Banco Central de Chile
Documentos de Trabajo

Central Bank of Chile
Working Papers

N° 648

Diciembre 2011

PROPAGATION OF SHOCKS TO FOOD AND ENERGY PRICES: AN INTERNATIONAL COMPARISON

Michael Pedersen

BANCO CENTRAL DE CHILE

CENTRAL BANK OF CHILE

La serie Documentos de Trabajo es una publicación del Banco Central de Chile que divulga los trabajos de investigación económica realizados por profesionales de esta institución o encargados por ella a terceros. El objetivo de la serie es aportar al debate temas relevantes y presentar nuevos enfoques en el análisis de los mismos. La difusión de los Documentos de Trabajo sólo intenta facilitar el intercambio de ideas y dar a conocer investigaciones, con carácter preliminar, para su discusión y comentarios.

La publicación de los Documentos de Trabajo no está sujeta a la aprobación previa de los miembros del Consejo del Banco Central de Chile. Tanto el contenido de los Documentos de Trabajo como también los análisis y conclusiones que de ellos se deriven, son de exclusiva responsabilidad de su o sus autores y no reflejan necesariamente la opinión del Banco Central de Chile o de sus Consejeros.

The Working Papers series of the Central Bank of Chile disseminates economic research conducted by Central Bank staff or third parties under the sponsorship of the Bank. The purpose of the series is to contribute to the discussion of relevant issues and develop new analytical or empirical approaches in their analyses. The only aim of the Working Papers is to disseminate preliminary research for its discussion and comments.

Publication of Working Papers is not subject to previous approval by the members of the Board of the Central Bank. The views and conclusions presented in the papers are exclusively those of the author(s) and do not necessarily reflect the position of the Central Bank of Chile or of the Board members.

Documentos de Trabajo del Banco Central de Chile
Working Papers of the Central Bank of Chile
Agustinas 1180, Santiago, Chile
Teléfono: (56-2) 3882475; Fax: (56-2) 3882231

Documento de Trabajo
N° 648

Working Paper
N° 648

PROPAGATION OF SHOCKS TO FOOD AND ENERGY PRICES: AN INTERNATIONAL COMPARISON

Michael Pedersen
Banco Central de Chile

Abstract

The present paper analyzes propagation of shocks to food and energy prices in 46 countries with data from the period 1999-2010. The empirical evidence suggests that in only one of the countries considered, a shock to the price of either energy or food shows no propagation to the prices of the goods and services included in the core inflation measure. In general, the propagation effect of food price shocks is larger than that of energy price shocks. Emerging economies are more affected by propagation than advanced ones. The results advocate that policy makers concerned with price stability should pay special attention to shocks affecting domestic food prices.

Resumen

El documento analiza la propagación de *shocks* a precios de alimentos y energía en 46 países con datos del periodo 1999-2010. La evidencia empírica sugiere que en solamente uno de los países considerados, un *shock* al precio de la energía o de los alimentos no muestra propagación a los precios de los artículos y servicios incluidos en la medida de inflación subyacente. Generalmente, el efecto de la propagación de un *shock* a los precios de los alimentos es mayor que en el caso de la energía. Las economías emergentes son más afectadas por propagación que los países avanzados. Los resultados sugieren que los políticos responsables de la estabilidad de precios debieran prestar especial atención a los *shocks* que afectan los precios locales de los alimentos.

E-mail: mpederse@bcentral.cl. The views presented here are my own and do not necessarily reflect those of the Central Bank of Chile. I am grateful for comments and suggestions from colleagues at the Central Bank of Chile and from participants at the 16th World Congress of the International Economic Association, the 2011 Annual Meeting of the Chilean Economic Society and the Sixteenth Meeting of the Researchers Network (CEMLA). All remaining errors are my own.

1. Introduction

Shocks to international prices of, for example, oil and cereals may affect some of the domestic prices included in the consumer price index (CPI) via a direct pass-through mechanism. Changes in these specific prices could cause variations in other prices through, for example, a cost-push effect. This is referred to as propagation of inflationary shocks, which is the subject analyzed in the present paper. More precisely, it is investigated how shocks to energy and food prices propagate to the rest of the prices in the CPI baskets in 46 countries of which 45 are located in Europe, Asia and the Americas[1] and one is situated Africa, South Africa (ZAF); a total of 17 emerging[2] and 29 advanced economies. The results suggest that food price shocks propagate more, i.e. have a stronger impact on core prices, than energy price shocks, while the duration of the two propagations is more or less the same. In general, emerging countries are more affected by propagation than advanced ones.

It is of great importance for, particularly but not exclusively, inflation-targeting central banks to understand how international price shocks affect national prices. While monetary policy usually has a limited impact on the direct pass-through of international commodity price shocks, for example the impact oil price shocks have on national gasoline prices, it is intended to affect the possible propagation of the initial shock to other prices by affecting, for instance, demand and inflation expectations. For designing the policy appropriately, however, it is important to understand how the propagation mechanism works with respect to size, duration and time lag. Due to different structural characteristics, inflationary shocks propagate differently in different economies and a main contribution of the present study is to analyze

---

[1] Austria (AUT), Belgium (BEL), Bulgaria (BGR), Brazil (BRA), Canada (CAN), Switzerland (CHE), Chile (CHL), Colombia (COL), Cyprus (CYP), Czech Republic (CZE), Germany (DEU), Denmark (DNK), Spain (ESP), Estonia (EST), Finland (FIN), France (FRA), Great Britain (GBR), Greece (GRC), Hong Kong (HKG), Hungary (HUN), Ireland (IRL), Iceland (ISL), Israel (ISR), Italy (ITA), Japan (JPN), Republic of Korea (KOR), Lithuania (LTU), Luxembourg (LUX), Latvia (LVA), Mexico (MEX), Malta (MLT), The Netherlands (NLD), Norway (NOR), Peru (PER), Philippines (PHL), Poland (POL), Portugal (PRT), Romania (ROM), Singapore (SGP), Slovakia (SVK), Slovenia (SVN), Sweden (SWE), Turkey (TUR), Taiwan (TWN), and the United States (USA).

[2] According to the Dow-Jones list of emerging markets: BGR, BRA, CHL, COL, CZE, EST, HUN, LTU, LVA, MEX, PER, PHL, POL, ROM, SVK, TUR, and ZAF.

these differences as a first and important step in understanding why propagation of inflationary shocks differs across countries.

The literature concerned with propagation of inflationary shocks is very sparse, although in a study on the economic effects of inflation targeting, Levin et al. (2004) estimate univariate autoregressive processes for the inflation series of five inflation-targeting (IT) economies and seven non-IT economies. The authors decompose the inflation volatility into two sources: one related to the variance of the shock and one due to the propagation of the same shock. They find that the volatility of inflation in the non-IT countries contains a substantial propagation component. Kim and Park (2006) study inflation targeting in Korea and as part of their analysis they estimate univariate inflation models. They conclude that the effect of the propagation has decreased during the period of inflation targeting. Finally, Pedersen (2010) proposes a multivariate framework and estimates structural vector autoregressive (SVAR) models with data spanning the entire CPI basket in order to conduct a general analysis of propagation effects in Chile. The findings suggest that propagation, in general, had a larger impact on the Chilean inflation before the implementation of inflation targeting. The present study applies a similar SVAR methodology but focuses the analysis on energy- and food-price shocks in several countries in order to gain further insight into the functioning of the propagation mechanism.

In a recent paper on the economic consequences of oil shocks in the euro area and the U.S., Peersman and Van Robays (2009) address direct and indirect effects on inflation by estimating SVAR models and identifying the shocks utilizing the method of sign restrictions. The authors underscore the importance of knowing the source of the oil price shock in order to determine the economic influence. Inflationary effects in the U.S. are mainly due to the direct pass-through and indirect effects of higher production costs, while inflation rates in the euro area react sluggishly and are driven by second-round effects of increasing wages. Baumeister et al. (2010) apply a similar methodology on data from five net oil-importing and three net oil-exporting economies. They argue that the second-round effects tend to be very different across the oil-importing countries included in the analysis and that these effects are important for explaining differences in the overall impact of an oil supply shock on inflation. Different from the focuses of these two articles, the paper in hand aims at a more pronounced understanding of what happens with the rest of the consumer prices once the direct pass-through has taken place. This pass-through could be from an international price shock, e.g. an oil price shock, or a domestic shock, such as a change of specific taxes on, say, gasoline. Hence, in the present context the direct pass-through is the exogenous shock and the focus is on how this price change propagates to prices of other goods and services. The advantage of this approach is that structural differences across countries, e.g. different tax structures, the existence of funds to stabilize prices etc., do not affect the size of the initial shock, allowing for an explicit analysis of the propagation mechanism, which is the important part of the total pass-through when deciding on possible policy reactions.

Propagation of inflationary shocks depends crucially on the direct pass-through of the external shock as well as the degree of inflation persistence. With respect to the latter, Angeloni et al. (2004) report the results of an extensive study carried out by the inflation persistence network, a project led by the European Central Bank with participation of national European central banks. The findings suggest that the inflation persistence in the euro area spans from 0.74 to 1.04, while the persistence in the U.S. is in the range 0.65 to 1.03. When allowing for time-variation in the mean, however, the estimates of the persistence fall significantly. Persistence is important for the propagation mechanism as a high degree of persistence implies a longer duration of the propagation of the initial shock.

Several studies are dedicated to the analysis of the pass-through of energy price shocks,[3] while there are fewer papers concerned with the effects of shocks to international food prices. Besides the already mentioned articles by Peersman and Van Robays (2009) and Baumeister et al. (2010), multi-country studies on the economic effects of oil price shocks[4] include those of Hunt et al. (2001) and Dalsgaard et al. (2001), who utilize the multi-country macro models

---

[3] A related line of literature, which is concerned with appropriate policy reactions to oil price shocks, includes the papers of Bernanke et al. (1997), Hooker (2002) and, more recently, those of Blanchard and Galí (2010) and Kilian (2010).

[4] A review of the literature on the effect of energy price shocks on the U.S. economy can be found in Kilian (2008).

of the International Monetary Fund (IMF) and the Organization for Economic Co-operation and Development (OECD), respectively. Of interest to the present analysis, the IMF paper concludes that the experience from the 1980s and 1990s is not a valid basis for discarding that a persistent increase in the oil price may affect core inflation. On the other hand, in the OECD model, the rise in the inflation rate caused by an oil price increase is followed by a rapid reversal such that inflation is unaffected in the medium to long term, but with a higher level of prices. Based on estimations of augmented Phillips curves, LeBlanc and Chinn (2004) conclude that oil price increases probably will have modest effects on inflation in the U.S., Japan and Europe, while De Gregorio et al. (2007) find evidence of decreasing pass-through in industrialized economies and to a lesser degree in emerging ones. Lastly, Pincheira and García (2007) apply time series models and discover that the response to an oil price shock in Chile is significantly higher than the average response in the industrialized countries included in the study. A tempting conclusion from the literature on pass-through of oil price shocks is that the inflationary impact is generally stronger in emerging countries than in advanced ones. Evidence from the analysis in the present paper will shed some further light on if this is because of the direct pass-through or rather the propagation to other prices and, hence, if there is a role for monetary policy when oil price shocks occur.

While the economic impact of oil prices shocks has attracted a lot of interest, the surge in commodity prices in 2007/2008 created a need to understand how shocks to other prices of internationally traded goods affect the local economies. Ribogon (2010) studies the pass-through of changes in commodity prices with micro price data from 50 countries. As part of the study he investigates the responses of shocks to oil and wheat prices on the CPI and specific national prices. The results suggest that the pass-through of oil price shocks to the CPI is smaller in the developed countries than in the other ones included in the sample, and that the speed of convergence to the long-run pass-through is very slow in the developed economies. With respect to the wheat price shocks, he finds that, in general, the incorporation of the pass-through in the CPI is slow but the impact is large. Pistelli and Riquelme (2010) analyze the impact of the commodity price boom-and-bust cycle during 2007 and 2008 with a sample of 44 countries. Evidence from their panel study suggests that structural factors are important in explaining different impacts on food and energy inflation across countries.

