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DIRECTORATE GENERAL FOR INTERNAL POLICIES
POLICY DEPARTMENT A: ECONOMIC AND SCIENTIFIC POLICY

The ability of the ECB to control inflation in a global environment

IN-DEPTH ANALYSIS

Abstract

In this paper, we study the global determinants of euro area inflation and show that they are large - they explain around 50% of inflation dynamics – and make it impossible for the ECB to fully control headline inflation. Nevertheless, we show that the ECB retains some control on the domestic part of euro area inflation. We therefore argue in favour of a change in the inflation target pursued by the ECB. Unless a change occurs, the ECB should promote cooperation with other central banks in order to match its CPI inflation target at 2% as 40 to 50% of CPI determinants is related to foreign yields and foreign output growths.

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EXECUTIVE SUMMARY

- The ECB is not able to impact the headline inflation with its conventional and unconventional policies. According to our assessment, the global determinants of euro area inflation are large, and explain around 50% of inflation dynamics, and sufficiently large to make it impossible for the ECB to fully control headline inflation.
- Nevertheless, the ECB is able to control the domestic part of inflation. This conclusion urges a change in the inflation target pursued by the ECB. The ECB mandate of “price stability” would remain adequate if the ECB were targeting a domestic index rather than a CPI index, even one that would correct for the evolution of some regulated and some volatile prices (the core index).
- In the current situation of domestic deflation, a more expansionary monetary policy is required. It should be accompanied by increases in wages, for instance in surplus countries. Indeed, financial conditions and wages and costs account for 10 percent each of the variance in euro area CPI: boosting them would help reverse the deflationary trend.
- The ECB should endeavour to foster cooperation with other central banks in order to match its CPI inflation target at 2%: 40 to 50% of CPI determinants is related to foreign yields and foreign output growths. If cooperation is not possible, the ECB may well make clear that its decisions on policy rates are dependent on the foreign economic, monetary and financial environment which weighs on euro area inflation. In the end, communication will be central to demonstrate that the ECB has still some ability to control part of inflation.

1. INTRODUCTION

The global financial crisis has had strong negative consequences on the real economy but has had only a minor impact on inflation, apparently. The surge in unemployment rates and GDP declines in Western countries have not been associated with a sharp decrease in inflation while the on-going recovery has not been accompanied, to date, by an increase in inflation.

There have been at least four explanations for this long-standing low and stable inflation era despite large swings in real activity and unemployment. The first one relates to the reliance by central banks on inflation targets (or on inflation targeting) and to the impact of inflation targets on inflation expectations: inflation targets have anchored the households and firms' expectations. If wages are indexed on expected inflation and central banks are credible, inflation should remain low. The second explanation relates to a change in the slope of the so-called Phillips curve: the sensitivity of inflation to the unemployment gap (the difference between the actual and natural unemployment rate) has decreased, for reasons that still remain unclear (see Constancio, Hartmann and Tristani, 2015). Among these reasons, one may argue that wages are no longer indexed on inflation expectations. The third explanation relates to the diffusion of information technology (IT) and its incidence on firms' costs. For instance, logistics would have been substantially improved (and its costs lessened) by the better instantaneous knowledge of the level, disposal and location of inventories that IT has permitted. The fourth explanation relates to globalisation: inflation rates are determined by global factors. The list of possible global factors is long: real activity of trade partners, oil shocks, import prices, international competition, etc. The fourth explanation may be that the low impact of the global financial crisis on inflation would reflect a situation in which some global factors, like the initial resilience of growth in emerging countries, would have mitigated the impact of some other factors, like the initial slump in Western countries.

In the following, we focus on the specific role of global factors. First, we study whether inflation in the euro area is determined, and to what extent, by global (or external) factors. Our own estimation is that half of the inflation dynamics (measured by the CPI which is the target of the ECB) is explained by global factors. This may seem a lot, but it also implies that half of the inflation dynamics is determined by past inflation and domestic factors which can be affected by monetary policy. Second, we study whether policies implemented by the ECB have an impact not only on inflation but also on its different components – domestic or external. Stated differently, we wonder whether the ECB can still control inflation and to what extent. We conclude with some policy recommendations.

