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# Determinants of Inflation Expectations

## Abstract

This paper analyses the determinants of short-term inflation expectations based on surveys of professionals, using dynamic cross-country panel estimation for a large number of 34 OECD economies. We find that food consumer price inflation and depreciations of the domestic exchange rate have significant positive effects on professionals' survey-based inflation expectations. Moreover, core consumer price inflation and the output gap have significant positive effects.

JEL-Codes: E520, E580.

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# 1. Introduction

This paper analyses the determinants of survey-based short-term inflation expectations of professionals, using dynamic cross-country panel estimation for a large number of 34 OECD economies.

Inflation expectations matter for inflation in economic models commonly used for monetary policy analysis (Clarida et al., 1999; Smets, 2003; Woodford, 2003; Moessner, 2021). The recent debate on monetary policy frameworks, including average inflation targeting, focused on the role of inflation expectations, eg in the monetary policy strategy reviews of the US Federal Reserve and the European Central Bank (ECB) (Powell and Wessel, 2020; Eurosystem work stream on inflation expectations, 2021). The decisions by the Federal Reserve to adopt an average inflation targeting framework in 2020, and by the ECB to change to a symmetric inflation target of 2% in 2021, were partly based on the role of inflation expectations. Policy makers also considered inflation expectations to be important for economic outcomes and monetary policy decisions in the past, despite difficulties in identifying their determinants: Former chair of the Federal Reserve Alan Greenspan noted that “I am not saying what [inflation expectations] is a function of. We know it’s a very difficult issue, but that is the key variable. It’s important, but just because we can’t make a judgment as to what these driving forces are in an econometric sense doesn’t mean that it’s not real.” (Federal Open Market Committee, 1994; Coibion et al., 2018).

The literature on inflation expectation formation mechanisms has been reviewed in Coibion et al. (2018), who argue that survey-based expectations should be included more systematically in macroeconomic studies. Shiller (1978) noted the importance of studying the determination of inflation expectations. A recent review of the literature on the determinants of inflation expectations in advanced and emerging economies and new evidence can be found in Kose et al. (2020). They conclude that empirical studies on inflation expectations have mostly focused on advanced economies, and on testing the implications of the theoretical literature and evaluating the degree of anchoring of expectations.<sup>2</sup>

The Eurosystem work stream on inflation expectations (2021) has recently studied the determinants of inflation expectations in the euro area within the ECB’s monetary policy strategy review, but without considering the effects of exchange rate changes. They find that short-term euro area inflation expectations have been affected by oil prices, by monetary policy shocks and central bank inflation projections. Galati et al. (2018) also find that short-term inflation expectations in the euro area have been affected by oil prices. Household inflation expectations in the United States and Japan responded to changes in food and oil prices (Ueda, 2010). Gerlach et al. (2011) find that short-term inflation expectations in major advanced and

<sup>2</sup> Kose et al. (2020) note that theoretical studies have focussed on investigating how public and private information is used by economic agents in formulating inflation expectations.

emerging economies have been affected by food, energy and core consumer price inflation. Patra and Ray (2010) find that lagged inflation, movements in food and fuel prices and the output gap are the main determinants of short-term inflation expectations in India. They note that the scarce literature on the determinants of inflation expectations in emerging economies has mainly focused on target credibility or the role of fiscal expectations (Minella et al., 2003; Celasun et al., 2004).

Inflation has been rising globally in the wake of the Covid pandemic. A concern for central banks has been that there could be second-round effects, with higher inflation leading to higher inflation expectations, which in turn lead to higher inflation. This could lead to inflation rising more persistently. This is another motivation for studying the drivers of inflation expectations.

Our paper contributes to a better understanding of the determinants of short-term inflation expectations. As possible determinants of inflation expectations we consider food and energy prices, both country-specific measures in the form of components of the consumer price index (CPI), and global food prices and oil prices. We also consider the effects of changes in exchange rates and global freight prices. Moreover, we include core consumer price inflation and the output gap as explanatory variables.

We use survey-based CPI inflation expectations of professionals, since they are available on a comparable basis for the large number of countries in our sample, and since they are not distorted by risk and liquidity premia, in contrast to financial market-based measures.<sup>3</sup>

We find that country-specific food CPI inflation has a significant positive effect on professionals' survey-based inflation expectations. This effect is larger than that of energy CPI inflation and of oil and global food prices. We also find that depreciations of the domestic exchange rate lead to significantly higher inflation expectations. Moreover, core CPI inflation and the output gap have significant positive effects.

The remainder of the paper is organised as follows. Section 2 introduces the data, section 3 presents the method and results, and section 4 concludes.

## **2. Data**

We use data on professionals' survey-based CPI short-term inflation expectations. These are taken from Consensus Economics surveys for next-year CPI inflation expectations.

