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The post-crisis slump in the Euro Area and the US: Evidence from an estimated three-region DSGE model ☆

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ABSTRACT

The global financial crisis (2008–09) led to a sharp contraction in both Euro Area (EA) and US real activity, and was followed by a long-lasting slump. However, the post-crisis adjustment in the EA and the US shows striking differences—in particular, the EA slump has been markedly more protracted. We *estimate* a three-region (EA, US and Rest of World) New Keynesian DSGE model (using quarterly data for 1999–2014) to quantify the drivers of the divergent EA and US adjustment paths. Our results suggest that financial shocks were key drivers of the 2008–09 Great Recession, for both the EA and the US. The post-2009 slump in the EA mainly reflects a combination of adverse aggregate demand and supply shocks, in particular lower productivity growth, and persistent adverse shocks to capital investment, linked to the continuing poor health of the EA financial system. Adverse financial shocks were less persistent for the US. The financial shocks identified by the model are consistent with observed performance indicators of the EA and US banking systems.

1. Introduction

The global financial crisis (2008–09) led to a sharp contraction in both Euro Area (EA) and US real activity, and was followed by a long-lasting slump. However, the post-crisis adjustment in the EA and the US shows striking differences. In

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particular, the EA slump has been markedly more protracted. As of this writing (2015), EA per capita real GDP remains below its pre-crisis peak. US per capita GDP only recovered to its pre-crisis peak in 2014 and remains noticeably below its pre-crisis trend. Private investment contracted less (as a share of GDP) in the EA than in the US, during the 2008–09 crisis, but in the aftermath of the crisis the EA investment share continued to trend down, while the US investment share began to recover in 2011. Also, post-crisis inflation has been lower in the EA than in the US. (See Section 2 for a detailed discussion of the EA and US post-crisis dynamics.)

There is a heated debate about the causes of these developments. Some commentators argue that the protracted EA slump reflects weak aggregate demand, driven i.a. by restrictive fiscal policy ('austerity'); see, e.g., IMF (2012), De Grauwe (2014) and Stiglitz (2015). Other analysts stress that rigidities in EA product and labor markets may have hampered the rebound of the EA economy, by slowing down sectoral redeployment and the adoption of new technologies (e.g., Fernald (2015)). Several commentators have also suggested that post-crisis deleveraging pressures and financial constraints have contributed to the persistent slump, especially in the EA (e.g., Rogoff (2015)). The supply of credit to the private sector may have been disrupted more persistently in the EA than in the US, due to the continuing poorer health of EA banks (OECD (2014)). EA banks rebuilt their capital much more gradually than US banks, after the crisis; in addition EA bank balance sheets were weakened by the sovereign debt crisis that erupted in 2010–11 (Acharya et al., 2015; Kalemli-Özcan et al., 2014).

The contribution of this paper is to shed light on these issues and hypotheses using a state-of-the-art *estimated* dynamic stochastic general equilibrium (DSGE) model. So far, the debate on the EA post-crisis slump has often been polemical, with remarkably little use of evidence-based quantitative models. (Some recent research uses estimated DSGE models to analyze the dynamics of the US economy since the crisis; see discussion below.) The use of an *estimated* rich DSGE model allows us to recover the shocks that have driven the EA, US and ROW economies—and, hence, we can determine what shocks and transmission mechanisms mattered most and when.

In order to explain the striking post-crisis divergence between the EA and the US, we jointly model these two regions, as well as an aggregate of the Rest of the World (ROW), i.e. we consider a three-region model. The EA and US blocks of the model have the same structure, but parameters are allowed to differ across the blocks. The model is estimated using quarterly data for the period 1999q1–2014q4. In order to address the range of views about the post-crisis slump (see above), our model assumes a rich set of demand and supply shocks in goods, labor and asset markets, and it allows for nominal and real rigidities and financial frictions.

Our estimation results suggest that the persistent EA slump reflects a combination of adverse supply *and* demand shocks, in particular negative shocks to TFP growth and adverse shocks to risk premia on production capital investment, linked to the continuing poor health of the EA banking system. Our empirical analysis suggests that fiscal policy (austerity) had a non-negligible impact, but was not the major factor delaying the recovery in the EA. EA real activity has benefited from noticeable *positive* factors during the aftermath of the crisis – however those positive influences were weaker than the adverse supply and demand shocks mentioned above. For example, our model estimates suggest that EA price mark-ups fell during and after the 2008–09 Great Recession, which was reflected in a rise in the EA wage share, and was a driver of low post-crisis EA inflation. An additional factor for low post-crisis inflation in the EA was private demand.

According to our estimates, the faster post-crisis rebound of the US economy largely reflects a steady fall in capital investment risk premia, linked to the faster improvement in the health of the US financial system. Furthermore, post-crisis TFP growth fell markedly less in the US than in the EA. In the aftermath of the crisis, US aggregate activity also benefited from more resilient private consumption demand, consistent with faster household deleveraging in the US (compared to the EA). According to our estimates, US fiscal policy was more stimulative than EA fiscal policy during the financial crisis. However, we also identify important factors that slowed down the recovery of the US economy; in particular, US price mark-ups rose during the post-crisis period, which had a negative influence on US output (and a positive effect on US inflation).

Our empirical estimates suggest that ROW real activity during the financial crisis had a noticeable stabilizing effect on EA and US GDP growth. Shock transmission between EA and the US has been weak.

As pointed out above, there is little empirical model-based research on the EA post-crisis slump. By contrast, several recent papers have studied the post-crisis dynamics of inflation and real activity in the US economy, using estimated *closed economy* DSGE models; see Christiano et al. (2015), Fratto and Uhlig (2014), Lindé et al. (2015) and Del Negro et al. (2015). Like Fratto and Uhlig (2014) and Lindé et al. (2015) we find that the zero-lower-bound (ZLB) was not a significant constraint for US and EA monetary policy during the 2008–09 Great Recession and its aftermath. We concur with Christiano et al. (2015) that financial shocks were the key driver of the Great Recession in the US; we find that those shocks matter a great deal for the persistence of the EA slump. A key contribution of our analysis of the US economy is that we model external (international) factors – we show that those factors play a non-negligible role for the US recovery.

As pointed out above, a central contribution of the paper here is the *estimation* of a large-scale multi-country model. By contrast most existing large multi-country models are *calibrated* (e.g., Coenen et al. (2010)). Jacob and Peersman (2013) and Kollmann (2013) have estimated two-country DSGE models, but those models are much more stylized than the structure here. The model here is closest to Kollmann et al. (2015) who estimated a three-country model for Germany, the rest of the Euro Area and the ROW. That model has a detailed German block, and the focus is on developments in that country, while the blocks describing the other two regions are more stylized. By contrast, the model here treats the EA and US at the same level of disaggregation, in order to understand differences in adjustment across these two regions and in order to capture the interaction between these two regions.