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THE ELUSIVE PREDICTIVE ABILITY OF GLOBAL INFLATION[*]

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Abstract

In this paper we analyze the contribution of international measures of inflation to predict local ones. To that end, we consider the set of current thirty one OECD economies for which inflation data is available at a monthly frequency. By considering this set of countries, a span of time including the post-crisis period and measures of both core and headline inflation, we are extending in three important dimensions the previous literature on this topic. Our main results indicate that on average there is a non-negligible predictive pass-through from international to local inflation both at the core and headline levels. This predictive pass-through has increased in the last period of our sample. Nevertheless, there is heterogeneity in the size and statistical significance of this pass-through which is especially important at the core level. Finally, important reductions in the Root Mean Squared Prediction Error are obtained only for a handful of countries.

Resumen

En este trabajo analizamos la contribución de medidas internacionales de inflación en la predicción de la inflación doméstica. Para ello consideramos un conjunto de treinta y un países de la OCDE con datos disponibles en frecuencia mensual. Considerando este conjunto de países, un período de tiempo post crisis, y medidas de inflación total y subyacente, extendemos la literatura existente sobre este tema en tres dimensiones importantes. Nuestros resultados principales indican que, en promedio, hay un traspaso predictivo significativo desde la inflación internacional a la doméstica tanto para inflación total como subyacente. Dicho traspaso ha aumentado en el último tramo de la muestra. Sin embargo, se observa una heterogeneidad relativa en el tamaño y significancia estadística del traspaso, lo cual es particularmente importe en la inflación subyacente. Finalmente, para un puñado de países se obtienen reducciones importantes en la raíz del error cuadrático medio de predicción.

[*] We thank the comments and suggestions of Claudio Raddatz. We also thank to colleagues at the Economic Research Department of the Central Bank of Chile for a wonderful discussion. The views expressed in this paper do not necessarily represent those of the Central Bank of Chile or its authorities. E-mails: cmedel@bcentral.cl; mpederse@bcentral.cl; and ppinchei@bcentral.cl (corresponding author).

1 Introduction

During the last decade one direction of research focuses on how international inflation may help forecast the local one. In the present paper we contribute to this line of research using monthly data from 31 OECD countries in the quest for links between global inflation and future local inflation.[1] Our study contributes to the growing literature on how international price fluctuations affect national inflation rates. Particularly, we ask if time-series based forecasts of the consumer price index (CPI) can be improved by including information of international price movements. This issue has been addressed by other studies, see Ciccarelli and Mojon (2010), West (2008), Hakkio (2009), Morales-Arias and Moura (2013) and Pincheira and Gatty (2014) but our investigation differs from existing ones in several dimensions. First, we include all up-to-date OECD countries for which monthly CPI data are available, including the less developed ones. Second, with these countries we study forecast ability of both headline and core inflation, and third, we analyze the post-crisis behavior of the linkages between local and international inflation. Differing from Hakkio (2009) we use a broader class of benchmarks as a simple way to deal with model uncertainty. As benchmarks we use a family of times series models which has been shown to have high accuracy when predicting inflation rates. This aims at limiting the possible critique about the fact that the forecasting performance of a relatively bad benchmark can often be improved when adding extra variables, even in out-of-sample exercises.[2]

The results of our study indicates that, statistically speaking, in nearly 50% of the countries our measure of international inflation could potentially be used to improve the forecast accuracy of good, and not naive, time series benchmarks for headline inflation. This number reduces to around 40% in the case of core inflation. In addition, we show that on average there is a non-negligible predictive pass-through from international to local inflation both at the core and headline levels. This predictive pass-through has increased in the last period of our sample. Nevertheless, there is heterogeneity in the size and statistical significance of this pass-through which is especially important at the core level. Despite these results, a pseudo-out-of-sample horse race between our time-series benchmarks and their augmented versions with international inflation, reveals that only a few countries achieve reductions in Root Mean Squared Prediction Error (RMSPE) that may be considered of economic relevance (higher than 5%), suggesting that future research is needed to better exploit the predictive information that statistical tests detect in the linkage between international inflation and leads of local inflation.

The idea that national price fluctuations to some extent are affected by international ones

[1] For monetary authorities, reliable inflation forecasts are of great importance for an appropriate conduction of monetary policy. For this and other reasons, researchers are investigating different alternatives for making good inflation forecasts at different time horizons. A recent survey of the performance of different methods used for forecasting inflation is offered by Faust and Wright (2013) who evaluate 17 different models spanning from a naive random walk to a more complex Dynamic Stochastic General Equilibrium (DSGE) model. They conclude that the best forecasts are the ones based on surveys. The comparison of Faust and Wright does not include the whole family of time series models that we use in this paper as benchmarks.

[2] Actually, Stock and Watson (2009) mention that: "*...in some cases, apparently good performance of a predictor for a particular inflation series over a particular period can be the result of a large denominator, not a small numerator.*" (Stock and Watson, 2009, p.141).

gained momentum after observing what has happened with international price fluctuations in, especially, industrialized countries, since the 1960s. In the two first decades since 1960, there was a common tendency of raising inflation rates, followed by more than a decade with declining rates. Inflation rates remained relatively stable in the two decades starting in the middle of the 1990s while the commodity price shocks in 2007-8 implied increased inflation rates, which were followed by a period of relatively low rates after the financial crises following the Lehman default. A similar pattern has been observed in many emerging economies, which have, however, had larger fluctuations. These observations have motivates scholars to analyze co-movements amongst national inflation rates.

Several papers investigate international links between national inflation rates and the evidence is rather mixed. Recent examples are: Bagliano and Morana (2009), who shows that in four G-7 countries and the euro area, co-movement exists not only in real activity but also in nominal macroeconomic variables such as the inflation rate; Beck *et al.* (2009) show with data from six euro area countries that the regional factor accounts for about 18% of the inflation variability; Calza (2009) finds limited evidence that the global output gap help explaining domestic consumer prices in the euro area; Capistrán and Ramos-Francia (2009) argue that about one third of the inflation in the ten largest Latin American countries can be explained by a common factor; Ihrig *et al.* (2010) analyze 11 industrial countries and, generally, find no effect of foreign output gabs on domestic inflation rates; Milani (2010) does not find evidence that global slack should be included in the PC as an extra driving variable for inflation; Cicek (2012) provides evidence that global activity affects the Turkish inflation rate; Neely and Rapach (2011) argue that world and regional components accounts for more than half of annual inflation fluctuations across 64 countries; Mumtaz *et al.* (2011) conclude with a sample of 36 countries, that a global factor has become more important in inflation variability since 1985; and Mumtaz and Surico (2012) find that an international factor tracks inflation rates (level and persistence) reasonable well in a sample of 13 industrialized countries.

In contrast to the vast amount of literature on links between global factors and inflation, fewer studies are concerned with the forecasting power of the global factors in local inflation rates. Interesting exceptions are West (2008), who applies quarterly observations for the period 1973-2007 to a panel of 19 OECD countries to construct a global measure of inflation from the factors of national inflation rates. This factor model leads to significant improvement in forecasting national inflation at the long horizons (2- and 3-years-ahead), but less so in the short-term. In conclusion, West notes that it is probable that the use of global data will lead to improvements in inflation forecasts. In the same line, Ciccarelli and Mojon (2010) use quarterly data of 22 OECD countries for the period 1960 to 2008 to argue that inflation indeed is a global phenomenon in the sense that the average inflation rate across countries, which they label "global inflation", accounts for almost 70% of the variance of the national rates. Furthermore, they claim that global inflation is an attractor of national inflation rates, such that it can be used to formulate an error correction model, which makes better forecasts when compared to those coming from simple time series models and Phillips curves.[3] Morales-Arias and Moura (2013) introduce a global inflation model with permanent

[3]Traditionally the Phillips curve (PC), in different specifications, has been utilized as a tool to predict

and transitory heteroskedastic components and compare the out-of-sample forecast against two univariate models; a random walk and an autoregressive model of order two. They find that their model has a good fit to the data and makes good forecasts. Pincheira and Gatty (2014) analyze the specific case of Chilean inflation, finding that international factors do help forecast Chilean inflation at several horizons, and that the predictive pass-through from international to local inflation has increased in the recent years. They also explores the predictive power of the average of the inflation of fifteen countries from which Chile gets a high percentage of its imports, but underperform the results obtained with the broader factors built with Latin American or OECD countries.

In a study similar to this one, Hakkio (2009) considers headline and core inflation for 19 and 18 OECD countries, respectively, constructing global inflation rates with principal components for the periods 1961.I-2008.II and 1980.I-2008.I. His forecasting exercise uses four simple univariate time series models as benchmarks: AR(2), IMA(1,1), RW and RW with drift, as well as an error correction model and a VAR. Generally, the models that include global inflation forecast better than the benchmarks, more so for headline inflation than for core. While Hakkio's forecast exercise is similar to the one presented in this study, there are several important differences, where the two most important are the following: First, we include all OECD countries with data availability and focus on a more recent period, which includes the whole boom-bust commodity price process. In fact, we analyze whether the forecast performance of global inflation was affected by this period. Secondly, we do report RMSPE for the forecasts but we also focus on the statistical significance of the international factors *per se*.

The roadmap of the paper is the following. In section 2 we present the forecast evaluation framework, the description of the data and the details of the models that we use as benchmarks. Section 3 presents the results of a thorough pseudo out-of-sample forecasting exercise. Finally, section 4 offers the conclusions of the analysis.

2 Forecast evaluation framework

We evaluate the predictive ability of our benchmark models against their augmented versions with the international factor both in-sample and out-of-sample. To describe the out-of-sample exercise, let us assume that we have a total of $T+1$ observations of the inflation rate

future inflation rates. Nevertheless, the evidence on its forecast performance is mixed. Faust and Wright (2013) include a couple of versions of the PC and note that the performance of the traditional formulated PC is especially bad, while the formulation in gap-form does far better. Also with US data, but for the period 1984-99, Atkeson and Ohanian (2001) conclude that PC forecasts have not been useful for forecasting inflation during this period. This is in line with results of a latter study by Stock and Watson (2009). They show that eventhough PC forecasts are better than other multivariate predictions, their performance depends on the evaluation sample period. In fact, in some episodes, a univariate time series model makes better forecasts. Mixed results of the PC forecasting performance have also been obtained with non-US data. An example is Canova (2007), who uses data from the G-7 countries, Pincheira and Rubio (2010) who applies Chilean real-time data, and Bánbura and Mirza (2013) who estimate several PC specifications with Euro zone data and find that the performance of the different models is very heterogeneous and unstable. Amongst other things, the non-convincing performance of the PC as an inflation predictor has led scholars to search for other factors which may help improving the forecasts of future inflation rates.

π_t for a given country. We generate a sequence of $P(h)$ h-step-ahead forecasts estimating the models in recursive windows of expanding size. The first estimation window is assumed to have size R. For instance, to generate the first h-step-ahead forecasts, we estimate our models with the first R observations of our sample. Then, forecasts are built with information available only at time R and are compared to the realization π_{R+h}. Next, we estimate our models with the first $R+1$ observations. These h-step-ahead forecasts are compared with the realization π_{R+h+1}. We iterate until the last forecasts are built using the first χ available observations for estimation, where χ is given by

$$\chi = T + 1 - h.$$

These forecasts are compared with the realization π_{T+1}. We generate a total of $P(h)$ forecasts, with $P(h)$ satisfying $R + (P(h) - 1) + h = T + 1$. So,

$$P(h) = T + 2 - h - R.$$

Forecast accuracy is measured in terms of RMSPE. Because this is a population moment, we estimate it using the following sample analog:

$$SRMSPE = \sqrt{\frac{1}{P(h)} \sum_{t=R}^{T+1-h} (\pi_{t+h} - \widehat{\pi}_{t+h|t})^2}$$

where $SRMSPE$ stands for "Sample Root Mean Squared Prediction Error", and $\widehat{\pi}_{t+h|t}$ represents the forecast of π_{t+h} made with information known up until time t.

We carry out inference about predictive ability by considering pairwise comparisons between different univariate models and its augmented versions. Inference is carried out within the frameworks developed by Clark and West (2007) (henceforth CW), and Diebold and Mariano (1995) and West (1996) (henceforth, DMW). In the first place we focus on the CW statistic, which is mainly aimed at evaluating models in an out-of-sample fashion. In other words, we first focus on model adequacy and not forecast accuracy. With the CW test we evaluate whether the international factor provides additional information to that already contained in our univariate benchmarks.

The CW test can be considered both as an encompassing test or as an adjusted comparison of Mean Squared Prediction Errors (MSPE). The adjustment is made in order to make a fair comparison between nested models. Intuitively, their test removes a term that introduces noise when a parameter, that should be zero under the null hypothesis of equal MSPE, is estimated.

The core statistic of the CW test is constructed as follows:

$$\hat{z}_{t+h} = (\widehat{e}_{1,t+h})^2 - [(\widehat{e}_{2,t+h})^2 - (\widehat{\pi}_{1,t+h|t} - \widehat{\pi}_{2,t+h|t})^2]$$

where

$$\begin{aligned} \widehat{e}_{1,t+h} &= \pi_{t+h} - \widehat{\pi}_{1,t+h|t} \\ \widehat{e}_{2,t+h} &= \pi_{t+h} - \widehat{\pi}_{2,t+h|t} \end{aligned}$$

represent the corresponding forecast errors. Here $\widehat{\pi}_{1,t+h|t}$ and $\widehat{\pi}_{2,t+h|t}$ denote the h-step-ahead forecasts generated from the two models under consideration. Model 1 is the parsimonious or "small" model that is nested in the larger model 2. In other words, model 2 would become model 1 if some of its parameters would be set to zero.

With some little algebra it is straightforward to show that $\hat{z}_{t+h}$ could also be expressed as follows

$$SMSPE\text{-}Adjusted = \frac{2}{P(h)} \sum_{t=R}^{T+1-h} \widehat{e}_{1,t+h} \left(\widehat{e}_{1,t+h} - \widehat{e}_{2,t+h} \right). \tag{1}$$

This statistic is used to test the following null hypothesis

$$H_0 : \mathbb{E}(SMSPE\text{-}Adjusted) = 0$$

against the alternative

$$H_A : \mathbb{E}(SMSPE\text{-}Adjusted) > 0.$$

CW suggests a one sided test for a t-type statistic based upon the core statistic in (1). They recommend asymptotically normal critical values for their test. In most of their analysis CW follows Clark and McCracken (2001, 2005). Theoretical results in these papers require the models to be estimated with nonlinear least squares, which we use here, and also that multistep forecasts be made with a direct method in opposition to the iterated method we use here. For this reason we only present results of the CW test for one-step-ahead predictions.

In the second place we focus on the DMW test. When doing so we do it in the spirit of the paper by Giacomini and White (2006) in the sense that our concern is to evaluate forecast accuracy and not model adequacy. We do not follow the exact unconditional version of the Giacomini and White (2006) approach for the simple reason that their asymptotic theory does not work when using expanding windows as in our case. We advocate the use of the DMW test by the same reasons explained by Diebold (2012).

