Jump-Starting the Euro Area Recovery: Would a Rise in Core Fiscal Spending Help the Periphery?

Olivier Blanchard, Christopher Erceg, and Jesper Linde

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The Euro Area Recovery and Fiscal Policy

- **The recovery in the euro area is forecast to be sluggish, and inflation is likely to remain well below 2 percent through at least through 2016.**

- **Resource slack is much larger in the periphery, and is likely to remain large for a prolonged period.**

- **Given that the ECB is constrained from lowering policy rates and the periphery cannot do fiscal stimulus, there are many calls for the core to expand fiscal spending.**

- **From a euro area perspective, one important goal would be to put the euro area recovery on a more solid footing by boosting periphery GDP and improving their external positions.**

Effects of Fiscal Expansion: Periphery vs. Core

- **The rapidly expanding literature on fiscal multipliers (Eggertsson 2010, Woodford 2011, Christiano, Eichenbaum, and Rebelo 2011, Werning 2012) has mainly used models that take an aggregate perspective**

- **This approach seems appropriate to the extent that the distribution of fiscal spending is fairly balanced across regions.**

- **Our focus is on the distributional impact of an expansion in fiscal spending by one group of members of a currency union (core) on all member states.**

What We Do

- **Key positive question: Would higher core spending raise periphery GDP substantially, or would the stimulus to euro area GDP mainly be concentrated in the core?**

- **The answer doesn't' seem obvious.**
  - **Kollmann, Ratto, Roeger, in't Veld and Vogel (2014): slight fall in periphery GDP after 2 qtrs.**
  - **Fahri and Werning (2012): periphery GDP falls in normal times, rise in liquidity trap.**

- **We also study some normative questions: Would the periphery likely be better off? What about the core? How much would the core like to expand spending relative to a policymaker maximizing euro area welfare?**

Model Framework

- **We use two variants of a two-country New Keynesian (NK) model calibrated so that one block corresponds to the euro area's periphery, the other to the core.**

- **Benchmark Model Simple NK model similar to Gali-Monacelli (2005), but adds habit persistence and allow for some government spending to be imported.**

  - Simple model with habit has just enough complexity to avoid features we regard as implausible; including a high degree of crowding-out in normal times (implying big differences in liq. trap).

- **Larger-Scale Model Allows for endogenous investment, both wage and price rigidities, "Hand-to-Mouth" households and real and financial frictions that give rise to typical Keynesian "accelerator" effects.**

Overview of Results

- **Outside of a liquidity trap, a rise in core government spending boosts core GDP, but tends to cause periphery GDP to contract.**

  - On net, higher policy rates more than offset the stimulus from a depreciation of the periphery's terms of trade.

  - Effects remain heavily tilted to the core even in a short-lived liquidity trap, unless import content of core spending is large.

- **In a long-lived liquidity trap, the stimulus from higher core spending boosts GDP in both core and periphery.**

  - In our preferred model, periphery GDP rises about 1/3 as much as core GDP in an 8 quarter trap, and ½ as much in a 12 quarter trap.

Some Normative Implications

- **The core would benefit from some expansion of fiscal spending insofar as there is some resource slack and inflation is well below 2 percent.**

- **However, given that the core must pay for the stimulus and its own resource gap is much smaller than the periphery's, the core has an incentive to increase spending by considerably less than would be optimal from a euro area perspective.**

- **Using a welfare measure based on output and inflation gaps, we find that the core – acting to maximize its own welfare – would increase fiscal spending by about half as much as would a policymaker maximizing euro area welfare.**

Structure of Presentation

- **Benchmark Model (in log-linearized form).**
- **Calibration.**
- **Impulse Responses in Normal Times and Liquidity Trap.**
- **Normative Results (using nonlinear variant of model).**
- **Results in a Large-Scale Model.**
- **Concluding Remarks.**

Benchmark Model

- **Our benchmark model is comprised of two countries that may differ in population size.**

- **Share many features with the workhorse model of Gali and Monacelli (2005):**

  - **Complete financial markets (domestically and internationally).**

  - **Producer currency pricing.**

  - **Sticky prices (Calvo-style).**

- **Our model also allows for habit persistence in consumption and for some fraction of government purchases to be imported.**

Aggregate vs. Compositional Effects

- **The model can be decomposed into two parts.**
- **The first part determines the aggregate effects on the currency union (CU) as a whole. The usual three equations from the closed economy analogue determine CU output, CU inflation, and the policy rate.**
- **The second part characterizes the differences between the responses of home and foreign variables. This relative or compositional impact on the home vs. foreign economy turn out to depend only on the terms of trade and exogenous shocks.**
- **Monetary policy only affects the home and foreign economy through aggregate channels – and thus has the same impact on home and foreign economies (including in a liquidity trap).**

Equilibrium in the Currency Union

- **In the Phillips curve, currency union inflation varies directly with marginal cost; or abstracting from habit, with the output gap:**

$$\pi_t^{CU} = \beta\pi_{t+1}^{CU} + \kappa_p x_t^{CU}$$

- **The IS curve is also identical to that of the workhorse NK model:**

$$x_t^{CU} = x_{t+1}^{CU} - c_y\sigma\left(i_t - \pi_{t+1}^{CU} - r_t^{pot}\right)$$

where the equilibrium real rate r_t^{pot} varies in response to aggregate demand shocks (including government spending)

- **Monetary policy follows a Taylor-style rule subject to the zero lower bound:** $i_t = max(0,\ \gamma_\Pi \pi_t^{CU} + \gamma_x x_t^{CU})$

Composition of Demand

- **Relative demand y_{Dt} - y^*_{Dt} – the demand for periphery relative to core output – is given by:**

$$y_{Dt} - y^*_{Dt} = \epsilon\tau_t + (1 - \omega_g - \omega^*_g)g_y(g_t - g^*_t)$$

$$+(1 - \omega_c - \omega^*_c)c_y(c_t - c^*_t)$$

- **A rise in core government spending g^*_t shifts demand to the core; though by less if more government spending falls on imports.**

- **Partly offsetting this direct effect, an induced terms of trade depreciation (higher τ_t) shifts demand towards the periphery by boosting net exports and raising periphery relative consumption.**

Composition of Demand (con't)

- **The rise in periphery relative consumption reflects that the initial depreciation in the terms of trade is tantamount to a fall in the periphery's long-term real interest rate relative to the core.**

- **However, these counterbalancing effects are small quantitatively:**

- **First, the parameter ϵ determining how net exports respond to the terms of trade is small given observed trade shares and reasonable assumptions about the trade price elasticity.**

- **Second, sluggish prices mean the terms of trade doesn't move much.**

- **Third, habit persistence damps the response of relative consumption.**

Composition of Demand (con't)

- **A key implication is that the rise in core government spending shifts relative demand sharply towards the core, unless the import share of core government spending is high.**

