation, CPI. Panel A presents the results of the estimation of equation (2) in the text for industrial economies. Panel B presents the results of the estimation of equation (2) in the text for emerging economies. Below the estimated persistent coefficients in columns 1 to 3 of both panels A and B, we have a t statistic. In the last 2 columns of both Panels A and B, we have p-values.

Panel A Industrial Countries

	ρ		ρ_1		ρ_2	**Wald test $\Sigma\rho = 0$**	**Wald test $\Sigma\rho = 1$**
Austria	0.6651	***				-	0.0208
	4.6300						
Australia	0.7146	***	-0.2096		-0.1029	0.0120	0.0002
	5.6093		-1.2801		-0.5608		
Belgica	0.8247	***	-0.7564	***	0.0877	0.2155	0.0000
	8.2414		-3.0952		0.4162		
Canada	0.8537	***	-0.3062	**	-0.1213	0.0086	0.0005
	13.6644		-2.2137		-0.6373		
Denmark	0.3383	**	0.1234			0.0009	0.0001
	1.9784		0.6673				
Finland	0.7440	***	-0.0237		-0.0716	0.0000	0.0249
	7.9196		-0.1393		-0.4678		
France	0.8828	***	-0.2008	**		0.0000	0.0001
	11.6432		-1.9542				
Germany	0.3101	*				-	0.0001
	1.9214						

Greece	0.4348	***	0.3111	***				0.0000	0.0056
	2.6666		2.9853						
Iceland	0.5856	***	-0.1981					0.0095	0.0001
	3.4938		-1.0824						
Ireland	0.0905		0.4018	**				0.0000	0.0000
	0.4993		2.4878						
Italy	0.6762	***	0.0778					0.0000	0.0000
	6.1904		0.6855						
Japan	0.6259	***	0.0288					0.0000	0.0064
	3.3478		0.1571						
Luxembourg	0.7404	***	-0.1860	**				0.0000	0.0000
	10.2034		-2.0264						
Netherlands	0.6537	***	-0.0038		-0.2662	*		0.0033	0.0000
	5.1597		-0.0215		-1.6354				
Norway	0.5614	***	-0.0102					0.0000	0.0001
	4.3645		-0.0918						
New Zealand	0.7746	***	-0.6319	***	0.3176	**		0.0010	0.0001
	11.2113		-4.7159		1.9812				
Portugal	0.5234	***	-0.2596	*	0.1686			0.0109	0.0009
	3.4340		-1.6813		1.1233				
Spain	0.7769	***	-0.2469					0.0008	0.0027
	4.8577		-1.5815						
Sweden	0.6139	***	-0.0104					0.0000	0.0004
	6.0519		-0.1044						
Switzerland	0.6054	***	-0.0476		0.1769			0.0000	0.0191
	5.0058		-0.2530		1.1190				
United Kingdom	0.8344	***	-0.1572					0.0000	0.0004
	6.9110		-1.4462						
United States	0.8915	***	-0.5987	***				0.0125	0.0000
	11.3765		-4.7270						

Panel B Emerging Economies

	ρ		**ρ_1**		**ρ_2**		**Wald test $\Sigma\rho = 0$**	**Wald test $\Sigma\rho = 1$**
Brazil	0.9341	***	-0.3997	**			0.0050	0.0139
	6.9822		-2.1925					
Chile	0.2553	*	0.1962		-0.1212		0.0103	0.0000
	1.7617		1.2358		-0.7874			
Colombia	0.6088	***	-0.0260				0.0000	0.0000
	4.4359		-0.2221					
Israel	0.0093		0.8217	***	-0.2759	**	0.0000	0.0000
	0.0886		7.5122		-2.2549			
Mexico	-0.3749	*	1.3488	***	-0.3454	***	0.0000	0.0000
	-1.7617		5.8620		-3.2484			
Phillipines	0.5716	***	-0.1572				0.0009	0.0000
	5.2584		-1.0167					
Poland	0.1118		0.5466	***			0.0000	0.0000
	1.4007		5.5514					

South Africa	0.8238	***	-0.0569			0.0000	0.0373
	13.8970		-0.4721				
South Korea	0.2635	*	-0.1381			0.2475	0.0000
	1.7911		-0.9387				
Slovak Republic	0.4791	**	0.0260			0.0142	0.0162
	2.3529		0.2561				
Thailand	0.6502	***	-0.3132	***		0.0260	0.0000
	4.5305		-2.6134				
Turkey	0.1759		0.2728			0.0465	0.0149
	0.9977		1.2168				