According to the one sided DMW test, we focus on testing the following null hypothesis:

$$H_0 : \mathbb{E}(\widehat{d}_{t(h)}) \leq 0$$

against the alternative:

$$H_A = \mathbb{E}(\widehat{d}_{t(h)}) > 0$$

where

$$\widehat{d}_{t(h)} = (\pi_{t+h} - \widehat{\pi}_{1,t+h|t})^2 - (\pi_{t+h} - \widehat{\pi}_{2,t+h|t})^2.$$

We focus on one-sided tests because we are interested in detecting forecast superiority. Our null hypothesis poses that forecasts generated from the nested model perform at least as well as forecasts generated from the larger model. Our alternative hypothesis claims superiority of the forecasts generated by the larger model.

It is important to emphasize here that both tests, CW and DMW, are different in a number of aspects. One of the most important differences, however, is that they are designed for different purposes. While we are using the DMW test to compare the ability of two different forecasting methods, the CW test is testing for model adequacy. In other words, it is testing whether the larger model is more appropriate than the smaller model. Consequently, we expect these two tests to deliver different results. Most likely, the CW test will be able to show more rejections of the null hypothesis than the DMW test as is the case in Pincheira and Gatty (2014).

2.1 Data

We work with monthly data of year-on-year inflation rates ranging from January 1995 to March 2013 (219 observations). We consider both headline and core measures of inflation. Our in-sample analysis uses the whole available data. Our pseudo out-of-sample analysis uses a recursive–or expanding–window approach with an initial estimation window length of 100 observations (from January 1995 to April 2003). This means that our first one-step-ahead forecast is made for May 2003, while the last one is made for March 2013. We construct a total of 119, 107 and 95 forecasts for 1-, 12- and 24-steps-ahead. Our sample includes a period of time in which two recent important international events took place: the sharp rise in commodity prices during the year 2007 and the deep international crisis after the Lehman default. It is reasonable to think that these two major events may have had an impact on the predictive linkages between international and domestic inflation. We address this concern splitting the sample to analyze the period before/after June 2007. Our first sample (April 2003-June 2007) considers 51 one-step-ahead forecasts. For the period (July 2007-March 2013) we consider a total of 69 one-step-ahead forecasts.

Table 1: List of countries

1. Austria	12. Iceland	23. Portugal
2. Belgium	13. Ireland	24. Slovakia
3. Canada	14. Israel	25. Slovenia
4. Chile	15. Italy	26. Spain
5. Czech Republic	16. Japan	27. Sweden
6. Denmark	17. South Korea	28. Switzerland
7. Finland	18. Luxembourg	29. Turkey
8. France	19. Mexico	30. United Kingdom
9. Germany	20. The Netherlands	31. United States
10. Greece	21. Norway	
11. Hungary	22. Poland	

Source: Authors' elaboration.

We extracted our data from the Main Economic Indicators database available at the web page of the Organization for Economic Cooperation and Development (OCED).[4] For the countries where monthly observations are available, we use the data of headline ("Consumer prices–all items") and core ("Consumer prices–all items non-food, non-energy"). This accounts to 31 countries in the case of headline inflation and 29 in the case of core inflation (there is no core inflation data reported for Mexico and Turkey). The list of considered countries is described in table 1, while the descriptive statistics of both measures of inflations are in the appendix.

[4] OECD (2013), "Prices: Consumer Prices", *Main Economic Indicators* (database). doi: 10.1787/data-00047-en.

2.2 The DESARIMA family of models

Differing from Ciccarelli and Mojon (2010) and Stock and Watson (2002) we rely on a different set of univariate time-series models to produce inflation forecasts. Pincheira and García (2012) and Pincheira and Medel (2012a) show that an extended family of SARIMA (seasonal ARIMA) models produce competitive out-of-sample forecasts at short and long horizons when compared to traditional univariate benchmarks used in the literature. This is shown for a number of different countries experiencing either stable or unstable inflation.

We focus on the additional ability that an international inflation factor may have over our univariate strategies to predict inflation in our set of OECD countries. We consider 10 different univariate specifications following Pincheira and Medel (2012a). Then, we compare each of these univariate specifications with their augmented versions. We denote each of the benchmarks as $SARIMA[j]$, $j = 1, \ldots, 10$. The augmented versions of these models are denoted $FASARIMA[j]$, $j = 1, \ldots, 10$, where FASARIMA stands for Factor Augmented SARIMA. Table 2 summarizes the FASARIMA specifications under consideration.

Table 2: The FASARIMA family

1:	$\pi_t - \pi_{t-1} = \gamma(f_{t-1} - f_{t-2}) + \varepsilon_t - \theta\varepsilon_{t-1}$
2:	$\pi_t - \pi_{t-1} = \gamma(f_{t-1} - f_{t-2}) + \varepsilon_t - \theta_E\varepsilon_{t-12}$
3:	$\pi_t - \pi_{t-1} = \gamma(f_{t-1} - f_{t-2}) + \varepsilon_t - \theta\varepsilon_{t-1} - \theta_E\varepsilon_{t-12}$
4:	$\pi_t - \pi_{t-1} = \gamma(f_{t-1} - f_{t-2}) + \varepsilon_t - \theta\varepsilon_{t-1} - \theta_E\varepsilon_{t-12} + \theta\theta_E\varepsilon_{t-13}$
5:	$\pi_t - \pi_{t-1} = \gamma(f_{t-1} - f_{t-2}) + \rho(\pi_{t-1} - \pi_{t-2}) + \varepsilon_t - \theta\varepsilon_{t-1} - \theta_E\varepsilon_{t-12} - \theta\theta_E\varepsilon_{t-13}$
6:	$\pi_t - \pi_{t-1} = \gamma(f_{t-1} - f_{t-2}) + \rho(\pi_{t-1} - \pi_{t-2}) + \varepsilon_t - \theta\varepsilon_{t-1} - \theta_E\varepsilon_{t-12}$
7:	$\pi_t - \pi_{t-1} = \gamma(f_{t-1} - f_{t-2}) + \rho(\pi_{t-1} - \pi_{t-2}) + \varepsilon_t - \theta_E\varepsilon_{t-12}$
8:	$\pi_t - \pi_{t-1} = \gamma(f_{t-1} - f_{t-2}) + \rho(\pi_{t-1} - \pi_{t-2}) + \varepsilon_t - \theta\varepsilon_{t-1}$
9:	$\pi_t - \pi_{t-1} = \gamma(f_{t-1} - f_{t-2}) + \rho(\pi_{t-1} - \pi_{t-2}) + \varepsilon_t$
10:	$\pi_t - \pi_{t-1} = \gamma(f_{t-1} - f_{t-2}) + \varepsilon_t$

Source: Authors' elaboration.

In table 2, π_t represents year-on-year inflation rate, ε_t represents a white noise process, and f_t represents the international inflation factor. It is important to remark that the parameters of the different models in table 2 are not necessarily equal across models. We have used the same Greek letters to denote the parameters of the moving average terms and the international factor just for simplicity, but no restriction is imposed on them. All models are estimated with nonlinear least squares. We define the International factor as the "leave-one-out" simple average of the year-on-year inflation rates in our sample.[5] Hence, our measure is a pure international factor, which is not affected by national inflation fluctuations,

[5] This is a bit different from the measures calculated by Ciccarelli and Mojon (2010) and West (2008), who calculate the simple average.

which may be important for some of the countries included in the sample.[6] For instance, when predicting inflation for country i we construct the following international factors:

$$\begin{aligned} f_{i,t} &= \sum_{j \in S, j \neq i} \pi_{j,t}, \\ f_{i,t}^{c} &= \sum_{j \in S, j \neq i} \pi_{j,t}^{c}, \end{aligned}$$

where S represents the set of countries in our sample, $f_{i,t}$ and $f_{i,t}^{c}$ represent the international headline and core inflation factor for country i at time t, respectively. Finally, $\pi_{j,t}$ and $\pi_{j,t}^{c}$ represent headline and core year-on-year inflation rates for country j at time t, respectively. We construct the international factors with the "leave-one-out" strategy to avoid the possibility that the predictive contribution of the international factor may be confused by a simple autoregressive component.

It is worth noticing that the univariate SARIMA benchmarks are also implicitly contained in table 2. As a matter of fact, setting $\gamma = 0$ in all the models in table 2 allows us to recover the ten univariate SARIMA models used as benchmarks. Details of the derivation of these SARIMA models are found in Pincheira and Medel (2012a).

It is also worth noticing that we consider ten benchmarks models in our analysis as a simple way to control for some forms of model uncertainty. Even though models in table 2 are similar, there is no way that we could pick the best one of all of them in advance, that is to say, previous to running a horse race between them. Moreover, several papers, including Stock and Watson (2009) and Rossi and Sekhposyan (2009), report the unstable behavior of inflation forecasting models during different time periods. Consequently, we work with these ten models because we cannot know for sure how these models will perform in the future, in different countries and at different forecasting horizons. Related to this, figures 1 and 2 shows the number of times in which each of the ten models shows the lowest RMSPE in our out-of-sample period. These figures are reported when forecasting with or without the international factor. They also include a histogram in which it is possible to see that in different conditions (countries, inflation measures and forecasting horizons in this case) different models may be the best ones.

[6] Ciccarelli and Mojon (2010) argue that similar results are obtained with either a simple average, a GDP-weighted average, or using a dynamic factor model as the one presented in Forni *et al.* (2010).

Figure 1: Number of times in which each model show the lowest RMSPE, full sample

Headline inflation

DESARIMA Model

	Model 1	Model 2	Model 3	Model 4	Model 5	Model 6	Model 7	Model 8	Model 9	Model 10
Without Global Factor										
h=1	0	2	2	2	13	8	4	0	0	0
h=12	1	5	6	4	7	7	0	1	0	0
h=24	0	6	6	3	3	10	0	1	0	2
With Global Factor										
h=1	0	2	1	1	15	7	5	0	0	0
h=12	1	3	3	5	7	9	0	1	2	0
h=24	2	4	5	7	3	9	0	1	0	0

All estimates

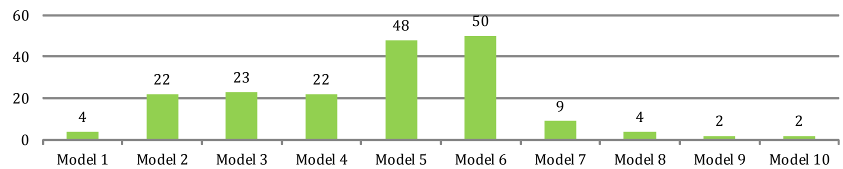
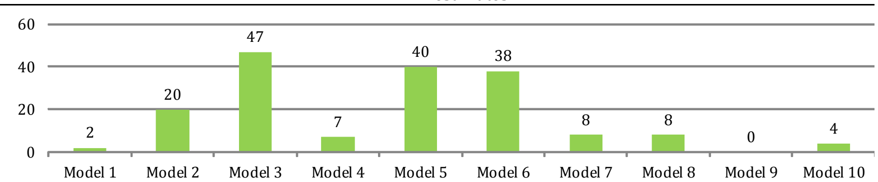


Figure 2: Core inflation

DESARIMA Model

	Model 1	Model 2	Model 3	Model 4	Model 5	Model 6	Model 7	Model 8	Model 9	Model 10
Without Global Factor										
h=1	0	2	3	2	9	10	3	0	0	0
h=12	0	2	11	2	5	5	1	2	0	1
h=24	1	4	10	0	5	6	0	2	0	1
With Global Factor										
h=1	0	3	5	2	7	9	3	0	0	0
h=12	0	5	10	1	6	3	1	2	0	1
h=24	1	4	8	0	8	5	0	2	0	1

All estimates



Source: Authors' elaboration.

To generate multi-step-ahead forecasts we use the iterated method relying on the following ARIMA specification for the international factor:

$$f_t - f_t = \alpha(f_{t-1} - f_{t-2}) + u_t - \varphi_E u_{t-12} \tag{2}$$

where u_t is a white noise process. This model corresponds to model 7 in table 2.

For the sake of simplicity and tractability we do not leave room for model uncertainty in the specification of the factor model and we work only with one model to generate exogenous multi-step forecasts of the international factor. We notice that we pick model 7 only because a previous paper analyzing a similar question but focused on a single emerging economy (Chile) reports satisfactory results (see Pincheira and Gatty, 2014). In that sense, our choice of model 7 is exogenous as we did not pick the best performing model for each country. Table 3 shows a measure of forecast accuracy when predicting the international factor with each of the univariate specifications embedded in table 2.

Table 3: RMSPE estimates of the whole global factor at different horizons, full sample

Headline inflation

	Model 1	**Model 2**	**Model 3**	**Model 4**	**Model 5**	**Model 6**	**Model 7**	**Model 8**	**Model 9**	**Model 10**
h=1	0.191	0.175	0.169	0.163	0.163	0.159	0.160	0.193	0.193	0.203
h=12	1.110	1.035	0.980	1.029	1.002	0.996	1.015	1.110	1.124	1.108
h=24	1.321	1.336	1.202	1.339	1.315	1.326	1.340	1.316	1.338	1.296

Core inflation

	Model 1	**Model 2**	**Model 3**	**Model 4**	**Model 5**	**Model 6**	**Model 7**	**Model 8**	**Model 9**	**Model 10**
h=1	0.085	0.113	0.103	0.111	0.097	0.108	0.104	0.085	0.085	0.087
h=12	0.404	0.874	0.639	0.961	0.601	0.908	0.871	0.411	0.404	0.405
h=24	0.679	0.981	0.757	1.005	0.919	0.995	0.995	0.676	0.680	0.680

Source: Authors' elaboration.

We see that model 7 is seldom the best performer, which indicates that, for that point of view, there might be some room to improve the multistep results described in future sections.[7]

We notice that all the specifications under consideration are driftless expressions. That is done on purpose to avoid the presence of deterministic trends in long-run forecasts. We also notice that in all our equations we have imposed a unit root to generate our inflation forecasts and the international inflation factor forecasts. This is also in line with important papers in the forecasting literature; see Stock and Watson (1999) and Atkeson and Ohanian (2001), for instance. Besides, Pincheira and Medel (2012b) provide interesting insights regarding the use of unit root-based forecasts when forecasting stationary variables.

3 Results

3.1 Granger causality: headline inflation

Does it pay to include the international factor into the univariate models as in table 2? Table 4 provides an answer to this question by reporting the t-statistics from the CW test carried out for each country in our sample and for each of the ten models in table 2. Results in table 4 correspond to headline inflation and considering a pseudo-out-of-sample exercise covering the whole sample period. For each country and model we report the CW t-statistic and its one sided p-value. Pink shaded cells indicate that the null hypothesis of no additional predictive power of the international component is rejected at the 10% significance level. Blue shaded cells indicate that a simple joint test across the ten models is able to reject the null hypothesis at the 10% level. This simple test is based on the traditional Bonferroni bounds. According to this very conservative procedure, we reject the joint null at the 10% level if we obtain a rejection of the null hypothesis at least in one model at the 1% significance level.[8]

Results in table 4 are strong. First, in 100% of the countries, we are able to reject the null favoring the usage of the international factor in at least one out of the ten models. Second,

[7] In this exercise the international factor is calculated with the inflation rates of all of the countries and, hence, it is slightly different from the international factor used in the country analyses, where the leave-one-out principle for calculating different international factors is used.