- **In addition, monetary policy has no influence on the evolution of the terms of trade, and hence on relative demand. The terms of trade evolves according to an autonomous difference equation (ex habit):**

$$\tau_t - \tau_{t-1} = \beta(\tau_{t+1} - \tau_t) - \kappa_{mc}\phi_{mc}\left(\tau_t - \tau_t^{pot}\right)$$

- **An implication is that higher core spending can only have large effects on the periphery if the aggregate CU impact is large, assuming the import share of core government spending is in the range typically observed. The expenditure-switching effects often emphasized in policy debates aren't likely to be big.**

Calibration – Key Parameters

- **Assume symmetric structure, core = 2/3 (Germany+France), periphery=1/3 (Italy+Spain).**

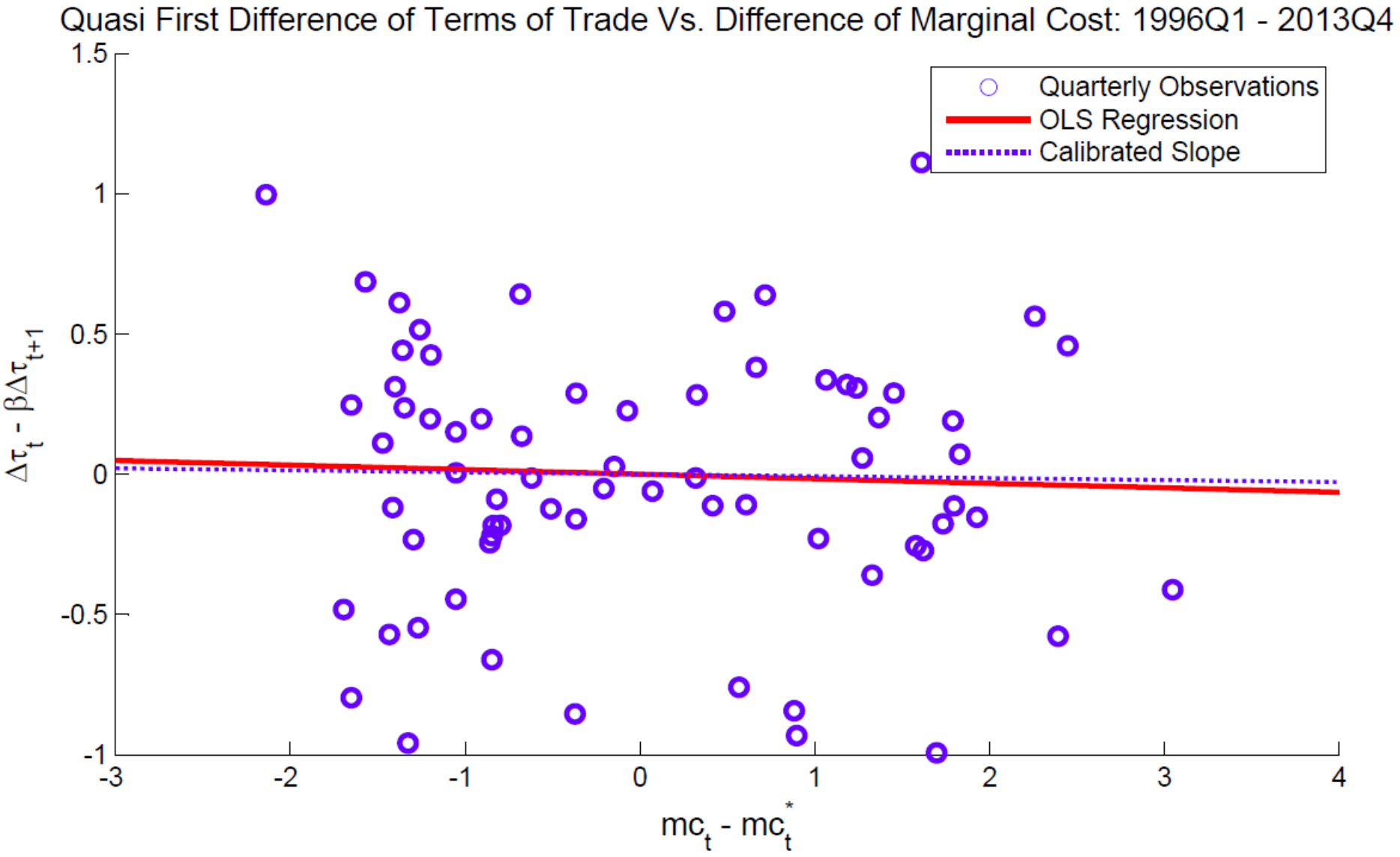
- **ξ_p – determines both the terms-of-trade and CU output and inflation. Set to 0.92. Motivated by i) low slope of estimated Phillips Curves, ii) slow adj of ToT (Figure 2), and iii) the resilience of periphery inflation during the crisis.**

- **Parameters determining the responsiveness of trade flows:**

  - Assume the trade price elasticity to be just above unity (1.1).
  - Set Core import share of private spending $\omega^*_C = .1$.
  - Vary import share of public spending (ω^*_G) between 0 and 0.2.

- **The habit parameter is set to 0.9, which helps to generate a plausible aggregate spending multiplier without additional model features.**

Evidence in support of ξ_p



Calibration – Remaining Parameters

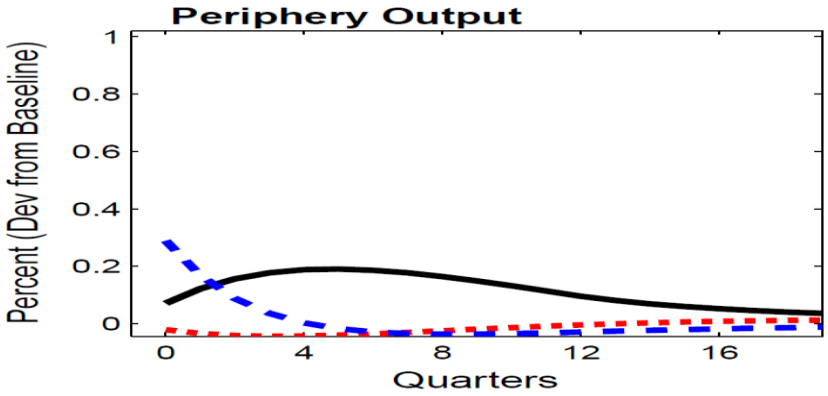
- **Other parameters fairly standard:**

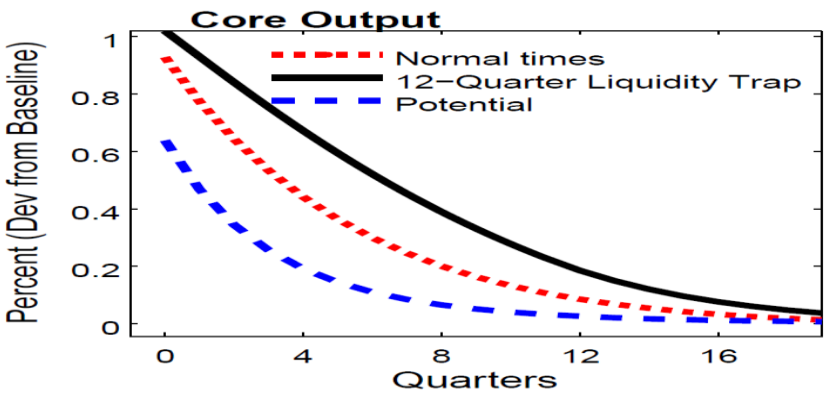
- **Log-utility over consumption and separability between C, labor and Govt spending. Frisch elasticity of labor supply = 0.4; capital share = 0.3; Government spending share $g_y = 0.23$.**