Data on seasonally adjusted headline consumer price indices (CPI) comes from Datastream and national sources. Data on seasonally adjusted food CPI indices,

<sup>3</sup> The advantages and disadvantages of survey- and market-based measures of inflation expectations are discussed in Galati et al (2011).

energy CPI indices and core CPI indices are based on data from the OECD, national data and BIS estimations. Core CPI inflation is defined as excluding food and energy. Brent oil prices (quarterly averages, US dollar per barrel) are from Datastream. Global commodity prices are taken as the IMF all commodity price index. Global food prices are taken as the UN FAO food nominal price index. As a measure of global freight prices we use quarterly averages of the Baltic Dry Index, as reported daily by the Baltic Exchange in London, from Datastream (in US dollar per points). This index provides a benchmark for the price of moving the major raw materials by sea.

Data on output gaps (as a percentage of potential GDP) was obtained from the OECD, and is linearly interpolated from annual data. Nominal effective exchange rate indices (broad indices, quarterly average) are from the BIS, with an increase reflecting an appreciation of the domestic currency.

We consider the following 34 OECD economies: Austria, Australia, Belgium, Canada, Chile, the Czech Republic, Denmark, Estonia, euro area, Finland, France, Germany, Great Britain, Greece, Hungary, Ireland, Israel, Italy, Japan, Latvia, Lithuania, Mexico, the Netherlands, Norway, New Zealand, Poland, Portugal, Slovakia, Slovenia, South Korea, Spain, Sweden, Switzerland and the United States. The sample period is from 2000Q1 to 2021Q1 at quarterly frequency.

### 3. Method and results

We study the determinants of inflation expectations by estimating the following dynamic fixed effects panel regressions, using a panel of 34 OECD economies,

$$\pi_{it}^e = \rho \pi_{it-1}^e + \mu \Delta NEER_{it} + \gamma_f \pi_{it}^{\text{food CPI}} + \gamma_e \pi_{it}^{\text{energy CPI}} + \gamma_c \pi_{it}^{\text{core CPI}} + \phi \text{outputgap}_{it} + \alpha_i + \beta_t + \varepsilon_{it}. \quad (1)$$

where  $\pi_{it}^e$  denotes next-year CPI inflation expectations from Consensus Economics surveys in percent;  $\pi_{it}^{\text{food CPI}}$ ,  $\pi_{it}^{\text{energy CPI}}$  and  $\pi_{it}^{\text{core CPI}}$  denote year-on-year (y/y) CPI food price inflation, CPI energy price inflation and CPI core inflation, respectively, in percent, in country  $i$  at time  $t$ ;  $\text{outputgap}_{it}$  denotes the output gap;  $\Delta NEER_{it}$  is the q/q change in the nominal effective exchange rate in percent, calculated from the log change in the nominal effective exchange rate, with an increase indicating an appreciation of the currency;  $\alpha_i$  are country fixed effects to control for observed and unobserved country heterogeneity; finally,  $\beta_t$  are time fixed effects in order to control for all observed and unobserved variation in common global factors. We use robust standard errors clustered at the country level. We use system generalised method of moments (GMM) estimation for panel data with endogenous explanatory variables (Arellano and Bover, 1995; Blundell and Bond, 1998). This method is appropriate since lagged inflation expectations are significant at the 1% level in all our specifications.

Equation (1) is our baseline specification, and the results are shown in column 1 of Table 1 and in Figure 1 (left panel). We find that country-specific food CPI inflation has a significant positive effect on professionals' survey-based inflation expectations.

A 10 percentage point (pp) increase in food CPI inflation leads to an increase in inflation expectations of around 0.3pp. This effect is larger than that of energy CPI inflation. We also find that depreciations of the domestic exchange rate have a significant positive effect on inflation expectations. A 10% depreciation over the quarter of the domestic exchange rate in nominal effective terms leads to an increase in inflation expectations of around 0.1pp. Moreover, we find that core CPI inflation and the output gap have significant positive effects on inflation expectations. These effects are in addition to those of lagged inflation expectations. The inflation expectations are highly persistent, with a coefficient of around 0.7 on lagged inflation expectations.

We also estimate versions of equation (1) where we drop time fixed effects, which allows us to add changes (y/y) in global commodity prices,  $\pi_t^{\text{commodity}}$ , and in global freight prices,  $\pi_t^{\text{freight}}$ . These results are shown in columns II and III of Table 1, respectively. We find that the effects of global commodity price inflation and of changes in global freight costs are positive and significant, but that of freight costs is very small. The effects of exchange rate depreciations, core CPI inflation and the output gap remain significant and of similar magnitude as in the baseline specification of column I.

We also estimate the following specification, where we use changes in global food prices and in oil prices, instead of country-specific food and energy CPI inflation and time fixed effects,

$$\pi_{it}^e = \rho \pi_{it-1}^e + \mu \Delta NEER_{it} + \gamma_c \pi_{it}^{\text{core CPI}} + \phi \text{outputgap}_{it} + \kappa_f \pi_t^{\text{food}} + \kappa_o \pi_t^{\text{oil}} + \alpha_i + \varepsilon_{it}. \quad (2)$$

Here,  $\pi_t^{\text{food}}$  denotes changes (y/y) in global food prices, and  $\pi_t^{\text{oil}}$  denotes changes (y/y) in oil prices, in percent. The results of equation (2) are shown in column IV of Table 1 and Figure 1 (right panel). We find that the effect of global food prices is positive and significant, but smaller than that of country-specific food CPI inflation. Oil prices also have a small significant positive effect on inflation expectations. Again, exchange rate depreciations, core CPI inflation and the output gap have significant positive effects on inflation expectations, of very similar magnitude to those for the baseline specification in equation (1).

