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## Missing disinflation and missing inflation: the puzzles that aren't

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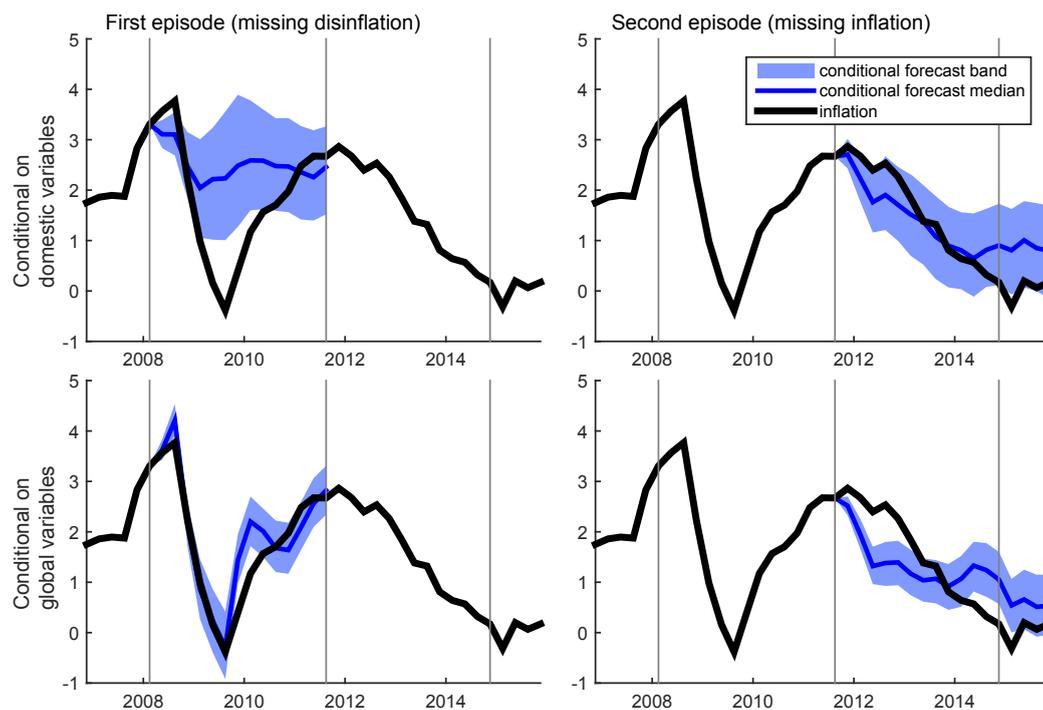
*Recent inflation “puzzles” disappear in a model that properly accounts for domestic and global factors and captures their changing importance over time. While global factors are often important, domestic factors explain much of the inflation dynamics in the recent missing inflation episode in the euro area.*

In the wake of the Great Recession, many economists began identifying puzzles in inflation dynamics. One is a missing disinflation puzzle, in which inflation in advanced economies in 2008-09 failed to fall as much as expected given the depth of the recession.<sup>[2]</sup> Another is a missing inflation puzzle, in which inflation has been unexpectedly low in many countries since 2012.<sup>[3]</sup> These two puzzling episodes have led economists to question and reassess the *relation between real activity and inflation* and to reconsider the *global nature of inflation*. As we show in this article (based on Bobeica and Jarociński (2016)), both puzzles are artefacts of models that are too small or too restricted. We show that a rich vector autoregressive (VAR) model explains away the puzzles, and in the process sheds light on the different impacts of domestic real activity and global factors.

### The changing role of domestic and global factors: two illustrations

We investigate the two inflation puzzles using an econometric model with multiple domestic and global variables. We illustrate the roles of global and domestic factors in two complementary ways. First, we compare forecasts that are conditional on either domestic or global variables. Second, we identify domestic and global shocks and compute their contributions to inflation over time.

