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

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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 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 more 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 two normative questions:**
  - **Would the periphery likely be better off?**
  - **What about the core?**

- **Do normative analysis with two alternative metrics: Simple loss function and household utility.**

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.**

  - Add habit to avoid features we regard as implausible, including a high degree of crowding-out in normal times (crowding-in even in a short-lived liquidity trap).

- **Larger-Scale Model** **Allows for endogenous investment, wage and price rigidities, 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 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 large scale model, periphery GDP rises about 1/2 as much as core GDP in a 12 quarter trap.

Some Normative Implications

- **Under the simple loss function metric, the core would benefit from some fiscal expansion insofar as there is some resource slack and inflation is well below 2 percent.**

- **In a long-lived liquidity trap, the periphery would also benefit from core stimulus according to the simple loss function metric**

  - Strongest positive spillovers on the periphery under a "fiscal union" or if a large share of core spending is imported.

- **Switching to the household welfare metric, we again find that the core benefits (assuming spending is not wasteful) from stimulus.**

  - For the periphery, welfare increases under fiscal union, but falls under a "core only" expansion unless periphery experiences a very deep liquidity trap.

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 due to Calvo-style pricing frictions.**

- **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 work through aggregate channels – and thus has the same impact on home and foreign economies.**

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 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 (first term on rhs) 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, habit persistence damps the response of relative consumption.**

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

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 τ_t, 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).**

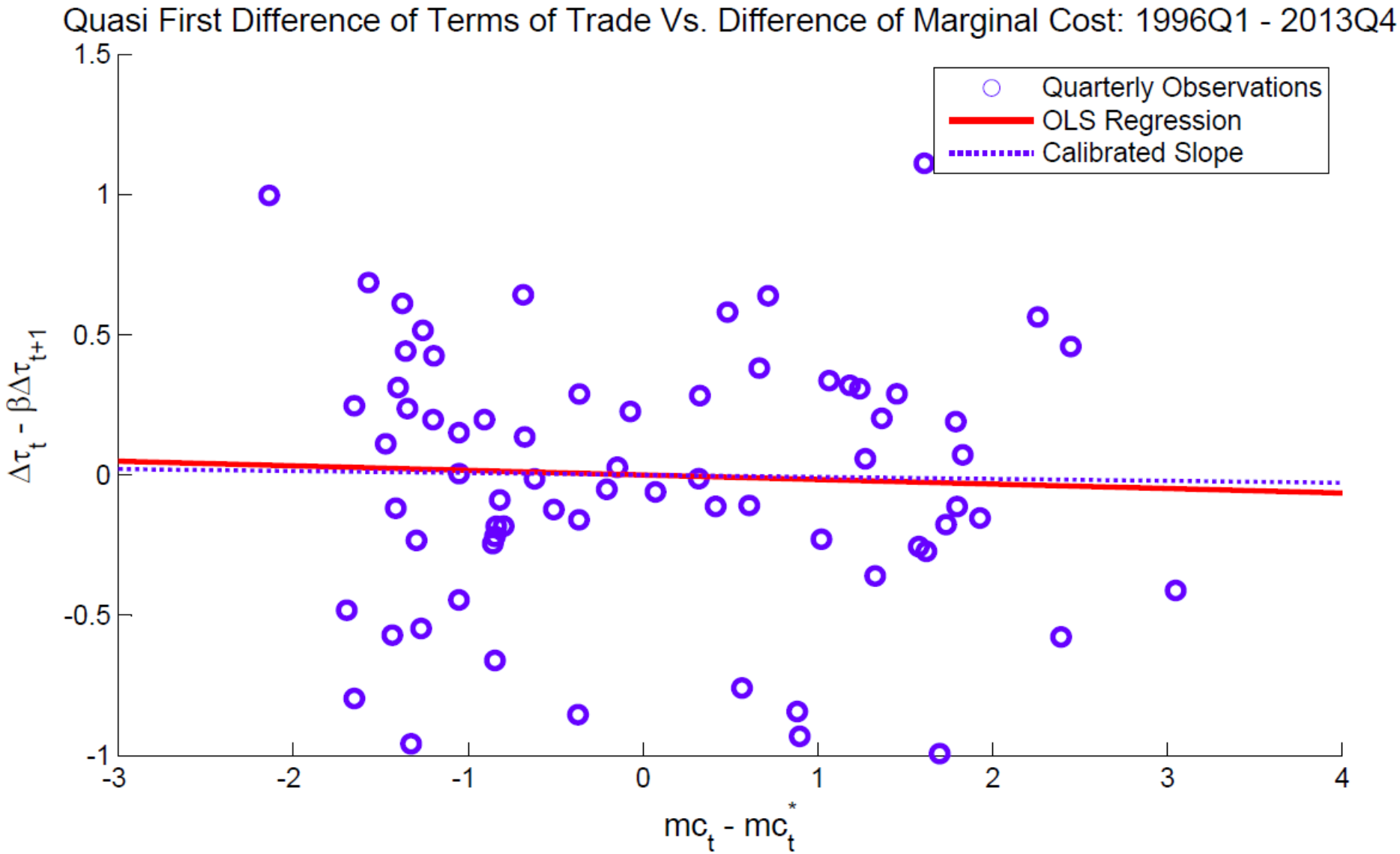
- **ξ_p – determines both the terms-of-trade and CU output and inflation. Set to 0.93. Motivation i) low slope of estimated Phillips Curves, ii) slow adj of ToT (Figure 2), and iii) the resilience of periphery inflation during the crisis.**