We also estimate a version of equation (2) where we consider changes in global commodity prices, instead of oil prices and global food prices. These results are shown in column V of Table 1. We find again that global commodity prices have a significant positive effect on inflation expectations.

## 4. Conclusions

This paper analysed the determinants of short-term inflation expectations based on surveys of professionals, using dynamic cross-country panel estimation for a large

number of 34 OECD economies. We find that country-specific food CPI inflation has a significant positive effect on professionals' survey-based inflation expectations. A 10pp increase in food CPI inflation leads to an increase in inflation expectations of around 0.3pp. This effect is larger than that of global food prices. Oil prices and global commodity prices also have a significant positive effect.

We also find that depreciations of the domestic exchange rate lead to significantly higher inflation expectations. A 10% depreciation over a quarter of the domestic exchange rate in nominal effective terms leads to an increase in inflation expectations of around 0.1pp. Moreover, core CPI inflation and the output gap have significant positive effects.



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Short-term inflation expectations					Table 1
Dep. var.: $\pi_{it}^e$					
	I	II	III	IV	V
$\pi_{it-1}^e$	0.7354***	0.6705***	0.6740***	0.7011***	0.7001***
$\Delta\text{NEER}_{it}$	-0.0108***	-0.0093*	-0.0097*	-0.0102**	-0.0072*
$\pi_{it}^{\text{food CPI}}$	0.0255***	0.0238***	0.0244***		
$\pi_{it}^{\text{energy CPI}}$	-0.0049	-0.0032	-0.0024		
$\pi_{it}^{\text{core CPI}}$	0.0307*	0.0380**	0.0369**	0.0445**	0.0463**
output gap <sub>it</sub>	0.0177***	0.0173***	0.0170***	0.0140***	0.0193***
$\pi_{t}^{\text{food}}$				0.0028**	
$\pi_{t}^{\text{oil}}$				0.0025***	
$\pi_{t}^{\text{commodity}}$		0.0054***	0.0049***		0.0049***
$\pi_{t}^{\text{freight}}$			0.0002**		
constant	0.5913***	0.5487***	0.5417***	0.5261***	0.5197***
observations	2583	2345	2345	1836	2352
number of countries	34	34	34	34	34
time fixed effects	yes	no	no	no	no
R2 within	0.845	0.784	0.785	0.758	0.776
R2 between	0.997	0.996	0.996	0.997	0.9952

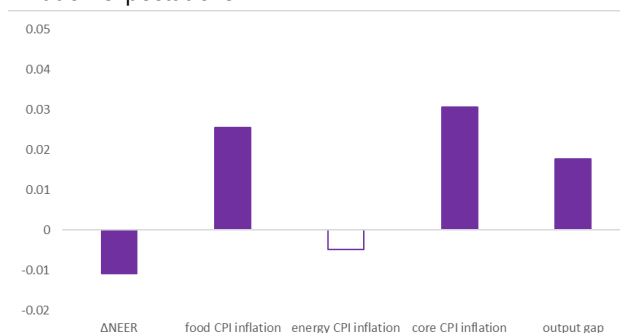
Note: Fixed effects panel estimation; sample period: 2000Q1-2021Q1. Robust standard errors clustered at the country level. \*\*\*/\*\*/\* denote statistical significance at 1/5/10% confidence level.

## Determinants of inflation expectations<sup>1</sup>

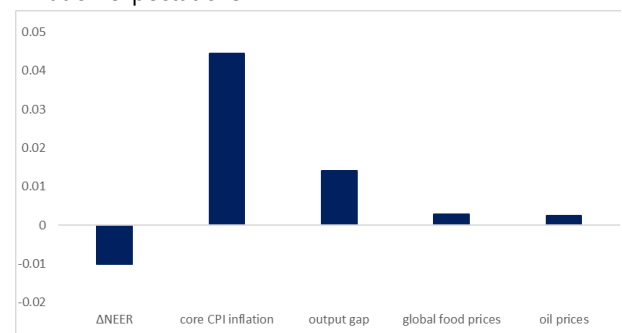
Responses to 1 percent or percentage point increase, in percentage points

Figure 1

Inflation expectations<sup>2</sup>



Inflation expectations<sup>3</sup>



<sup>1</sup> Estimates based on Table 1. <sup>2</sup> Coefficients for model I (also includes lagged inflation expectations and time fixed effects). <sup>3</sup> Coefficients for model IV (also includes lagged inflation expectations, but no time fixed effects).

Notes: Using dynamic fixed effects panel regressions and Consensus survey inflation expectations for the following year; sample period: 2000Q1-2021Q1; 34 OECD economies; filled bars indicate significant coefficients.