[8] The joint null hypothesis posits that the γ coefficient is zero in all ten models in table 2.

we are able to reject the null hypothesis in 84% of the countries when the model under consideration is the simple random walk, which has been widely used in the forecasting literature as a natural benchmark. Third, in 61% of the countries we are able to reject the null in at least 6 of the models. Finally, in 48% of the countries our joint test based on the Bonferroni bounds is able to reject the null hypothesis, favoring again the additional predictive information of the international factor. Despite these impressive results, table 4 also indicates that some heterogeneity do exists amongst the countries, as for instance models 5 and 6 are able to reject the null for only 18 countries, which represents 58% of our sample.

Results in table 4 include a period of time in which two recent important international events took place: the sharp rise in commodity prices during the year 2007 and the deep international crisis after the Lehman default. It is reasonable to think that these two major events may have had an impact on the predictive linkages between international and domestic inflation. We address this concern in table 5. This table reports the t-statistics of the CW test in the same fashion as in table 4, the only difference being that for the construction of table 5 we drop all the forecasts from July 2007 onwards. Therefore, the two aforementioned major events are not contemplated in table 5.

As a result, there is a drastic decrease in the number of shaded cells indicating that the CW test is not rejecting as many null hypotheses as before. In particular we want to mention four points. First, the percentage of countries in which the null is rejected in at least one model drops from 100% to 81%. Second, the percentage of countries for which we reject the null when the model under consideration is the simple random walk drops from 84% in table 4 to 45% in table 5. Third, the percentage of countries for which we reject the null in at least 6 of the models drops from 61% to 32%. Finally, the percentage of countries for which our joint test based on the Bonferroni bounds is able to reject the null hypothesis drops from 48% to 39%.

Table 6 focuses on the period July 2007-March 2013. Results from tables 4 and 6 are very similar. First, in almost 100% of the countries, we are able to reject the null favoring the usage of the international factor in at least one out of the ten models (actually this happens in 94% of the countries). Second, we are able to reject the null hypothesis in 71% of the countries when the model under consideration is the simple random walk. Third, in 55% of the countries we are able to reject the null in at least 6 of the models. Finally, in 45% of the countries our joint test based on the Bonferroni bounds is able to reject the null hypothesis, favoring again the additional predictive information of the international factor. In summary, figures in table 6 indicate a little less predictability than figures in table 4, but are much more similar than figures shown in table 5. This is important because the weaker results in table 5 could have been attributed to a small sample problem, as the number of forecasts considered in table 5 is much lower than in table 4. Nevertheless, the number of forecasts considered in table 6 is similar to that in table 5 which is suggesting that our results are not driven by a small sample issue.[9]

[9] Forecasts in table 6 are built with models estimated with a larger number of observations when compared with forecasts in table 4. From that point of view, forecasts in table 6 may have an "advantage" over forecasts in table 4.

These results are interesting. They suggest that the marginal predictive influence of the international inflation factor has spread across countries in the last six or seven years, a period not totally covered by Ciccarelli and Mojon (2010), West (2008), Hakkio (2009) or Morales-Arias and Moura (2013). As mentioned before, it is possible that the commodity boom, the world impact of the subprime crises or both may explain these results. Anyhow, we only place these arguments as mere possibilities that certainly need to be explored in detail in a future research agenda. Our main point is simple that according to the CW test, in the recent years our international factor is influencing more countries than in past.

It is also interesting to mention the list of countries for which the international factor seems to be more helpful. Countries appearing in blue shaded cells in tables 4-6 are: Chile, Czech Republic, Israel, Italy, Japan, Poland, Slovenia and Switzerland.

Table 4: CW test for headline inflation, full sample

	Model 1 (p-value) (t-Statistic)	Model 2 (p-value) (t-Statistic)	Model 3 (p-value) (t-Statistic)	Model 4 (p-value) (t-Statistic)	Model 5 (p-value) (t-Statistic)	Model 6 (p-value) (t-Statistic)	Model 7 (p-value) (t-Statistic)	Model 8 (p-value) (t-Statistic)	Model 9 (p-value) (t-Statistic)	Model 10 (p-value) (t-Statistic)
Austria	0.049	0.110	0.231	0.584	0.387	0.338	0.612	0.246	0.057	0.047
	1.652	1.226	0.734	-0.212	0.287	0.419	-0.284	0.686	1.582	1.677
Belgium	0.124	0.872	0.880	0.790	0.627	0.791	0.782	0.084	0.115	0.068
	1.153	-1.136	-1.177	-0.808	-0.323	-0.810	-0.779	1.380	1.198	1.493
Canada	0.158	0.150	0.125	0.415	0.277	0.170	0.268	0.082	0.185	0.103
	1.001	1.036	1.151	0.214	0.593	0.955	0.619	1.391	0.896	1.264
Chile	0.002	0.002	0.013	0.006	0.003	0.007	0.006	0.001	0.002	0.001
	2.847	2.893	2.220	2.517	2.717	2.479	2.497	3.229	2.937	3.011
Czech Rep.	0.052	0.000	0.023	0.000	0.048	0.007	0.000	0.075	0.051	0.046
	1.625	3.965	1.998	3.712	1.664	2.474	3.386	1.437	1.638	1.681
Denmark	0.016	0.038	0.032	0.029	0.031	0.054	0.032	0.041	0.015	0.029
	2.155	1.772	1.850	1.895	1.866	1.604	1.852	1.741	2.165	1.889
Finland	0.024	0.505	0.528	0.743	0.838	0.706	0.777	0.078	0.019	0.030
	1.980	-0.012	-0.070	-0.652	-0.986	-0.541	-0.762	1.419	2.074	1.874
France	0.028	0.232	0.012	0.232	0.024	0.017	0.208	0.014	0.024	0.023
	1.917	0.732	2.255	0.732	1.975	2.124	0.812	2.206	1.975	1.996
Germany	0.018	0.256	0.210	0.037	0.032	0.154	0.036	0.018	0.018	0.102
	2.091	0.656	0.805	1.789	1.847	1.021	1.804	2.099	2.107	1.273
Greece	0.025	0.030	0.073	0.033	0.024	0.125	0.033	0.135	0.028	0.033
	1.956	1.883	1.454	1.842	1.979	1.148	1.835	1.105	1.915	1.845
Hungary	0.323	0.000	0.000	0.001	0.337	0.014	0.012	0.188	0.319	0.225
	0.460	3.839	3.840	3.126	0.422	2.193	2.247	0.886	0.471	0.754
Iceland	0.221	0.794	0.091	0.573	0.808	0.830	0.789	0.593	0.339	0.095
	0.770	-0.820	1.334	-0.184	-0.871	-0.956	-0.803	-0.235	0.415	1.309
Ireland	0.050	0.103	0.050	0.123	0.589	0.012	0.161	0.024	0.186	0.017
	1.648	1.265	1.646	1.161	-0.224	2.259	0.989	1.975	0.892	2.127
Israel	0.083	0.000	0.001	0.000	0.000	0.000	0.000	0.033	0.261	0.003
	1.386	4.289	3.052	3.538	3.451	3.739	3.684	1.837	0.639	2.736
Italy	0.002	0.002	0.001	0.000	0.001	0.000	0.000	0.003	0.001	0.003
	2.894	2.821	3.266	3.553	3.148	3.465	3.682	2.786	2.977	2.761
Japan	0.001	0.016	0.040	0.014	0.013	0.030	0.012	0.000	0.000	0.001
	3.204	2.137	1.748	2.185	2.229	1.880	2.256	3.478	3.339	3.071
Korea	0.020	0.004	0.013	0.025	0.015	0.021	0.013	0.013	0.005	0.001
	2.056	2.635	2.219	1.962	2.175	2.042	2.233	2.221	2.551	3.128
Luxembourg	0.006	0.060	0.068	0.040	0.577	0.060	0.033	0.010	0.008	0.023
	2.524	1.558	1.488	1.752	-0.195	1.555	1.844	2.335	2.429	1.998
Mexico	0.462	0.029	0.407	0.011	0.543	0.557	0.534	0.478	0.542	0.297
	0.095	1.890	0.234	2.290	-0.108	-0.143	-0.086	0.056	-0.105	0.533
The Netherlands	0.755	0.075	0.050	0.014	0.565	0.010	0.016	0.583	0.775	0.798
	-0.689	1.437	1.645	2.185	-0.163	2.309	2.142	-0.209	-0.754	-0.833
Norway	0.657	0.020	0.090	0.025	0.029	0.120	0.012	0.761	0.746	0.057
	-0.404	2.058	1.343	1.961	1.903	1.174	2.266	-0.710	-0.663	1.582
Poland	0.034	0.001	0.030	0.014	0.002	0.021	0.038	0.006	0.030	0.013
	1.826	3.165	1.886	2.197	2.906	2.040	1.774	2.528	1.886	2.215
Portugal	0.006	0.012	0.010	0.015	0.018	0.026	0.009	0.006	0.003	0.003
	2.521	2.262	2.339	2.164	2.107	1.945	2.373	2.501	2.743	2.761
Slovakia	0.023	0.004	0.017	0.003	0.001	0.003	0.002	0.011	0.022	0.007
	1.998	2.648	2.110	2.699	2.990	2.737	2.901	2.299	2.006	2.465
Slovenia	0.028	0.001	0.001	0.001	0.003	0.001	0.001	0.057	0.019	0.031
	1.909	3.064	2.997	2.976	2.800	3.165	3.145	1.580	2.066	1.872
Spain	0.174	0.025	0.087	0.192	0.411	0.234	0.248	0.438	0.221	0.031
	0.937	1.957	1.358	0.872	0.224	0.727	0.682	0.155	0.769	1.862
Sweden	0.019	0.836	0.824	0.868	0.926	0.840	0.866	0.031	0.023	0.025
	2.083	-0.978	-0.931	-1.118	-1.448	-0.994	-1.109	1.867	2.004	1.958
Switzerland	0.019	0.027	0.012	0.007	0.000	0.020	0.007	0.019	0.016	0.036
	2.079	1.934	2.267	2.439	3.430	2.060	2.467	2.078	2.151	1.797
Turkey	0.005	0.011	0.007	0.235	0.013	0.033	0.074	0.026	0.029	0.001
	2.575	2.294	2.442	0.724	2.221	1.845	1.449	1.946	1.895	2.984
United Kingdom	0.003	0.012	0.102	0.049	0.008	0.192	0.065	0.004	0.003	0.002
	2.769	2.257	1.271	1.659	2.398	0.871	1.514	2.626	2.774	2.826

Source: Authors' elaboration.

Table 5: CW test for headline inflation until June 2007

	Model 1 (p-value) (t-Statistic)	Model 2 (p-value) (t-Statistic)	Model 3 (p-value) (t-Statistic)	Model 4 (p-value) (t-Statistic)	Model 5 (p-value) (t-Statistic)	Model 6 (p-value) (t-Statistic)	Model 7 (p-value) (t-Statistic)	Model 8 (p-value) (t-Statistic)	Model 9 (p-value) (t-Statistic)	Model 10 (p-value) (t-Statistic)
Austria	0.866	0.183	0.483	0.238	0.377	0.496	0.195	0.181	0.722	0.326
	-1.109	0.905	0.042	0.713	0.314	0.009	0.858	0.911	-0.590	0.452
Belgium	0.999	0.890	0.920	0.140	0.067	0.047	0.164	0.378	0.972	0.993
	-2.974	-1.224	-1.402	1.082	1.498	1.676	0.979	0.311	-1.910	-2.435
Canada	0.751	0.666	0.599	0.525	0.568	0.504	0.626	0.165	0.713	0.512
	-0.679	-0.428	-0.250	-0.063	-0.171	-0.010	-0.320	0.975	-0.561	-0.029
Chile	0.010	0.003	0.080	0.014	0.036	0.051	0.045	0.001	0.005	0.001
	2.313	2.728	1.405	2.187	1.798	1.639	1.695	3.073	2.570	3.008
Czech Rep.	0.156	0.009	0.134	0.005	0.173	0.158	0.008	0.119	0.099	0.316
	1.012	2.346	1.106	2.566	0.942	1.002	2.411	1.179	1.288	0.480
Denmark	0.398	0.428	0.162	0.099	0.088	0.099	0.102	0.128	0.371	0.772
	0.259	0.182	0.986	1.286	1.353	1.287	1.271	1.135	0.328	-0.747
Finland	0.494	0.305	0.957	0.181	0.131	0.910	0.106	0.066	0.384	0.658
	0.014	0.511	-1.712	0.913	1.120	-1.339	1.247	1.506	0.295	-0.408
France	0.492	0.966	0.370	0.986	0.711	0.079	0.984	0.402	0.455	0.770
	0.020	-1.823	0.332	-2.202	-0.557	1.411	-2.133	0.249	0.113	-0.739
Germany	0.567	0.786	0.742	0.531	0.463	0.849	0.570	0.492	0.565	0.869
	-0.168	-0.793	-0.649	-0.078	0.093	-1.032	-0.176	0.021	-0.164	-1.123
Greece	0.309	0.434	0.165	0.239	0.284	0.196	0.221	0.479	0.270	0.557
	0.500	0.165	0.973	0.711	0.572	0.857	0.768	0.052	0.613	-0.143
Hungary	0.971	0.066	0.136	0.111	0.171	0.194	0.169	0.769	0.924	0.817
	-1.891	1.509	1.098	1.223	0.952	0.865	0.960	-0.735	-1.435	-0.905
Iceland	0.408	0.588	0.246	0.776	0.655	0.386	0.837	0.365	0.397	0.092
	0.232	-0.222	0.687	-0.759	-0.400	0.291	-0.982	0.344	0.262	1.327
Ireland	0.067	0.838	0.141	0.406	0.153	0.068	0.152	0.017	0.033	0.002
	1.501	-0.987	1.074	0.237	1.022	1.490	1.028	2.118	1.845	2.864
Israel	0.112	0.001	0.040	0.010	0.019	0.043	0.067	0.029	0.503	0.023
	1.216	3.105	1.755	2.322	2.066	1.717	1.497	1.896	-0.007	1.998
Italy	0.018	0.025	0.049	0.006	0.012	0.006	0.007	0.033	0.009	0.083
	2.089	1.957	1.657	2.503	2.243	2.532	2.443	1.843	2.348	1.383
Japan	0.041	0.080	0.131	0.039	0.038	0.066	0.036	0.000	0.033	0.054
	1.739	1.406	1.121	1.766	1.772	1.508	1.802	3.343	1.840	1.607
Korea	0.284	0.114	0.070	0.172	0.161	0.115	0.163	0.302	0.327	0.247
	0.571	1.208	1.474	0.945	0.989	1.200	0.981	0.518	0.449	0.685
Luxembourg	0.040	0.055	0.184	0.058	0.303	0.006	0.113	0.099	0.106	0.053
	1.755	1.601	0.902	1.576	0.517	2.508	1.212	1.286	1.247	1.618
Mexico	0.454	0.135	0.826	0.033	0.289	0.417	0.338	0.636	0.391	0.565
	0.116	1.101	-0.938	1.845	0.556	0.210	0.418	-0.347	0.277	-0.163
The Netherlands	0.039	0.042	0.014	0.016	0.021	0.008	0.014	0.076	0.035	0.052
	1.766	1.728	2.208	2.140	2.024	2.412	2.191	1.436	1.810	1.625
Norway	0.156	0.103	0.747	0.026	0.061	0.755	0.055	0.623	0.278	0.464
	1.012	1.262	-0.664	1.950	1.544	-0.690	1.598	-0.313	0.588	0.090
Poland	0.117	0.010	0.328	0.120	0.003	0.019	0.054	0.091	0.049	0.047
	1.192	2.314	0.446	1.175	2.723	2.065	1.611	1.337	1.654	1.679
Portugal	0.002	0.025	0.073	0.043	0.048	0.116	0.026	0.002	0.001	0.000
	2.959	1.966	1.456	1.714	1.665	1.196	1.936	2.901	3.100	3.343
Slovakia	0.429	0.136	0.081	0.159	0.081	0.085	0.102	0.203	0.389	0.266
	0.179	1.100	1.400	1.000	1.397	1.374	1.273	0.831	0.281	0.626
Slovenia	0.161	0.000	0.025	0.011	0.003	0.010	0.004	0.262	0.098	0.072
	0.991	3.418	1.955	2.279	2.712	2.324	2.688	0.637	1.293	1.458
Spain	0.999	0.228	0.989	0.945	0.965	0.958	0.969	0.993	0.992	0.560
	-3.073	0.744	-2.276	-1.597	-1.814	-1.726	-1.863	-2.457	-2.407	-0.151
Sweden	0.645	0.689	0.612	0.615	0.725	0.422	0.632	0.252	0.617	0.663
	-0.371	-0.492	-0.284	-0.292	-0.598	0.196	-0.338	0.669	-0.297	-0.422
Switzerland	0.037	0.078	0.016	0.021	0.005	0.103	0.025	0.019	0.053	0.071
	1.787	1.416	2.147	2.041	2.550	1.266	1.953	2.082	1.614	1.468
Turkey	0.125	0.191	0.020	0.899	0.019	0.055	0.425	0.528	0.430	0.025
	1.148	0.873	2.050	-1.277	2.080	1.599	0.188	-0.069	0.177	1.964
United Kingdom	0.057	0.490	0.891	0.623	0.708	0.906	0.613	0.088	0.052	0.052
	1.584	0.024	-1.234	-0.313	-0.549	-1.317	-0.288	1.356	1.624	1.626

Source: Authors' elaboration.