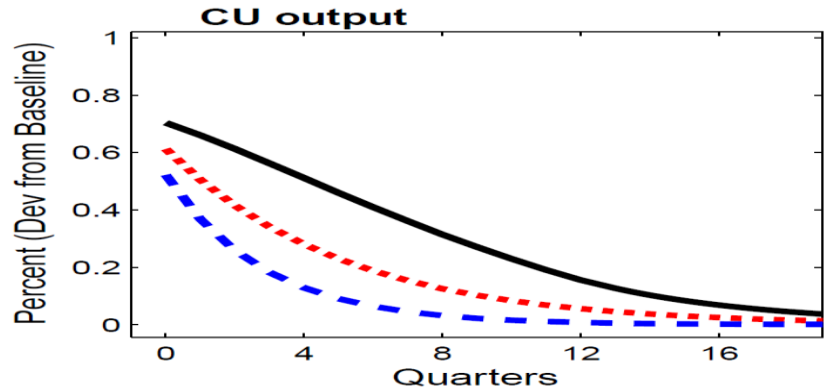
- **Steady state nominal interest rate of 4 percent and simple Taylor rule for ECB with coeffs $\psi_\pi = 2.5$. and $\psi_x = 0.5$ for the output gap.**

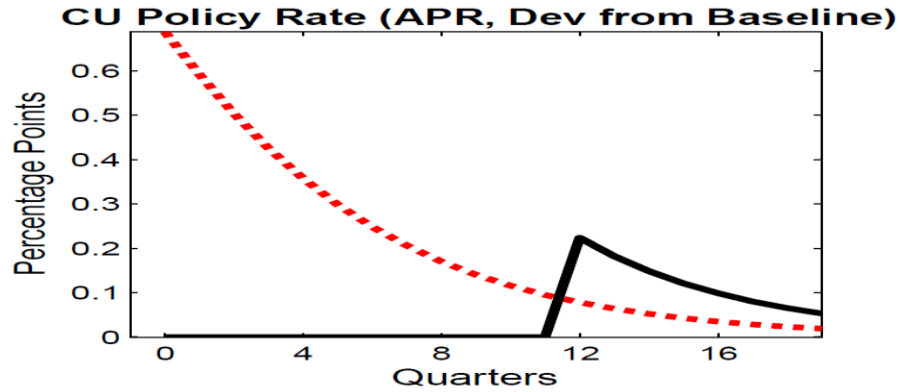
- **Finally, all exogenous variables (including discretionary component of govt spending) are assumed to follow simple AR(1) processes with persistence coeffs of 0.9.**

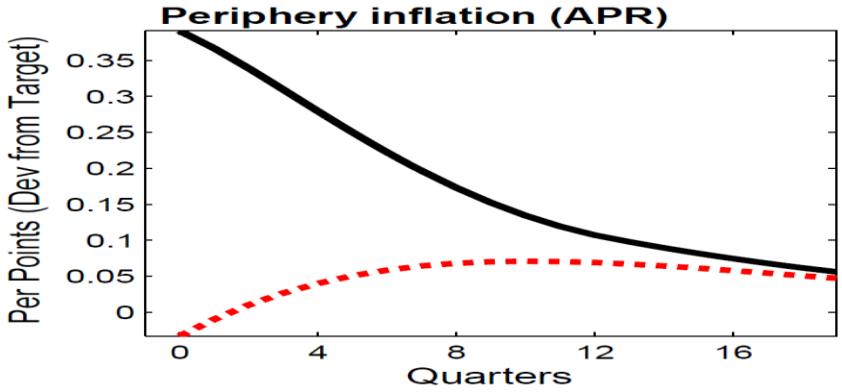
Core Spending Hike with 1 Percent of GDP, Slow Price Adj.

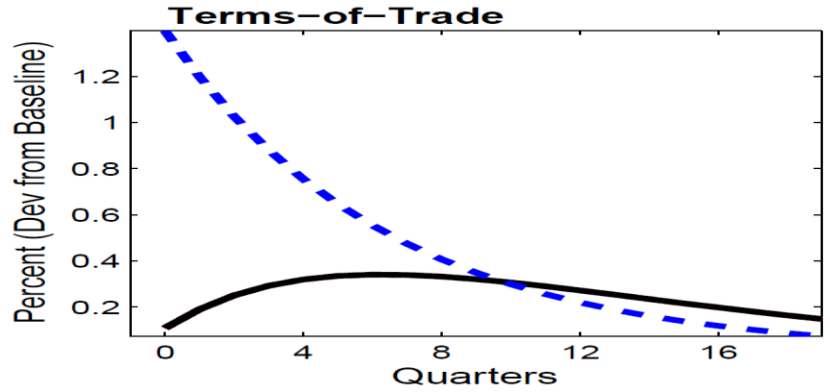












Impulses in Normal Times and Liquidity Trap III

- **Next, we study how the spillovers to the periphery vary with the expected duration of the liquidity trap and the import content of core govt spending.**