2. GLOBAL INFLATION

Before presenting our own assessment of the role of global factors on inflation dynamics, we present a literature review of previous studies. A fair assessment is that the results are mixed, and no clear consensus emerges.

2.1 Global inflation in the literature

The “Great Moderation” has spurred an abundant literature on its determinants and many papers in this field of research studied the impact of globalisation on inflation. On the one hand, and according to Ball (2006), globalisation has not reduced the long-run level of inflation, has not changed the determinants of inflation, and has not contributed substantially and negatively to the inflation process. On the other hand, Ciccarelli and Mojon (2010) show that inflation in industrialized countries is largely a global phenomenon. First, inflations of 22 OECD countries have a common factor that accounts for nearly 70% of their variance. Second, a robust error-correction mechanism brings domestic inflation rates back to global inflation.

A few papers have used measures of global output gaps to proxy the external factors of inflation. They usually reach a similar conclusion as Ball (2006). Ihrig et al. (2010) do not support the hypothesis that globalisation has increased the role of international factors and decreased the role of domestic factors in the inflation process of 11 industrial economies. They point to insignificant estimated effect of foreign output gaps on domestic consumer price inflation. Calza (2008) finds little evidence that global capacity constraints have either explanatory or predictive power for domestic consumer price inflation in euro area countries between 1979 and 2003. Gnan and Valderrama (2006) show that the domestic output gap seems to have lost its influence on inflation in the euro area; however, the global output gap does not significantly impinge on euro area inflation. In contrast, Borio and Filardo (2006) show that the impact of global factors has been growing since the 1990s and that these factors have sometimes contributed more to inflation than domestic measures of economic activity. They use different proxies of global output gaps (trade-weighted global output gap, exchange rate weighted global output gap, exchange rate adjusted trade-weighted global output gap and GDP-weighted global output gap) which add substantial explanatory power to inflation rate equations.

Several other papers have focused on international trade to proxy the external factors of inflation. Sbordone (2007) analyses the potential effect of global market competition on US inflation dynamics. He argues that the actual increase in US trade has not been substantial enough to foster the rise in US market competition that is necessary to explain the observed

decline in the slope of the inflation-marginal cost relation. Kohn (2006) argues that import prices have a direct impact on US consumer prices and shows that this impact has increased over time with the increase in the share of imported consumer goods in households' spending. Badinger (2008) uses a cross-section of 91 countries covering the period 1985-2004 to assess the relationship between inflation and globalisation, measured in terms of trade and financial openness. He shows that increasing trade or financial openness by 1 percentage point reduces average inflation by -0.2 to -0.4 percent. He also concludes that this result is not robust to a subsample of 25 OECD countries.

The lack of consensus on the global nature of inflation raises two issues. The first one relates to the definition of global factors. The above-mentioned papers use either some aggregate measures of foreign output gaps or some measures of trade. They neither take both nor extend proxies to other factors. The second issue is one of assessment. The multiplicity of empirical results so far calls for own assessment.

2.2 Global inflation in the euro area

We assess to what extent the consumer price index and core euro area inflation are driven by domestic or global factors. In contrast with the above mentioned literature, we use a large array of determinants to extract the global determinants of inflation in the euro area, including some related to finance. Our results, discussed below, show that the variable which the ECB is targeting – the consumer price index – is substantially explained by global factors: around 50% of the variability of inflation is explained by these factors whereas only a quarter is driven by domestic factors. The remaining quarter is explained by past CPI. Results explaining the variability of core inflation (excluding energy and food, the prices of which are assumed to be determined on global markets) also point to a larger influence of external factors than domestic ones. The conclusion is that inflation in the euro area is largely influenced by global factors. Consequently, a substantial part of inflation is out of control of the ECB.