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

  - **The trade price elasticity assumed to be just above unity (1.1).**
  - **Set Core import share of private spending $\omega_C^* = 0.1$.**
  - **Vary import share of public spending (ω_G^*) between 0 and 0.2.**

- **The habit parameter is set to 0.8, 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.**

Impulses in Normal Times and Liquidity Trap

- **We now study the effects of a positive shock to Core govt spending equal to one percent of core trend GDP. Assume initially that all the spending is directed towards domestic goods ($\omega_G^* = 0$).**

- **In normal times when monetary policy is unconstrained by the ZLB, an increase in core spending boosts CU output and induces the CB to raise policy rates.**

- **Turning to the compositional effects, we see in Figure 3 that the stimulative impact is confined to the core; periphery output is about flat as the higher real interest rate offsets the increase in net export.**

- **Periphery NX increase small because terms-of-trade adjust depreciates slowly when price adjustment occurs very gradually.**

Impulses in Normal Times and Liquidity Trap II

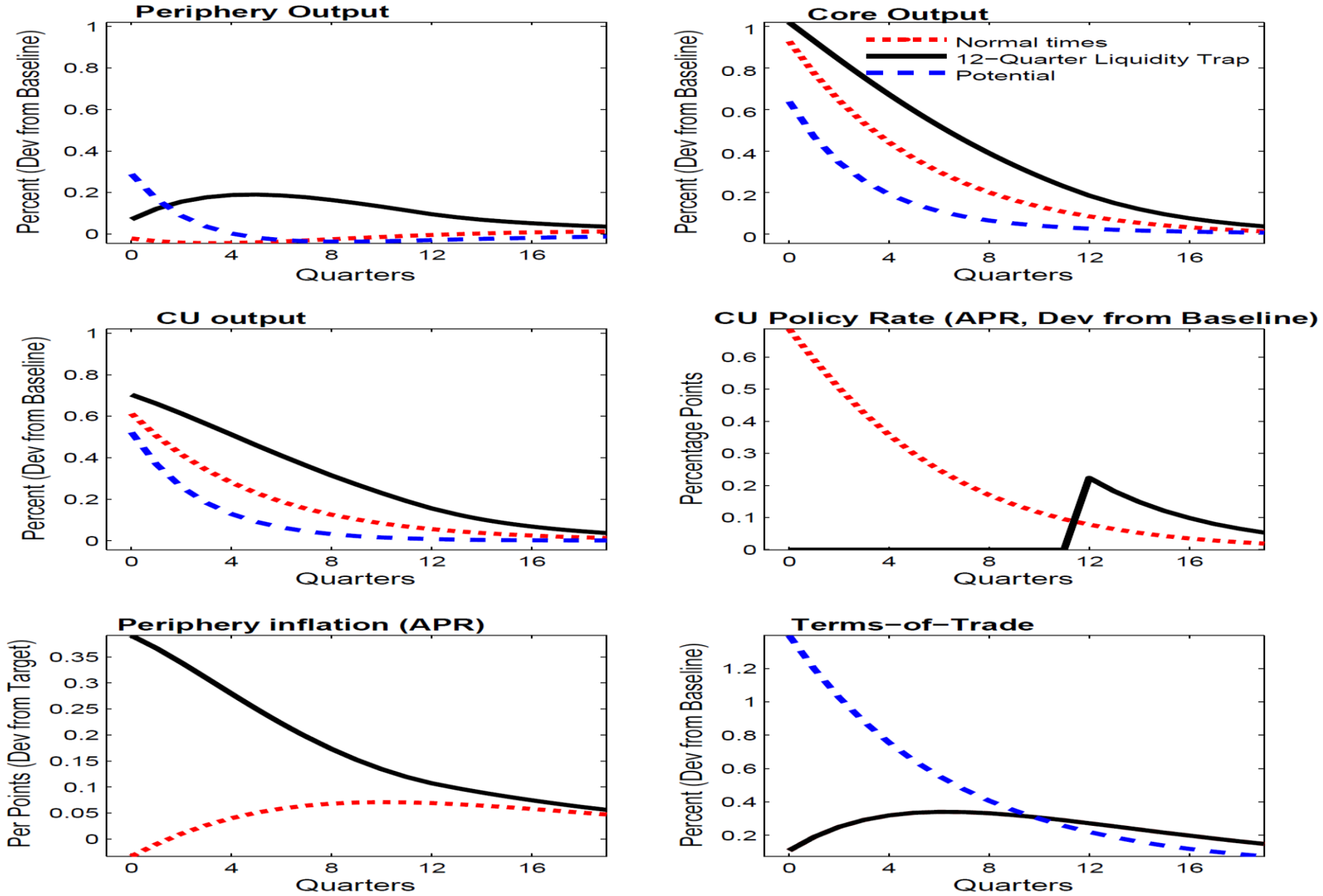
- **We now turn to the liquidity trap case, which we generate in our model with a negative consumption demand shock hitting both the periphery and core.**

- **In a prolonged liquidity trap, however, the larger-than-normal CU response implies that the spillovers to the periphery becomes positive.**

- **Terms-of- trade, and thus relative demand is unchanged.**

- **Accordingly, same shift-up of the output response for both the core and the periphery (a liquidity trap "lifts all boats")**