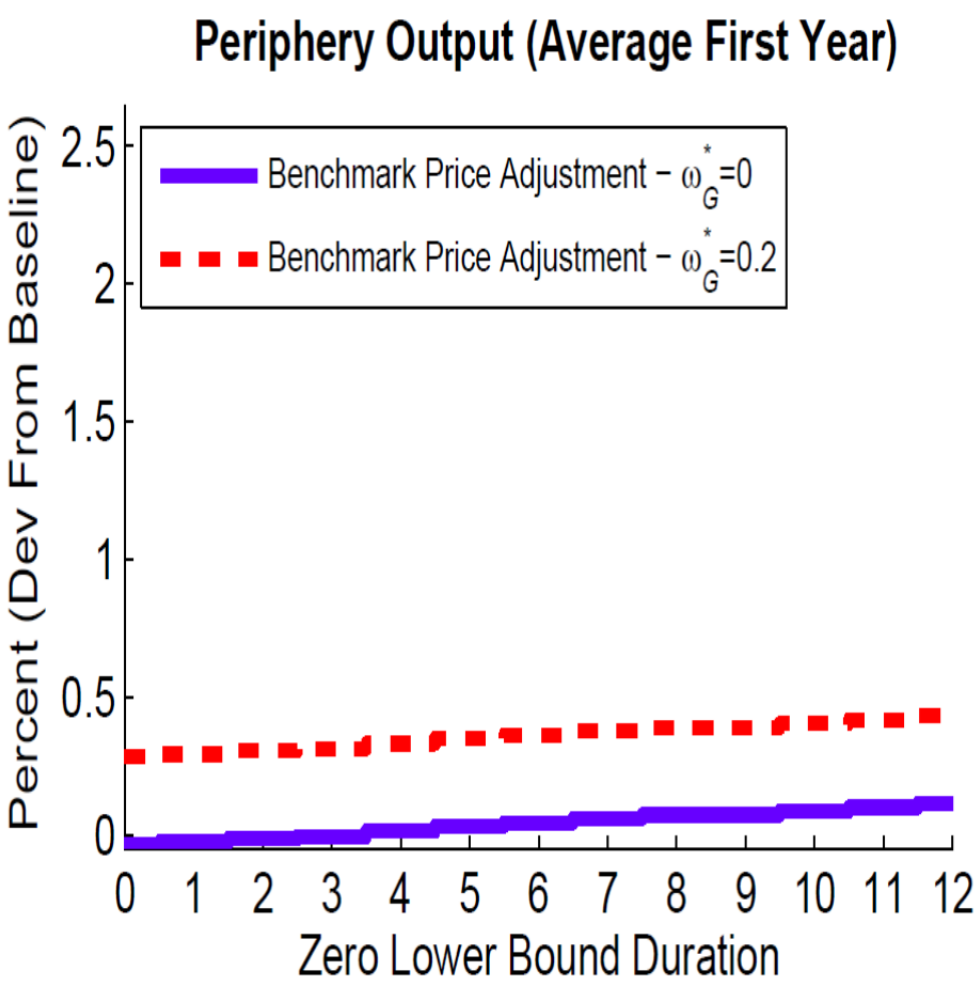
- **Next figure studies effects for core and periphery as function of the ZLB under two alternative parameterizations:**

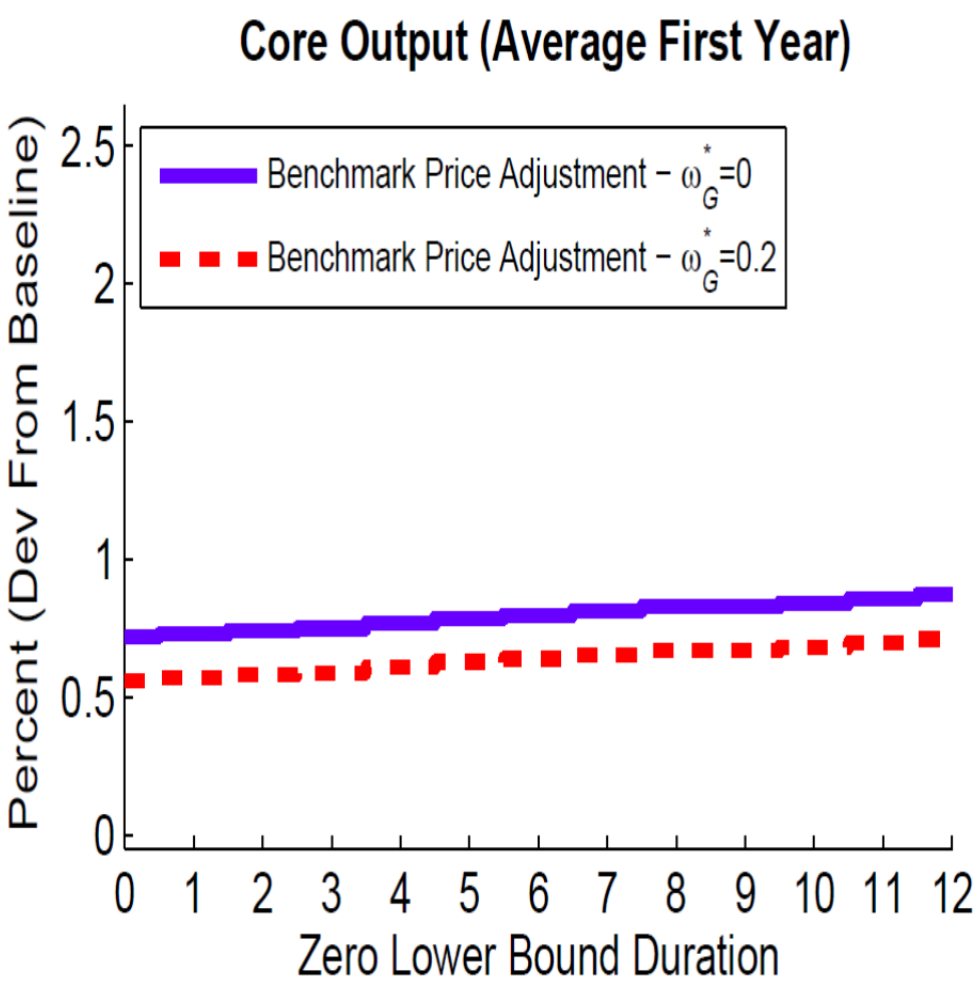
  (1) Benchmark spec. with no import content of govt spending, $\omega_G^* = 0$.

  (2) An alternative where core spends 20 percent of the spending on periphery output, $\omega_G^* = 0.2$.

Slow Price Adj., Varying Core Import Content in G

Panel B: Benchmark (Slow) Price Adjustment, Varying the Degree of Import Content in Core Govt Spendin





Normative Results - Baseline

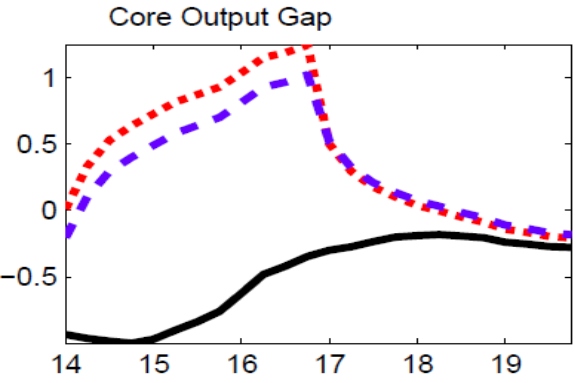
- **Next, we study the extent to which an expansion in core spending could improve the outlook in the Euro Area as a whole (cooperative equil.), and to what extent the core has an incentive to pursue stimulus (Nash).**