Table 6: CW test for headline inflation, July 2007–March 2013

	Model 1 (*p-value*) (*t-Statistic*)	Model 2 (*p-value*) (*t-Statistic*)	Model 3 (*p-value*) (*t-Statistic*)	Model 4 (*p-value*) (*t-Statistic*)	Model 5 (*p-value*) (*t-Statistic*)	Model 6 (*p-value*) (*t-Statistic*)	Model 7 (*p-value*) (*t-Statistic*)	Model 8 (*p-value*) (*t-Statistic*)	Model 9 (*p-value*) (*t-Statistic*)	Model 10 (*p-value*) (*t-Statistic*)
Austria	0.040	0.169	0.185	0.938	0.450	0.304	0.956	0.319	0.048	0.051
	1.753	0.959	0.897	-1.535	0.125	0.512	-1.711	0.470	1.661	1.638
Belgium	0.450	0.822	0.857	0.321	0.105	0.193	0.267	0.197	0.459	0.244
	0.125	-0.922	-1.066	0.464	1.256	0.868	0.623	0.852	0.104	0.695
Canada	0.214	0.090	0.096	0.100	0.089	0.088	0.111	0.050	0.199	0.120
	0.792	1.338	1.303	1.279	1.345	1.356	1.219	1.649	0.844	1.176
Chile	0.041	0.009	0.073	0.032	0.029	0.054	0.051	0.012	0.029	0.013
	1.739	2.346	1.451	1.857	1.891	1.606	1.631	2.259	1.891	2.213
Czech Rep.	0.039	0.004	0.029	0.003	0.109	0.048	0.010	0.031	0.025	0.055
	1.763	2.651	1.896	2.718	1.232	1.663	2.316	1.866	1.967	1.602
Denmark	0.024	0.070	0.027	0.029	0.062	0.059	0.032	0.068	0.022	0.065
	1.983	1.474	1.921	1.894	1.538	1.559	1.857	1.489	2.014	1.512
Finland	0.044	0.105	0.157	0.047	0.524	0.897	0.028	0.004	0.028	0.126
	1.707	1.254	1.007	1.679	-0.060	-1.265	1.906	2.643	1.910	1.147
France	0.121	0.354	0.042	0.522	0.098	0.008	0.476	0.091	0.095	0.082
	1.168	0.374	1.732	-0.054	1.293	2.419	0.060	1.332	1.312	1.390
Germany	0.160	0.446	0.282	0.239	0.200	0.338	0.244	0.117	0.137	0.229
	0.996	0.136	0.578	0.711	0.842	0.419	0.695	1.190	1.092	0.743
Greece	0.060	0.096	0.041	0.065	0.065	0.074	0.061	0.134	0.055	0.084
	1.552	1.302	1.737	1.517	1.516	1.447	1.546	1.107	1.598	1.379
Hungary	0.384	0.011	0.045	0.058	0.065	0.129	0.108	0.209	0.348	0.222
	0.295	2.290	1.692	1.575	1.511	1.133	1.237	0.810	0.390	0.765
Iceland	0.136	0.564	0.202	0.386	0.211	0.077	0.474	0.165	0.158	0.131
	1.098	-0.160	0.834	0.291	0.803	1.428	0.064	0.975	1.002	1.120
Ireland	0.059	0.188	0.089	0.169	0.151	0.171	0.128	0.020	0.015	0.061
	1.565	0.884	1.347	0.958	1.031	0.949	1.137	2.044	2.159	1.546
Israel	0.076	0.000	0.013	0.001	0.002	0.001	0.003	0.014	0.309	0.004
	1.434	4.234	2.213	3.134	2.849	2.974	2.793	2.201	0.499	2.644
Italy	0.003	0.006	0.004	0.002	0.002	0.000	0.001	0.003	0.000	0.019
	2.706	2.501	2.648	2.918	2.916	3.670	2.985	2.753	3.345	2.077
Japan	0.004	0.014	0.057	0.004	0.004	0.026	0.003	0.003	0.003	0.009
	2.666	2.200	1.582	2.634	2.655	1.949	2.702	2.772	2.801	2.363
Korea	0.047	0.020	0.030	0.065	0.058	0.051	0.050	0.058	0.057	0.017
	1.672	2.052	1.882	1.518	1.568	1.638	1.648	1.571	1.579	2.128
Luxembourg	0.021	0.028	0.050	0.017	0.179	0.022	0.137	0.032	0.032	0.036
	2.033	1.907	1.648	2.114	0.918	2.007	1.093	1.857	1.847	1.805
Mexico	0.420	0.158	0.812	0.031	0.133	0.158	0.125	0.539	0.284	0.444
	0.202	1.002	-0.884	1.873	1.112	1.004	1.149	-0.099	0.571	0.140
The Netherlands	0.635	0.015	0.004	0.007	0.007	0.003	0.006	0.632	0.666	0.819
	-0.345	2.182	2.636	2.476	2.458	2.772	2.537	-0.336	-0.430	-0.913
Norway	0.831	0.018	0.156	0.004	0.013	0.155	0.009	0.944	0.899	0.042
	-0.960	2.095	1.012	2.614	2.224	1.014	2.374	-1.586	-1.276	1.723
Poland	0.023	0.006	0.133	0.099	0.006	0.027	0.059	0.024	0.007	0.005
	1.990	2.511	1.114	1.289	2.536	1.931	1.560	1.973	2.470	2.598
Portugal	0.003	0.040	0.030	0.026	0.033	0.071	0.016	0.005	0.001	0.012
	2.741	1.749	1.878	1.937	1.832	1.470	2.151	2.543	3.053	2.263
Slovakia	0.105	0.046	0.029	0.055	0.033	0.031	0.040	0.055	0.099	0.050
	1.254	1.689	1.899	1.601	1.841	1.868	1.749	1.602	1.286	1.644
Slovenia	0.045	0.000	0.003	0.001	0.000	0.001	0.000	0.276	0.022	0.035
	1.699	3.741	2.774	3.050	3.413	3.079	3.378	0.595	2.005	1.808
Spain	0.273	0.045	0.170	0.227	0.449	0.412	0.438	0.599	0.704	0.066
	0.604	1.693	0.954	0.749	0.127	0.223	0.157	-0.250	-0.537	1.507
Sweden	0.093	0.613	0.522	0.839	0.912	0.777	0.823	0.078	0.089	0.107
	1.322	-0.287	-0.056	-0.989	-1.352	-0.761	-0.928	1.416	1.345	1.244
Switzerland	0.011	0.016	0.005	0.002	0.000	0.028	0.002	0.018	0.010	0.034
	2.305	2.133	2.579	2.832	3.461	1.912	2.836	2.101	2.338	1.821
Turkey	0.007	0.046	0.010	0.646	0.005	0.051	0.484	0.088	0.062	0.003
	2.450	1.689	2.323	-0.375	2.576	1.634	0.039	1.351	1.535	2.803
United Kingdom	0.025	0.053	0.266	0.194	0.146	0.503	0.232	0.034	0.026	0.021
	1.958	1.617	0.624	0.863	1.053	-0.007	0.733	1.829	1.948	2.043

Source: Authors' elaboration.

3.2 Granger causality: core inflation

In this subsection we explore if a core international inflation factor (CIIF) is able to improve the predictive ability of the univariate models implicitly defined in table 2. Table 7 reports the t-statistics from the CW test carried out for each country in our sample and for each of the ten models in table 2. Results in table 7 correspond to core inflation and consider a pseudo-out-of-sample exercise covering the whole sample period. Yellow shaded cells indicate that the null hypothesis of no additional predictive power of the CIIF is rejected at the 10% significance level. Blue shaded cells indicate that the simple joint Bonferroni test across the ten models is able to reject the null hypothesis at the 10% level.

From table 7 we would like to highlight four facts. First, in 69% of the countries, we are able to reject the null favoring the use of the CIIF in at least one out of the ten models. Second, we are able to reject the null hypothesis in 48% of the countries when the model under consideration is the simple random walk. Third, in 45% of the countries we are able to reject the null in at least 6 of the models. Fourth, in 38% of the countries our joint test based on the Bonferroni bounds is able to reject the null hypothesis, favoring the additional predictive information of the CIIF.

This CIIF adds predictive information to a much lower number of countries when compared with the results obtained for headline inflation. This is expected, however, as one might think that an important component of the results obtained for headline inflation comes from commodity price fluctuations which may affect directly the food and energy components of the CPI. These are the same components that are removed from this index to obtain our measure of core inflation. From another perspective, our results for core inflation are quite impressive as well. They provide evidence of a deeper predictive linkage between international and local inflation than one could have initially thought.

Table 8 reports the same statistics shown in table 7 when we restrict the sample to end in June 2007. The idea again is to isolate the major two events that occurred after July 2007 (commodity prices boom and international financial crisis). Table 9 shows the same statistics for the period July 2007-March 2013.

Broadly speaking, tables 9 and 8 are similar on the aggregate. First, we are able to reject the null favoring the use of the CIIF in at least one out of the ten models in 83% of the countries in both tables. Second, we are able to reject the null hypothesis in 48% of the countries when the model under consideration is the simple random walk in both tables as well. Third, both tables indicate that in 31% of the countries we are able to reject the null in at least 6 of the models. We detect a difference when analyzing the Bonferroni criteria. Table 8 indicates rejection of the null in 41% of the countries, whereas table 9 indicates rejection in only 28% of the countries. Therefore, the global situation is similar, indicating that the international core factor have additional information that could be useful to predict the local core inflation of about a third of the countries in our sample.

Table 7: CW test for core inflation, full sample

	Model 1 (p-value) (t-Statistic)	Model 2 (p-value) (t-Statistic)	Model 3 (p-value) (t-Statistic)	Model 4 (p-value) (t-Statistic)	Model 5 (p-value) (t-Statistic)	Model 6 (p-value) (t-Statistic)	Model 7 (p-value) (t-Statistic)	Model 8 (p-value) (t-Statistic)	Model 9 (p-value) (t-Statistic)	Model 10 (p-value) (t-Statistic)
Austria	0.073	0.135	0.105	0.092	0.248	0.228	0.115	0.042	0.084	0.110
	1.452	1.105	1.251	1.328	0.681	0.746	1.200	1.726	1.381	1.227
Belgium	0.592	0.030	0.101	0.000	0.003	0.306	0.021	0.488	0.326	0.577
	-0.232	1.879	1.274	3.482	2.788	0.508	2.029	0.030	0.450	-0.193
Canada	0.069	0.095	0.093	0.029	0.027	0.011	0.020	0.092	0.032	0.287
	1.483	1.308	1.324	1.899	1.926	2.278	2.053	1.331	1.851	0.562
Chile	0.065	0.001	0.017	0.001	0.203	0.013	0.013	0.084	0.035	0.015
	1.514	3.167	2.127	3.251	0.830	2.215	2.215	1.378	1.812	2.158
Czech Rep.	0.003	0.006	0.000	0.001	0.001	0.000	0.000	0.012	0.001	0.006
	2.801	2.527	3.903	3.068	3.027	3.863	3.650	2.272	3.004	2.521
Denmark	0.065	0.374	0.101	0.707	0.391	0.524	0.458	0.050	0.080	0.097
	1.514	0.321	1.277	-0.545	0.277	-0.060	0.106	1.648	1.403	1.300
Finland	0.027	0.630	0.919	0.661	0.729	0.111	0.652	0.133	0.087	0.029
	1.933	-0.332	-1.399	-0.416	-0.611	1.223	-0.391	1.111	1.357	1.897
France	0.008	0.008	0.002	0.002	0.009	0.004	0.002	0.011	0.009	0.006
	2.417	2.388	2.887	2.883	2.357	2.665	2.814	2.289	2.351	2.539
Germany	0.180	0.672	0.635	0.286	0.264	0.244	0.393	0.592	0.586	0.750
	0.914	-0.446	-0.345	0.565	0.630	0.692	0.272	-0.233	-0.217	-0.674
Greece	0.058	0.109	0.036	0.034	0.216	0.032	0.036	0.093	0.069	0.219
	1.570	1.234	1.793	1.820	0.785	1.852	1.796	1.324	1.483	0.777
Hungary	0.683	0.154	0.542	0.293	0.318	0.341	0.111	0.095	0.017	0.404
	-0.477	1.018	-0.105	0.545	0.472	0.409	1.221	1.309	2.125	0.243
Iceland	0.003	0.018	0.024	0.031	0.814	0.820	0.076	0.113	0.004	0.006
	2.790	2.090	1.977	1.872	-0.891	-0.917	1.433	1.210	2.649	2.507
Ireland	0.061	0.054	0.294	0.004	0.006	0.214	0.012	0.384	0.161	0.070
	1.549	1.603	0.543	2.643	2.496	0.792	2.245	0.294	0.992	1.478
Israel	0.294	0.004	0.457	0.416	0.219	0.652	0.097	0.611	0.608	0.084
	0.541	2.693	0.109	0.213	0.775	-0.392	1.298	-0.282	-0.275	1.376
Italy	0.001	0.182	0.048	0.085	0.088	0.013	0.039	0.004	0.002	0.016
	3.141	0.908	1.663	1.373	1.356	2.232	1.768	2.617	2.966	2.145
Japan	0.444	0.132	0.173	0.180	0.321	0.176	0.165	0.610	0.309	0.244
	0.140	1.116	0.943	0.916	0.466	0.930	0.974	-0.279	0.499	0.694
Korea	0.014	0.000	0.003	0.000	0.003	0.001	0.001	0.022	0.049	0.001
	2.203	4.191	2.718	3.387	2.778	3.094	3.121	2.008	1.654	3.135
Luxembourg	0.855	0.218	0.278	0.347	0.365	0.289	0.271	0.868	0.804	0.567
	-1.059	0.779	0.590	0.394	0.345	0.557	0.609	-1.115	-0.856	-0.168
The Netherlands	0.732	0.374	0.622	0.522	0.547	0.553	0.442	0.832	0.803	0.584
	-0.619	0.322	-0.311	-0.056	-0.117	-0.133	0.147	-0.962	-0.854	-0.211
Norway	0.020	0.089	0.095	0.100	0.015	0.134	0.113	0.361	0.162	0.014
	2.060	1.348	1.310	1.284	2.162	1.106	1.209	0.356	0.987	2.211
Poland	0.199	0.121	0.435	0.353	0.237	0.580	0.224	0.179	0.597	0.240
	0.845	1.169	0.164	0.377	0.715	-0.201	0.759	0.921	-0.246	0.707
Portugal	0.459	0.416	0.376	0.532	0.567	0.498	0.403	0.690	0.371	0.318
	0.103	0.211	0.317	-0.081	-0.170	0.004	0.246	-0.495	0.330	0.472
Slovakia	0.069	0.003	0.021	0.000	0.002	0.009	0.000	0.040	0.069	0.016
	1.485	2.780	2.039	3.876	2.915	2.348	4.059	1.745	1.486	2.144
Slovenia	0.002	0.014	0.011	0.006	0.009	0.007	0.006	0.005	0.005	0.013
	2.808	2.188	2.304	2.535	2.372	2.469	2.509	2.585	2.589	2.216
Spain	0.885	0.371	0.727	0.588	0.755	0.707	0.701	0.916	0.888	0.700
	-1.201	0.328	-0.603	-0.223	-0.689	-0.546	-0.528	-1.380	-1.216	-0.524
Sweden	0.186	0.608	0.453	0.568	0.474	0.489	0.565	0.061	0.183	0.632
	0.891	-0.275	0.119	-0.171	0.066	0.027	-0.164	1.543	0.903	-0.336
Switzerland	0.082	0.056	0.074	0.070	0.018	0.195	0.071	0.050	0.084	0.067
	1.391	1.592	1.444	1.475	2.087	0.858	1.471	1.644	1.376	1.495
United Kingdom	0.819	0.863	0.886	0.898	0.961	0.955	0.960	0.499	0.861	0.598
	-0.912	-1.096	-1.206	-1.270	-1.768	-1.695	-1.751	0.002	-1.086	-0.247
United States	0.393	0.360	0.160	0.602	0.802	0.266	0.669	0.282	0.392	0.367
	0.271	0.358	0.994	-0.259	-0.850	0.625	-0.438	0.577	0.273	0.339