The methodology to obtain this result is explained in Appendix 1. We use two econometric models to extract the role of global factors on euro area inflation. In the first one, we directly introduce measures of potential international determinants of inflation: we consider oil prices, US corporate bond yields, a weighted measure of the GDP of OECD countries plus the 6 major non-member economies (Brazil, China, India, Indonesia, Russia and South Africa) and unit labour costs of OECD countries. Oil prices give information on energy intensity of production; US interest rates proxy the global financial environment while weighted GDP measures the global output. Unit labour costs are competitiveness indicators which give an

assessment of the incidence of global labour competition and global trade on inflation.

In the second one, we are more agnostic about the nature of global factors and we use a factor model. The idea of these models is to directly extract from the data some unknown (but measurable!) determinants (or factors) which affect the euro area inflation rates.

The two methods conclude that roughly 50% of inflation (CPI or core inflation) is explained by global factors.

3. DOES THE ECB CONTROL INFLATION?

The global nature of euro area inflation raises two related issues: first, is the ECB able to impact, then control, inflation, in accordance with its main mandate? As we have just seen that 50% of CPI inflation is global, the ECB cannot be expected to have a direct influence of the "global part" of inflation. This being said, the key and second issue is to assess the ability of the ECB to control the remaining part of inflation, the "domestic" inflation. To do this we first construct a measure of inflation once we remove the role of global factors. We use our two econometric models presented in Appendix 1 to extract the role of global factors from observed inflation. We apply these methods to both CPI inflation to obtain a "domestic CPI inflation" and to core inflation (when we exclude foods and energy), to obtain a domestic "core inflation". The difference between headline CPI inflation and our measure of domestic CPI inflation is big. The difference between core inflation and our measure of domestic core inflation is much smaller, as one can expect. Food and energy are indeed some key determinants of the role of global factors in CPI inflation.

To ease the discussion, the first graph of Figure 1 plots CPI inflation (black line) together with our two measures of "domestic CPI inflation". The difference between domestic CPI and headline CPI raises two remarks:

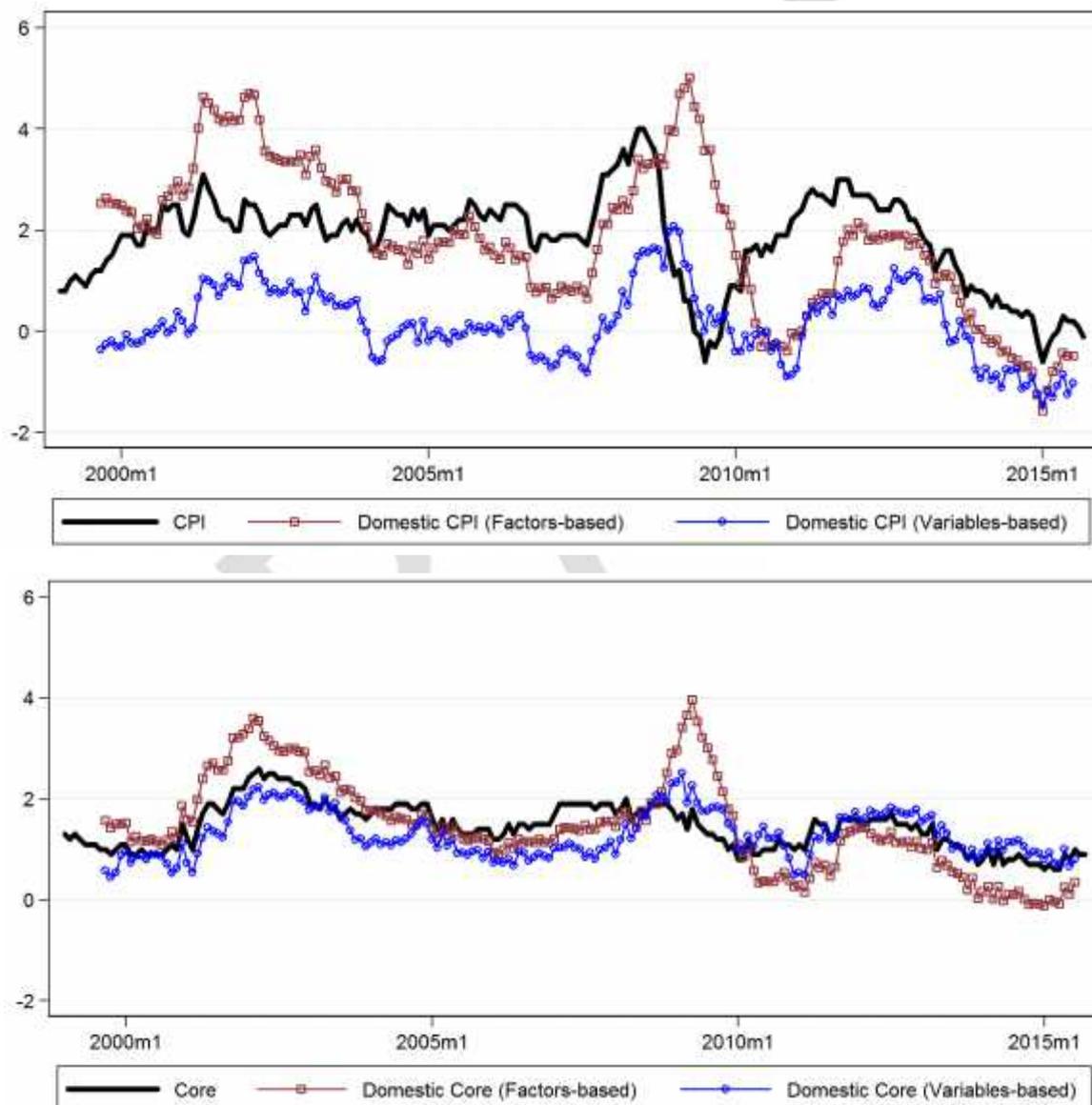
- First, until 2012, the contribution of global factors to headline CPI has been large, as shown by the difference between the headline CPI and the domestic CPI. The global nature of euro area inflation is not a new issue.
- Second, the euro area has entered into a domestic deflation since 2013; a more aggressive monetary policy would have been welcome since then¹.

¹ The domestic inflation peak of 2009 does not weaken our computed measure. Indeed, some may argue that this peak is the lagged peak of headline inflation in 2008 after the oil peak; hence the domestic measure would turn out to be a global one. This is not true, for two reasons. The first is that

The second graph of Figure 1 plots core inflation (black line) together with our measure of "domestic core inflation". The difference between domestic core inflation and headline core inflation shows that:

- This core inflation is relatively well immune from global factors. In contrast with headline CPI, the differences between the overall core index and the domestic core index are relatively minor.
- The most important difference is certainly in terms of variability: the domestic core index is more volatile than the overall core index.

Figure 1 – Times series of domestic inflation measures



Source: Eurostat and OFCE calculations

the domestic CPI measure does not exhibit a repeating lag vis-à-vis the headline CPI; the second is simply that, in 2009, most global factors were downward-trending: the 2009 domestic measure of the CPI is computed after subtracting these negative global factors from the headline CPI.

As we have now consistent measures of domestic inflation, we can assess the ability of the ECB to control domestic inflation. We can contrast this result with the ability of the ECB to control headline inflation. We do this exercise with both CPI inflation and core inflation.

The methodology is presented in Appendix 2. The analysis yields the following results.

- Is the ECB able to impact, then control, inflation, in accordance with its main mandate?