Table 5 Autoregressive Processes Estimation with Output Gap

Our data are quarterly and differs depending on the country. We select 40 countries: 23 industrial and 17 emerging. Our data source is the International Financial Statistics of the International Monetary Fund. Our measure of inflation is headline Consumer Price Index inflation, CPI. We use as exogenous the following variables: the GDP gap, which is the difference between nominal GDP and potential GDP obtained through Hodrick-Prescott filtering and the unemployment rate. Panel A presents the results of the estimation of equation (2) in the text for industrial economies with the inclusion of output gap. Panel B presents the results of the estimation of equation (3) in the text for emerging economies with the inclusion of output gap. Below the estimated persistent coefficients in columns 1 to 3 of both panels A and B, we have a t statistic. In the last 2 columns of both Panels A and B, we have p-values.

Panel A Industrial Economies

	ρ	**ρ1**	**ρ2**	**t4**	**Wald test Σρ = 0**	**Wald test Σρ = 1**
Austria	0.6273				-	-
	5.2325					
Australia	0.7152	-0.2097	-0.1027		0.013	0.000
	3.6671	-1.0385	-0.6589			
Belgium	-0.4184		0.4828		0.656	0.000
	-1.8560		2.2910			
Canada	0.8641	-0.2993	-0.1119		0.005	0.028
	11.12721	-1.4550	-1.4550			
Denmark	0.4555	-0.0006			0.001	0.000
	2.1673	-0.0033				
Finland	0.5292	0.3147	0.0101		0.000	0.461
	4.6721	2.1178	0.0501			
France	0.8677	-0.1512			0.000	0.000
	12.5946	-1.4931				
Germany	-0.1817				-	-
	-1.1145					
Greece	-0.2128				-	-
	-1.0395					
Iceland	0.5504				-	-
	3.1813					
Ireland	0.0578	0.4807			0.006	0.018
	0.2299	1.6817				
Italy	0.6979	0.1234			0.000	0.054
	9.3732	1.0724				

Japan	0.6425	0.0339		0.000	0.012
	6.1977	0.2510			
Luxembourg	-0.1121			-	-
	-0.5839				
Netherlands	0.4482	0.1924	-0.3448	0.070	0.000
	2.1914	0.8404	-1.8425		
Norway	0.5626	-0.0090		0.000	0.001
	4.6979	-0.0654			
New Zealand	0.3598			-	-
	3.4195				
Portugal	0.2616	-0.2850	0.2645	0.246	0.000
	1.5215	-1.4687	1.0766		
Spain	0.8001	-0.1872		0.000	0.010
	7.0035	-1.2740			
Sweden	0.4444	0.1713		0.000	0.019
	2.6728	1.1216			
Switzerland	0.2082	0.3167	0.1265	0.000	0.009
	1.0414	1.1405	0.5113		
United Kingdom	0.7962	-0.0430		0.000	0.017
	10.3402	-0.3745			
United States	0.8689	-0.6176		0.052	0.000
	10.4447	-4.6432			

Panel B Emerging Economies

	ρ	**ρ1**	**ρ2**	**Wald test Σρ = 0**	**Wald test Σρ = 1**
Argentina	0.4069			-	-
	4.6427				
Bolivia	0.5894			-	-
	3.9389				
Brazil	0.2615			-	-
	3.9715				
Chile	-0.2814		0.3313	0.777	0.000
	-1.1696		1.3477		
Colombia	0.8663			-	-
	11.6388				
Czech Rep.	0.0720	0.3390		0.093	0.018
	0.2005	1.0319			
Hungary	0.8040			-	-
	10.1117				
Israel	0.7243		-0.1471	0.000	0.000
	7.1765		-1.1697		
Mexico	0.9996		-0.3453	0.000	0.000
	7.7764		-2.5331		
Peru	-0.0867	0.8090		0.000	0.000
	-0.3882	3.6291			
Phillipines	0.7553	-0.3612		0.002	0.000
	6.9186	-2.3982			