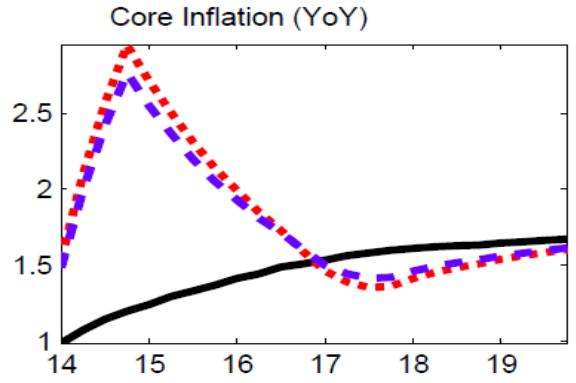
- **To do this, we set up a baseline projection (absent any fiscal stimulus), where we match the IMF spring 2014 WEO forecast for the core and the periphery for 2014-2019.**

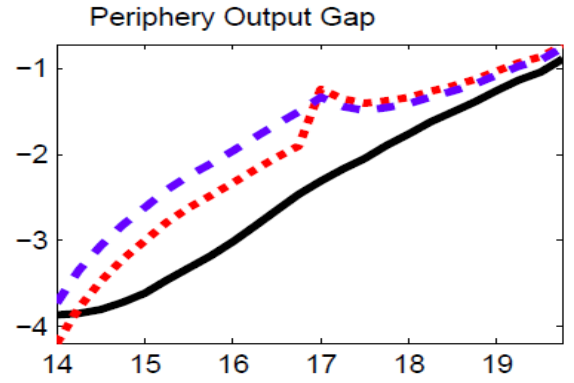
- **Following mid-July OIS rates, the ECB is assumed to be at the ZLB until 2016Q4 (i.e. for 3 years), and keeps the ZLB exit-date unchanged although the Taylor rule may call for earlier lift-off.**

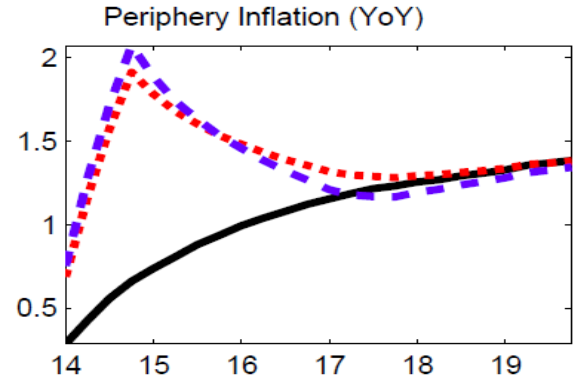
- **Report baseline projection in Figure 7, along with core spending hike with 2 percent of baseline GDP per period for 12 periods.**

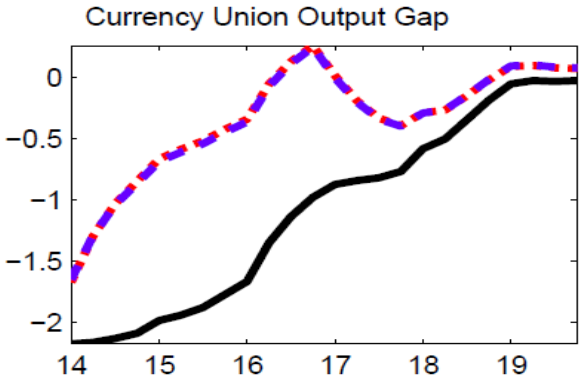
Impact of Fiscal Stimulus in Core When ECB Keeps Exitdate Unchanged.

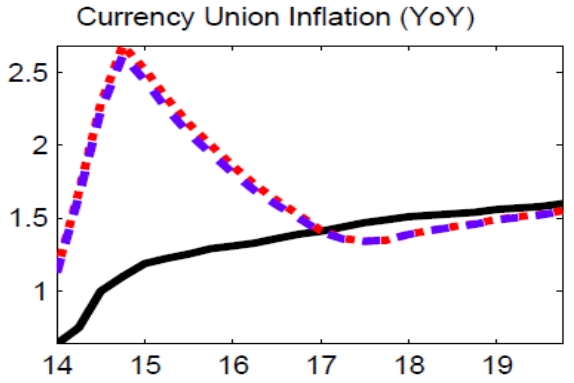


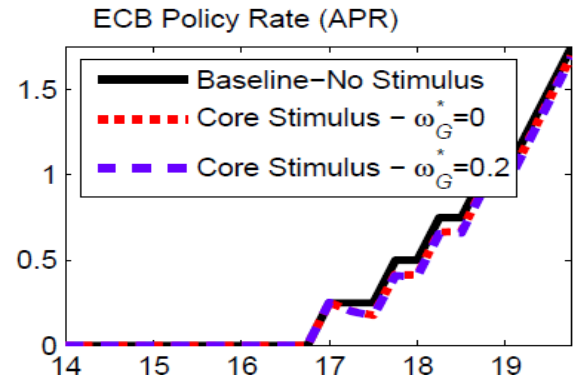


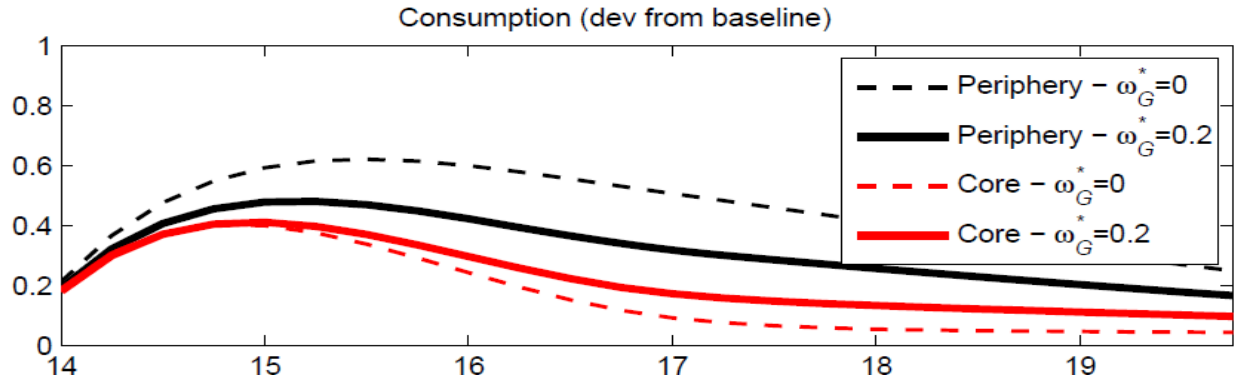












Normative Results – Welfare Metric

- **The currency union welfare metric is assumed to be a size-weighted sum of quadratic inflation and output gap deviations from target, i.e.:**

$$L_t^{CP} = \sum_{s=0}^{S} \beta^s \left\{ \frac{1}{3}\left[\left(\pi_{t+s}^{Per} - 2\right)^2 + \lambda_y \left(\mathrm{x}_{t+s}^{Per}\right)^2 \right] + \frac{2}{3}\left[\left(\pi_{t+s}^{Core} - 2\right)^2 + \lambda_y \left(\mathrm{x}_{t+s}^{Core}\right)^2 \right] \right\}$$