Source: Authors' elaboration.

Table 8: CW test for core inflation until June 2007

	Model 1 (p-value) (t-Statistic)	Model 2 (p-value) (t-Statistic)	Model 3 (p-value) (t-Statistic)	Model 4 (p-value) (t-Statistic)	Model 5 (p-value) (t-Statistic)	Model 6 (p-value) (t-Statistic)	Model 7 (p-value) (t-Statistic)	Model 8 (p-value) (t-Statistic)	Model 9 (p-value) (t-Statistic)	Model 10 (p-value) (t-Statistic)
Austria	0.019	0.045	0.066	0.055	0.393	0.140	0.099	0.192	0.023	0.032
	2.081	1.697	1.508	1.602	0.272	1.082	1.286	0.870	2.002	1.856
Belgium	0.975	0.034	0.063	0.004	0.036	0.147	0.006	0.685	0.941	0.336
	-1.952	1.822	1.530	2.641	1.798	1.051	2.492	-0.483	-1.567	0.424
Canada	0.064	0.300	0.346	0.199	0.003	0.163	0.012	0.043	0.046	0.103
	1.521	0.524	0.397	0.846	2.758	0.982	2.251	1.722	1.687	1.264
Chile	0.447	0.001	0.035	0.000	0.002	0.002	0.000	0.001	0.189	0.198
	0.134	3.049	1.807	3.973	2.814	2.853	3.403	3.264	0.882	0.849
Czech Rep.	0.034	0.318	0.005	0.161	0.133	0.002	0.049	0.034	0.028	0.057
	1.828	0.472	2.602	0.992	1.114	2.943	1.651	1.824	1.915	1.582
Denmark	0.181	0.312	0.425	0.204	0.058	0.304	0.137	0.255	0.219	0.221
	0.910	0.489	0.189	0.826	1.568	0.512	1.093	0.660	0.777	0.768
Finland	0.010	0.249	0.925	0.221	0.101	0.017	0.367	0.005	0.008	0.034
	2.319	0.677	-1.440	0.769	1.278	2.110	0.341	2.562	2.430	1.828
France	0.064	0.064	0.066	0.077	0.065	0.082	0.078	0.061	0.070	0.023
	1.520	1.525	1.503	1.426	1.516	1.394	1.416	1.546	1.479	1.993
Germany	0.234	0.375	0.482	0.455	0.452	0.589	0.604	0.362	0.558	0.115
	0.726	0.319	0.044	0.113	0.120	-0.225	-0.265	0.352	-0.146	1.202
Greece	0.100	0.397	0.053	0.060	0.444	0.051	0.064	0.103	0.125	0.661
	1.280	0.261	1.621	1.553	0.141	1.634	1.524	1.264	1.148	-0.415
Hungary	0.102	0.003	0.009	0.001	0.453	0.230	0.021	0.054	0.083	0.096
	1.268	2.750	2.375	3.217	0.117	0.739	2.041	1.606	1.384	1.302
Iceland	0.028	0.105	0.094	0.202	0.129	0.585	0.247	0.027	0.027	0.046
	1.916	1.254	1.319	0.836	1.129	-0.215	0.683	1.927	1.919	1.686
Ireland	0.116	0.138	0.680	0.097	0.144	0.875	0.197	0.558	0.109	0.110
	1.195	1.091	-0.467	1.301	1.062	-1.149	0.853	-0.147	1.231	1.228
Israel	0.670	0.008	0.608	0.590	0.564	0.902	0.490	0.996	0.995	0.516
	-0.439	2.395	-0.273	-0.228	-0.162	-1.292	0.024	-2.658	-2.543	-0.041
Italy	0.007	0.257	0.237	0.186	0.683	0.016	0.160	0.030	0.008	0.070
	2.459	0.654	0.716	0.892	-0.476	2.151	0.995	1.881	2.425	1.473
Japan	0.087	0.068	0.081	0.104	0.351	0.086	0.103	0.265	0.098	0.083
	1.360	1.492	1.396	1.261	0.383	1.367	1.267	0.628	1.293	1.388
Korea	0.021	0.001	0.009	0.015	0.029	0.004	0.020	0.036	0.080	0.005
	2.042	3.041	2.366	2.170	1.890	2.666	2.050	1.804	1.402	2.577
Luxembourg	0.104	0.125	0.304	0.223	0.232	0.319	0.161	0.121	0.080	0.079
	1.261	1.150	0.512	0.763	0.731	0.471	0.992	1.172	1.408	1.413
The Netherlands	0.228	0.143	0.004	0.004	0.030	0.189	0.047	0.063	0.575	0.737
	0.746	1.067	2.637	2.620	1.887	0.882	1.674	1.528	-0.189	-0.633
Norway	0.115	0.037	0.041	0.070	0.003	0.083	0.079	0.534	0.114	0.091
	1.199	1.791	1.744	1.474	2.770	1.388	1.412	-0.086	1.204	1.337
Poland	0.591	0.036	0.164	0.161	0.124	0.082	0.151	0.104	0.240	0.038
	-0.230	1.801	0.977	0.990	1.156	1.392	1.033	1.259	0.706	1.771
Portugal	0.195	0.379	0.411	0.488	0.386	0.521	0.280	0.286	0.191	0.206
	0.859	0.308	0.225	0.030	0.291	-0.052	0.582	0.564	0.874	0.822
Slovakia	0.444	0.031	0.227	0.034	0.417	0.144	0.038	0.198	0.353	0.260
	0.140	1.872	0.750	1.820	0.210	1.064	1.773	0.848	0.378	0.642
Slovenia	0.146	0.078	0.263	0.178	0.208	0.211	0.149	0.180	0.150	0.096
	1.053	1.420	0.635	0.922	0.814	0.803	1.040	0.915	1.036	1.302
Spain	0.979	0.698	0.899	0.892	0.975	0.887	0.946	0.987	0.963	0.794
	-2.031	-0.520	-1.276	-1.235	-1.953	-1.213	-1.608	-2.238	-1.790	-0.822
Sweden	0.207	0.211	0.720	0.138	0.208	0.533	0.086	0.062	0.180	0.092
	0.817	0.802	-0.583	1.088	0.814	-0.082	1.366	1.540	0.915	1.328
Switzerland	0.176	0.056	0.073	0.077	0.009	0.111	0.079	0.035	0.179	0.127
	0.929	1.585	1.453	1.423	2.368	1.219	1.410	1.816	0.918	1.139
United Kingdom	0.888	0.952	0.954	0.949	0.894	0.928	0.920	0.769	0.900	0.884
	-1.218	-1.667	-1.684	-1.638	-1.247	-1.464	-1.408	-0.735	-1.281	-1.194
United States	0.166	0.552	0.196	0.705	0.816	0.185	0.701	0.139	0.143	0.168
	0.969	-0.130	0.856	-0.539	-0.902	0.898	-0.527	1.083	1.068	0.963

Source: Authors' elaboration.

Table 9: CW test for core inflation, July 2007–March 2013

	Model 1 (p-value) (t-Statistic)	Model 2 (p-value) (t-Statistic)	Model 3 (p-value) (t-Statistic)	Model 4 (p-value) (t-Statistic)	Model 5 (p-value) (t-Statistic)	Model 6 (p-value) (t-Statistic)	Model 7 (p-value) (t-Statistic)	Model 8 (p-value) (t-Statistic)	Model 9 (p-value) (t-Statistic)	Model 10 (p-value) (t-Statistic)
Austria	0.175	0.222	0.179	0.172	0.261	0.500	0.170	0.073	0.186	0.210
	0.935	0.764	0.918	0.947	0.640	0.000	0.956	1.457	0.891	0.806
Belgium	0.931	0.025	0.105	0.022	0.091	0.278	0.026	0.433	0.855	0.304
	-1.487	1.959	1.255	2.007	1.336	0.588	1.936	0.170	-1.059	0.512
Canada	0.062	0.091	0.110	0.052	0.006	0.086	0.015	0.074	0.068	0.088
	1.536	1.332	1.227	1.630	2.524	1.363	2.177	1.444	1.488	1.356
Chile	0.314	0.000	0.011	0.000	0.056	0.006	0.010	0.005	0.123	0.056
	0.484	3.453	2.289	3.351	1.592	2.500	2.316	2.578	1.158	1.591
Czech Rep.	0.011	0.042	0.000	0.012	0.018	0.000	0.003	0.012	0.008	0.019
	2.288	1.725	3.543	2.253	2.093	3.919	2.797	2.256	2.389	2.076
Denmark	0.206	0.484	0.442	0.225	0.054	0.398	0.231	0.232	0.271	0.327
	0.822	0.040	0.145	0.756	1.607	0.259	0.737	0.732	0.609	0.447
Finland	0.015	0.213	0.896	0.185	0.287	0.011	0.304	0.020	0.014	0.025
	2.170	0.797	-1.260	0.898	0.561	2.283	0.514	2.051	2.211	1.964
France	0.058	0.055	0.049	0.067	0.064	0.069	0.065	0.053	0.059	0.016
	1.573	1.597	1.652	1.500	1.526	1.482	1.517	1.613	1.560	2.156
Germany	0.499	0.178	0.802	0.636	0.635	0.771	0.800	0.642	0.787	0.244
	0.002	0.924	-0.847	-0.347	-0.344	-0.743	-0.840	-0.365	-0.795	0.692
Greece	0.072	0.317	0.042	0.047	0.412	0.040	0.050	0.078	0.093	0.510
	1.462	0.475	1.726	1.674	0.222	1.747	1.642	1.416	1.323	-0.025
Hungary	0.325	0.083	0.441	0.280	0.520	0.711	0.399	0.095	0.101	0.177
	0.455	1.387	0.149	0.583	-0.051	-0.555	0.255	1.312	1.275	0.925
Iceland	0.003	0.016	0.019	0.043	0.038	0.090	0.119	0.009	0.006	0.004
	2.775	2.144	2.084	1.718	1.771	1.340	1.180	2.350	2.487	2.635
Ireland	0.126	0.038	0.230	0.013	0.026	0.810	0.025	0.522	0.060	0.217
	1.146	1.780	0.739	2.221	1.939	-0.878	1.965	-0.055	1.554	0.782
Israel	0.585	0.006	0.730	0.534	0.414	0.784	0.198	0.964	0.920	0.265
	-0.214	2.508	-0.613	-0.085	0.216	-0.787	0.848	-1.794	-1.405	0.629
Italy	0.005	0.382	0.328	0.232	0.764	0.076	0.160	0.037	0.006	0.092
	2.558	0.299	0.446	0.732	-0.719	1.431	0.993	1.788	2.523	1.328
Japan	0.116	0.077	0.112	0.132	0.359	0.121	0.129	0.327	0.127	0.097
	1.194	1.423	1.215	1.116	0.361	1.172	1.130	0.447	1.140	1.296
Korea	0.003	0.000	0.027	0.004	0.007	0.001	0.006	0.007	0.022	0.001
	2.706	3.619	1.923	2.638	2.450	2.992	2.532	2.463	2.021	3.197
Luxembourg	0.110	0.096	0.250	0.174	0.175	0.255	0.126	0.123	0.096	0.078
	1.226	1.304	0.676	0.937	0.934	0.660	1.144	1.162	1.306	1.418
The Netherlands	0.228	0.143	0.052	0.071	0.091	0.231	0.106	0.128	0.552	0.703
	0.746	1.069	1.630	1.472	1.332	0.734	1.249	1.134	-0.130	-0.534
Norway	0.103	0.221	0.222	0.371	0.002	0.467	0.413	0.467	0.102	0.069
	1.263	0.769	0.766	0.329	2.942	0.084	0.220	0.082	1.269	1.480
Poland	0.591	0.061	0.137	0.148	0.247	0.147	0.144	0.151	0.277	0.082
	-0.231	1.545	1.096	1.043	0.685	1.049	1.063	1.034	0.592	1.394
Portugal	0.356	0.631	0.567	0.712	0.561	0.648	0.432	0.451	0.344	0.368
	0.369	-0.334	-0.168	-0.560	-0.153	-0.381	0.172	0.124	0.401	0.337
Slovakia	0.200	0.020	0.137	0.016	0.100	0.083	0.016	0.080	0.155	0.069
	0.843	2.061	1.092	2.139	1.279	1.384	2.134	1.405	1.015	1.481
Slovenia	0.137	0.038	0.081	0.076	0.110	0.052	0.057	0.163	0.110	0.051
	1.093	1.776	1.401	1.434	1.225	1.630	1.582	0.982	1.225	1.635
Spain	0.929	0.599	0.836	0.840	0.931	0.847	0.881	0.965	0.914	0.664
	-1.468	-0.252	-0.979	-0.993	-1.486	-1.022	-1.182	-1.817	-1.368	-0.423
Sweden	0.421	0.135	0.520	0.105	0.097	0.520	0.116	0.220	0.391	0.399
	0.199	1.103	-0.049	1.251	1.298	-0.051	1.197	0.772	0.277	0.257
Switzerland	0.207	0.121	0.180	0.168	0.036	0.099	0.172	0.069	0.213	0.152
	0.818	1.172	0.916	0.963	1.802	1.286	0.947	1.486	0.797	1.030
United Kingdom	0.871	0.929	0.941	0.933	0.898	0.929	0.926	0.795	0.876	0.834
	-1.129	-1.465	-1.567	-1.498	-1.270	-1.472	-1.447	-0.824	-1.153	-0.971
United States	0.407	0.652	0.225	0.778	0.832	0.197	0.779	0.223	0.376	0.493
	0.236	-0.391	0.756	-0.767	-0.963	0.853	-0.770	0.762	0.317	0.017

Source: Authors' elaboration.