The few existing papers focused exclusively on the pass-through of international food prices across countries include the ones by Jalil and Zea (2011) and Lora et al. (2011), both applying time series models to analyze the effects in Latin American countries. The results of the first study indicate that the pass-through of a shock to international food prices to headline inflation takes from one to six quarters, depending on the country. Furthermore, the authors find that part of the pass-through is due to increased core inflation, which is affected directly as well as through possible second-round effects. The IDB study of Lora et al. (2011) states that the extent of the pass-through is quite heterogeneous among the countries included in the analysis and it depends on factors such as the weight of the food component in the CPI basket and local policy measures. Understanding the pass-through mechanism of shocks to international food prices is probably more complicated than that of oil price shocks, as domestic food prices tend to be less flexible than energy prices, particularly when facing negative shocks. For example, when international food prices rose during 2007 and 2008, domestic food prices in several countries followed an upward trend. On the other hand, during the financial crises of 2008 and 2009, when the international prices fell, several related domestic prices remained unchanged allowing for an increase in the mark-up. When international prices started to rise again in 2010 and 2011 the direct pass-through to domestic prices was slower and smaller than during the years 2007 and 2008, probably because there where room to diminish the mark-ups. This example of recent events illustrates that the direct pass-through of international food price shocks seems to be non-symmetric and depends on e.g. the current size of the mark-up.[5] Therefore, for policy purposes it is vital to monitor changes in domestic food prices and understand how these may propagate to other prices of goods and services.

The rest of the paper is organized as follows. The next section presents some stylized facts concerning the recent behavior of the national inflation rates of the 46 countries investigated. Section 3 illustrates the propagation mechanism employed and outlines the econometric model utilized. In the fourth section, the data are presented followed by the results of the empirical analysis in section 5. The sixth section investigates possible relationships between propagation

---

[5] See also Ferrucci et al. (2010).

and the consumption weights of the components affected by the initial shock and, finally, some concluding remarks are offered in section 7.

2. Some stylized facts

As illustrated in Figure 1(a), the international prices of oil and cereals increased significantly during the first half of 2008. Measured in U.S. dollars, between January 2007 and the month of peaking in 2008, the corn price increased almost 80%, the price of rice more than 110% and the wheat price more than 140%. The oil price (WTI) increased by 140% during the one-and-a-half year starting at the beginning of 2007. Locally, these rises were larger or smaller, but nevertheless quite important.

[Figure 1]

Figure 1(b) shows the average inflation rates in the 46 countries included in the present analysis. While there seems to be little correlation between the inflation of the energy component and the non-food and non-energy component (also referred to as core inflation), the correlation between the core and food prices is more apparent. The two years where the highest core rates were registered (2002 and 2008) where both after a period of increasing food inflation rates.

Figure 2(a) shows that in 37 of the 46 countries analyzed, the 2008 inflation rate of the energy component was higher than the average rate over the period 1999-2007; in 22 of these countries it was more than twice as high. In 2008 the average rate for advanced countries was 2.5 times the average of the nine preceding years, while the same ratio was 1.5 for the emerging economies. Particularly the East Asian countries experienced large increases in energy prices in 2008. With respect to food prices, Figure 2(b) shows that in 2008 these inflation rates were higher than the historical average in 43 of the countries in the sample. Excluding Hong Kong, where food inflation in 2008 was 190 times the historical rate, on average the food prices increased 3.5 times more than they did in the period 1999-2007.

European and Latin American countries in particular experienced a faster than normal acceleration in food prices in 2008.

[Figure 2]

The third graph of the figure (2(c)) shows the ratios of average inflation rates of the non-food and non-energy component (henceforth referred to as core inflation). In more than half of the countries in the sample (27 of the 46), the core rate was higher in 2008 than in the nine preceding years, in 19 of these countries, the core rate where more than 25% higher than the historical average. In 2009, 17 countries experienced core rates higher than the historical average, in thirteen it was more than 25% higher. There is no clear geographical distinction although the 2008 rates were relatively higher in East Asia and lower in the two North American countries.

Considering the fast acceleration of the international food and oil prices, it is not a surprise that these were passed on to the national economies resulting in higher local food and energy prices. The fact that also core inflation rates were higher in several of the countries investigated may be contributed to propagation of the original price shocks.

As a final stylized fact, Figure 2(d) presents the volatility of the core inflation for the period 1999-2010 calculated as ratio between the variance and the mean. The volatility is more than six times higher in the emerging economies. When excluding Turkey, where the volatility has been particularly high, the emerging market volatility is still more than four times higher. Part of this excess volatility may be caused by stronger propagation of shocks to energy and food prices. The next section illustrates the mechanism used to explain propagation.

3. The propagation mechanism

Propagation of inflationary shocks implies that prices that are not directly affected by the original shock may experience variations due to this initial shock. The process can be illustrated as in Figure 3, which includes three components of the CPI basket: the energy part, whose inflation rate is π^e, the food part (π^f) and the rest of the basket, which is referred to as the core part (π^{xfe}). To exemplify the mechanism, let us assume that the world is hit by an oil price shock. Via the direct pass-through this creates increases in the domestic energy prices. This may have a direct effect on food prices (e.g. higher costs of producing bread) but also an indirect effect, for example that because of higher energy prices a smaller part of the households' income can be spent on food, and this lower demand may result in a downward adjustment of the food prices contrasting the first effect. The same line of argument can be applied for products included in the core inflation measure. All of these adjustments can happen instantaneously or with a time delay. Furthermore, there may also be effects in the other direction, i.e. that higher prices of, say, food create upward pressure on salaries, which forces the firms to raise their prices. This is just a simple example, but one can easily think of other mechanisms explaining the arrows of direct and indirect effects illustrated in Figure 3. Finally, each of the three components in the figure may have some degree of persistence, which also affects the entire propagation mechanism.

[Figure 3]

In short, there are two principal effects which influence the propagation mechanism; a push-cost effect and a demand effect. Whereas the first effect results in positive propagation, i.e. upward pressure on core prices, the second causes a downward pressure. If the push-cost effect dominates the demand effect, the propagation is positive and vice versa. It could also happen that one effect dominates in the short term and the other in the long term such that, for example, the initial propagation is positive and later on is becomes negative.

3.1. The statistical model

The econometric model utilized for describing the propagation mechanism is a VAR model, where the data vector spans the entire CPI basket. Particularly, for analyzing the propagation of energy and food price shocks, this implies a three-dimensional model where the data vector includes the inflation rate of the energy component of the CPI basket (π^e), the inflation rate of the food component (π^f) and the core inflation rate (π^{xfe}). Simplifying the notation by excluding deterministic terms and restricting the lag order to one, the model is presented as:

$$\begin{bmatrix} \pi_t^e \\ \pi_t^f \\ \pi_t^{xfe} \end{bmatrix} = \begin{bmatrix} a_{11} & a_{12} & a_{13} \\ a_{21} & a_{22} & a_{23} \\ a_{31} & a_{32} & a_{33} \end{bmatrix} \begin{bmatrix} \pi_{t-1}^e \\ \pi_{t-1}^f \\ \pi_{t-1}^{xfe} \end{bmatrix} + \begin{bmatrix} u_t^e \\ u_t^f \\ u_t^{xfe} \end{bmatrix},$$

where a_{ij} ($i,j = 1,2,3$) are coefficients and u_t^k ($k = e, f, xfe$) are unobservable i.i.d. zero mean error terms. The assumption that all three variables are potentially endogenous relies on the fact that the prices considered in the analysis are those facing the consumer such that they include, for example, mark-ups and salaries, which potentially are related to increases in the prices of other goods and services.

To allow for possible contemporaneous relations between the variables, the structural form of the VAR is considered:

$$\begin{bmatrix} 1 & b_{12} & b_{13} \\ b_{21} & 1 & b_{23} \\ b_{31} & b_{32} & 1 \end{bmatrix} \begin{bmatrix} \pi_t^e \\ \pi_t^f \\ \pi_t^{xfe} \end{bmatrix} = \begin{bmatrix} c_{11} & c_{12} & c_{13} \\ c_{21} & c_{22} & c_{23} \\ c_{31} & c_{32} & a_{33} \end{bmatrix} \begin{bmatrix} \pi_{t-1}^e \\ \pi_{t-1}^f \\ \pi_{t-1}^{xfe} \end{bmatrix} + \begin{bmatrix} \varepsilon_t^e \\ \varepsilon_t^f \\ \varepsilon_t^{xfe} \end{bmatrix},$$

where b_{ij} and c_{ij} ($i,j = 1,2,3$) are the coefficients of the model, and the structural errors are assumed to be serially and cross-sectionally uncorrelated.

For modeling the propagation mechanism discussed in the previous subsection, a Cholesky decomposition is applied to identify the shocks, such that the energy component is the most exogenous one, followed by the food component and, at the other extreme, the core component is the most endogenous one. In other words, an initial shock to energy prices may have contemporaneous effects on food and core prices, but not vice versa. Food price shocks may affect core prices in the same period the shock occurs, but not the other way around. This identification scheme implies that $b_{12} = b_{13} = b_{23} = 0$ and allows the analysis to be focused on the propagation of food and energy shocks to the rest of the prices in the consumer basket. Hence, the relationship between the errors of the VAR and the SVAR is:

$$\begin{bmatrix} u_t^e \\ u_t^f \\ u_t^{xfe} \end{bmatrix} = \begin{bmatrix} 1 & 0 & 0 \\ b_{21} & 1 & 0 \\ b_{31} & b_{32} & 1 \end{bmatrix}^{-1} \begin{bmatrix} \varepsilon_t^e \\ \varepsilon_t^f \\ \varepsilon_t^{xfe} \end{bmatrix}.$$

To sum up, the multi-country analysis of propagation consists of impulse-response analyses in SVAR models and to evaluate whether or not the propagations of the shocks are statistically significant, 95% confidence intervals are bootstrapped as described by Hall (1992), setting the number of replications equal to 2000.

4. Empirical analysis

After a brief description of the data in section 4.1, the empirical models are discussed in the following subsection.

4.1. Data description

The empirical analysis is conducted with monthly data of annual CPI inflation rates for 45 countries from Europe, Asia and the Americas as well as South Africa, i.e. a total of 46 countries. Unless stated otherwise, the period considered is January 1999 to December 2010, i.e. the annual inflation rates are calculated with CPI data starting in January 1998.[6] All level series have been rebased to 2005=100.

The data for OECD member countries included in the analysis (with the exception of Turkey) and those from South Africa are extracted from the OECD's Main Economic Indicator (MEI) database. The three components are energy, food and non-alcoholic beverages and all items

---

[6] Pedersen (2010) discusses the advantages of using annual inflation rates in the case of Chile. A main argument is that monthly data are affected by seasonality, which has to be removed either by including seasonal dummies in the models or applying a seasonal adjustment method. The first method relies on an assumption that the seasonality is constant over the sample, which is very unlikely in several of the countries analyzed. The second option is not desirable when conducting impulse-response analysis, since most seasonal adjustment methods apply the centered moving average as part of the process, which makes the assumption of an unanticipated shock difficult to interpret. For these reasons it was chosen to make the analysis with annual rates despite the disadvantages this involves.

less food less energy. Index data cover the period 1998–2010 except for Slovenia (first observation is January 2000) and South Africa (January 2002). In the case of Chile, the OECD series start in December 1998 and the remaining 1998-data have been calculated with the spliced series published by Pedersen et al. (2009).