- **When core minimizes L_t^{CP} it cooperates, but we also study outcomes when core simply minimizes its own loss, i.e. set weight on periphery to nil.**

- **We set λ_y=1/3 in the simulations, roughly consistent with Okun's law, recognizing that inflation is measured in yearly rates.**

Normative Results – Spending Hike

- **We search numerically for the optimal stimulus size under the assumption that core hikes spending with a constant amount each period as long as the ECB is at the ZLB (12 quarters).**

- **We make two alternative assumptions about the composition of core spending:**

  - **Sim 1: Core spending falls exclusively on domestic goods, $\omega_G^* = 0$**
  - **Sim 2: Part of core spending falls on periphery goods, $\omega_G^* = 0.2$**

Normative Results - Findings I

- **We find that the loss L_t^{CP} is reduced substantially following a core spending hike, especially for periphery when part of the core hike falls on periphery goods.**

Table 1: Effect on Losses of Higher Core Spending in Figure 7

Panel A: Loss in Baseline

Total Loss L_t^{CP}	Core Loss in Baseline	Periphery Loss in Baseline
34.5	10.8	82.1

Panel B: Losses under Fiscal Expansion in Figure 7

Import content	Total Loss L_t^{CP}	Core Loss under Expansion	Periphery Loss under Expansion
$\omega_G^* = 0$	23.0	8.9	51.2
$\omega_G^* = 0.2$	18.9	6.4	43.9

- **Optimal stimulus size: about 2 percent of GDP per period (Figure 7).**

Normative Results - Findings II

- **When Core plays Nash and minimizes its own loss it has incentives to do less, but spillovers to periphery may still be substantial.**

Table 2: Effect on Losses under "Optimal" Spending Hike for Core.

Panel A: Loss in Baseline		
Total Loss L_t^{CP}	Core Loss in Baseline	Periphery Loss in Baseline
34.5	10.8	82.1

Panel B: Losses under Optimized Core Fiscal Expansion			
Import content	Total Loss L_t^{CP}	Core Loss under Expansion	Periphery Loss under Expansion
$\omega_G^* = 0$	24.0	4.2	63.5
$\omega_G^* = 0.2$	21.1	3.9	55.5

- **Optimal stimulus size: a little more than 1 percent of GDP per period.**

Normative Results – Household Welfare

- **Assess effects on household welfare of the core spending hike using true welfare criterion:**

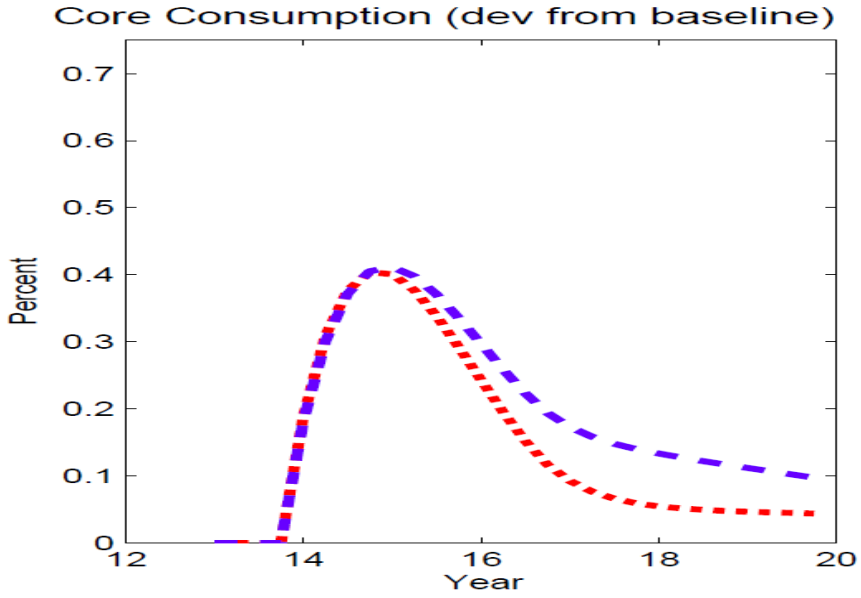
$$\mathbb{E}_t \sum_{j=0}^{\infty} \beta^j \varsigma_{t+j} \left\{ \ln\left(C_{t+j} - \varkappa C_{t+j-1} - C\nu_{t+j}\right) - \chi_0 \frac{\left(N_{t+j}\right)^{1+\chi}}{1+\chi} + \frac{\vartheta_g}{1-\frac{1}{\sigma_g}} G_{t+j}^{1-\frac{1}{\sigma_g}} \right\}.$$

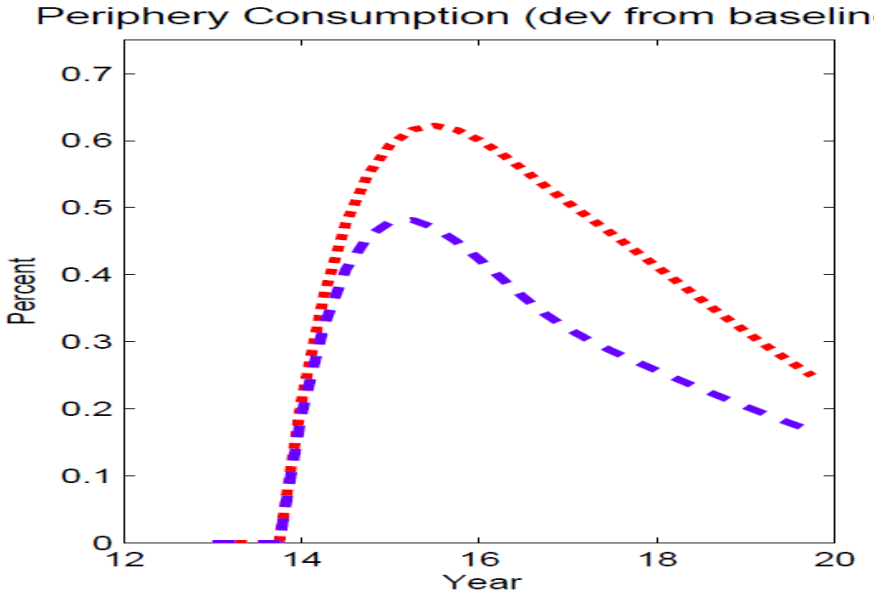
- **Set utility parameter on G (vartheta_g) to rationalize G/Y=0.23 in steady state.**