Tables 10 and 11 provide summary statistics from tables 4-9.

Table 10: Summary statistics for the CW test in tables 4-6 (*)

	Full sample	Until June 2007	July 2007 - March 2013
IF significant in at least one model	100%	81%	94%
IF significant in the RW model	84%	45%	71%
IF significant in at least six models	58%	32%	55%
Bonferroni criteria	48%	39%	45%
Percentage of significant models	68%	39%	61%
Average of p-values	0.161	0.301	0.160

(*) IF stands for International Factor. Source: Authors' elaboration.

Table 11: Summary statistics for the CW test in tables 7-9 (*)

	Full sample	Until June 2007	July 2007 - March 2013
IF significant in at least one model	69%	83%	83%
IF significant in the RW model	48%	48%	48%
IF significant in at least six models	45%	31%	31%
Bonferroni criteria	38%	41%	28%
Percentage of significant models	46%	40%	40%
Average of p-values	0.259	0.250	0.262

(*) IF stands for International Factor. Source: Authors' elaboration.

In summary, for headline inflation we detect predictive ability of the international factor in our first subsample (until June 2007) but stronger evidence of predictability is found in the July 2007-March 2013 period. Overall, about a half of the countries in our sample may benefit from predicting local inflation with the aid of our international factor.

For core inflation we observe that our full sample results are not as strong as in the case of headline inflation. Now it is a little more than a third of the countries in our sample that may benefit from our core international factor. Another interesting difference is that on the aggregate level we do not detect very important differences in the two subsamples that we analyze, suggesting that the 2007 commodity boom and the 2008 recession did not have noticeable impact on the predictive ability of the core inflation factor.

It is also interesting to mention the list of countries for which the international factor seems to be more helpful to predict core inflation. Countries appearing in blue shaded cells in tables 7-9 are: Chile, Czech Republic, Israel, Italy and Korea. The first four countries are also in the list for headline inflation suggesting a very strong linkage between international and local inflation for these countries.

Two more questions are important to address. First, is it relevant the marginal predictive contribution of the international inflation factor? and second, what is the size of the improvements in predictive ability due to the inclusion of this international factor? We analyze the answer to these questions next.

3.2.1 Size of the predictive marginal contribution

To complement the pseudo out-of-sample exercise presented in the previous subsection, now we present some in-sample statistics for the whole period and for the two subsamples we use in the previous section. The results are presented in table 12 for both headline and core inflation. The first row for each period shows the number of models in which the coefficient of the international factor (henceforth, the γ coefficient, see table 2) is statistical significant at the 10% level. The second row reports the average size of this coefficient across the ten models.

Table 12: Average estimates of γ across countries for different samples (*)

Headline inflation

	Austria	Belgium	Canada	Chile	Czech Rep.	Denmark	Finland	France	Germany	Greece	Hungary	Iceland	Ireland	Israel	Italy	Japan
Jan. 1995 - Jun. 2007	0	0	0	10	10	0	0	1	4	6	6	5	0	4	8	0
Average γ	-0.07	-0.13	-0.02	0.44	0.74	0.01	-0.08	0.03	0.11	0.15	0.51	0.39	0.00	0.36	0.09	0.03
July 2007 - May 2013	10	10	9	10	10	9	10	10	10	9	6	0	4	8	10	10
Average γ	0.48	0.79	0.42	1.50	0.57	0.39	0.70	0.39	0.37	0.56	0.43	0.15	0.47	0.50	0.53	0.66
Jan. 1995 - May 2013	3	1	1	10	10	5	4	5	9	6	7	3	3	6	10	10
Average γ	0.09	0.05	0.12	0.70	0.66	0.13	0.11	0.17	0.19	0.25	0.60	0.24	0.21	0.40	0.21	0.19

	Korea	Luxembourg	Mexico	Netherlands	Norway	Poland	Portugal	Slovak Rep.	Slovenia	Spain	Sweden	Switzerland	Turkey	UK	United States
Jan. 1995 - Jun. 2007	10	4	0	0	10	0	0	7	0	0	7	2	0	0	0
Average γ	0.50	0.20	0.19	-0.10	-0.16	0.67	0.08	0.08	0.50	0.05	-0.17	0.19	1.36	0.07	-0.01
July 2007 - May 2013	10	10	0	4	8	1	10	10	10	5	10	10	10	10	3
Average γ	0.46	0.54	0.03	0.15	0.70	0.26	0.48	0.55	0.71	0.32	0.72	0.45	0.98	0.60	-0.04
Jan. 1995 - May 2013	10	6	1	0	1	10	10	7	10	3	3	10	5	10	2
Average γ	0.44	0.28	0.13	-0.02	0.08	0.53	0.22	0.38	0.54	0.15	0.09	0.30	0.78	0.26	0.03

Core inflation

	Austria	Belgium	Canada	Chile	Czech Rep.	Denmark	Finland	France	Germany	Greece	Hungary	Iceland	Ireland	Israel	Italy	Japan
Jan. 1995 - Jun. 2007	0	0	0	6	4	0	0	0	0	0	4	3	0	3	5	0
Average γ	0.12	-0.03	0.09	0.50	0.62	0.03	-0.11	0.06	0.13	0.20	0.75	0.26	-0.09	0.69	0.15	-0.13
July 2007 - May 2013	0	6	0	10	10	2	6	10	0	0	0	10	0	6	4	0
Average γ	0.35	0.29	0.02	1.36	1.09	0.24	0.52	0.43	0.01	0.46	-0.70	3.06	0.68	0.78	0.28	-0.03
Jan. 1995 - May 2013	2	0	0	8	8	0	0	4	0	6	4	7	0	8	5	0
Average γ	0.18	0.01	0.09	0.53	0.71	0.06	0.08	0.18	0.08	0.24	0.54	0.65	-0.13	0.64	0.19	-0.12

	Korea	Luxembourg	Netherlands	Norway	Poland	Portugal	Slovak Rep.	Slovenia	Spain	Sweden	Switzerland	UK	United States
Jan. 1995 - Jun. 2007	7	0	0	3	0	0	9	0	0	0	0	0	0
Average γ	0.41	-0.22	0.09	0.06	0.41	0.11	0.59	1.33	0.06	0.00	-0.30	0.05	0.09
July 2007 - May 2013	10	0	0	6	0	0	10	10	0	0	0	0	0
Average γ	0.95	0.04	-0.04	0.69	0.11	0.51	1.11	1.05	0.04	0.37	-0.61	-0.37	-0.03
Jan. 1995 - May 2013	10	0	0	0	1	0	6	10	0	0	0	0	2
Average γ	0.49	-0.15	0.03	0.11	0.24	0.19	0.82	1.07	0.08	0.05	-0.33	-0.01	0.10

(*) Cells in white are associated to cases in which the γ coefficient was never found to be statistically significant at the 10% level. Cells in yellow are associated to cases in which the γ coefficient was found to be statistically significant in at least one model and at most nine models at the 10% level. Finally, cells in red are associated to cases in which the γ coefficient was found to be statistically significant in all ten models for a given country at the 10% level.

Source: Authors' elaboration.

The first thing to note is that in the second subsample there is a tendency for the γ coefficient to be statistically significant in more models than in the early subsample, suggesting a more robust linkage between local and international inflation in the more recent period. This is a feature shared by core and headline inflation, but it is stronger at the headline level. Secondly, the average across all countries of the marginal predictive contribution of the international factor is 0.19 and 0.51 for headline inflation in both subsamples, and 0.20 and 0.44 for core inflation in both subsamples as well. Therefore, on average, the predictive marginal contribution is similar between headline and core measures, and also has increased by a fairly similar amount between the two sample periods. Thirdly, there is positive correlation in the predictive marginal contributions between headline and core inflation of 0.30 in the first sample period, 0.68 in the second sample period and of 0.65 in the whole sample, indicating a tendency for the predictive pass-through in core and headline inflation to move in tandem. Finally, and despite all the aforementioned similarities between headline and core results, we detect more heterogeneity in the predictive pass-through of core inflation, especially in the second subsample. Moreover, while the heterogeneity decreased for headline inflation in the more recent period, it increased for core inflation. In fact, the standard deviation of the estimates of the predictive pass-through for headline inflation decreased from 0.33 to 0.28 between the two sample periods but increased from 0.34 to 0.71 for core inflation. In fact, in the last sample period, in 94% of the countries the γ coefficient is statistically significant in at least one model for headline inflation, yet this percentage decreases to 45% for core inflation.

In summary, we see that on average the predictive pass-through from international to local inflation is far from negligible in a number of countries and moreover has shown an increment in the recent years. This is true both for core and headline inflation but more so for the latter measure. Finally, more heterogeneity is found in results for core inflation. This is particularly noticeable in the more recent subsample.

3.3 Forecast accuracy

In this section we are concerned with finite sample forecast accuracy. In previous sections we showed evidence indicating that, at least for some countries and periods, the international inflation factor may potentially help in predicting local inflation. Even when this is true, if the marginal predictive contribution of the international factor is either small or time varying, its finite sample estimates may be too noisy to help in a real life application. Moreover, for multi-step forecasts we need to rely on an appropriate model for the international factor, which of course will provide imperfect forecasts for the factor as well.[10]

To evaluate how useful is to include the international factor in an empirical application, we run a horse race using the same recursive pseudo-out-of-sample framework used for the calculation of the CW statistic. The difference now is that we focus on sample Root Mean Squared Prediction Errors between each of the ten univariate models used as benchmarks and

[10] We recall that in this paper we are interested in generating iterated multistep forecasts. An interesting topic for future research would be a comparison between iterated and direct multistep forecasts in this environment.

their international inflation augmented versions displayed in table 2. The RMSPE for the ten models when forecasting at three different horizons (1, 12 and 24 months) are calculated to form the ratio of RMSPE between the models with international factor and the models without international factor (this is done simply by setting $\gamma = 0$ in the models in table 2).[11]

Tables 13 and 14 show for each country the average ratio across our ten models, and also the lowest ratio between the ten models, so to get an idea of the best performance of the international factor. While table 13 shows results for headline inflation, table 14 shows results for core inflation. Yellow shaded cells highlight situations in which the inclusion of the international factor generates a reduction of at least 5% in pseudo-out-of-sample RMSPE.

Table 13: RMSPE Ratios between models with and without the international factor

Headline inflation

Country	Average Relative Performance			Best Relative Performance		
	h=1	h=12	h=24	h=1	h=12	h=24
Austria	1.00	0.98	0.98	0.99	0.96	0.96
Belgium	1.00	0.98	0.98	0.98	0.92	0.94
Canada	1.00	0.99	0.99	0.99	0.95	0.94
Chile	0.92	0.95	0.95	0.82	0.83	0.86
Czech Republic	0.98	0.93	0.92	0.95	0.89	0.87
Denmark	0.98	0.96	0.95	0.96	0.85	0.74
Finland	1.00	0.97	0.97	0.96	0.89	0.89
France	0.98	0.98	1.00	0.95	0.93	0.94
Germany	0.99	0.99	0.99	0.97	0.91	0.91
Greece	0.99	0.97	0.97	0.98	0.94	0.91
Hungary	1.03	1.17	1.25	0.96	0.98	0.91
Iceland	1.00	0.99	1.00	0.99	0.96	0.98
Ireland	0.98	0.97	0.98	0.89	0.88	0.91
Israel	0.96	0.96	0.95	0.90	0.93	0.90
Italy	0.94	0.96	0.97	0.89	0.89	0.92
Japan	0.96	0.94	0.93	0.92	0.72	0.63
Korea	0.99	0.94	0.97	0.96	0.90	0.94
Luxembourg	0.98	0.98	0.98	0.95	0.90	0.90
Mexico	1.00	1.00	1.01	0.98	0.97	0.97
The Netherlands	1.00	1.00	1.00	1.00	1.00	0.98
Norway	0.99	0.99	0.99	0.99	0.98	0.97
Poland	0.99	1.01	1.00	0.97	0.95	0.96
Portugal	0.98	0.97	0.98	0.96	0.93	0.94
Slovakia	0.96	0.92	0.92	0.91	0.84	0.80
Slovenia	0.97	0.99	1.02	0.96	0.96	0.98
Spain	0.99	0.98	0.99	0.95	0.93	0.93
Sweden	0.99	0.97	0.97	0.94	0.91	0.91
Switzerland	0.97	0.97	0.98	0.94	0.91	0.93
Turkey	0.98	1.03	1.07	0.96	0.96	0.96
United Kingdom	0.97	0.95	0.92	0.92	0.89	0.82
United States	1.00	1.00	1.00	0.97	0.96	0.96

Figures below 1 favor models including the international factor.

Source: Authors' elaboration.

When focusing on headline inflation, we detect 8 countries for which average reductions in RMSPE are 5% or higher at some forecasting horizons. These countries are Chile, Czech

[11]Several backup estimates using the WTI Crude Oil Spot Price, the US inflation (leads and lags), the GDP-weighted OECD-Countries Inflation measure, and the IMF Commodity Price Index delivered an almost similar (a bit worse) out-of-sample performance, based on RMSPE.

Republic, Denmark, Italy, Japan, Korea, Slovakia and the UK. Average gains are modest, however, reaching a maximum of 8% for Chile, Czech Republic, Slovakia and the UK. The right panel of table 13 shows the lowest ratio across models for each country and forecasting horizon. In this case we see that for about two thirds of our countries the inclusion of the international factor helps (sometimes importantly) the worst performing univariate benchmark.