Poland	0.6753			-	-
	10.0075				
South Africa	0.8204	-0.0582		0.000	0.057
	11.2390	-0.4601			
South Korea	0.2658	-0.1290		0.400	0.000
	2.3163	-0.7722			
Slovak Rep.	0.5080			-	-
	2.6988				
Thailand	-0.1628			-	-
	-0.9366				

Table 6 New Keynesian Phillips Curves Estimations

Our data are quarterly and differs depending on the country. We select 40 countries: 23 industrial and 17 emerging. Our data source is the International Financial Statistics of the International Monetary Fund. Our measure of inflation is headline Consumer Price Index inflation, CPI. We use as exogenous the following variables: the GDP gap, which is the difference between nominal GDP and potential GDP obtained through Hodrick-Prescott filtering and the unemployment rate. Panel A presents the results of the estimation of equation (3) in the text for industrial economies using the first lag of inflation as an instrument. Panel B presents the results of the estimation of equation (3) in the text for emerging economies using the first lag of inflation as an instrument. Panel C presents the results of the estimation of equation (3) in the text for industrial economies using the residual of an inflation equation of a VAR that also includes a GDP equation as an instrument. Panel D presents the results of the estimation of equation (3) in the text for emerging economies using the residual of an inflation equation of a VAR that also includes a GDP equation as an instrument. Below the estimated persistent coefficients in columns 1 to 3 of A, B, C and D we have a t statistic. In the last 2 columns of Panels A, B, C and D we have p-values.

Panel A Lag Inflation as Instrument: Industrial Economies

	ρ	**ρ_1**	**ρ_2**	**Wald test Σρ = 0**	**Wald test Σρ = 1**
Austria	-0.4339			-	-
	-4.6312				
Australia	-0.1235	0.0640	0.0341	0.858	0.000
	-0.4122	0.2872	0.2069		
Belgium	-0.5730		0.5019	0.514	0.000
	-2.9873		2.4292		
Canada	0.4773	-0.0308	-0.2964	0.222	0.000
	2.2775	-0.1006	-1.2554		
Denmark	-0.0442	0.1310		0.398	0.000
	-0.2957	0.7686			
Finland	-1.0941	1.2501	0.1843	0.086	0.001

	-5.0522	5.5031	0.7865		
France	0.1404	0.0293		0.093	0.000
	1.0302	0.2710			
Germany	0.1523			-	-
	1.5338				
Greece	0.2390			-	-
	2.0400				
Iceland	-0.2396			-	-
	-0.9535				
Ireland	0.0044	0.4623		0.015	0.006
	0.0178	1.6863			
Italy	0.2516	0.0722		0.004	0.000
	2.3286	0.6957			
Japan	-0.1211	0.3261		0.073	0.000
	-1.0094	2.1389			
Luxembourg	0.1678			-	-
	1.3849				
Netherlands	1.1656	-0.7432	-1.0346	0.000	0.000
	4.9648	-2.6644	-4.0510		
Norway	-0.2722	0.1755		0.415	0.000
	-2.3894	1.1846			
New Zealand	0.2645			-	-
	2.4981				
Portugal	0.0606	0.2743	-0.6772	0.080	0.000
	0.5638	1.2152	-2.5240		
Spain	-0.4302	-0.8421		0.000	0.000
	-2.3088	-6.4839			
Sweden	-0.9553	0.3054		0.000	0.000
	-4.9944	1.7656			
Switzerland	-0.1635	0.2136	-0.1859	0.159	0.000
	-1.1488	0.8173	-0.7157		
United Kingdom	-0.2333	0.4009		0.123	0.000
	-1.5691	2.5490			
United States	0.4798	-0.3917		0.410	0.000
	1.6014	-1.0440			

Panel B Lag Inflation as Instrument: Emerging Economies

	ρ	ρ_1	ρ_2	Wald test $\Sigma\rho = 0$	Wald test $\Sigma\rho = 1$
Argentina	0.5103			-	-
	6.0301				
Bolivia	-0.0297			-	-
	-0.1533				
Brazil	0.3573			-	-
	6.2320				