For the non-OECD countries that are members of the European Union and for Turkey, the source is Eurostat. The three components of the harmonized consumer price index are energy, food including alcohol and tobacco and an overall index excluding energy, food, alcohol and tobacco. CPI data from Romania start in December 2000.

Data from the non-OECD South American and Asian countries have been calculated with series extracted from the CEIC database. CPI data from Colombia are available from January 1999 and those from Brazil from July the same year. Appendix A reports details of the series occupied.

4.2. Model specifications

As discussed in subsection 3.1, the statistical models used in the empirical analysis are SVARs where the errors are identified by Cholesky decompositions. Following the work of e.g. Lütkepohl (1985) the lag lengths are, as a first step, determined by the Schwarz Information Criterion (SIC). However, as argued by Killian (2001), including more lags than suggested by this parsimonious selection criterion may result in more accurate impulse response estimates. As a consequence, some of the models contain more lags than suggested by the SIC, but always when this facilitates the objective of obtaining white noise errors and while the final lag length does not exceed what is suggested by the less parsimonious Akaike Information Criterion (AIC). The lag lengths used in each of the 46 models are presented in table B1 in appendix B, which also reports the number of lags suggested by SIC and AIC, respectively, when allowing for a maximum of 12 lags. In all cases the SICs suggest either one or two lags, while the AIC in the majority of the cases suggests a higher lag order.

To avoid misspecified models, a number of dummies have been introduced to eliminate the effect of outliers on the estimates of the impulse-response functions. The dummies are all of the type {…,0,0,1,0,0,…}, where "1" is the number of the observation presented in table B1. In general, the dummies included are country specific, but the sharp fall in the commodity prices in the end of 2008 seems to have caused outliers in several of the countries included in the analysis.

Table B2 in appendix B presents the *p*-values of three kinds of tests validating the assumption of no correlated errors: Multivariate LM tests for no serial correlation of order one and four univariate χ^2 tests for no ARCH, and tests of no skewness compared to the normal distribution.[7] With the evidence from the tests reported in table B2 it cannot be rejected that the errors of all models are white noise.

The last column of table B1 reports the modulus of the three largest roots of the companion matrices of the systems. In the majority of the cases, the largest root is close to but less than one and, in fact, often tests cannot reject the presence of a unit root. However, assuming non-stationarity in the present analysis would imply that unanticipated shocks have permanent effects on the inflation rate. In other words, propagation of shocks to, say, energy prices would cause permanently higher core inflation rates. This seems highly unlikely and the propagation analysis is conducted under the assumption of stationary but, in some cases, highly persistent systems.

5. Propagation of shocks to energy and food prices

The results of the propagation exercise for shocks to energy and food prices are reported in Tables 1 and 2. Aggregated results can be found in Table 3. The results suggest that only in one of the countries considered (Austria) there is no significant propagation effect of either of the shocks. In general, the propagation of a unit food price shock is larger than that of a unit energy price shock, and emerging countries are more affected by both shocks than the advanced ones.

---

[7] As mentioned by Juselius (2006), VAR estimates are more sensitive to non-normality due to skewness than to excess kurtosis.

[Table 1]

[Table 2]

[Table 3]

5.1. Propagation of shocks to energy prices

In 38 countries a unit shock to energy prices propagates statistically significantly to other prices. In two of the Nordic countries (Norway and Sweden), the propagation is negative, i.e. a positive energy price shock results in negative pressure on core prices. In 15 of the countries, where the propagation is significantly different from zero (eight emerging and seven advanced, including Norway and Sweden), the effect on core prices is immediate, i.e. propagation starts the same month of the initial shock. On average, however, the propagation starts four months after the original shock and lasts almost 19 months. The average maximum effect (0.06 percentage points (pp.) of the annual inflation rate) occurs after eleven months. These effects are very diverse, spanning from -0.08 pp. in Israel, after eight months, to 0.66 pp. in Turkey after 18 months. In seven countries the maximum effect is larger than 0.10 pp. and all of them are classified as emerging.

Propagation effects are significant in 88% of the emerging countries included in the analysis (the exceptions are Latvia and Romania) and in 83% of the advanced economies. Propagation to core prices occurs faster in the emerging countries and the average maximum impact is larger. Separating the countries between those who have inflation targeting as the monetary anchor (ITers[8]) and those who do not (non-ITers), it appears that the impact is faster and larger in IT economies. This result, however, is affected by the fact that 13 of the 21 ITers are

---

[8] Countries which at the time of writing have adopted inflation targeting as the anchor of the monetary policy (in parentheses, the year of adoption according to Lim (2009)): BRA (1999), CAN (1991), CHE (2000), CHL (1991), COL (1999), CZE (1998), GBR (1992), HUN (2001), ISL (2001), ISR (1992), KOR (1998), MEX (1999), NOR (2001), PER (2002), PHL (2002), POL (1998), ROM (2005), SVK (2005), SWE (1993), TUR (2006), and ZAF (2000).

emerging countries. In the emerging ITers the average maximum impact is more than twice as large as in the emerging non-ITers.

Turning to the regional analysis, in the advanced European countries the propagation of a shock to energy prices is statistically significant in 86% of the countries; it starts almost five months after the shock and lasts until month 19. The propagation, however, is very small and the average maximum effect (0.03 pp. of annual core inflation) occurs after eleven months. There is no clear distinction between the northern and the southern part of Europe and the three countries most affected by propagation are Iceland (maximum impact of 0.10 pp.), Ireland and Malta (0.08 pp.). While differences in the maximum impact are not large among the countries, there is more diversity in the duration and the timing of the propagation. In the UK, Luxembourg and Norway, propagation starts shortly after the initial shock, and lasts only a few months. On the other hand, in Cyprus, Denmark, France, Italy, The Netherlands and Slovenia, the first significant effect of the propagation is recorded after almost a year or more. In several countries propagation is significant more than two years after the initial energy price shock. To sum up, even though the impacts of the propagation of an energy price shock in the advanced European countries are similar, the timing and duration are very diverse.

In seven of the ten emerging European countries the propagation of a shock to energy prices is statistically significant. The effect is larger and with longer duration compared to the advanced part of Europe. On average, propagation starts about three months after the initial shock and lasts until month 17. The impacts are, however, very disperse among the countries where the maximum effects in six of the countries are comparable with the advanced European countries, whereas it is larger in Slovakia, Bulgaria, Poland and, particularly, Turkey. In three countries (Bulgaria, Slovakia and Turkey) propagation is still significant after three years.

Propagation is significant in all of the East Asian countries and the average duration is longer than in any of the other geographic areas in the sample, namely 22 months. In most countries propagation is relatively fast, but in Hong Kong it is significant only after seven months. The maximum impact, on the other hand, is lower than in emerging Europe and Latin America, but notably higher than the average of the advanced European countries. The largest impact occurs in the only emerging country in the region, the Philippines, 0.12 pp. of the annual core inflation rate after three months.

Only in one of the two North American countries in the sample, the United States, the propagation effect of shocks to energy prices is significantly different from zero, but the impact is very limited, with a maximum of 0.02 pp. of annual core inflation. In the Latin part of the continent, where all of the economies are emerging, the propagation is significant in all five countries included in the sample. A shock to energy prices in Latin America propagates to the prices in the core index after one month and the duration is on average a year and the average maximum effect (0.09 pp.) occurs about nine months after the initial shock. In the countries where the duration is smallest (Colombia, Mexico and Peru) the maximum effect is smaller than 0.10 pp., while it is larger in Brazil as well as in Chile.

Finally, in Israel the propagation of a shock to energy prices is not statistically different from zero, but it is in South Africa, where the impact, however, is smaller than the average of the other emerging countries, but the duration longer.

Even though the propagation of an energy price shock is statistically significant in all of the East Asian countries included the analysis, it is not evident that the magnitude and duration of the propagation of energy price shocks are determined by the geographical location. On the other hand, there is some evidence that the state of development (emerging or advanced) is an important factor as the impact is generally larger in emerging countries but the duration of the propagation appears to be a bit shorter.

5.2. Propagation of shocks to food prices

Also in 38 of the 46 countries considered in the analysis, a unit shock to food prices has a significant effect on core inflation. In five of these countries (Finland, Greece, the Republic of Korea, Turkey and the U.S.), propagation is significantly negative. Propagation is statistically significant in all the emerging countries and in 72% of the advanced. On average, propagation starts 3.2 months after the initial shock to food prices, and lasts until month 21 with a maximum impact of 0.14 pp. of the annual core inflation rate after ten months. The smallest of the positively significant impacts are recorded in Japan and Taiwan, 0.03 pp. and 0.04 pp., respectively, while the largest is in South Africa (0.85 pp. of the annual core inflation rate).

In emerging countries the average maximum impact is more than three times as big as in the advanced economies and the duration almost twice as long. In the advanced countries where propagation is significantly positive, Japan and Taiwan are, as already mentioned, the countries least affected by propagation, while the maximum impacts occur in Spain, Hong Kong, Iceland and Slovenia, all higher than 0.20 pp. Propagation is statistically significant in all of the emerging countries and, with the exception of Mexico and Turkey, the maximum impact is 0.20 pp. or higher. In all but four emerging economies (Brazil, Hungary, Philippines and Turkey) effects of the propagation is still statistically significant after one year.

In IT economies the duration is longer than in non-IT countries, and the average impact is larger. This is, as in the case of the energy price shocks, influenced by the large proportion of emerging economies that have adopted inflation targeting. Considering only the emerging economies, the impact is bigger in those that are not ITers and the duration of the propagation is longer. For advanced countries, the average maximum impact as well as the average duration are more or less the same in IT and non-IT economies.

With respect to the regional results, propagation of food price shocks is statistically significant in two thirds of the advanced European countries and in all of the emerging economies. The time between the initial shock and the month where the propagation is significant is more or less the same in advanced and emerging Europe. On the other hand, the duration of the propagation is almost twice as long in the emerging countries of the region, despite the fact that in six of the advanced economies (Germany, Finland, France, the UK, Luxembourg and Slovenia) it is still significant after two years. The maximum effect in Europe occurs after a year, but the average impact in the emerging economies is more than three times as large as in the advanced ones. Considering only the countries where propagation is statistically significant, the duration of the shock is still six months longer in emerging Europe, and the maximum impact is 0.11 pp. larger. In only three of the advanced countries, where propagation is significantly positive, the maximum impacts are higher than 0.20 pp. In none of the emerging economies is it smaller than 0.20 pp.

In East Asia the propagation effect is statistically significant in all but one country (Singapore). The average impact of the propagation is larger than in emerging Europe, but smaller then in advanced Europe. Particularly in Hong Kong and the Philippines propagation is quite large. The duration of the propagation, however, is on average shorter than in Europe and Latin America, as the propagation affects core inflation rates after about three months and lasts until month ten after the initial shock. In Hong Kong and the Republic of Korea, however, the duration of the propagation is more than a year.

The propagation of food price shocks is different in the two North American countries included in the analysis; the impact on core prices is negative in the U.S., while it is positive in Canada. In both countries the propagation starts within the first quarter following the original shock, but the duration is longer in Canada. In all of the five Latin American economies propagation of food price shocks to core prices is statistically significant. On average, the propagation starts 2.6 months after the original shock and lasts around 20 months, but in Colombia the duration is almost four years. While the average maximum effect is 0.22 pp. of the annual core inflation, only in Mexico is it smaller than 0.20 pp.