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



Impulses in Normal Times and Liquidity Trap III

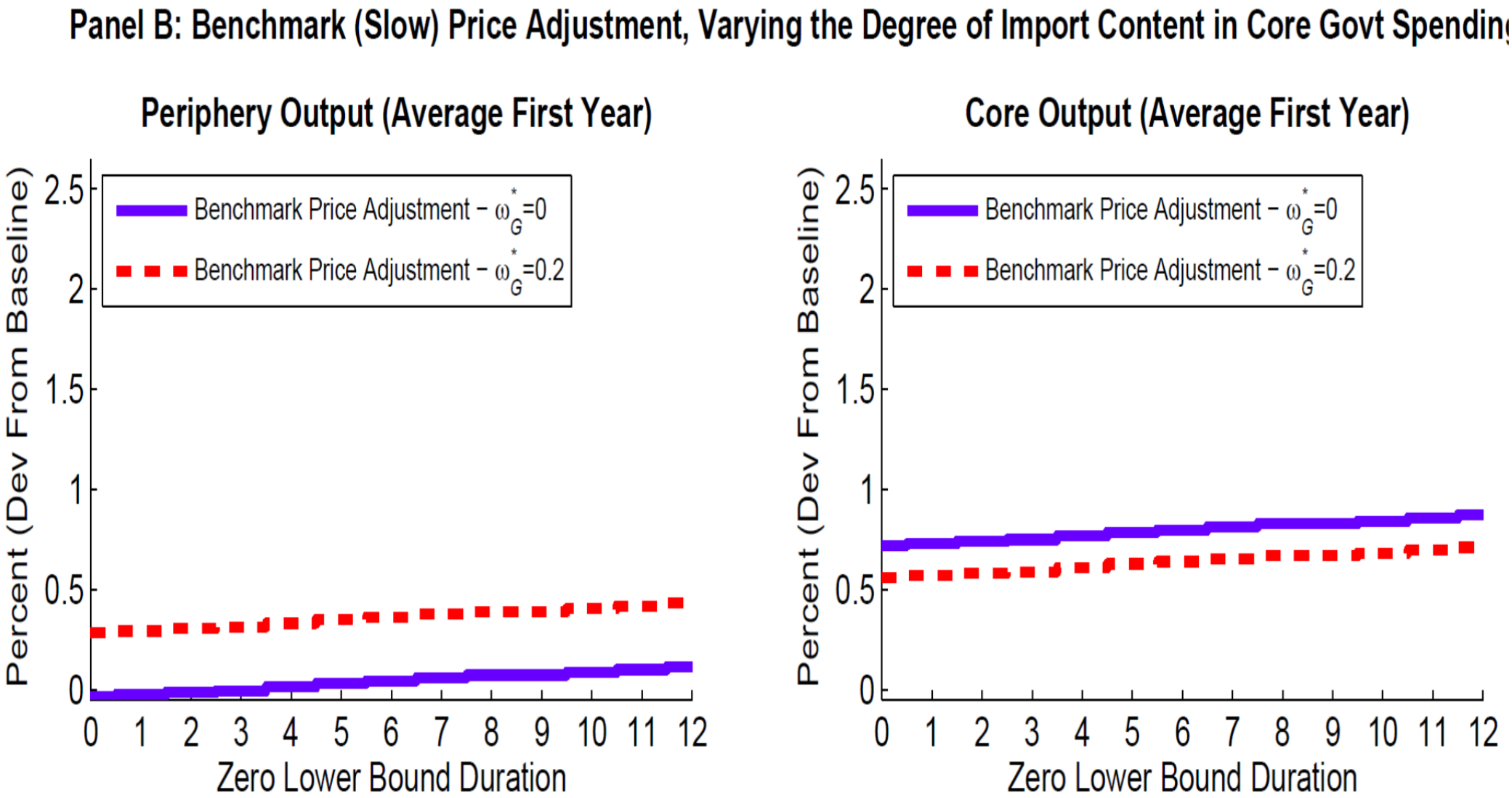
- **Next, we study how the spillovers to the periphery vary with the expected duration of the liquidity trap and the import content of core govt spending.**

- **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



Key Points about Output Response Schedules

- **Without habit persistence and with a more upward sloping Phillips Curve, there is a sharp difference between the periphery output response in normal times and a liquidity trap. Spillovers are very negative in normal times, but positive even in a short-lived liquidity trap (1 quarter) if the core spending hike is very transient.**

- **Under our calibration, periphery output responses vary smoothly as the liquidity trap duration lengthens, and there is not much difference between the spillovers in normal times and a short-lived liquidity trap.**

- **Our results reflect that; (i) habit persistence damps the crowding out of consumption that would occur in normal times; (ii) a flat Phillips Curve damps the aggregate CU multiplier and also the expenditure-switching effects toward periphery goods; and (iii) finally our assumption that fiscal stimulus tends to be fairly persistent.**