**Figure 1: Conditional forecasts of inflation (euro area quarterly HICP, year-on-year growth as a percentage)**

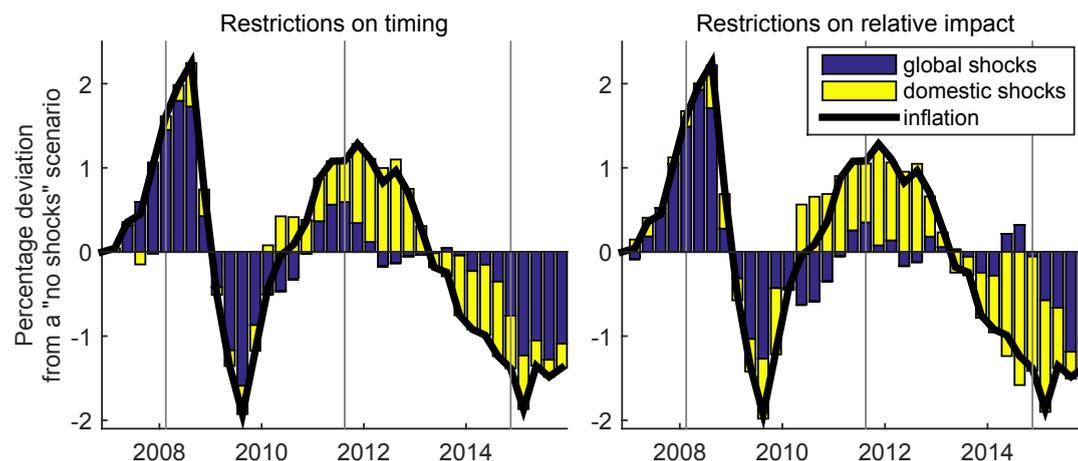


Conditional forecasts show that the relative importance of global and domestic factors has varied strongly over time: global variables were crucial for inflation in the first episode (missing disinflation) and domestic real activity variables were crucial in the second episode (missing inflation).

Imagine a forecast of inflation made in early 2008 using a VAR model with domestic real activity, financial and global variables.<sup>[4]</sup> Suppose that in addition to using the pre-2008 data for the estimation we also had access to data on the actual path of the domestic real activity variables post 2008 and condition the forecast on that. (Naturally, this is an exercise that can only be performed ex post. Therefore, this article does not address the inflation forecast errors in projections by the ECB or others, which do not have access to the future path of output.) Does this knowledge of the future evolution of domestic real activity help in forecasting future inflation? The top-left plot in Figure 1 displays the resulting conditional forecast in blue with a 68% confidence band. The forecast clearly does not match actual inflation, plotted as a black line. Domestic real activity indicators therefore did not help forecast inflation in this period. By contrast, the forecast in the bottom-left panel is conditional on the actual path of the global variables. This forecast matches actual inflation almost exactly. In the second episode, however, the roles of global influences and domestic real activity are reversed. The two right-hand panels of Figure 1 present the same exercise for the second episode. This time the situation is the opposite: the forecast based on global variables is poor, while the forecast conditional on domestic real activity variables tracks actual inflation well.

Identifying economically interpretable domestic and global shocks leads to similar conclusions. Distinguishing domestic shocks from global shocks is challenging in the interlinked global economy and one can think of at least two approaches. One approach is to use restrictions on the timing, i.e. to assume that domestic shocks affect global variables with a delay. This approach is frequent in the literature, but it is open to the criticism that the underlying assumption is relatively arbitrary. Another approach is to use restrictions on the relative impacts and assume that domestic shocks affect domestic output more than global output. Both approaches were followed here for robustness purposes: Figure 2 shows the contributions of domestic and global shocks to inflation for each approach.<sup>[6]</sup> Both approaches suggest that global shocks are important most of the time, but domestic shocks matter too; in particular, they are relatively more important in the period of missing inflation.