In Israel, propagation is significant only more than one year after the original shock, while the impact is immediate in South Africa, where the size of the propagation is larger than in the other countries; the maximum effect after eleven months is 0.85 pp. of the annual core inflation rate.

Also in the case of food price shocks, propagation seems to depend rather on the state of development than on the geographical location. It is noteworthy, however, that the propagation of food price shocks is found to be significantly positive in all of the Latin American countries included in the analysis, suggesting that inflation rates in this region are particularly affected by international food price shocks.

The next section discusses whether the relative consumption weights of energy and food are factors that can help explain differences in the propagation of price shocks.

6. Importance of consumption weights

A natural question concerning the analysis of propagation of inflation shocks is whether or not it is affected by the relative weights in the consumption basket of the components hit by the original shock. A priori one might expect this to be indeed the case; if the relative weight is large, a shock has a greater impact on the household's expenditures.

Table 4 reports the weight of the energy, food and ex. energy and food components of the CPIs in the countries included in the study. The average weight of the energy component is 9.2%, spanning from 3.9% in Hong Kong to 16.7% in Romania. The average weight for the advanced countries included in the sample is 8.0%, while it is 11.1% for the emerging economies. With respect to food, the average weight for the entire sample is 19.7%, where the smallest weight is in the U.S. (7.8%) and the largest in the Philippines (46.6%). Food plays a relatively greater role in the households' budgets in the emerging countries than in the advanced, with averages of respectively 26.9% and 15.6%.

[Table 4]

Table 5 reports the averages divided in geographical regions as well as the minimum and maximum weights. In Europe the average weight of the energy component is larger than in the other regions and the weights are highest in the emerging part. Energy weights are lowest in Asia and Latin America. On the other hand, foodstuffs are much more important in these two regions and in emerging Europe compared to advanced Europe and North America.

[Table 5]

Figure 4 shows two weights / significance plots, i.e. plots with weights on the first axis, "0" on the second axis if the propagation is not statistically significant and "1" if it is. With respect to energy prices, Figure 4(a) shows that there is no clear pattern suggesting that energy price shocks do not necessarily propagate to other prices when the consumption weight is high. In fact, in the two countries with the highest weights (Romania and Hungary), propagation is not statistically significant. When making the same plot for respectively advanced and emerging countries, the picture is the same.

[Figure 4]

With respect to food price shocks, the plot in Figure 4(b) indicates that there may be a relation between the weight in the consumption basket and the significance of propagation to other prices. Recall that propagation is significant in all the emerging countries in the sample, which is also where the weights of the food component are highest. With respect to the advanced economies, propagation is indeed significant in the three countries with the highest weights (Hong Kong, Taiwan and Malta), but not so in the country with the fourth highest weight (Singapore). In the other end of the weight-scale, in the three countries with the lowest weights (the U.S., Germany and the U.K.), propagation is statistically significant, but this not the case for the following three countries (The Netherlands, Switzerland and Norway).

Turning to the more detailed analysis of energy price shocks, Figure 5 shows four plots of the weights and, respectively, (a) maximum impact, (b) months after the shock where the maximum impact occurs, (c) the first month where the impact is significant, and (d) the duration of the propagation. The last two plots include only countries where the propagation is significantly different from zero.

[Figure 5]

Figure 5(a) shows that there seems to be a positive relation between the weight of the energy component of the consumer price basket and the maximum impact of the propagation. A simple regression, however, yields a slope of 0.008, which is not statistically different from zero when testing with a 5% significance level.[9] With respect to the month where the maximum impact occurs, there is no relation to the energy weight, as illustrated in Figure 5(b).

---

[9] When excluding Turkey from the sample, the slope decreases further.

The slope of the estimated regression is positive, but not statistically significant. The relation between the weight and the speed with which propagation affects the core inflation rate is shown in Figure 5(c). Counter-intuitively, the sign of the estimated regression slope is positive, but not statically significant from zero. Finally, Figure 5(d) shows a plot of the energy weights on the first axis and the duration of the propagation on the second axis. This relationship is not visible either and, hence, the overall conclusion is that there is no strong evidence suggesting a connection between the weight of the energy component in the consumption basket and propagation of shocks to energy prices.

With respect to the propagation of food price shocks, Figure 6 shows the same plots as in Figure 5, but where the weights are replaced by those of the food components. As shown in Figure 6(a), a higher weight leads to higher maximum impact. A simple regression shows that the sign of the slope is positive, as expected, and statistically significant. This also holds when excluding the three outliers, Ireland, Turkey and South Africa, but only for the emerging countries because the estimated regression slope for the advanced economies turns out not to be statistically significant.

[Figure 6]

Also with respect to the month where the maximum impact is registered, the relationship is as expected, as illustrated in Figure 6(b); a higher weight implies that the maximum impact occurs faster. This connection, however, is not statistically significant, neither in advanced nor in emerging countries. Judging from Figure 6(c), the size of the food weight does seem to impact when the propagation starts, but this slope is not significant either. Finally, Figure 6(d) shows the plot of the food weights and the duration of the propagation. The slope of the regression is positive as expected; the higher the weight, the longer the duration, but not statistically significant. All in all, there does seem to be some connection between the weights of the food component and the propagation of food price shocks in the sense that the estimated regression slopes have the expected signs, but they are, more often than not, not statistically different from zero.

Concluding the analysis of the importance of consumption weights, it appears that they are more important for the propagation of shocks to food prices than for the energy price shocks. In the first case, the connection between statistically significant propagation and the weight in the consumption basket is quite clear, whereas it is not evident that the same relation exists for shocks to energy prices. Even though the plots indicate some association between propagation of energy price shocks and the weight of the energy component, the slopes of the companioning regressions are not significantly different from zero. On the other hand, there is some evidence that the weights of the food components impact the propagation of food price shocks with respect to the magnitude of the propagation, particularly in emerging economies, while it is not evident that the weight has impact on duration and the speediness of the propagation.

7. Concluding remarks

Different from pass-through of international price shocks, the analysis of propagation is concerned with how price changes of some components of the CPI basket may affect the prices of other goods and services and, thus, the overall inflation rate. The present study focused on the propagation of shocks to food and energy prices, and the empirical analysis provided evidence that indeed propagation effects are important since in only one of the countries considered, the effect of neither of the two shocks was statically significant. Inflationary propagation was discussed with respect to the size of the effect, duration and the speed with which the other prices are affected. On average, the propagation effect of food price shocks is stronger and longer lasting than the effect of energy price shocks, which suggests that policy makers should pay more attention to shocks affecting national food prices than to shocks affecting energy prices.

The evidence suggested that the impact of both energy and food price shocks is greater in emerging than in advanced countries. Furthermore, the duration of the propagation of food price shocks is longer in the emerging economies and, as a consequence, especially in emerging countries it is recommendable that policy makers concerned with price stability carefully monitor how e.g. international commodity price shocks directly affect local energy and food prices.

Finally, it was established that the larger impact of food price shocks in emerging economies may be partly related to the weights in the consumer prices basket of these items, whereas the same relationship is not evident with respect to energy price shocks. This, however, is only one of perhaps many structural characteristics which may explain the propagation mechanism and research is still needed to discover what other structural features could explain differences in the propagation of inflationary shocks across countries, such as rigidities in prices and salaries and the degree of openness.

References

Angeloni, I., L. Aucremanne, M. Ehrmann, J. Galí, A. Levin and F. Smets (2004), 'Inflation persistence in the euro area: Preliminary summary of findings', *Paper presented at the ECB conference on inflation persistence in the euro area*, Frankfurt am Main, 10-11 December 2004.

Baumeister, C., G. Peersman and I. Van Robays (2010), 'The economic consequences of oil shocks: Differences across countries and time', in R. Fry, C. Jones and C. Kent (eds), *Inflation in an Era of Relative Price Shocks*, Reserve Bank of Australia, 91-128.

Bernanke, B.S., M. Gertler, M. Watson, C.A. Sims and B.M. Friedman (1997), ´Systematic monetary policy and the effects of oil price shocks', *Brookings Papers on Economic Activity*, 1, 91-142.

Blanchard, O.J. and J. Galí (2010), 'The macroeconomic effects of oil price shocks: Why are the 2000s do different from the 1970s?', in J. Galí and M. Gertler (eds), *International Dimensions of Monetary Policy*, University of Chicago Press, 372-421.

Dalsgaard, A. and P. Richardson (2001), ‘Standard shocks in the OECD Interlink model’, *Working Paper No. 306*, Organization for Economic Co-operation and Development, Economics Department.

De Gregorio, J., O. Landerretche and C. Neilson (2007), ‘Another pass-through bites the dust? Oil prices and inflation’, *Working Paper No. 417*, Central Bank of Chile.

Ferrucci, G., R. Jiménez-Rodríguez and L. Onorante (2010), ‘Food price pass-through in the eura area. The role of asymmetries and non-linearities’, *Working Paper No 1168*, European Central Bank.

Hall, P. (1992), *The Bootstrap and Edgeworth Expansion*, Springer.

Hooker, M.A. (2002), ‘Are oil price shocks inflationary? Asymmetric and nonlinear specifications versus changes in regime’, *Journal of Money, Credit and Banking*, 34(2), 540-561.

Hunt, B., P. Isard and D. Laxton (2001), ‘The macroeconomic effects of higher oil prices’, *Working Paper No. WP/01/14*, International Monetary Fund.

Jalil, M. and E.T. Zea (2011), ‘Pass-through on international food prices to domestic inflation during and after the great recession: Evidence from a set of Latin American Economies’, *Desarollo y Sociedad*, primer semester, 135-179.

Juselius, K. (2006), *The Cointegrated VAR Model: Methodology and Applications*, Oxford University Press.

Killian, L. (2001), ‘Impulse response analysis in vector autoregressions with unknown lag order’, *Journal of Forecasting*, 6(3), 161-179.

Kilian, L. (2008), ‘The economic effects of energy price shocks’, *Journal of Economic Literature*, 46(4), 871-909.

Kilian, L. (2010), ‘Oil price shocks, monetary policy and stagflation’, in R. Fry, C. Jones and C. Kent (eds), *Inflation in an Era of Relative Price Shocks*, Reserve Bank of Australia, 60-84.

Kim, S. and Y.C. Park (2006), ‘Inflation targeting in Korea: a model of success?’ in ‘Monetary Policy in Asia: approaches and implementation’, *BIS Papers No. 31.*, 140-164.

LeBlanc, M. and M.D. Chinn (2004), ‘Do high oil prices presage inflation?’, *Business Economics*, 39(2), 38-48.

Levin, A.T., F.M. Natalucci and J.M. Piger (2004), ‘The macroeconomic effect of inflation targeting’, *Federal Reserve Bank of St. Louis Review*, 86(4), 51-80.

Lim, G.G. (2009), ‘Inflation targeting’, *Australian Economic Review*, 42(1), 110-118.

Lora, E., A. Powell and P. Tavella (2011), ‘How will the food price shock affect inflation in Latin America and the Caribbean?’, *Policy Brief No. IDB-PB-120*, Inter-American Development Bank, Department of Research and Chief Economist.

Lütkepohl, H. (1985), ‘Comparison of criteria for estimating the order of a vector autoregressive process’, *Journal of Time Series Analysis*, 6(1), 35-52.

Pedersen, M. (2010), ‘Propagation of inflationary shocks in Chile and an international comparison of propagation of shocks to food and energy prices’, *Working Paper No. 566*, Central Bank of Chile.

Pedersen, M., H. Rubio and C. Saavedra (2009), ‘Empalme de subclases del IPC de Chile. Series mensuales 1989-2008’, *Estudios Económicos Estadísticos No. 79*, Central Bank of Chile.

Peersman, G. and I. Van Robays (2009), ‘Oil and the Euro area economy’, *Economic Policy*, 24(60), 603-651.