Table 14: RMSPE Ratios between models with and without the international factor

Core inflation

Country	Average Relative Performance			Best Relative Performance		
	h=1	*h=12*	*h=24*	*h=1*	*h=12*	*h=24*
Austria	0.99	0.98	0.97	0.99	0.95	0.91
Belgium	1.00	1.02	1.04	0.99	0.99	0.99
Canada	0.99	1.00	0.99	0.98	0.97	0.94
Chile	0.98	0.96	0.95	0.95	0.93	0.89
Czech Republic	0.98	0.98	0.99	0.96	0.96	0.97
Denmark	1.00	1.00	1.00	0.99	1.00	0.99
Finland	1.00	1.00	1.00	0.98	0.97	0.97
France	0.99	1.00	0.99	0.99	0.99	0.98
Germany	1.00	1.00	0.99	1.00	0.99	0.98
Greece	1.00	1.00	1.01	0.99	0.98	0.99
Hungary	1.00	1.01	1.02	0.99	1.00	0.98
Iceland	0.98	1.00	1.01	0.94	0.98	0.99
Ireland	1.00	0.98	0.98	0.99	0.95	0.96
Israel	1.01	0.97	0.95	0.99	0.88	0.83
Italy	0.99	0.99	0.99	0.98	0.97	0.94
Japan	1.00	1.01	1.01	1.00	1.01	1.00
Korea	0.97	0.94	0.94	0.95	0.89	0.83
Luxembourg	1.00	1.00	1.00	1.00	0.98	0.97
The Netherlands	1.00	1.00	1.00	1.00	1.00	0.99
Norway	1.00	1.00	0.99	0.99	0.99	0.99
Poland	1.00	1.00	1.00	0.99	0.98	0.98
Portugal	1.00	1.00	1.00	1.00	0.99	0.99
Slovakia	0.97	0.95	0.95	0.91	0.83	0.80
Slovenia	0.99	1.00	1.04	0.98	0.99	1.03
Spain	1.00	1.00	1.00	1.00	0.99	0.99
Sweden	1.00	0.99	0.99	1.00	0.98	0.98
Switzerland	0.98	1.01	1.01	0.96	0.99	1.00
United Kingdom	1.00	1.00	1.00	1.00	0.99	0.99
United States	1.01	0.99	0.99	1.00	0.98	0.98

Figures below 1 favor models including the international factor.

Source: Authors' elaboration.

When focusing on core inflation results are poorer as we only detect one country for which average reductions in RMSPE are 5% or higher at some forecasting horizon: Korea. The right panel of table 14 shows the lowest ratio across models for each country and forecasting horizon. In this case we see that for about one third of our countries the inclusion of the international factor helps the worst performing univariate benchmark by reducing the RMSPE by more than a 5%.

We also looked if these gains are statistically significant according to the DMW test. For the sake of brevity we do not report the detailed tables that are available upon request. But, as expected, more rejections are found when analyzing headline inflation. In fact, considering our ten models, 3 forecasting horizons, 31 countries with headline inflation data and 29 with core inflation data we computed the percentage of rejections of the null hypothesis of superior predictive ability of the model without international inflation. Aggregating all models, forecasting horizons and countries, we ended up with 39% of rejections for headline inflation and 28% of rejections for core inflation.

3.3.1 Stability of our results

In previous sections we detected some instability in the predictive contribution of the international factor. In this brief subsection we explore in terms of forecast accuracy how stable the relative performance of the models with international factors is versus the performance of the models excluding the international factors. In table 15 we analyze the average predictive performance of the models in two different samples: previous to June 2007 and during the period July 2007-March 2013. Table 15 shows the percentage of countries in which forecasts generated with the models in table 2 including the international factor outperform forecasts generated with the same models but without the international factor. We see that in the case of headline inflation the percentage of countries for which the international factor is useful is higher in the last period of our sample. In fact, in 30 out of 31 countries the inclusion of the international factor generates lower RMSPE when forecasting one-month-ahead.

In the case of core inflation, table 15 indicates that the international factor is useful for roughly the same share of countries in the two different sample periods.

Table 15: Percentage of countries for which the International Factor reduces RMSPE, different samples

Headline inflation

	h=1	*h=12*	*h=24*
Until June 2007	58%	45%	39%
Jul-2007 - Mar-2013	97%	65%	52%

Core inflation

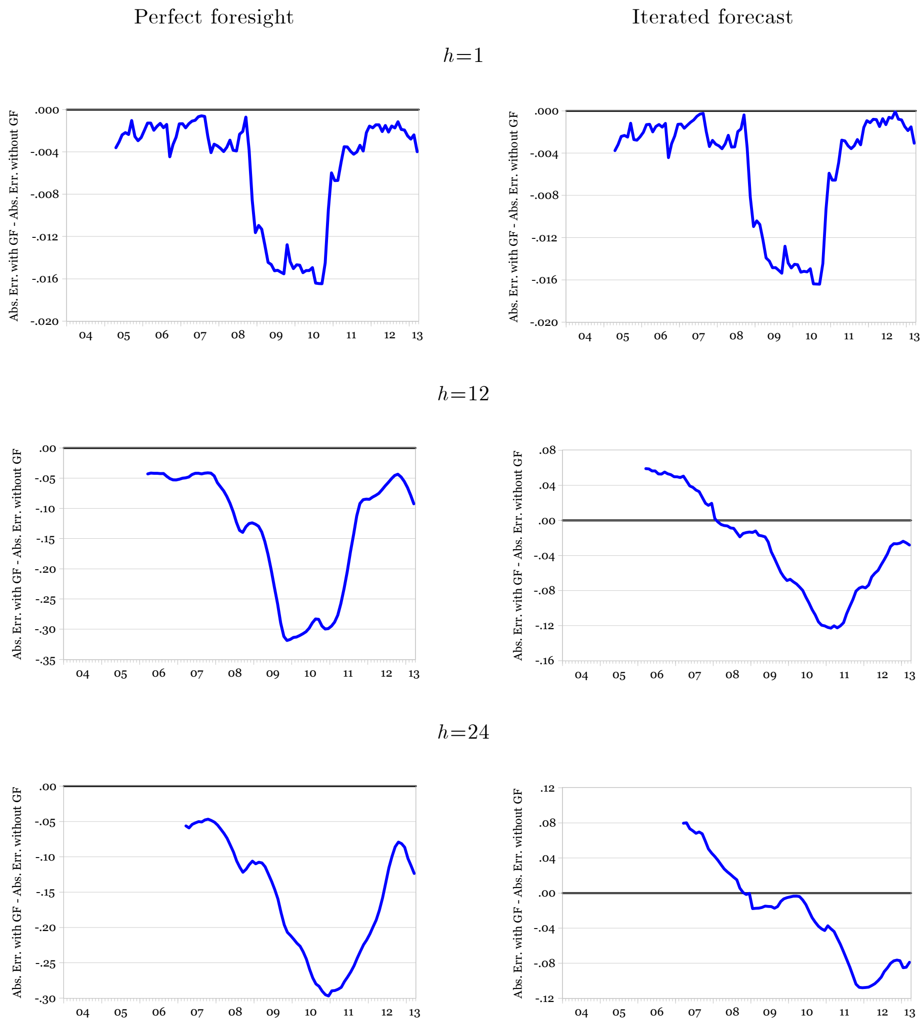
	h=1	*h=12*	*h=24*
Until June 2007	72%	62%	55%
Jul-2007 - Mar-2013	76%	55%	59%

Source: Authors' elaboration.

3.3.2 A perfect foresight comment

We have relied on expression (2) for the construction of multi-step-ahead forecasts. If this expression is a poor representation of the international factor we will end up with poor multi-step forecasts for local inflation and that may erode our conclusions. To that end we have built forecasts assuming that the future path of the international factor is known. This is what we call a perfect foresight exercise. Figure 3 below shows the results of the average across models of an exercise in which we compute the difference between the sample Mean Absolute Errors (MAE) over rolling windows of two years between models with and without the international factor. Negative values favor the models incorporating the international factors. We show this for the three forecasting horizons under analysis. This figure displays a left panel and a right panel. These two panels differ in that we have assumed in the left panel that the true future values of the international factors are known so there is no need to forecast them. In the right panel we have assumed that the evolution of the international factors follows expression (2). Therefore we have generated forecasts for the international factors according to this expression.[12] This is what we call an iterated forecast exercise.

Figure 3: Difference in mean absolute errors calculated over rolling windows of two years



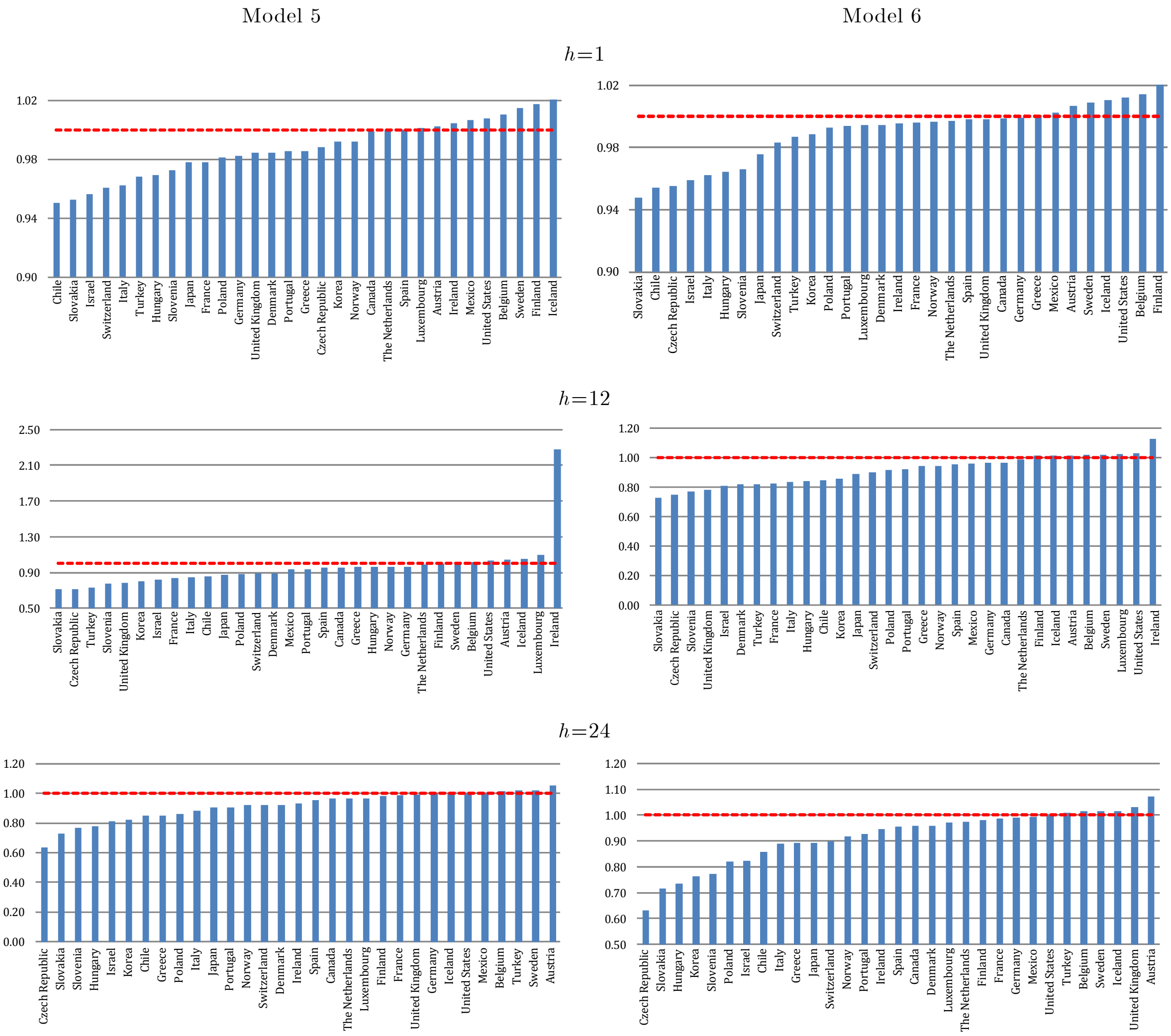
Source: Authors' elaboration.

Figure 3 speaks for itself as all charts could be described as U-shaped with some random noise. We see that for all the three horizons the relative performance of the models is not stable as around the year 2008 the relative performance of the models including the international factor improved. Figure 3 also shows that this relative improvement has declined in the last period of our sample. This figure is also very vivid at indicating that full knowledge of future values of the international factor would improve the accuracy of multi-step forecasts. To give another illustration of this finding let us take a look at figure 4 below. For a pair of selected models from table 2 we have depicted the RMSPE ratios between the models with and without international factors assuming a perfect foresight exercise. Let us recall from figure 1 that models 5 and 6 that we use in this illustration are the most frequent winners,

[12] Notice that when forecasting one-month-ahead both the perfect foresight and iterated forecast exercises provide the same results by construction.

so in general they are strong univariate benchmarks to beat. As usual, ratios below 1 favor the model including international factors. Figure 4 suggests that accurate forecasts of the international factors would be able to generate important gains in forecast accuracy when predicting local inflation for a number of countries. For instance, using model 6 to forecast 2-years-ahead we see that full knowledge of future values of the international factor would generate reductions in RMSPE of 5% or higher for about half of our sample.

Figure 4: RMSPE Ratios with perfect foresight of the global factor



Source: Authors' elaboration.

4 Concluding remarks

In this paper we analyze the contribution of international measures of inflation to predict local ones. To that end we consider the set of current thirty two OECD economies for which inflation data is available at a monthly frequency. By considering this set of countries, a span of time including the recent post-crisis period and measures of core and headline inflation, we are extending in three important dimensions the previous literature on this topic. Our main results indicate that for headline inflation about a half of the countries in our sample may benefit from predicting local inflation with the aid of our international factor. While we detect predictive ability of the international factor in our first subsample (until June 2007) stronger evidence of predictability is found in the July 2007-March 2013 period. For core inflation we observe that our full sample results are not as strong as in the case of headline inflation. Now it is a little more than a third of the countries that may benefit from our core international factor. Interestingly, for core inflation we do not detect very important differences in the two subsamples that we analyze, suggesting that the 2007 commodity boom and the 2008 recession did not have noticeable impact on the predictive ability of the core inflation factor.

In terms of the size of the predictive pass-through from international to local inflation we show that it is non-negligible both at the core and headline levels. Besides, this predictive pass-through has increased in the last period of our sample. Nevertheless, there is cross-country heterogeneity in the size and statistical significance of this pass-through which is especially important at the core level.

Finally, sizeable reductions in RMSPE are obtained only for a handful of countries and they are more significant for headline than for core inflation. For most of the countries, however, the inclusion of the international factor generates, at the very best, mild improvements in forecast accuracy. The question about how to take more advantage of international inflation to predict local ones is unanswered and left for future research. One might embrace the hope that a more adequate definition of each country's relevant international factor, a more efficient estimation strategy in finite samples and a more adequate model to generate multistep forecasts of the international factors could improve the forecast accuracy of local inflation for a number of countries substantially. If this is obtained, a second step might be to understand better why some countries' inflation rates are better forecasted with the help of international inflation, if this has to do with the degree of openness, the exchange policy or other factors. These interesting topics are also left to future research.

