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

Olivier Blanchard, Christopher Erceg, and Jesper Lindé

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The views expressed are solely those of the authors and should not be interpreted as reflecting the views of the International Monetary Fund, Federal Reserve Board or the Sveriges Riksbank.
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 2017.

- 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 that the periphery can’t boost government spending due to fiscal solvency concerns, 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:
  - *Wieland (1996)*: German expansion reduces GDP outside of Germany.
  - *Kollmann, Ratto, Roeger, in’t Veld and Vogel (2014)*: German fiscal expansion causes slight fall in periphery GDP after 2 qtrs.
  - *Fahri and Werning (2012)*: Core expansion causes periphery GDP to fall in normal times, rise in liquidity trap.

- We also study **normative questions** that focus on whether periphery and core welfare could be enhanced by a core spending expansion.
  - Compare the benefits of a core-only expansion to fiscal union.
  - Use two alternative welfare metrics: quadratic loss and utility-based.
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 (and crowding-in even in a short-lived liquidity trap).

- **Larger-Scale Model** Allows for endogenous investment, wage and price rigidities, and other frictions that give rise to typical Keynesian “accelerator” effects.
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:

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

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:

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

- **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 $\tau_t$) 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 $\varepsilon$ 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.
Why Big Effects in Liquidity Trap?

- A key implication is that the rise in core government spending shifts relative demand sharply towards the core (assuming that the import share of government spending is fairly low). The expenditure-switching effects emphasized in policy debates aren’t likely very large.

- Thus, higher core spending can only have large effects on periphery GDP if the aggregate CU impact is large.

- In a deep liquidity trap, higher core spending puts persistent upward pressure on inflation in both the core AND periphery, which crowds in domestic demand in both regions.

  - Although core inflation rises more initially, prices in the periphery must eventually rise as much as in the core (so that the terms of trade revert to baseline).
Calibration – Key Parameters

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

- $\xi_p$ – 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 ($\omega_g^*$) 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 $\xi_p$

$$\tau_t - \tau_{t-1} = \beta(\tau_{t+1} - \tau_t) - \kappa_{mc}(mc_t - mc_t^*)$$
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 MA-processes.
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 CU GDP for 10 quarters (MA(10)). Assume initially that all the spending is directed towards domestic goods ($\omega_G^* = 0$).

- First, we study the effects in normal times when monetary policy is unconstrained by the ZLB.

- Then we study the effects in a liquidity trap, which we generate in our model with a negative consumption demand shock hitting both the periphery and core so that CB constrained by ZLB for 12 quarters.
Core Hike by 1 Percent of CU GDP, Slow Price Adj.
Impulses in Normal Times: Summary

- **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 a Liquidity Trap: Summary

- 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”)
Impulses in Normal Times and Liquidity Trap II

- 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.

- Panel B in Figure 4 shows the 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, \( \omega^*_G = 0.2 \).

- Study average output responses during the first year following core spending hike.
Panel B: Benchmark (Slow) Price Adjustment, Varying the Degree of Import Content in Core Govt Spending

Periphery Output (Average First Year)

Core Output (Average First Year)
Key Points about Output Response Schedules

- In a variant 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 are positive even in a short-lived liquidity trap (1 quarter) if the government spending 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; and (ii) a flat Phillips Curve damps the aggregate CU multiplier and also the expenditure-switching effects toward periphery goods.
• 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.

• Multiplier schedules become much more symmetric when the import content of core govt spending is positive, $\omega^*_G = 0.2$. 
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 2017Q4 (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.
Impact of Core Stimulus When ECB Keeps Exit Date 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.:

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

• We set \( \lambda_y = 1/3 \) in the simulations, roughly consistent with Okun’s law, recognizing that inflation is measured in yearly rates.