Figure 2: Decomposition of inflation into the contributions of global and domestic shocks



## Was inflation puzzling at all during the two episodes?

The puzzles seem to be an artefact of models of inflation that are too small or too restrictive. The economic research that highlights the puzzling nature of inflation dynamics uses either simple Phillips curve-type regressions or tightly restricted versions of the workhorse New Keynesian dynamic stochastic general equilibrium (DSGE) model. In these restricted set-ups, conditional forecasts are indeed far from actual inflation, giving rise to the erroneous notions of the missing disinflation and missing inflation puzzles. However, it turns out that with a VAR model broadly similar to the one in this article, it is virtually impossible to replicate the missing disinflation puzzle (i.e. to underpredict inflation when conditioning on the actual path of real activity in the Great Recession) for either the United States or the euro area. Moreover, as shown in Figure 1, a VAR model can match inflation during the euro area missing inflation episode. Two key modelling differences may explain why the more general modelling approach adopted in this article is better at explaining the actual path of inflation. First, this model includes multiple variables that represent real activity and global influences in a flexible way instead of relying on a single indicator of each. Second, the model includes multiple lags of all variables, which allows it to capture the dynamics of the economy well. Such a model is rich enough to account for the changing relative importance of global and domestic factors for inflation over time.

## Final remarks

The empirical findings reported here confirm the often global nature of inflation, but put it in perspective by isolating the recent episode when domestic real activity was crucial for explaining inflation dynamics. Economic research suggests that inflation is increasingly a global phenomenon, as the globalisation process has rendered domestic inflation more sensitive to economic developments abroad.<sup>[6]</sup> Another line of research argues that the Phillips curve has flattened and hence downplays the connection between inflation and domestic real activity.<sup>[7]</sup> But the results presented here highlight the dangers of overreliance on the global nature of inflation. Future research will clarify whether the large role that domestic variables played in the recent disinflation episode was the effect of the regional nature of the euro area sovereign debt crisis or a harbinger of the new normal resulting from the slowdown or even reversal of globalisation trends.

## References

- Blanchard, O., Cerutti, E., and Summers, L. (2016), "Inflation and activity – two explorations and their monetary policy implications", ECB, *Inflation and Unemployment in Europe, Conference proceedings of the ECB Forum on Central Banking*, pp. 25-46.
- Bobeica, E. and Jarociński, M. (2016), "Missing disinflation and missing inflation: the puzzles that aren't", ECB Working Papers.

Ciccarelli, M. and Mojon, B. (2010), "Global inflation", *The Review of Economics and Statistics*, 92(3), pp. 524-535.

Constâncio, V. (2015), "Understanding inflation dynamics and monetary policy", speech at the Jackson Hole Economic Policy Symposium.

Friedrich, C. (2016), "Global inflation dynamics in the post-crisis period: What explains the puzzles?", *Economic Letters*, 142(2), pp. 31-34.

Hall, R.E. (2011), "The long slump", *American Economic Review*, 101(2), pp. 431-469.

Mumtaz, H. and Surico, P. (2012), "Evolving international inflation dynamics: World and country-specific factors", *Journal of the European Economic Association*, 10(4), pp. 716-734.

Simon, J., Matheson, T., and Sandri, D. (2013), "The dog that didn't bark: has inflation been muzzled or was it just sleeping?", *IMF World Economic Outlook*, pp. 1-17.

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<sup>[2]</sup>See, for example, Hall (2011) on the United States and Friedrich (2016) on other advanced economies.

<sup>[3]</sup>The euro area inflation forecasts of all major institutions were consistently too high in the years 2012-14; see, for example, Constâncio (2015).

<sup>[4]</sup>The VAR includes 23 variables: the consumer price level, eight domestic real activity variables (real GDP, unemployment, etc.), six domestic financial variables (interest rates and spreads) and eight global variables (world GDP, the price of oil, US consumer price level, etc.). The VAR is estimated with a standard Bayesian prior that is suitable for forecasting with a model of this size.

<sup>[5]</sup>This exercise is based on a smaller VAR model that includes seven variables in total, representing each of the three groups: domestic real activity, financial factors and global factors.

<sup>[6]</sup>See, for example, Ciccarelli and Mojon (2010) and Mumtaz and Surico (2012).

<sup>[7]</sup>See, for example, Simon, Matheson and Sandri (2013) and Blanchard, Cerutti and Summers (2016).

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