The answer is no. A monetary shock has a minor and weak impact whatever the horizon (short or long) on headline inflation, CPI or core. As a consequence, headline inflation (which thus includes the effects of global factors) seems to be out of control for the ECB, for the period we consider.

- Is the ECB powerless?

No. Our analysis shows that a monetary shock impinges on domestic inflation rates: a restrictive monetary policy generates a reduction in domestic inflation rates, CPI and core.

The general outcome is thus mixed: monetary policy has some power but cannot control the overall dynamics of the headline inflation. This has some collateral implication for the mandate of the ECB: it is not consistent to ask the ECB to fulfil a target (headline inflation) that it does not fully control.

4. CONCLUSIONS AND POLICY RECOMMENDATIONS

The previous analysis yields four conclusions:

1. The ECB is not able to impact the headline inflation with its conventional and unconventional policies, a conclusion which corresponds to what observers of the current evolution of euro area inflation can witness. This conclusion is consistent with the view that in a globalised world, a central bank cannot control the inflation rate. This conclusion is not straightforward, though: it might well be that the extent to which the globalised world impinges on the inflation rate is not large enough to discharge the central bank from the control of inflation. Empirical assessment is thus required. According to our assessment, the global determinants of euro area inflation are large, and explain around 50% of inflation dynamics, and sufficiently large to make it impossible for the ECB to fully control headline inflation.

2. The ECB is able to control the domestic part of inflation. This conclusion urges a change in the inflation target pursued by the ECB. The ECB mandate of “price stability” would remain adequate if the ECB were targeting a domestic index rather than a CPI index, even one that would

correct for the evolution of some regulated and some volatile prices (the core index).

3. In the current situation of domestic deflation, a more expansionary monetary policy is required. It should be accompanied by increases in wages. Indeed, financial conditions and wages and costs account for 10 percent each of the variance in euro area CPI: boosting them would help reverse the deflationary trend.

4. The ECB should endeavour to foster cooperation with other central banks in order to match its CPI inflation target at 2%: 40 to 50% of CPI determinants is related to foreign yields and foreign output growths. If cooperation is not possible, the ECB may well make clear that its decisions on policy rates are dependent on the foreign economic, monetary and financial environment which weighs on euro area inflation. In the end, communication will be central to demonstrate that the ECB has still some ability to control part of inflation.

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APPENDIX 1

Determinants of inflation

We assess the determinants of inflation with a vector auto-regressive (VAR) model including 6 lags, under two different settings. In the first one, we simply include a limited list of macro variables in the model. It includes four possible domestic determinants of inflation: bank credit to the private sector, unemployment rate, 10-year bond yields, and wage growth. Bank credit and 10-year bond yields are proxies of the financial and economic environment: the higher bank credit and the lower interest rates, the higher investment and economic activity. Unemployment rate intervenes as in the Phillips curve while the wage growth tackles the issue of wage indexation. The VAR model includes four potential global determinants: oil prices, US corporate bond yields, a weighted measure of the GDP of OECD countries plus the 6 major non-member economies (Brazil, China, India, Indonesia, Russia and South Africa) and unit labour costs of OECD countries. Oil prices give information on energy intensity of production; US interest rates proxy the global financial environment while weighted GDP measures the global output. Unit labour costs are competitiveness indicators which give an assessment of the incidence of global labour competition and global trade on inflation.