Chile	0.1992		0.2894	0.003	0.002
	1.2707		1.1668		
Colombia	0.4556			-	-
	3.9511				
Czech Rep.	-0.6092	0.8990		0.057	0.000
	-1.4706	1.8519			
Hungary	0.5128			-	-
	4.8017				
Israel	0.6072		-0.1161	0.000	0.000
	6.0488		-1.1051		
Mexico	1.0311		-0.4072	0.000	0.000
	6.8668		-3.1165		
Peru	0.2638	0.0349		0.003	0.000
	1.9529	0.4796			
Phillipines	0.3751	-0.1750		0.103	0.000
	1.8733	-0.9015			
Poland	0.5530			-	-
	4.8120				
South Africa	-0.2424	0.1837		0.596	0.000
	-1.5805	1.1693			
South Korea	-0.2230	-0.1205		0.021	0.000
	-1.7879	-0.6821			
Slovak Rep.	-0.1651			-	-
	-1.1079				
Thailand	0.2357			-	-
	2.3221				

Panel C Residual of Inflation Equation in a VAR as Instrument: Industrial Economies

	ρ	ρ_1	ρ_2	**Wald test $\Sigma\rho = 0$**	**Wald test $\Sigma\rho = 1$**
Austria	-0.2574			-	0.000
	-3.5794				
Australia	0.3492	-0.2616	-0.0427	0.752	0.000
	1.6957	-1.5696	-0.2579		
Belgium	-0.0304		-0.0097	0.707	0.000
	-0.1472		-0.0448		
Canada	0.7315	-0.3038	-0.3552	0.503	0.000
	8.3223	-1.3337	-1.5288		
Denmark	0.1185	-0.0117		0.277	0.000
	0.8846	-0.0742			
Finland	-0.6019	0.8141	0.0805	0.084	0.000
	-4.3721	5.0931	0.4062		

France	0.7260	-0.2866		0.000	0.000
	10.5948	-3.3704			
Germany	0.0607			-	0.000
	0.5831				
Greece	0.2890			-	0.000
	1.8665				
Iceland	-0.0601			-	0.000
	-0.2564				
Ireland	0.2528	0.2556		0.009	0.012
	1.1703	0.9899			
Italy	0.3030	0.0488		0.001	0.000
	3.3054	0.4970			
Japan	0.3352	-0.0718		0.022	0.000
	4.0694	-0.5371			
Luxembourg	0.1575			-	0.000
	1.2740				
Netherlands	0.5077	-0.3006	-1.2213	0.000	0.000
	2.9355	-1.1859	-4.9737		
Norway	0.1291	-0.1479		0.874	0.000
	1.5511	-1.0907			
New Zealand	0.3121			-	0.000
	3.0512				
Portugal	0.1705	0.1104	-0.5720	0.120	0.000
	1.2268	0.4465	-2.1846		
Spain	0.3508	-1.1094		0.000	0.000
	3.2176	-9.3773			
Sweden	-0.1870	-0.2408		0.002	0.000
	-1.2250	-1.5408			
Switzerland	-0.0640	0.1255	-0.1775	0.227	0.000
	-0.4927	0.4749	-0.6735		
United Kingdom	0.4722	-0.1615		0.005	0.000
	5.7385	-1.2725			
United States	0.7969	-0.7786		0.835	0.000
	7.6919	-5.1091			

Panel D Residual of Inflation Equation in a VAR as Instrument: Emerging Economies

	ρ	ρ_1	ρ_2	Wald test $\Sigma\rho = 0$	Wald test $\Sigma\rho = 1$
Argentina	0.5360			-	0.000
	6.7154				
Bolivia	0.0969			-	0.000
	0.5148				
Brazil	0.5085			-	0.000
	5.6863				
Chile	0.0056		0.5647	0.002	0.016

	0.0248		1.7156		
Colombia	0.3348			-	0.000
	2.6434				
Czech Rep.	-0.4956	0.7448		0.112	0.000
	-1.2577	1.5923			
Hungary	0.1489			-	0.000
	1.1276				
Israel	-0.2542		0.6596	0.000	0.000
	-1.5737		4.4864		
Mexico	1.3194		-0.6211	0.000	0.004
	3.5008		-2.0914		
Peru	0.4416			-	0.000
	3.8686				
Phillipines	0.0806	0.0333		0.291	0.000
	0.4048	0.1888			
Poland	0.4827			-	0.000
	4.4332				
South Africa	0.5090	-0.3917		0.306	0.000
	6.4270	-3.0595			
South Korea	-0.0113	-0.2739		0.053	0.000
	-0.1107	-1.6458			
Slovak Rep.	-0.0981			-	0.000
	-0.6959				
Thailand	0.2135			-	0.000
	2.0754				