Pincheira, P. and Á. García (2007), ‘Shocks de petróleo e inflación, el caso de Chile y una muestra de países industriales’, *Economía Chilena*, 10(1), 5-36.

Pistelli, A. and V. Riquelme (2010), ‘Auge y caída de precios de commodities y su impacto sobre precios domésticos: Comparación internacional’, *Working Paper No. 567*, Central Bank of Chile.

Rigobon, R. (2010), ‘Commodity prices pass-through’, *Working Paper No. 572*, Central Bank of Chile.

Appendix A

This appendix describes the series extracted from the CEIC database to obtain energy, food and core price measures for South American and Asian countries who are not OECD members.

Brazil: Series used: National Consumer Price Index, IPCA: General [Dec93=100]; National Consumer Price Index, IPCA: Food and Beverages (FB) [Dec93=100]; IPCA: MoM%: Housing: Energy & Fuel [Aug99 – Dec10]; IPCA: MoM%: Transport: Fuel [Aug99 – Dec10]; IPCA: Weights: Food & Beverage (FB) [Jul06 – Dec10]; IPCA: Weights: Housing: Fuel & Energy [Jul06 – Dec10]; IPCA: Weights: Transport: Transport: Fuel [Jul06 – Dec10]. Notes on calculation: Indices (jul-99 = 100) for the two energy components are created with the monthly inflation rates. Weights for the two energy components are maintained fixed from July 1999 to July 2006.

Colombia: Series used: Consumer Price Index [Dec08=100]; Consumer Price Index: Food & Beverages [Dec08=100]; Consumer Price Index: Gas [Dec08=100]; Consumer Price Index: Electric Power [Dec08=100]; Consumer Price Index: Fuel [Dec08=100]; Consumer Price Index: Lubricating Oil [Dec08=100]; CPI: Weights: Food & Beverages [1999-2010]; CPI: Weights: Housing: Fuel & Public Services: Fuels: Gas [1999-2010]; CPI: Weights: Housing: Fuel & Public Services: Public Services: Electric Power [1999-2010]; CPI: Weights: Transport & Communications: Personal Transport: Vehicle Expenses: Fuel [1999-2010]; CPI: Weights: Transport & Communications: Personal Transport: Vehicle Expenses: Lubricating [1999-2010]. Note on calculation: Weights for 2008 equal to weights of 2009.

Peru: Series used: (DC)Consumer Price Index (CPI): Lima [1994=100, Jan98-Dec01]; Consumer Price Index (CPI): Lima [Dec01=100, Dec01-Dec2009]; (DC)CPI: Lima: Food and Beverage: Food and Beverage [1994=100, Jan98-Dec01]; CPI: Lima: Food and Beverage: Food and Beverage [Dec01=100, Dec01-Dec09]; (DC)CPI: Lima: House, Combustible and Electricity: Fuel and Electricity [1994=100, Jan98-Dec01]; CPI: Lima: House, Combustible and Electricity: Fuel and Electricity [Dec01=100, Dec01-Dec09]; CPI: Weights: Lima: Food

& Beverage [2009]; CPI: Weights: Lima: House, Combustion & Electricity: Fuel & Electricity [2009]. Notes on calculation: Indices Dec2001=100 are created with monthly changes calculated with the indices 1994=100. Weights are fixed 2009 weights.

Hong Kong: Series used: Composite Consumer Price Index [10/04-9/05=100]; Composite CPI: Food [10/99-9/00=100, Jan98-Sep99]; Composite CPI: Food [10/04-9/05=100, Oct99 – Dec09]; Composite CPI: Fuel and Light: Electricity [10/94-9/95=100, Jan98-Sep99]; Composite CPI: Electricity, Gas & Water: Electricity [10/99-9/00=100, Oct99-Sep04]; Composite CPI: Electricity, Gas & Water: Electricity [10/04-9/05=100, Oct04 – Dec09]; Composite CPI: Fuel and Light: Liquefied Petroleum Gas [10/94-9/95=100, Jan98-Sep99]; Composite CPI: Electricity, Gas & Water: Liquefied Petroleum Gas [10/99-9/00=100, Oct99-Sep04]; Composite CPI: Electricity, Gas & Water: Liquefied Petroleum Gas [10/04-9/05=100, Oct04 – Dec09]; Composite CPI: Fuel and Light: Towngas [10/94-9/95=100, Jan98-Sep99]; Composite CPI: Electricity, Gas & Water: Towngas [10/99-9/00=100, Oct99-Sep04]; Composite CPI: Electricity, Gas & Water: Towngas [10/04-9/05=100, Oct04 – Dec09]; Composite CPI: Transport: Motor Fuel and Lubricant [10/94-9/95=100, Jan98-Sep99]; Composite CPI: Transport: Motor Fuel and Lubricant [10/99-9/00=100, Oct99-Sep04]; Composite CPI: Transport: Motor Fuel [10/04-9/05=100, Oct04 – Dec09]; Composite CPI: Weights: Food [Apr06 – Dec09]; Composite CPI: Weights: Electricity, Gas & Water: Electricity [Apr06 – Dec09]; Composite CPI: Weights: Electricity, Gas & Water: Towngas [Apr06 – Dec09]; Composite CPI: Weights: Electricity, Gas & Water: Liquefied Petroleum [Apr06 – Dec09]; Composite CPI: Weights: Transport: Motor Fuel [Apr06 – Dec09]. Notes on calculation: Indices (10/04-9/05=100) constructed with monthly changes of indices with different base year. Weights are assumed fixed.

Philippines: Series used: Consumer Price Index [2000=100]; CPI: Food [2000=100]; CPI: Fuel, Light & Water (FW): Fuel [2000=100]; CPI: FW: Light: Electricity [2000=100]; CPI: Svcs: TC: Transpo: AT: Oil, Gasoline & Diesel [2000=100]; CPI: Svcs: TC: Transpo: AT: Other Lubricants [2000=100]; CPI: Weights: Food; CPI: Weights: Fuel, Light and Water (FW): Fuel; CPI: Weights: FW: Light: Electricity; CPI: Weights: Svcs: TC: Transpo: AT: Oil, Gasoline & Diesel; CPI: Weights: Svcs: TC: Transpo: AT: Other Lubricants

Singapore: Series used: Consumer Price Index [2009=100]; Consumer Price Index: Food [2009=100]; CPI: By Item: Utility: Electricity Tariff [2009=100]; CPI: By Item: Utility: Gas Tariff [2009=100]; CPI: By Item: Utility: Liquefied Petroleum Gas [2009=100]; CPI: By Item: Private Road Transport: Petrol: 98 Octane [2009=100]; CPI: By Item: Private Road Transport: Petrol: 95 Octane [2009=100]; CPI: By Item: Private Road Transport: Petrol: 92 Octane [2009=100]; CPI: Weights: Food; CPI: Weights: By Item: Utility: Electricity Tariff; CPI: Weights: By Item: Utility: Gas Tariff; CPI: Weights: By Item: Utility: Liquefied Petroleum Gas; CPI: Weights: By Item: Private Road Transport: Petrol: 98 Octane; CPI: Weights: By Item: Private Road Transport: Petrol: 95 Octane; CPI: Weights: By Item: Private Road Transport: Petrol: 92 Octane.

Taiwan: Series used: Consumer Price Index (CPI) [2006=100]; CPI: Food [2006=100]; CPI: Housing: Water, Electricity & Gas Supply: Gas [2006=100]; CPI: Housing: Water, Electricity & Gas Supply: Electricity [2006=100]; CPI: TC: Fuels and Lubricants [2006=100]; Weights: As reported in footnote. Note on calculation: Weights are fixed.

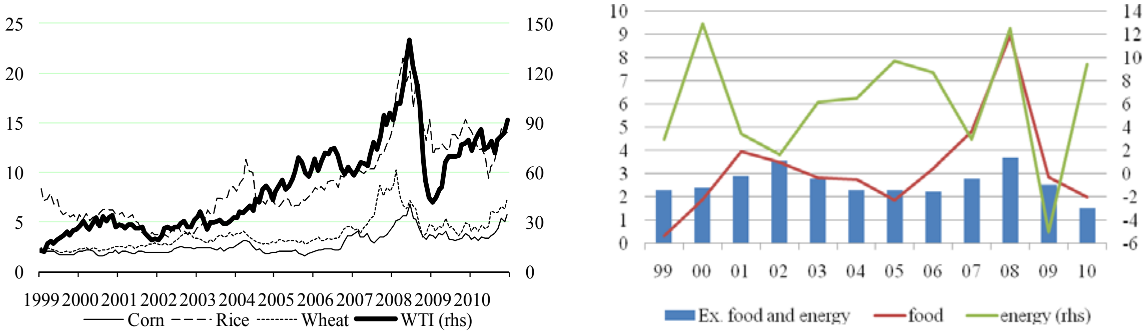
Appendix B

[Table B1]

[Table B2]

Figures

Figure 1. Prices of oil and cereals and average inflation rates



(a) Prices of oil and cereals
(US dollars)

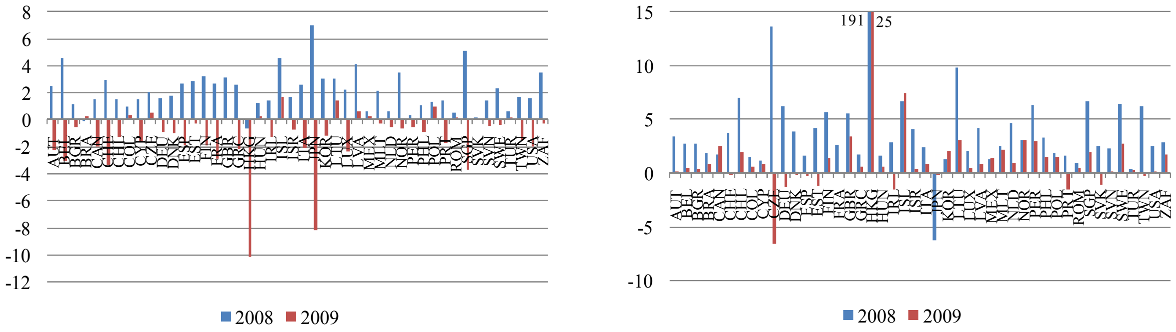
(b) Average inflation rates
(percentage)

Source: Bloomberg and author’s elaboration.
Note: The prices in figure 1(a) are: corn: per bushel, rice: per 100 pounds, wheat: per bushel, WTI: per barrel.