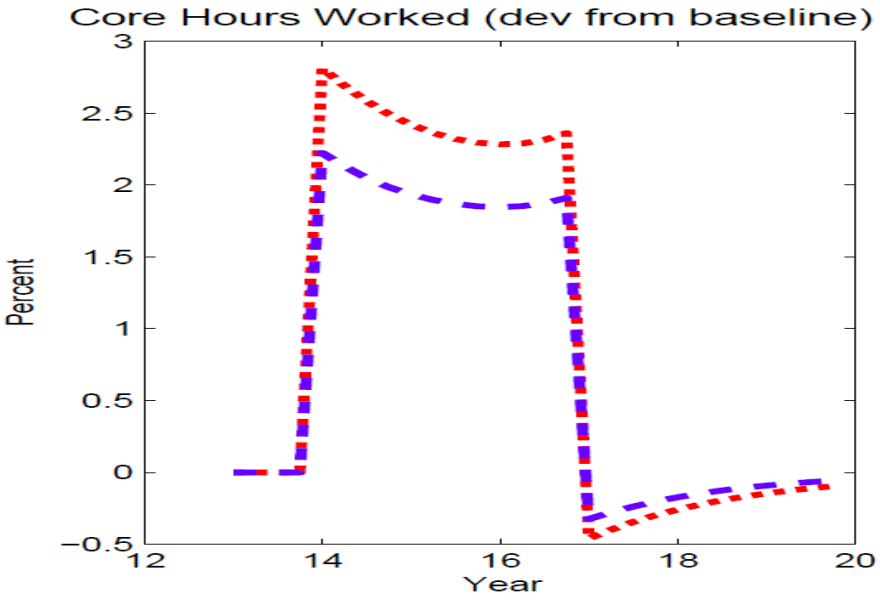
- **On net, Core gains from fiscal expansion (C+G up dominate N up), where welfare declines in Periphery (C up dominated by N up).**

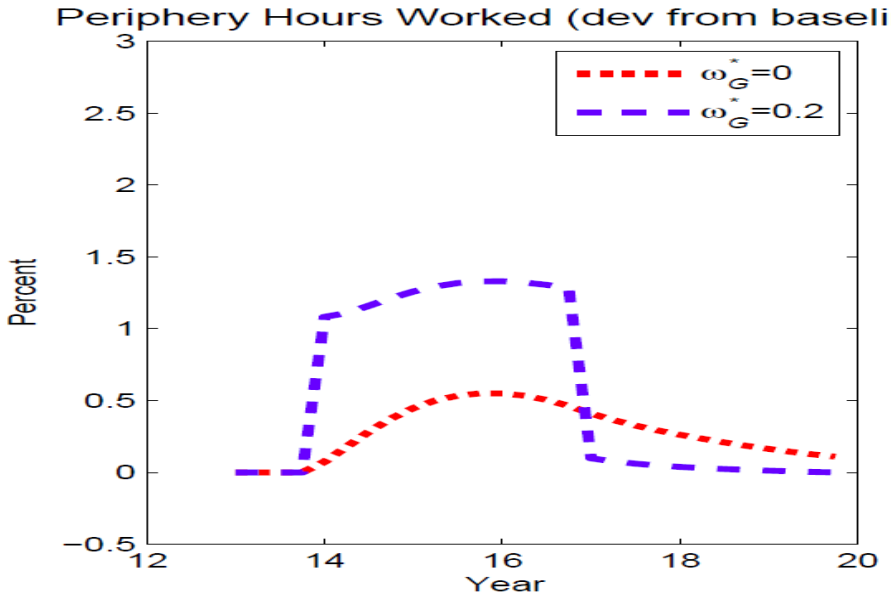
  - **Wealth effects on labor supply, moving to GHH preferences implies welfare gains for Periphery.**

Figure 8: Impact of Core Fiscal Stimulus on Consumption and Hours Worked.









Results in a Large-Scale Model

- **The channels discussed above remain operative in a "fully-fledged" open economy DSGE model with endogenous capital accumulation and sticky wages used by Erceg and Linde (2010, 2012 and 2013).**

- **This model features two regions within the currency area with:**
  - **Nominal price and wage stickiness as in CEE (2005).**
  - **Habit persistence in consumption and CEE type of investment adjustment costs.**
  - **"Hand-to-mouth" households following EGG (2006).**
  - **Financial accelerator mechanism; CMR (2007) variant of BGG (1999).**
  - **Imperfect financial integration and producer currency pricing.**

- **Imports are utilized in combination with final domestic output good to produce private and public consumption as well as investment goods (CES baskets).**

Results in a Large-Scale Model II

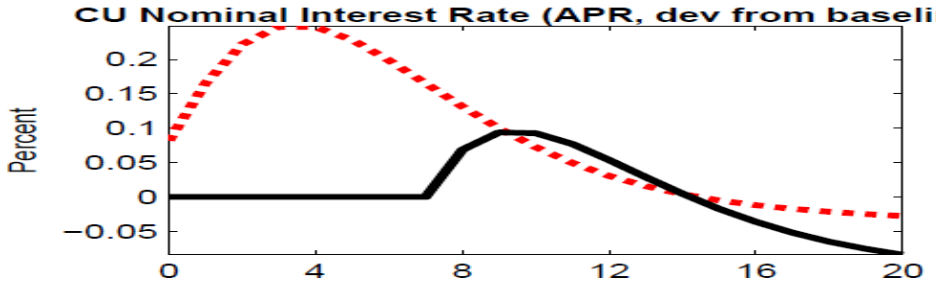
- **Next figure studies the impact an increase in core government spending with 1 percent of their GDP.**

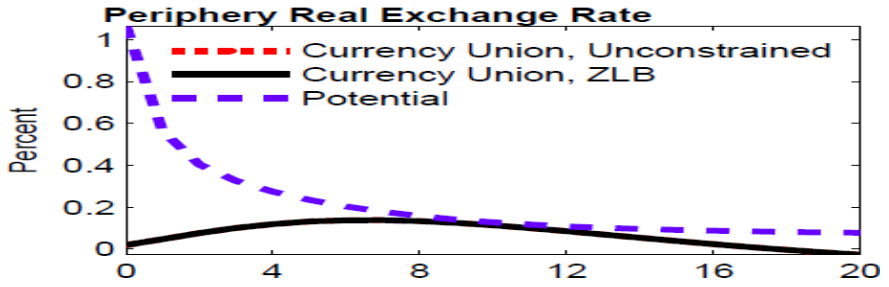
- **The calibrated degree of price stickiness is the same as in the benchmark model (0.92), and we adapt a commensurate degree of wage stickiness. The import content of core spending is roughly 7 percent.**