- **Spillovers to the periphery don't become sizeable until the liquidity trap lasts 11-12 quarters under our benchmark calibration (zero or very low import content). Our larger model also implies very small spillovers in a short-lived liquidity trap of a year or less, but does imply substantial positive spillovers for a liquidity trap lasting more than 8-9 quarters given that it includes an array of Keynesian accelerator effects.**

Normative Results - Baseline

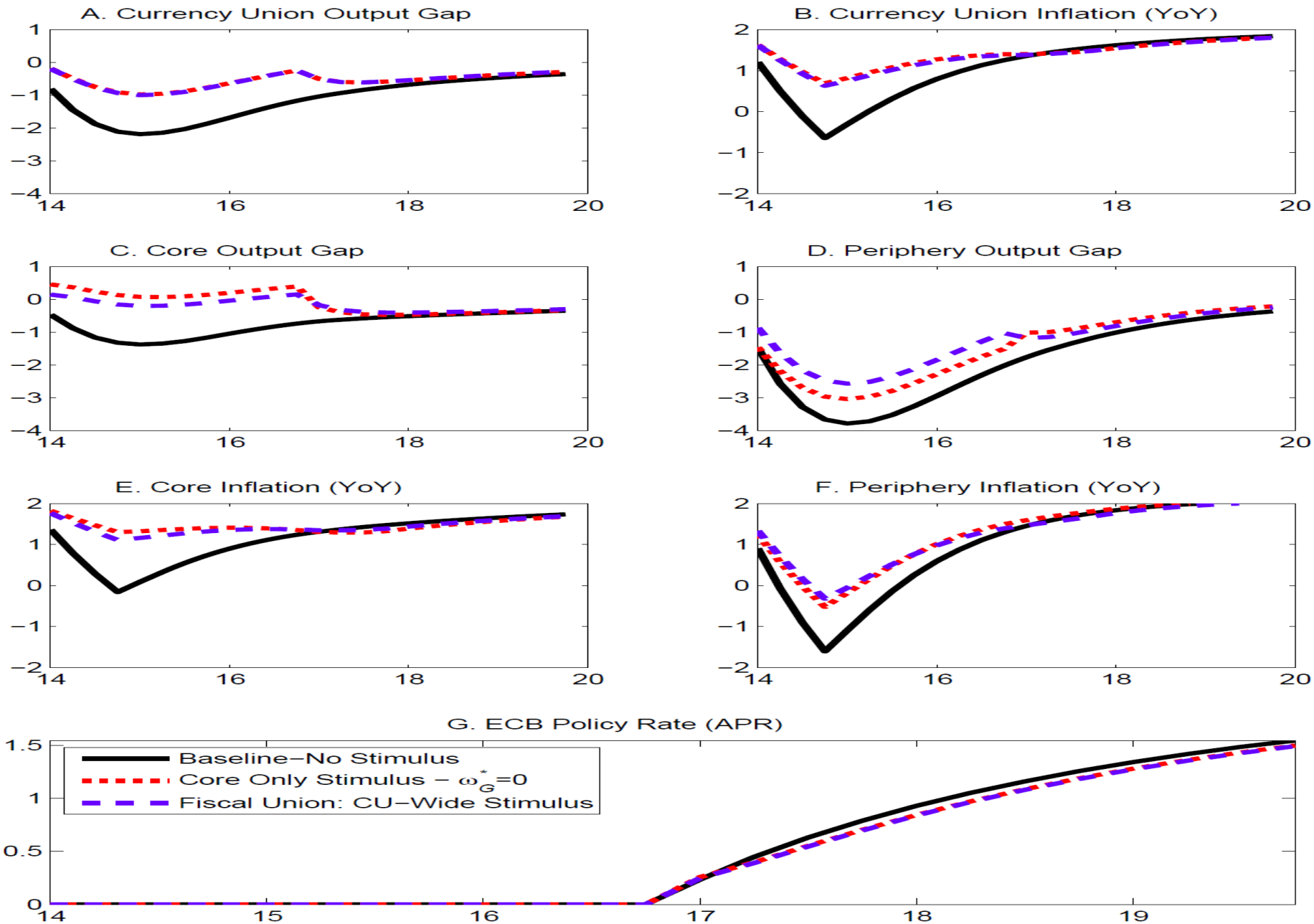
- **Next, we study the extent to which an expansion in spending could improve the outlook in the Euro Area.**