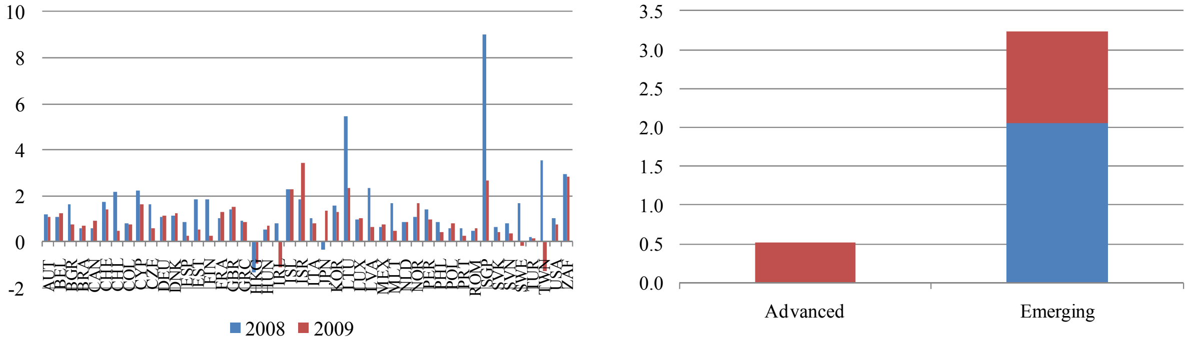
Figure 2. Relative inflation rates and average volatility

(ratios)

(a) Energy prices (b) Food prices



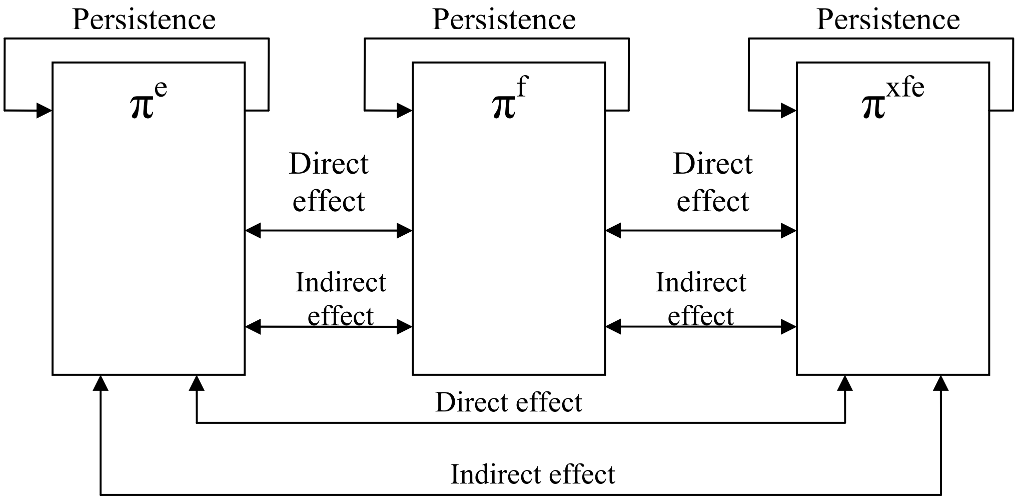
(c) Non food and energy prices (d) Volatility core inflation



Source: Author's elaboration.

Note: (a-c): Average annual inflation rate the years indicated in the legend divided by the average annual inflation rate for the years 1999 – 2007. (d): Variance of annual inflation rate divided by the average. The blue area is for emerging economies excluding TUR.

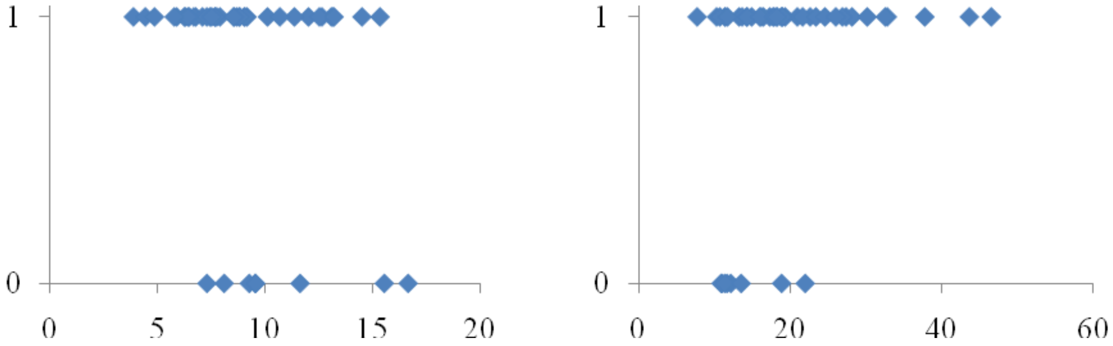
Figure 3. The propagation mechanism



Source: Author’s elaboration.
Note: π^e indicates the inflation of the energy component of the CPI basket, π^f the inflation of the food component, and π^{xfe} is the inflation of the non food and energy (core) component.

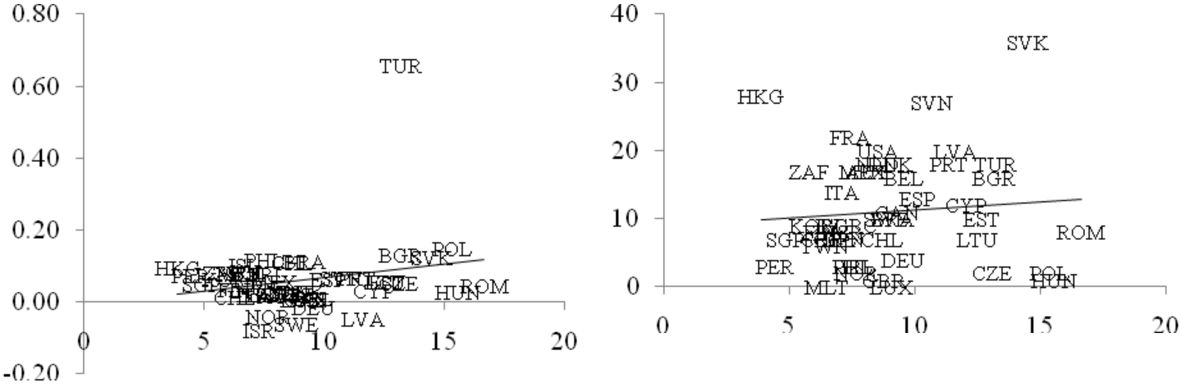
Figure 4. Weights and statically significant propagation

(a) Energy prices **(b) Food prices**



Source: Author´s elaboration.
Note: “0” indicates that there are no significant propagation and “1” that there is.

Figure 5. Plots of weights of the energy components and the variable indicated in the title

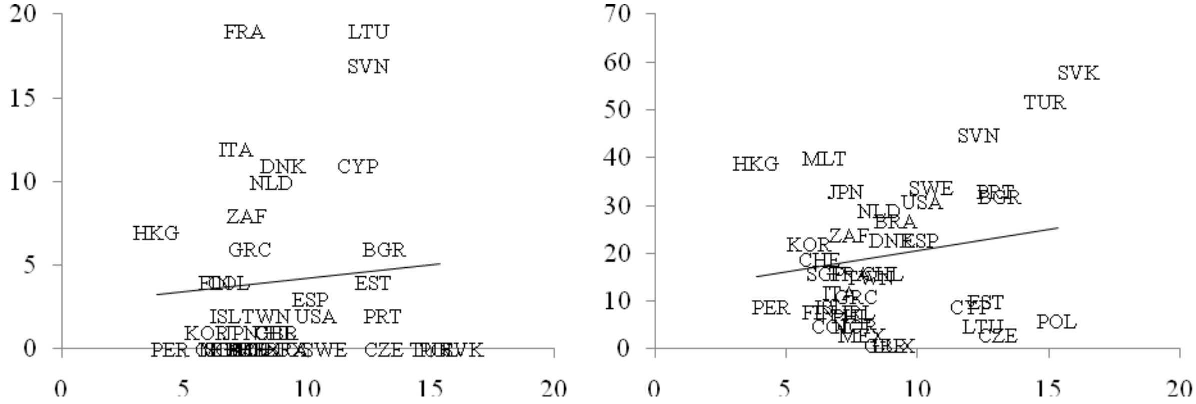


(a) Maximum impact (pp.)

(b) Month with max. impact

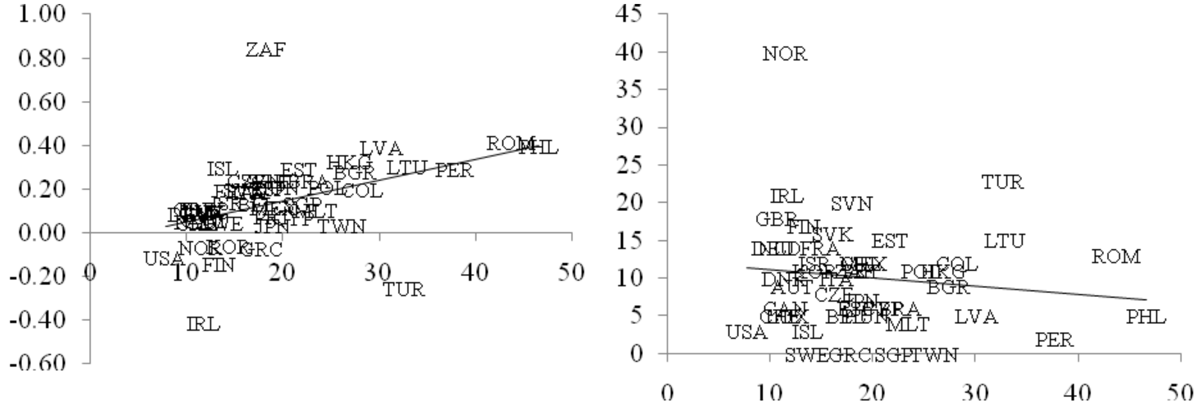
(c) First month with sign. Impact

(d) Duration of propagation

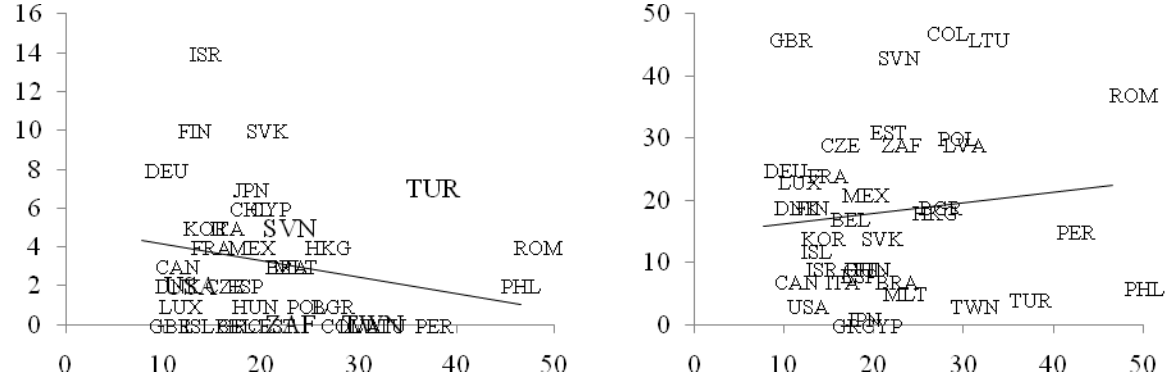


Source: Author´s elaboration.

Figure 6. Plots of weights of the food components and the variable indicated in the title



(a) Maximum impact (pp.) **(b) Month with max. impact**



(c) First month with sign. Impact **(d) Duration of propagation**

Source: Author´s elaboration.