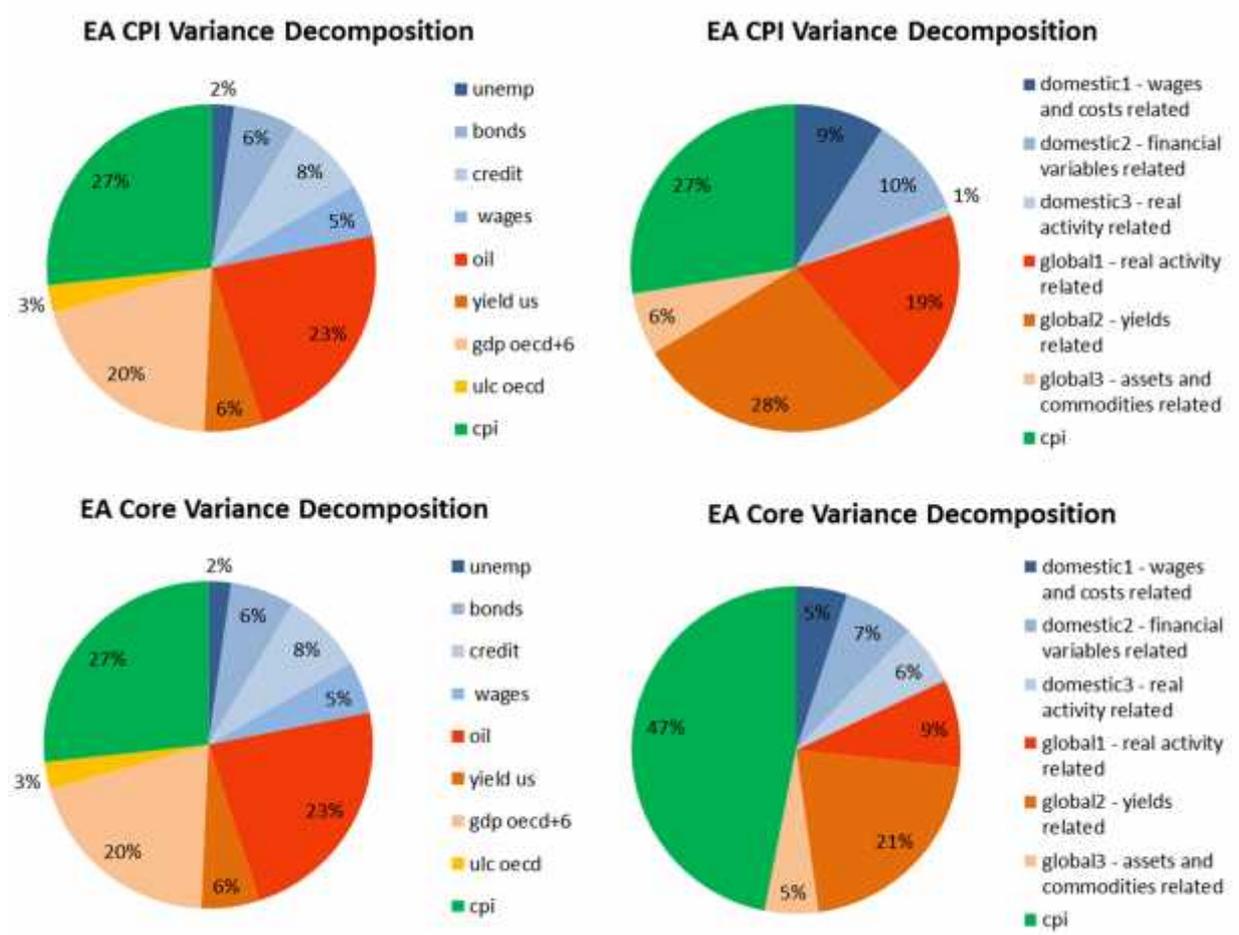
In the second setting, we proceed in two steps. Rather than using the “usual suspects” of inflation determinants (the above mentioned 8 macro variables), we extract from several macro variables (26) a few principal components (that we call factors) which capture the largest possible variance in the data. In the second step, we include these factors in a VAR model to assess their contribution to inflation. Drawing on a Principal Component Analysis, we estimate 3 domestic factors, from 11 euro area variables: credit to the private sector, unemployment, 10-year bond yields, wage growth, industrial production, CISS –Composite Indicator of Systemic Stress–, the euro/dollar exchange rate, the number of hours worked, the monetary aggregate M3, and the shadow rate representing the level of both conventional and unconventional monetary policy tools in the interest rate space. We estimate 3 global factors from 15 global variables: oil prices, the VIX index capturing financial stress and liquidity, US corporate bond yields, Chinese corporate bond yields, unit labour costs of OECD countries, the GDP of OECD countries plus the 6 major non-member economies, gold price, the US economic policy uncertainty index and the Chinese economic policy uncertainty index of Baker, Bloom and Davis, world trade, the ECB commodity price index for food, the ECB commodity price index for non-food, the OECD composite leading indicator, the OECD business confidence survey and the OECD consumer confidence survey.