- **To do this, we set up a baseline projection (absent any fiscal stimulus), where we roughly match the important asymmetries in the core and periphery outlook.**

- **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 under fiscal stimulus.**

- **Report baseline projection in Figure 7, along with fiscal stimulus equal to 1 percent of baseline CU GDP per period for 12 periods.**

Figure 7: Impact of Fiscal Stimulus When ECB Keeps Exitdate Unchanged.



Normative Results – First 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.:**

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

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

- **Baseline losses (without any government spending):**

Table 1: Welfare Loss in Baseline

	L_t^{CP} – Overall Loss	Core	Periphery
Benchmark ($\omega_G^* = 0$)	54.5	31.8	100.0

Normative Results – Spending Hike

- **Now, we compute losses under the assumption that spending is increased by 1 percent of baseline EA GDP each period as long as the ECB is at the ZLB (12 quarters).**

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

  - **Sim 1: Fiscal union, spending is increased in both core and periphery.**
  - **Sim 2: Core spending falls exclusively on domestic goods, $\omega_G^* = 0$.**
  - **Sim 3: Part of core spending falls on periphery goods, $\omega_G^* = 0.2$.**

Normative Results – Simple Loss Function

- **We find that losses are reduced substantially, especially under fiscal union or for periphery when part of the core hike falls on periphery goods.**

Table 2: Welfare Gains From Fiscal Expansion: Quadratic Loss

Panel A: Welfare Gains under Fiscal Union			
	L_t^{CP} – Overall Loss	Core	Periphery
	20.9	9.2	44.4
Panel B: Welfare Gains under "Core Only" Fiscal Expansion			
	L_t^{CP} – Overall Loss	Core	Periphery
Benchmark ($\omega_G^* = 0$)	24.1	8.7	54.8
High Import Share ($\omega_G^* = 0.2$)	22.1	9.1	48.2

- **Optimal stimulus size: about 2 percent of GDP per period in FU case and 2.5-3 percent when only core hikes spending (depending on ω_G^*).**

Normative Results – Household Welfare

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

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

- **Set utility parameter ϑ_g to rationalize *G/Y* = 0.23 in the steady state.**

- **Repeat stimulus profiles studied previously: FU, Only core hike ($\omega_G^* = 0$) and only core hike ($\omega_G^* = 0.2$).**

Normative Results – Household Welfare

- **Results (CEV numbers) reported in Table 3:**

Table 3: Welfare Gains From Fiscal Expansion: Utility-Based

Panel A: Welfare Gains under Fiscal Union			
	Aggregate CU	Core	Periphery
	.026	.023	.032
Panel B: Welfare Gains under "Core Only" Fiscal Expansion			
	Aggregate CU	Core	Periphery
Benchmark ($\omega_G^* = 0$)	.024	.036	-.001
High Import Share ($\omega_G^* = 0.2$)	.025	.042	-.010

- **On net, core gains from fiscal expansion (*C*+*G* up dominate *N* up), whereas periphery only gains under FU. Welfare declines in periphery in core only case as the rise in *C* is dominated by costs associated with higher *N*.**

  - **Need a deeper liquidity trap with more periphery deflation (higher sticky price distortion) to obtain periphery welfare gains in the core only case.**