Tables

Table 1. Effect on core CPI of a unit shock to energy prices

(percentage points of annual inflation rate)

	First(a)	**Last(a)**	**3M(b)**	**6M(b)**	**12M(b)**	**Max(c)**	**Month(c)**
AUT	N/A	N/A	0.01	0.01	0.02	0.02	17
BEL	N/A	N/A	0.00	0.00	0.01	0.01	16
BGR	6	37	0.05	0.08	0.12	0.13	16
BRA	0	26	0.08	0.10	0.11	0.12	10
CAN	N/A	N/A	0.00	0.01	0.01	0.01	11
CHE	0	18	0.01	0.02	0.01	0.02	7
CHL	1	16	0.09	0.11	0.09	0.11	7
COL	4	8	0.06	0.08	0.06	0.08	7
CYP	11	19	0.00	0.02	0.03	0.03	12
CZE	0	2	0.05	0.00	-0.04	0.05	2
DEU	N/A	N/A	-0.01	-0.01	0.00	-0.01	4
DNK	11	33	0.01	0.01	0.02	0.03	18
ESP	3	25	0.02	0.04	0.06	0.06	13
EST	4	13	0.03	0.05	0.06	0.06	10
FIN	4	11	0.02	0.03	0.02	0.03	8
FRA	19	34	-0.01	-0.01	0.01	0.02	22
GBR	1	1	0.01	0.00	-0.01	0.02	1
GRC	6	16	0.00	0.02	0.02	0.02	9
HKG	7	45	0.02	0.03	0.06	0.10	28
HUN	N/A	N/A	0.01	0.01	0.02	0.03	1
IRL	0	7	0.08	0.08	0.06	0.08	3
ISL	2	10	0.07	0.10	0.10	0.10	9
ISR	N/A	N/A	-0.03	-0.07	-0.06	-0.08	8
ITA	12	23	0.01	0.02	0.02	0.02	14
JPN	1	33	0.04	0.04	0.04	0.04	7
KOR	1	22	0.04	0.06	0.06	0.06	9
LTU	1	5	0.05	0.06	0.05	0.06	7
LUX	0	0	0.00	0.00	0.01	0.01	0
LVA	N/A	N/A	0.02	-0.01	-0.04	-0.05	20
MEX	0	2	0.04	0.03	0.05	0.06	17
MLT	0	39	0.05	0.04	0.03	0.08	0
NLD	10	38	0.00	0.01	0.03	0.03	18
NOR	0	4	-0.03	-0.01	-0.01	-0.04	2
PER	0	8	0.08	0.07	0.04	0.08	3
PHL	0	6	0.12	0.07	0.03	0.12	3
POL	0	5	0.13	0.07	0.03	0.15	2
PRT	2	34	0.04	0.04	0.06	0.07	18
ROM	N/A	N/A	0.04	0.04	0.04	0.05	8
SGP	0	15	0.05	0.05	0.05	0.05	7
SVK	0	57	0.09	0.09	0.10	0.12	36
SVN	17	61	0.01	0.02	0.04	0.07	27
SWE	0	33	-0.05	-0.06	-0.06	-0.06	10
TUR	0	51	0.37	0.51	0.63	0.66	18
TWN	2	16	0.05	0.08	0.05	0.08	6
USA	2	32	0.01	0.01	0.02	0.02	20
ZAF	8	31	0.03	0.04	0.07	0.08	17

Source: Author's elaboration.

Note: (a) First (last) month with statistically significant effect. (b) Effect after respectively 3, 6 and 12 months. (c) Maximum effect in absolute value reached in the month reported in the last column. In four countries the effects are also significant in the following months (maximum effect in absolute values in parenthesis): BGR: 0 – 0 (0.04), CHL: 24-35 (-0.06), HKG: 1 – 1 (0.03), LUX: 12-37 (0.01). In USA the impact in the fourth month after the initial shock is 0.01, but it is not statistically significant.

Table 2. Effect on core CPI of a unit shock to food prices

(percentage points of annual inflation rate)

	First(a)	**Last**(a)	**3M**(b)	**6M**(b)	**12M**(b)	**Max**(c)	**Month**(c)
AUT	N/A	N/A	0.03	0.05	0.05	0.06	9
BEL	0	17	0.13	0.13	0.09	0.13	5
BGR	1	20	0.20	0.27	0.26	0.28	9
BRA	3	10	0.15	0.24	0.18	0.24	6
CAN	3	10	0.08	0.09	0.07	0.09	6
CHE	N/A	N/A	0.04	0.05	0.02	0.05	5
CHL	6	15	0.08	0.16	0.24	0.24	12
COL	0	47	0.10	0.16	0.20	0.20	12
CYP	6	6	0.01	0.07	0.04	0.07	6
CZE	2	31	0.17	0.24	0.23	0.24	8
DEU	8	33	0.01	0.05	0.08	0.09	14
DNK	2	21	0.07	0.10	0.11	0.11	10
ESP	2	10	0.17	0.21	0.15	0.21	6
EST	0	31	0.10	0.19	0.28	0.29	15
FIN	10	29	0.02	-0.03	-0.11	-0.14	17
FRA	4	28	0.05	0.11	0.19	0.19	14
GBR	0	46	0.08	0.09	0.11	0.11	18
GRC	0	0	-0.01	0.00	-0.01	-0.07	0
HKG	4	22	0.23	0.29	0.33	0.33	11
HUN	1	10	0.20	0.20	0.13	0.21	5
IRL	N/A	N/A	0.16	0.07	-0.24	-0.41	21
ISL	0	12	0.30	0.26	0.15	0.30	3
ISR	14	23	0.01	0.08	0.14	0.14	12
ITA	5	12	0.11	0.17	0.18	0.19	10
JPN	7	8	0.02	0.03	0.03	0.03	7
KOR	5	19	-0.03	-0.05	-0.06	-0.06	11
LTU	0	46	0.18	0.24	0.30	0.30	15
LUX	1	24	0.10	0.10	0.08	0.10	5
LVA	0	29	0.37	0.39	0.34	0.39	5
MEX	4	25	0.05	0.10	0.11	0.12	12
MLT	3	8	0.10	0.10	0.04	0.11	4
NLD	N/A	N/A	0.00	0.03	0.05	0.05	14
NOR	N/A	N/A	0.03	-0.01	-0.04	-0.06	40
PER	0	15	0.29	0.26	0.18	0.29	2
PHL	2	8	0.33	0.37	0.00	0.40	5
POL	1	31	0.14	0.19	0.21	0.21	11
PRT	N/A	N/A	0.02	0.06	0.08	0.08	11
ROM	4	41	0.17	0.31	0.41	0.41	13
SGP	N/A	N/A	0.07	0.04	0.02	0.13	0
SVK	10	24	0.02	0.10	0.19	0.20	16
SVN	5	48	0.07	0.14	0.21	0.24	20
SWE	N/A	N/A	0.01	-0.01	-0.01	0.04	0
TUR	7	11	-0.03	-0.12	-0.21	-0.25	23
TWN	0	3	0.02	0.01	0.00	0.04	0
USA	2	5	-0.11	-0.09	0.01	-0.11	3
ZAF	0	29	0.66	0.78	0.84	0.85	11

Source: Author’s elaboration.

Note: See Table 1. In CYP the contemporaneous effect is 0.04 and it is statistically significant. In TUR the impact the tenth month after the initial shock is 0.59, but is not significantly significant.

Table 3. Average effect on core CPI

(percentage points of annual inflation rate)

Unit shock to energy prices

	First[(a)]	Last[(a)]	3M[(b)]	6M[(b)]	12M[(b)]	Max[(c)]	Month[(c)]
All	4.0	21.9	0.04	0.04	0.05	0.06	11.0
OECD	3.0	18.2	0.03	0.04	0.04	0.06	11.4
Europe	4.1	18.5	0.03	0.04	0.05	0.06	11.2
Adv.	4.7	19.3	0.01	0.02	0.02	0.03	10.9
Emer.	2.9	16.8	0.08	0.09	0.10	0.13	12.0
E. Asia	1.8	22.8	0.05	0.05	0.05	0.08	10.0
N. Am.	1.0	16.0	0.00	0.01	0.01	0.02	15.5
Latin Am.	1.0	12.0	0.07	0.08	0.07	0.09	8.8
Advanced	3.8	19.6	0.01	0.02	0.02	0.03	11.2
Emerging	2.5	15.6	0.08	0.08	0.08	0.11	10.8
IT	0.8	14.3	0.06	0.06	0.06	0.08	9.0
Non-IT	5.4	21.4	0.02	0.03	0.03	0.04	12.8

Unit shock to food prices

	First[(a)]	Last[(a)]	3M[(b)]	6M[(b)]	12M[(b)]	Max[(c)]	Month[(c)]
All	3.2	21.2	0.11	0.13	0.12	0.14	10.0
OECD	3.1	16.3	0.06	0.08	0.08	0.08	11.3
Europe	2.3	18.3	0.10	0.12	0.11	0.12	11.4
Adv.	2.2	14.0	0.07	0.08	0.06	0.07	11.0
Emer.	2.6	27.4	0.15	0.20	0.21	0.23	12.0
E. Asia	3.0	10.0	0.11	0.12	0.05	0.15	5.7
N. Am.	2.5	7.5	-0.02	0.00	0.04	-0.01	4.5
Latin Am.	2.6	22.4	0.13	0.18	0.18	0.22	8.8
Advanced	2.8	13.2	0.06	0.07	0.06	0.07	9.7
Emerging	2.4	24.9	0.19	0.24	0.23	0.27	10.6
IT	3.0	19.4	0.13	0.17	0.15	0.19	11.0
Non-IT	2.4	16.0	0.09	0.11	0.10	0.11	9.2

Source: Author's elaboration.

Note: See Table 1. IT: Inflation targeting economies. The column "Month" for a unit shock to energy prices excludes Hungary as explained in footnote 4.

Table 4. Weights in the consumer price baskets

(percentage)

	Energy	**Food**	**Ex. food and Energy**
AUT	8.1	12.2	79.7
BEL	9.6	17.4	73.1
BGR	13.2	27.4	59.4
BRA	9.2	22.7	68.1
CAN	9.3	11.5	79.3
CHE	6.3	11.1	82.6
CHL	8.7	18.9	72.4
COL	6.8	28.2	65.0
CYP	12.0	21.0	67.0
CZE	13.1	16.3	70.6
DEU	9.6	10.4	80.1
DNK	9.0	11.5	79.4
ESP	10.1	18.4	71.5
EST	12.7	21.7	65.6
FIN	6.3	13.3	80.4
FRA	7.5	15.0	77.6
GBR	8.8	10.8	80.4
GRC	7.7	17.8	74.5
HKG	3.9	26.9	69.2
HUN	15.6	19.4	65.0
IRL	7.8	11.7	80.5
ISL	6.7	13.7	79.6
ISR	7.3	14.3	78.4
ITA	7.1	16.5	76.4
JPN	7.3	19.0	73.7
KOR	5.9	14.4	79.7
LTU	12.5	32.9	54.6
LUX	9.1	11.8	79.1
LVA	11.6	30.2	58.1
MEX	7.9	19.1	73.0
MLT	6.5	23.5	70.0
NLD	8.6	11.0	72.8
NOR	7.7	11.4	80.9
PER	4.4	37.8	57.7
PHL	7.5	46.6	45.9
POL	15.4	24.6	60.0
PRT	11.4	18.9	69.7
ROM	16.7	43.7	39.7
SGP	4.9	22.1	73.1
SVK	14.5	16.1	69.4
SVN	10.7	17.9	71.4
SWE	8.8	13.6	77.6
TUR	13.2	32.6	54.2
TWN	6.4	26.1	67.5
USA	8.6	7.8	83.6
ZAF	5.8	18.3	75.9

Sources: OECD, Eurostat and CEIC database.

Table 5. Average weights in the consumer price basket

(percentage)

	Energy			Food		
	Average	Min.	Max.	Average	Min.	Max.
Europe	10.2	6.3	16.7	18.2	10.4	43.7
Advanced	8.5	6.3	12.0	14.7	10.4	23.5
Emerging	13.8	11.6	16.7	26.5	16.1	43.7
E. Asia	6.6	3.9	7.5	25.8	14.4	46.6
North America	8.9	8.6	9.3	9.6	7.8	11.5
Latin America	7.4	4.4	9.2	25.4	18.9	37.8

Sources: OECD, Eurostat and CEIC database and author´s elaboration.