We compute the variance decomposition of the two VAR models which we use to assess the contribution of domestic and global determinants of inflation. The sources of data are ECB, FRED Saint Louis, and OECD. The sample has a monthly frequency and covers the period from January 1999 to May 2015.

Figure 2 presents the variance decomposition of CPI (first row) and Core inflation (second row), based on the first model with macro variables (first column) and on the second model with factors (second column). From the first model, it appears that domestic determinants of inflation capture a relatively small portion of inflation, i.e. about 20%; among these 20%, those related to the labour market (wages and unemployment) are relatively minor. Global determinants are prominent in explaining inflation, with global output and the price of oil capturing significant portions of inflation with contribution above 20% for each. The conjunctions of hikes in the price of oil and trough in world output in 2008-2009 or of trough in the price of oil and output recovery in 2014-2015, which mitigate each other, help explain the low and stable inflation rate in these periods. It is important to stress that core inflation is computed on all items excluding energy and food, but that these components are not necessarily external factors. Moreover, the consumption of energy which is excluded from the core index may not entirely account for the incidence of oil as an intermediate consumption in the output process and then on the price of output. Finally, the core index may include the price of commodities: correcting the core index for the price of oil can be viewed as a proxy for a commodities-corrected price index.

The second model does not attribute inflation variations to deliberately-chosen variables but to the variables which actually contribute to the variance of inflation. They do not show a very different picture and therefore confirm the global nature of euro area inflation. The contribution of global factors to inflation is more than twice that of domestic factors, whatever the inflation index. The second model also highlights the substantial contribution of factors related to foreign yields; they explain between 20 and 30% of the variance of CPI or core inflation. The global monetary and finance environment has an impact on euro area inflation