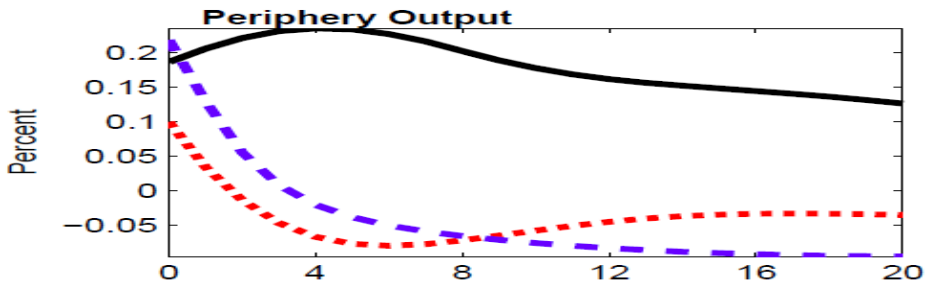
- **Report results for both normal times (steady state) and when the CU is in a liquidity trap.**

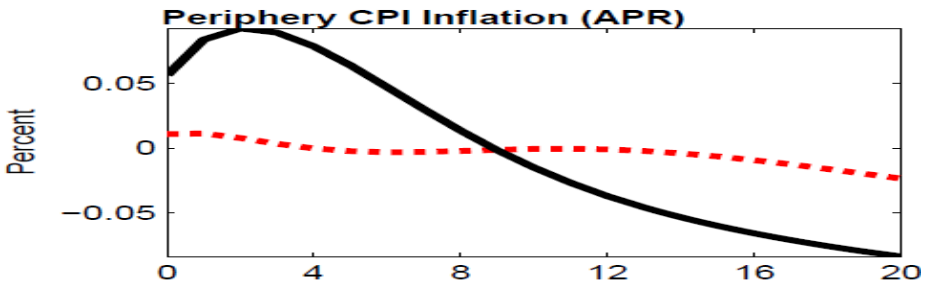
  - **In the latter case we use a combination of negative demand and supply shocks to drive the CU into a two-year liquidity trap absent any core stimulus.**

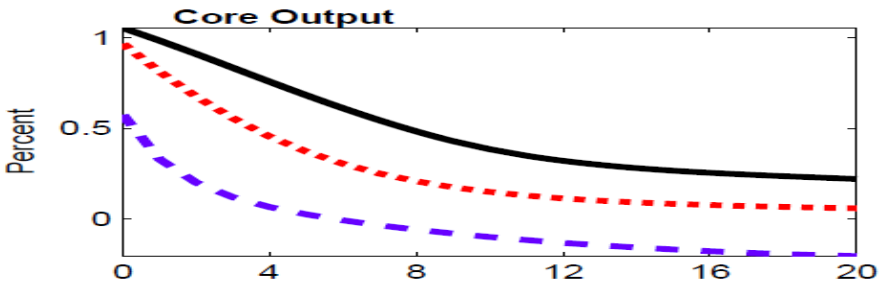
Core Spending Hike In Large Scale Model, Slow Price Adj.

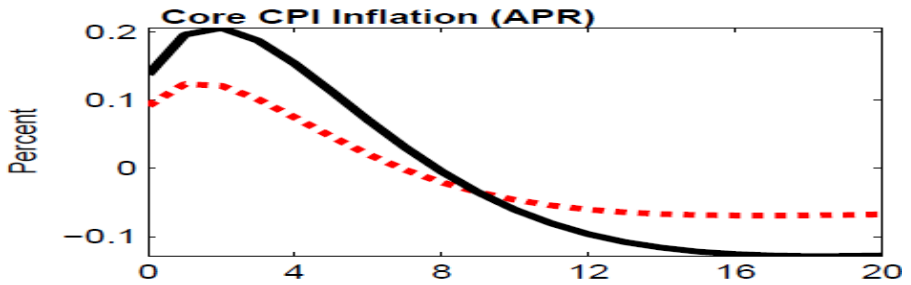


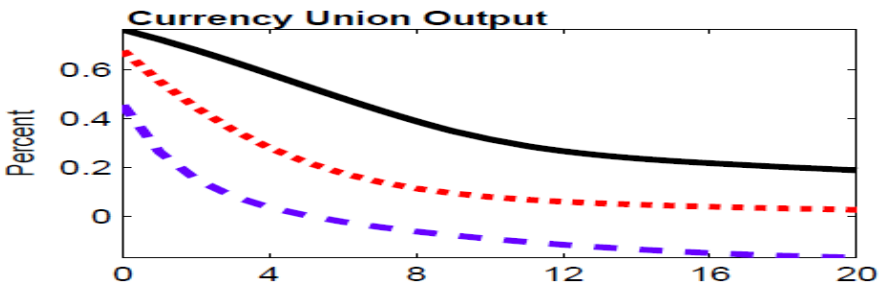


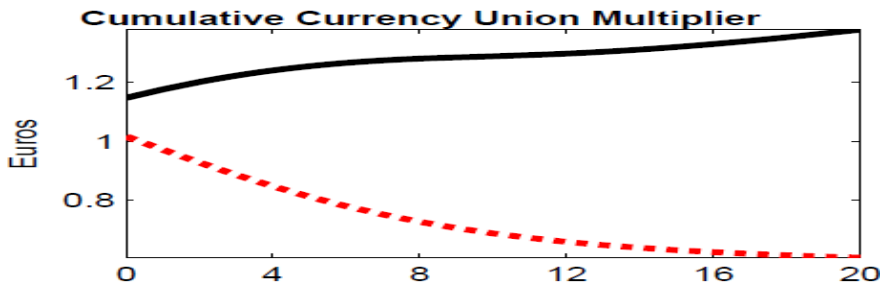












Core Spending Hike in Large Scale Model

- **Large similarities between the results in the benchmark model:**

  - **In normal times, spillovers to periphery negative after a couple of quarters.**

  - **Only in a liquidity trap do we obtain persistent positive spillovers to the periphery.**

  - **The positive spillovers to the periphery imply that the cumulative CU output multiplier (adopting Uhlig's (2010) concept) can be well above unity for a prolonged period.**

  - **Spillovers even more enhanced in a longer-lived trap (see Figure 10 for the 12-quarter case).**

Concluding Remarks

- **Our analysis indicates that the spillovers from a fiscal expansion in the core to the periphery are likely to be small or even negative in normal times.**

- **However, the spillovers may be substantial and positive in a prolonged liquidity trap, especially if a relatively large share of the core spending hike is directed towards goods produced in the periphery.**

- **Our analysis suggests that the core might well benefit from some fiscal expansion insofar as it would narrow the core output gap while boosting inflation. Even so, the core has incentives to provide considerably less stimulus than would be desirable from a euro area perspective.**