Table B1. Lags, dummies and roots of companion matrix

	Lags			**Dummies**	**3 largest roots**		
	Model	**SIC**	**AIC**				
AUT	1	1	1	18, 25, 31, 62, 73, 88, 106	0.95	0.95	0.87
BEL	1	1	2	37, 85, 119	0.94	0.94	0.90
BGR	2	1	2	86, 116	0.95	0.92	0.92
BRA	4	2	12	47, 49, 59	0.97	0.91	0.91
CAN	1	1	1		0.89	0.89	0.89
CHE	2	1	8	20, 26, 37, 46	0.94	0.94	0.88
CHL	3	2	4	26, 52, 119, 134, 141	0.97	0.97	0.91
COL	2	2	5	19, 23, 25, 37	0.97	0.82	0.81
CYP	4	1	7	7, 25, 51, 53, 55, 119	0.88	0.88	0.83
CZE	4	1	7	7, 25, 37, 109, 119	0.95	0.93	0.93
DEU	2	1	4		0.91	0.91	0.90
DNK	2	1	3	93, 119	0.95	0.95	0.94
ESP	2	2	5	37, 40, 43, 46, 106, 118, 136	0.96	0.96	0.87
EST	2	2	12	105, 118, 121, 124	0.94	0.94	0.84
FIN	2	1	2	63, 109, 113, 130, 142	0.94	0.94	0.88
FRA	2	1	2	119	0.96	0.96	0.90
GBR	2	1	9	31, 41, 115	0.97	0.91	0.91
GRC	2	1	2	36, 41, 50, 73, 74	0.90	0.90	0.81
HKG	3	2	12	39, 63, 110, 117, 129, 141	0.98	0.98	0.89
HUN	3	1	5	19, 53, 85, 105, 127, 137, 139	0.96	0.92	0.92
IRL	3	2	4	12, 93, 122	0.95	0.93	0.93
ISL	2	2	2	99, 118, 120, 123, 124, 138	0.96	0.91	0.91
ISR	2	2	6	57, 119	0.89	0.86	0.86
ITA	2	2	5	25, 37, 49	0.94	0.94	0.94
JPN	2	2	2	21, 112, 113, 125, 142	0.96	0.83	0.83
KOR	1	1	2	114, 119	0.94	0.94	0.81
LTU	1	1	7	13, 25, 39, 109, 133	0.97	0.95	0.95
LUX	1	1	2	7, 106, 118	0.96	0.96	0.48
LVA	2	2	7	77, 89, 91, 106, 109, 119, 133	0.98	0.93	0.86
MEX	2	2	6	3, 12, 25, 31, 49, 53	0.96	0.84	0.84
MLT	1	1	12	60, 94, 118, 120, 132, 133	0.98	0.85	0.73
NLD	1	1	3	25, 85, 97, 127	0.94	0.93	0.93
NOR	2	2	2	31, 37, 43, 118, 126, 127, 138	0.99	0.95	0.75
PER	2	2	6	35, 51, 52, 63, 66, 71, 74	0.94	0.94	0.75
PHL	3	3	6	11, 13, 25, 112	0.98	0.90	0.90
POL	2	2	2	8, 77, 78	0.97	0.92	0.81
PRT	2	1	2	87, 119	0.96	0.93	0.93
ROM	2	1	2	47, 50, 55, 104, 105, 133, 139	0.92	0.92	0.81
SGP	2	1	6	26, 38, 81, 109, 121, 133, 136	0.94	0.92	0.92
SVK	2	1	2	7, 10, 13, 14, 19, 25, 26, 38, 42, 48, 49, 61, 73, 82, 85, 94, 97	0.99	0.93	0.93
SVN	1	1	1	26, 106, 119	0.96	0.96	0.89
SWE	1	1	2	109, 133	0.96	0.91	0.91
TUR	2	2	11	27, 28, 39, 40, 49	0.99	0.90	0.90
TWN	2	2	4	25, 26, 38, 50, 73, 76, 114, 118, 131	0.84	0.73	0.67
USA	4	1	7	88, 93, 119	0.94	0.94	0.89
ZAF	2	2	5	55, 59	0.94	0.94	0.85

Source: Author's elaboration.

Note: The numbers in the column "Dummies" refer to the observation after December 1998 such that, for example, "18" is a dummy for June 1999.

Table B2. *p*-values

	No serial correlation		No ARCH (12 lags)			No skewness		
	Order 1	**Order 4**	**Eq. 1**	**Eq. 2**	**Eq. 3**	**Eq. 1**	**Eq. 2**	**Eq. 3**
AUT	0.13	0.52	0.05	0.13	0.90	0.52	0.32	0.05
BEL	0.12	0.42	0.23	0.22	0.08	0.57	0.66	0.94
BGR	0.61	0.45	0.77	0.19	0.12	0.16	0.05	0.91
BRA	0.30	0.27	0.08	0.98	0.71	0.23	0.63	0.19
CAN	0.11	0.94	0.06	0.54	0.27	0.18	0.12	0.64
CHE	0.75	0.21	0.72	0.38	0.08	0.34	0.58	0.18
CHL	0.11	0.10	0.14	0.07	0.05	0.06	0.51	0.42
COL	0.06	0.46	0.56	0.29	0.38	0.72	0.24	0.15
CYP	0.06	0.34	0.26	0.27	0.06	0.97	0.07	0.07
CZE	0.83	0.18	0.08	0.13	0.84	0.80	0.20	0.91
DEU	0.68	0.41	0.18	0.16	0.10	0.11	0.18	0.41
DNK	0.05	0.21	0.20	0.30	0.14	0.90	0.89	0.16
ESP	0.55	0.09	0.06	0.82	0.37	0.26	0.75	0.23
EST	0.30	0.08	0.39	0.81	0.10	0.90	0.08	0.65
FIN	0.95	0.76	0.15	0.25	0.71	0.14	0.11	0.05
FRA	0.37	0.28	0.76	0.56	0.93	0.12	0.39	0.37
GBR	0.67	0.32	0.73	0.40	0.06	0.16	0.72	0.14
GRC	0.31	0.84	0.69	0.11	0.51	0.19	0.06	0.68
HKG	0.48	0.21	0.14	0.50	0.29	0.13	0.13	0.06
HUN	0.37	0.05	0.07	0.97	0.28	0.63	0.94	0.49
IRL	0.19	0.34	0.06	0.28	0.23	0.89	0.16	0.15
ISL	0.18	0.07	0.01	0.57	0.15	0.15	0.58	0.15
ISR	0.15	0.12	0.34	0.62	0.22	0.91	0.86	0.50
ITA	0.06	0.06	0.27	0.57	0.32	0.30	0.06	0.93
JPN	0.33	0.10	0.09	0.20	0.95	0.18	0.71	0.33
KOR	0.55	0.21	0.23	0.62	0.13	0.68	0.14	0.06
LTU	0.05	0.74	0.26	0.08	0.46	0.57	0.87	0.57
LUX	0.05	0.08	0.31	0.19	0.42	0.35	0.80	0.05
LVA	0.28	0.07	0.14	0.10	0.94	0.88	0.06	0.16
MEX	0.07	0.44	0.17	0.40	0.89	0.10	0.38	0.13
MLT	0.09	0.89	0.01	0.09	0.62	0.58	0.47	0.24
NLD	0.09	0.47	0.61	0.26	0.44	0.45	0.55	0.16
NOR	0.05	0.46	0.12	0.10	0.08	0.41	0.30	0.22
PER	0.16	0.09	0.76	0.50	0.64	0.63	0.28	0.56
PHL	0.25	0.09	0.23	0.21	0.53	0.64	0.99	0.15
POL	0.20	0.54	0.13	0.30	0.30	0.67	0.10	0.39
PRT	0.07	0.74	0.19	0.05	0.77	0.52	0.84	0.45
ROM	0.59	0.36	0.28	0.07	0.09	0.73	0.10	0.41
SGP	0.18	0.28	0.05	0.38	0.28	0.18	0.38	0.08
SVK	0.69	0.15	0.10	0.41	0.33	0.35	0.32	0.77
SVN	0.55	0.78	0.25	0.12	0.85	0.15	0.71	0.06
SWE	0.08	0.57	0.34	0.35	0.08	0.63	0.05	0.43
TUR	0.09	0.07	0.13	0.76	0.32	0.89	0.06	0.70
TWN	0.14	0.32	0.07	0.53	0.54	0.13	0.48	0.26
USA	0.14	0.23	0.57	0.23	0.90	0.21	0.05	0.54
ZAF	0.13	0.31	0.33	0.88	0.87	0.59	0.21	0.48

Source: Author’s elaboration.

Notes: Eq. 1 is the equation for energy prices, eq. 2 is for food prices and eq. 3 for core inflation rates.

Documentos de Trabajo
Banco Central de Chile

Working Papers
Central Bank of Chile

NÚMEROS ANTERIORES

PAST ISSUES

La serie de Documentos de Trabajo en versión PDF puede obtenerse gratis en la dirección electrónica: www.bcentral.cl/esp/estpub/estudios/dtbc. Existe la posibilidad de solicitar una copia impresa con un costo de $500 si es dentro de Chile y US$12 si es para fuera de Chile. Las solicitudes se pueden hacer por fax: (56-2) 6702231 o a través de correo electrónico: bcch@bcentral.cl.

Working Papers in PDF format can be downloaded free of charge from: www.bcentral.cl/eng/stdpub/studies/workingpaper. Printed versions can be ordered individually for US$12 per copy (for orders inside Chile the charge is Ch$500.) Orders can be placed by fax: (56-2) 6702231 or e-mail: bcch@bcentral.cl.

DTBC – 647 Noviembre 2011
Incertidumbre Global Sobre la Economía Chile
Yan Carrière–Swallow y Carlos Medel

DTBC – 646 Noviembre 2011
The Impact of Uncertainty Shocks in Emerging Economies
Yan Carrière–Swallow y Luis Felipe Céspedes

DTBC – 645 Septiembre 2011
Crédito, Exceso de Toma de Riesgo, Costo de Crédito y Ciclo Económico en Chile
Carlos J. García y Andrés Sagner

DTBC – 644 Septiembre 2011
Optimal Fiscal Policy in a Small Open Economy with Limited Commitment
Sofia Bauducco y Francesco Caprioli

DTBC – 643 Septiembre 2011
Contracting Institutions and Economic Growth
Álvaro Aguirre

DTBC – 642 Agosto 2011
Dinámica de Precios en Chile: Evidencia con datos de Supermercados
Gastón Chaumont, Miguel Fuentes, Felipe Labbé y Alberto Naudon

DTBC – 641 Agosto 2011
A Reassessment of Flexible Price Evidence Using Scanner Data: Evidence from an Emerging Economy
Gastón Chaumont, Miguel Fuentes, Felipe Labbé y Alberto Naudon

DTBC – 640 Agosto 2011
Copper, the Real Exchange Rate and Macroeconomic Fluctuations in Chile
José De Gregorio y Felipe Labbé

DTBC – 639 Agosto 2011
Credit Contraction and International Trade: Evidence From Chilean Exporters
Ari Aisen, Roberto Álvarez, Andrés Sagner y Javier Turén

DTBC – 638 Agosto 2011
Investment Dynamics in a DSGE Model With Heterogeneous Firms and Corporate Taxation
Sergio Salgado I.

DTBC – 637 Agosto 2011
Labor Market Dynamics in Chile: the Role of Terms of Trade Shocks
Juan Pablo Medina y Alberto Naudon

DTBC – 636 Agosto 2011
Distribución de la Riqueza, Capital Social y Tasa de Crecimiento
Pablo Filippi

DTBC – 635 Julio 2011
Time – Consistent Bailout Plans
Ernest Pastén

DTBC – 634 Julio 2011
Proyecciones de Inflación con Precios de Frecuencia Mixta: el Caso Chileno
Juan Sebastián Becerra y Carlos Saavedra

DTBC – 633 Junio 2011
Long – Term Interest Rate and Fiscal Policy
Eduardo López, Victor Riquelme y Ercio Muñoz