• Baseline losses (without any government spending):

<table>
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<tr>
<th>Table 1: Losses under Baseline: Ad Hoc Welfare Function</th>
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<tbody>
<tr>
<td>Overall Loss</td>
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<tr>
<td>Discounted Loss</td>
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</table>
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>
<thead>
<tr>
<th>Panel A: Welfare Gains under Fiscal Union</th>
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<td>Currency Union</td>
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<th>Panel B: Welfare Gains under “Core Only” Fiscal Expansion</th>
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<tr>
<td>----------------</td>
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<tr>
<td>Benchmark ($\omega^*_c = 0$)</td>
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<tr>
<td>High Import Share ($\omega^*_c = 0.2$)</td>
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Note: The table reports absolute gains, computed as $\text{Loss}_\text{Baseline} - \text{Loss}_\text{Scenario}$.

- Optimal stimulus size: about 2.5 percent of CU GDP per period in FU case and 2-2.3 percent when only core hikes spending (dep. on $\omega^*_c$).
Normative Results – Utility-Based Welfare

- Assess effects on household welfare of the core spending hike using utility-based welfare criterion:

\[
E_t \sum_{j=0}^{\infty} \beta^j \zeta_{t+j} \left\{ \ln(C_{t+j} - \kappa C_{t+j-1} - C_{t+j}) - \chi_0 \frac{(N_{t+j})^{1+\chi}}{1+\chi} + \frac{\vartheta_G}{1 - \frac{1}{\sigma_G}}(G_{t+j} - \gamma G_{t+j-1})^{1-\frac{1}{\sigma_G}} \right\}
\]

- Set utility parameter \( \vartheta_g \) 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 – Utility-Based Welfare

- Results (CEV numbers) reported in Table 3:

<table>
<thead>
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<th>Panel A: Welfare Gains under Fiscal Union</th>
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<tr>
<td>Aggregate CU</td>
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- Under FU, both core and periphery experience welfare gains:
  
  - Welfare improves because the substantial resource slack means that it is much cheaper – in terms of foregone leisure – to produce government services than if core and periphery were close to full employment.
Normative Results – Utility-Based Welfare (Cont.)

- The “core-only” expansion causes core welfare to improve for the same reason.

- But strikingly, the “core only” expansion causes periphery welfare to be roughly unchanged even under the grim baseline.

  - The composition and timing of the GDP expansion is critical under this metric, with the litmus test whether the periphery’s consumption rise is big and front-loaded enough to justify the cost in terms of employment.

  - Under the benchmark with $\omega^*_G = 0$, period utility rises noticeably initially because of the crowding-in of private consumption; but the drawn-out response of consumption hurts period welfare at longer horizons.

  - With $\omega^*_G = 0.2$, utility is adversely affected at all horizons because the rise in GDP is heavily driven by net exports. In this case, the consumption rise isn’t worth the employment cost.
Transmission Channels of Higher Core Spending

A. Core Consumption
B. Periphery Consumption
C. Core Hours Worked
D. Periphery Hours Worked
E. Core Net Exports
F. Periphery Net Exports
G. Core Period Utility
H. Periphery Period Utility

- Core only, $\omega_G=0$
- Core only, $\omega_G=0.2$
Normative Results – Utility-Based Welfare (Cont.)

- The utility-based metric is useful for highlighting that a focus on reducing output and inflation gaps is probably too narrow in assessing the merits of fiscal expansion.

- Under the utility-based welfare metric, higher core spending raises core welfare but has little effect on periphery welfare.
  - Composition of GDP rise is critical under this criteria: if the periphery GDP rise is driven by NX, periphery welfare can deteriorate substantially!

- However, we are inclined to think that the utility-based metric understates the benefits of fiscal expansion in economies facing high resource slack:
  - Without perfect consumption insurance across households, boosting employment should help improving the distribution of consumption across households.
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.
  - 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 by 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 Hike by 1 Percent of CU GDP In SIGMA, Slow Price Adj.

A. Currency Union Output

B. Policy Rate (APR, dev from baseline)

C. Core Output

D. Periphery Output

E. Core CPI Inflation (APR)

F. Periphery CPI Inflation (APR)

G. Terms of Trade (Periphery RER)

H. Periphery Consumption
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.
  
  - In a liquidity trap, 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.
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, in a prolonged liquidity trap the spillovers may be substantial and positive, 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 should benefit from some fiscal expansion insofar as it would narrow the core output gap while boosting inflation.

- The periphery also seem very likely to experience welfare benefits, at least over the next couple of years.