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

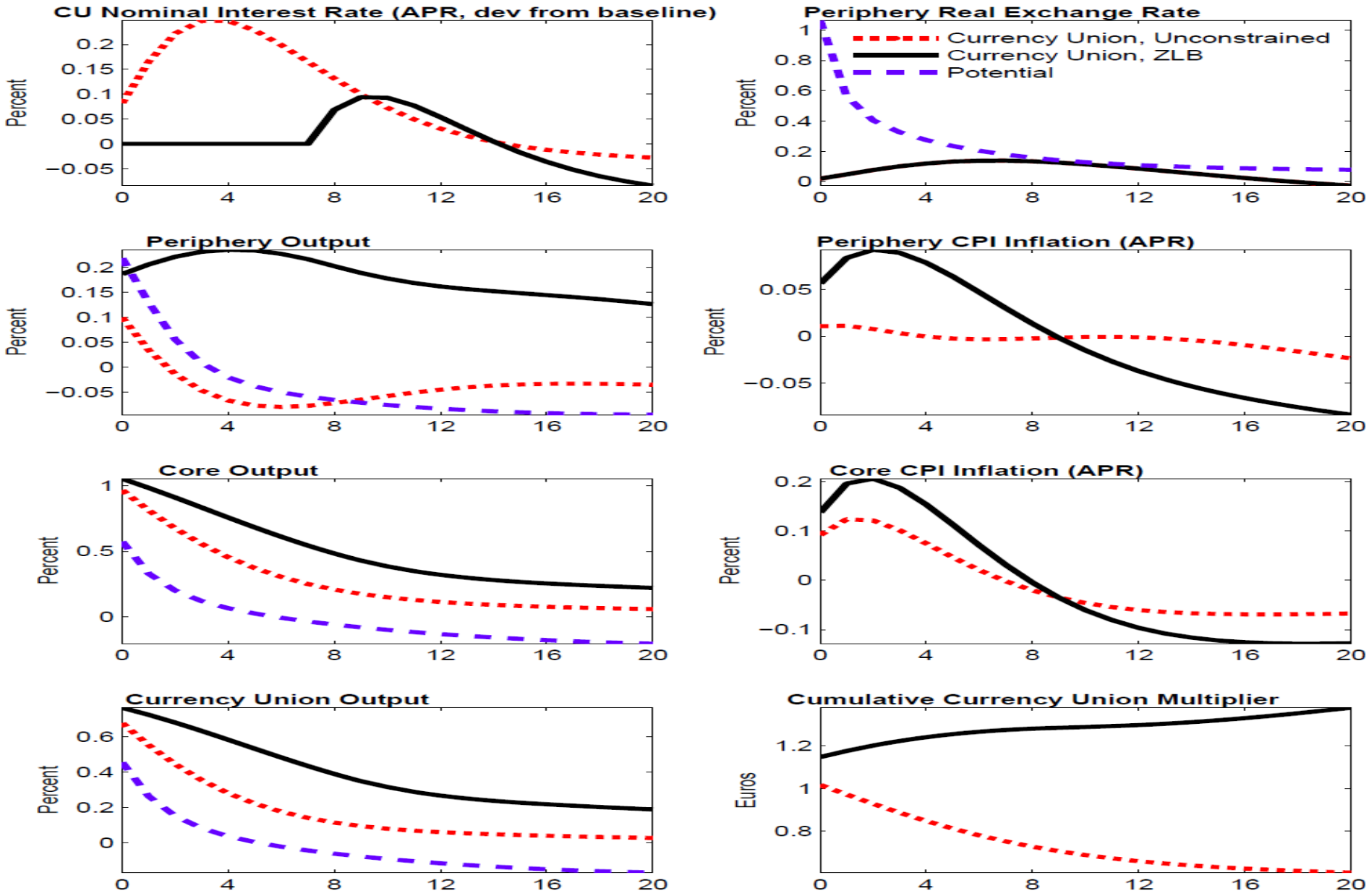
- **Next figure studies the impact an increase in core government spending with 1 percent of its GDP.**

- **The calibrated degree of price stickiness is the same as in the benchmark model (0.93), 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.**

- **For the periphery the results are less clear, unless it experiences a deep liquidity trap with substantial deflation in which case it gains from a core spending hike.**