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A Descriptive statistics

A: Headline inflation - annual variation, different samples

Country	Date	Mean	Median	Std. Dev.	Max.	Min.
Austria	*Jan-95 - Jun-07*	1.74	1.78	0.70	3.34	-0.11
	Jun-07 - May-13	2.29	2.31	1.08	3.86	-0.28
	Jan-95 - Mar-13	1.92	1.88	0.88	3.86	-0.28
Belgium	*Jan-95 - Jun-07*	1.84	1.80	0.67	3.38	0.35
	Jun-07 - May-13	2.50	2.80	1.67	5.88	-1.64
	Jan-95 - Mar-13	2.04	1.92	1.12	5.88	-1.64
Canada	*Jan-95 - Jun-07*	2.04	2.07	0.82	4.68	0.59
	Jun-07 - May-13	1.78	1.87	1.05	3.68	-0.92
	Jan-95 - Mar-13	1.96	1.98	0.91	4.68	-0.92
Chile	*Jan-95 - Jun-07*	4.15	3.74	2.12	8.78	-0.72
	Jun-07 - May-13	3.53	3.16	3.25	9.82	-3.45
	Jan-95 - Mar-13	3.95	3.56	2.54	9.82	-3.45
Czech Republic	*Jan-95 - Jun-07*	4.65	3.43	3.55	13.49	-0.42
	Jun-07 - May-13	2.86	2.24	2.00	7.54	-0.18
	Jan-95 - Mar-13	4.08	2.94	3.25	13.49	-0.42
Denmark	*Jan-95 - Jun-07*	2.10	2.14	0.52	3.31	0.82
	Jun-07 - May-13	2.31	2.39	0.81	4.26	0.83
	Jan-95 - Mar-13	2.17	2.19	0.63	4.26	0.82
Finland	*Jan-95 - Jun-07*	1.35	1.17	0.91	3.70	-0.50
	Jun-07 - May-13	2.30	2.72	1.55	4.70	-1.55
	Jan-95 - Mar-13	1.65	1.51	1.23	4.70	-1.55
France	*Jan-95 - Jun-07*	1.57	1.68	0.58	2.57	0.11
	Jun-07 - May-13	1.68	1.78	0.98	3.59	-0.66
	Jan-95 - Mar-13	1.61	1.70	0.73	3.59	-0.66
Germany	*Jan-95 - Jun-07*	1.46	1.49	0.50	2.82	0.11
	Jun-07 - May-13	1.71	1.94	0.92	3.28	-0.46
	Jan-95 - Mar-13	1.54	1.52	0.67	3.28	-0.46
Greece	*Jan-95 - Jun-07*	4.38	3.54	2.06	10.67	2.02
	Jun-07 - May-13	2.87	2.83	1.65	5.60	-0.24
	Jan-95 - Mar-13	3.90	3.41	2.06	10.67	-0.24
Hungary	*Jan-95 - Jun-07*	11.35	9.26	7.78	31.12	2.32
	Jun-07 - May-13	5.07	5.12	1.39	8.29	2.18
	Jan-95 - Mar-13	9.37	6.60	7.11	31.12	2.18
Iceland	*Jan-95 - Jun-07*	3.69	2.98	2.18	9.39	0.81
	Jun-07 - May-13	7.43	5.73	4.36	18.55	1.84
	Jan-95 - Mar-13	4.87	4.14	3.49	18.55	0.81
Ireland	*Jan-95 - Jun-07*	3.15	2.74	1.47	6.96	0.93
	Jun-07 - May-13	0.98	1.72	3.29	5.02	-6.53
	Jan-95 - Mar-13	2.46	2.50	2.43	6.96	-6.53
Israel	*Jan-95 - Jun-07*	4.19	3.14	4.21	13.89	-2.79
	Jun-07 - May-13	2.97	3.00	1.20	5.60	0.29
	Jan-95 - Mar-13	3.81	3.04	3.59	13.89	-2.79
Italy	*Jan-95 - Jun-07*	2.60	2.30	1.03	5.76	1.30
	Jun-07 - May-13	2.25	2.34	1.02	4.13	0.00
	Jan-95 - Mar-13	2.49	2.30	1.04	5.76	0.00
Japan	*Jan-95 - Jun-07*	-0.05	-0.19	0.80	2.57	-1.57
	Jun-07 - May-13	-0.18	-0.20	1.01	2.30	-2.53
	Jan-95 - Mar-13	-0.09	-0.20	0.88	2.57	-2.53
Korea	*Jan-95 - Jun-07*	3.56	3.34	1.74	9.55	0.12
	Jun-07 - May-13	3.20	3.10	1.12	5.90	1.23
	Jan-95 - Mar-13	3.45	3.33	1.58	9.55	0.12
Luxembourg	*Jan-95 - Jun-07*	1.98	2.08	0.79	3.66	-1.29
	Jun-07 - May-13	2.42	2.49	1.20	4.80	-0.64
	Jan-95 - Mar-13	2.12	2.18	0.96	4.80	-1.29
Mexico	*Jan-95 - Jun-07*	13.06	7.06	11.95	51.92	2.84
	Jun-07 - May-13	4.34	4.08	0.92	6.54	2.97
	Jan-95 - Mar-13	10.31	5.09	10.69	51.92	2.84
The Netherlands	*Jan-95 - Jun-07*	2.17	2.05	0.82	4.43	0.89
	Jun-07 - May-13	1.96	1.99	0.73	3.22	0.19
	Jan-95 - Mar-13	2.10	2.03	0.80	4.43	0.19
Norway	*Jan-95 - Jun-07*	2.03	2.11	1.02	5.07	-1.81
	Jun-07 - May-13	1.92	1.73	1.26	5.52	-0.29
	Jan-95 - Mar-13	2.00	2.08	1.10	5.52	-1.81
Poland	*Jan-95 - Jun-07*	8.63	6.06	8.33	33.53	0.11
	Jun-07 - May-13	3.48	3.78	0.93	4.87	0.97
	Jan-95 - Mar-13	7.01	4.07	7.31	33.53	0.11
Portugal	*Jan-95 - Jun-07*	3.01	2.87	0.82	5.13	1.57
	Jun-07 - May-13	1.89	2.42	1.64	4.19	-1.74
	Jan-95 - Mar-13	2.65	2.75	1.25	5.13	-1.74
Slovakia	*Jan-95 - Jun-07*	6.90	6.54	3.29	16.59	1.94
	Jun-07 - May-13	2.90	3.31	1.42	5.40	0.35
	Jan-95 - Mar-13	5.64	5.18	3.39	16.59	0.35
Slovenia	*Jan-95 - Jun-07*	6.89	7.28	3.44	19.58	1.48
	Jun-07 - May-13	2.72	2.26	1.85	6.95	-0.61
	Jan-95 - Mar-13	5.58	5.47	3.60	19.58	-0.61
Spain	*Jan-95 - Jun-07*	3.09	3.12	0.87	5.34	1.37
	Jun-07 - May-13	2.34	2.39	1.58	5.28	-1.34
	Jan-95 - Mar-13	2.85	2.94	1.19	5.34	-1.34
Sweden	*Jan-95 - Jun-07*	1.15	0.99	1.00	3.33	-1.19
	Jun-07 - May-13	1.61	1.50	1.60	4.41	-1.84
	Jan-95 - Mar-13	1.29	1.22	1.23	4.41	-1.84
Switzerland	*Jan-95 - Jun-07*	0.88	0.82	0.57	2.10	-0.21
	Jun-07 - May-13	0.46	0.29	1.19	3.15	-1.24
	Jan-95 - Mar-13	0.75	0.65	0.84	3.15	-1.24
Turkey	*Jan-95 - Jun-07*	49.58	56.08	32.61	128.57	7.16
	Jun-07 - May-13	8.06	8.18	2.04	12.12	3.97
	Jan-95 - Mar-13	36.50	12.03	33.20	128.57	3.97
United Kingdom	*Jan-95 - Jun-07*	1.73	1.63	0.63	3.07	0.54
	Jun-07 - May-13	3.14	3.05	0.99	5.25	1.09
	Jan-95 - Mar-13	2.17	1.94	1.00	5.25	0.54
United States	*Jan-95 - Jun-07*	2.59	2.64	0.76	4.73	1.10
	Jun-07 - May-13	2.16	2.12	1.71	5.53	-2.04
	Jan-95 - Mar-13	2.46	2.57	1.16	5.53	-2.04

Source: Authors' elaboration.

B: Core inflation - annual variation, different samples

Country	Date	Mean	Median	Std. Dev.	Max.	Min.
	Jan-95 - Jun-07	1.59	1.50	0.64	2.80	-0.30
Austria	*Jun-07 - May-13*	1.91	1.90	0.43	2.70	1.10
	Jan-95 - Mar-13	1.69	1.70	0.60	2.80	-0.30
	Jan-95 - Jun-07	1.63	1.65	0.49	3.10	0.60
Belgium	*Jun-07 - May-13*	1.78	1.70	0.39	2.60	1.00
	Jan-95 - Mar-13	1.68	1.70	0.46	3.10	0.60
	Jan-95 - Jun-07	1.76	1.60	0.59	3.80	0.30
Canada	*Jun-07 - May-13*	1.42	1.50	0.45	2.70	0.60
	Jan-95 - Mar-13	1.65	1.60	0.57	3.80	0.30
	Jan-95 - Jun-07	4.06	3.15	2.27	9.79	0.15
Chile	*Jun-07 - May-13*	2.28	1.85	1.96	7.00	-1.63
	Jan-95 - Mar-13	3.50	2.92	2.32	9.79	-1.63
	Jan-95 - Jun-07	5.06	3.45	3.94	14.60	0.00
Czech Republic	*Jun-07 - May-13*	1.92	1.20	1.66	5.60	0.10
	Jan-95 - Mar-13	4.01	2.70	3.66	14.60	0.00
	Jan-95 - Jun-07	1.89	1.90	0.45	2.80	1.00
Denmark	*Jun-07 - May-13*	1.91	1.90	0.39	2.80	1.00
	Jan-95 - Mar-13	1.90	1.90	0.43	2.80	1.00
	Jan-95 - Jun-07	1.37	1.40	1.07	3.80	-0.80
Finland	*Jun-07 - May-13*	1.75	1.90	0.95	3.10	-0.60
	Jan-95 - Mar-13	1.49	1.50	1.05	3.80	-0.80
	Jan-95 - Jun-07	1.37	1.30	0.65	2.60	0.30
France	*Jun-07 - May-13*	1.14	1.00	0.45	2.10	0.30
	Jan-95 - Mar-13	1.30	1.20	0.60	2.60	0.30
	Jan-95 - Jun-07	1.33	1.30	0.50	2.50	0.40
Germany	*Jun-07 - May-13*	1.20	1.20	0.38	2.20	0.30
	Jan-95 - Mar-13	1.29	1.20	0.47	2.50	0.30
	Jan-95 - Jun-07	4.61	3.40	2.51	10.90	1.40
Greece	*Jun-07 - May-13*	1.85	2.40	1.61	4.20	-2.00
	Jan-95 - Mar-13	3.74	3.20	2.60	10.90	-2.00
	Jan-95 - Jun-07	11.22	8.25	7.87	30.60	1.30
Hungary	*Jun-07 - May-13*	3.55	3.60	1.72	6.60	0.60
	Jan-95 - Mar-13	8.80	6.10	7.48	30.60	0.60
	Jan-95 - Jun-07	3.85	3.35	2.19	9.40	0.80
Iceland	*Jun-07 - May-13*	6.78	5.90	4.12	17.40	0.70
	Jan-95 - Mar-13	4.78	4.30	3.23	17.40	0.70
	Jan-95 - Jun-07	3.25	2.75	1.66	7.00	0.70
Ireland	*Jun-07 - May-13*	0.61	1.00	3.13	5.90	-6.30
	Jan-95 - Mar-13	2.42	2.40	2.54	7.00	-6.30
	Jan-95 - Jun-07	3.85	2.60	4.55	13.40	-3.20
Israel	*Jun-07 - May-13*	2.58	2.50	1.36	5.30	0.30
	Jan-95 - Mar-13	3.45	2.50	3.88	13.40	-3.20
	Jan-95 - Jun-07	2.59	2.40	0.99	5.70	1.40
Italy	*Jun-07 - May-13*	1.76	1.70	0.34	2.50	0.90
	Jan-95 - Mar-13	2.33	2.10	0.93	5.70	0.90

Country	Date	Mean	Median	Std. Dev.	Max.	Min.
	Jan-95 - Jun-07	-0.03	-0.20	0.78	2.50	-1.10
Japan	*Jun-07 - May-13*	-0.56	-0.60	0.52	0.50	-1.50
	Jan-95 - Mar-13	-0.20	-0.30	0.75	2.50	-1.50
	Jan-95 - Jun-07	3.05	3.00	1.54	6.10	-0.70
Korea	*Jun-07 - May-13*	2.46	2.50	0.83	4.50	1.20
	Jan-95 - Mar-13	2.86	2.70	1.39	6.10	-0.70
	Jan-95 - Jun-07	1.76	1.90	0.62	3.00	-1.50
Luxembourg	*Jun-07 - May-13*	2.02	1.90	0.44	3.40	1.30
	Jan-95 - Mar-13	1.84	1.90	0.58	3.40	-1.50
	Jan-95 - Jun-07	2.13	2.10	0.83	4.10	0.30
The Netherlands	*Jun-07 - May-13*	1.76	1.70	0.38	2.90	1.20
	Jan-95 - Mar-13	2.02	1.90	0.74	4.10	0.30
	Jan-95 - Jun-07	1.72	2.00	0.95	3.50	-0.60
Norway	*Jun-07 - May-13*	2.00	2.00	0.85	4.00	0.10
	Jan-95 - Mar-13	1.81	2.00	0.92	4.00	-0.60
	Jan-95 - Jun-07	7.42	5.00	6.91	25.80	0.40
Poland	*Jun-07 - May-13*	1.97	2.00	0.80	3.40	0.60
	Jan-95 - Mar-13	5.61	2.40	6.21	25.80	0.40
	Jan-95 - Jun-07	3.47	3.10	1.10	5.90	1.40
Portugal	*Jun-07 - May-13*	1.63	1.60	0.88	3.30	-0.90
	Jan-95 - Mar-13	2.89	2.70	1.34	5.90	-0.90
	Jan-95 - Jun-07	6.42	6.70	3.59	15.80	-0.30
Slovakia	*Jun-07 - May-13*	2.78	2.50	0.92	5.20	1.10
	Jan-95 - Mar-13	5.20	4.30	3.44	15.80	-0.30
	Jan-95 - Jun-07	4.97	5.70	2.64	8.90	0.40
Slovenia	*Jun-07 - May-13*	1.53	1.20	1.43	4.50	-1.10
	Jan-95 - Mar-13	3.48	2.80	2.78	8.90	-1.10
	Jan-95 - Jun-07	2.94	2.70	0.66	4.90	1.60
Spain	*Jun-07 - May-13*	1.38	1.30	0.80	2.60	-0.20
	Jan-95 - Mar-13	2.45	2.50	1.01	4.90	-0.20
	Jan-95 - Jun-07	0.63	0.40	1.20	3.30	-1.50
Sweden	*Jun-07 - May-13*	0.98	1.00	1.53	4.20	-1.80
	Jan-95 - Mar-13	0.74	0.50	1.32	4.20	-1.80
	Jan-95 - Jun-07	0.81	0.70	0.52	2.30	-0.10
Switzerland	*Jun-07 - May-13*	0.37	0.50	0.84	1.70	-1.10
	Jan-95 - Mar-13	0.67	0.70	0.67	2.30	-1.10
	Jan-95 - Jun-07	1.47	1.40	0.79	3.80	-0.10
United Kingdom	*Jun-07 - May-13*	2.29	2.30	0.68	3.70	1.10
	Jan-95 - Mar-13	1.72	1.60	0.85	3.80	-0.10
	Jan-95 - Jun-07	2.32	2.30	0.44	3.10	1.10
United States	*Jun-07 - May-13*	1.80	1.90	0.52	2.50	0.60
	Jan-95 - Mar-13	2.15	2.20	0.52	3.10	0.60

Source: Authors' elaboration.

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