Figure 2 – Variance decomposition



APPENDIX 2

Effects of monetary policy on inflation

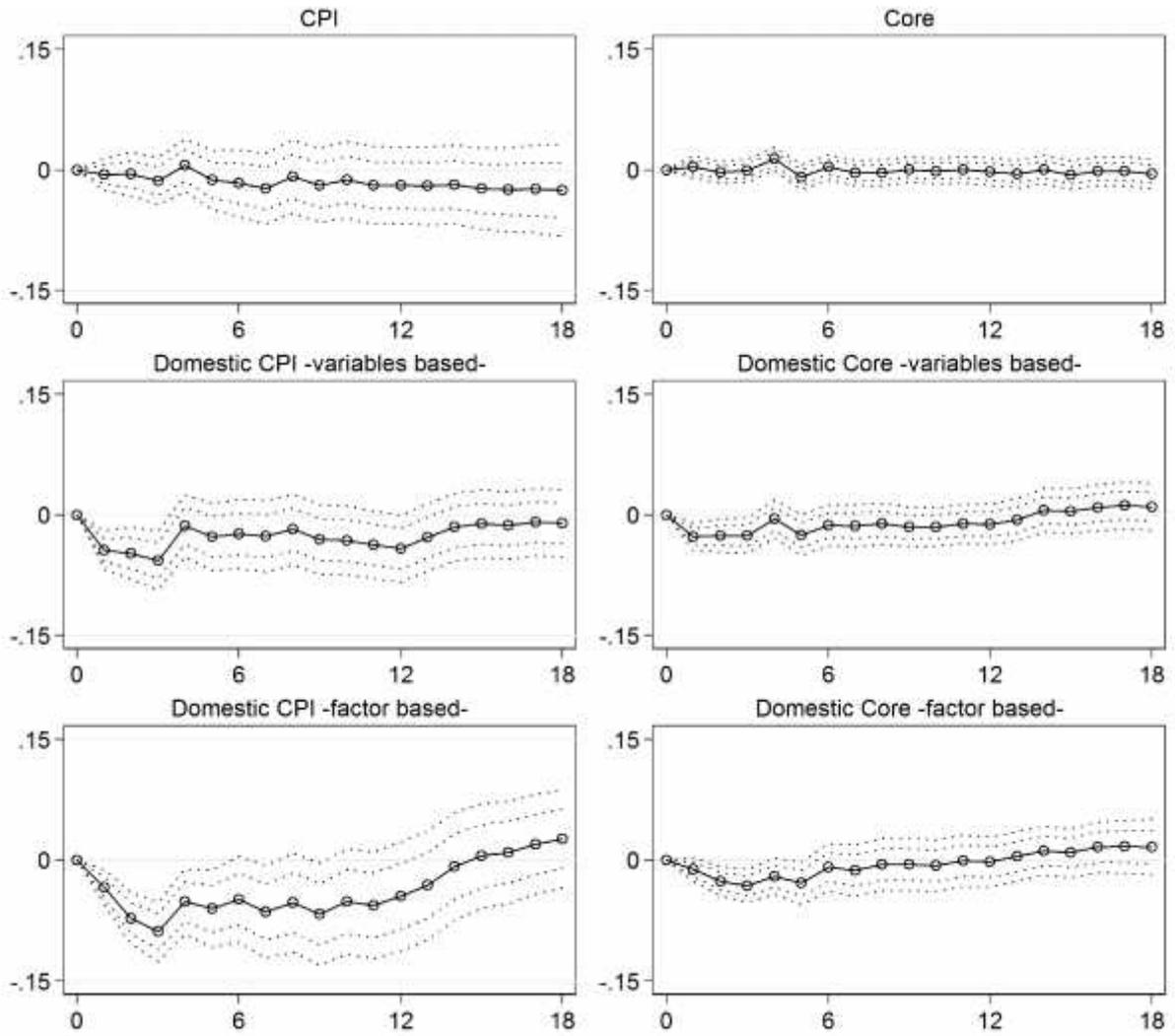
Drawing on these six measures of euro area inflation (headline CPI, core inflation, and domestic indices respectively for both, with corrections stemming from two models), we can disentangle the ability of ECB policies to impact the headline measures from its ability to impact domestic measures. We assess by how much ECB policies affect the headline CPI and core inflation, and compare with the assessment of how much the same ECB policies affect the domestic inflation indices that we computed.

We estimate the effect of a restrictive (positive) monetary shock on the different measures of inflation in a VAR model with 6 lags comprising unemployment, industrial production, credit growth, the relevant inflation measure, 10-year bond yields, euro/dollar exchange rate, CISS, oil prices, inflation expectations 5-year 5-year-forward, and the shadow rate which gives a proxy of conventional and unconventional monetary measures. Figure 3 plots the impulse response of inflation measures to the positive monetary shock.

The first row of figure 3 shows that a monetary shock has a minor and weak impact whatever the horizon (short or long) on headline inflation, CPI or core.

The second and third rows of figure 3 show that a monetary shock impinges on domestic inflation rates: a restrictive monetary policy generates a reduction in inflation rates, CPI and core, whatever the model used to correct for global factors. If the ECB were targeting a domestic inflation rate, it would be able to impact, then to control, this inflation rate.

Figure 3 – Effect of monetary policy shocks on inflation



Note: Responses of inflation measures to a positive (restrictive) monetary shock. Dotted lines represent 68% and 90% confidence intervals.