Asymmetric Shocks in a Currency Union with Monetary and Fiscal Handcuffs

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Federal Reserve Board

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- Conventional wisdom: The effects of a given sized asymmetric shock (e.g. fiscal contraction) in a single small economy is considerably more severe than if a sizeable group of its neighbors are exposed to the same shock.
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  - Reflecting the fact that monetary policy essentially leaves interest rates unchanged for a small periphery country in a currency union, while reducing interest rates considerably in the case of a concerted shock hitting several countries.
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  - Reflecting the fact that monetary policy essentially leaves interest rates unchanged for a small periphery country in a currency union, while reducing interest rates considerably in the case of a concerted shock hitting several countries.
  - According to this logic, Greece and Portugal would be better off if e.g. Germany and France cut spending at the same time.
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- We define a liquidity trap as a situation where nominal interest rates cannot be lowered for a protracted period due to the zero lower bound constraint
- In this environment, the impact of shocks in the periphery (and core) depends on agents’ perceptions of long the liquidity trap would last in the absence of additional shocks, and the severity of the associated recession
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For instance, in the case of a coordinated aggressive fiscal spending cut of 1% to baseline GDP, output contraction so large (-2.8%) that government debt to output ratio increases for a 4(3) year period in periphery(core).
Our algorithm for computing the equilibrium makes the duration of the liquidity trap endogenous.
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- In this framework, the marginal impact on currency union GDP of asymmetric shocks in the periphery grows with the size of the asymmetric shock.
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For example, a spending cut of 1% in a large periphery has an impact multiplier slightly above unity (for large periphery), but a spending cut of 3% in large periphery is associated with a multiplier of 1.5 (again, for large periphery), reflecting that the larger cut extends the duration of the liquidity trap by two quarters.
Discussion outline

- Model
- Parameterization of model
- Effects of fiscal shocks
- (Effects of financial shocks)
- Sensitivity analysis
- Concluding remarks
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- Staggered price and wage contracts

Habit persistence in consumption

Investment adjustment costs

"Hand-to-mouth" households following Erceg, Guerrieri and Gust (2005)

Imports are utilized in combination with final domestic output good to produce consumption and investment goods (CES baskets), costly to adjust import shares

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We assume that a fraction $\varsigma$ of households are purely “Keynesian” and do not save so that:

$$P_{C,t}C_t^{HM}(h) = (1 - \tau_{N,t})W_t(h)N_t(h) + TR_t(h) - T_t$$
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- The Hand-to-mouth (HM) households set their wage at the average wage of the optimizing households, and since they face same labor demand curve, they work the same amount as optimizing households in equilibrium.
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Distributors purchase both the domestically-produced good and imported goods, and resell the final consumption and investment goods to households (CES). Face quadratic costs of changing the composition of imported to domestic goods.
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\[ i_t = \max \left\{ -i, (1 - \gamma_i) \left( \gamma_{\pi} \tilde{\pi}_t + \gamma_x \tilde{x}_t \right) + \gamma_i i_{t-1} \right\} \]

where \( \tilde{\pi}_t \) and \( \tilde{x}_t \) are member size weighted inflation and output gaps
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Hebden, Lindé and Svensson (2009): Perfect foresight solution
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  - Slope of pricing and wage schedules on the low side (0.007, compare well with often-cited papers in empirical literature 0.009-0.014)
  - Policy rule more aggressive to inflation that standard Taylor rule ($\gamma_\pi = 2.5$)
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  - However, identification of fiscal shocks in VAR models arguably more difficult (issues pertaining to fiscal foresight, see e.g. Leeper, Walker and Yang, 2009).
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- Note: With symmetric calibration and symmetric shock, baseline identical for small and large periphery calibration.
Baseline Scenario in model
Solution when interest rates are unconstrained and subject to ZLB
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- Bigger effects of asymmetric shock in a currency union relative to flexible exchange rate case
Effects of fiscal shocks

Government spending cut in small periphery in alternative situations

Figure 2: Responses to a Front-Loaded Decrease in Government Spending in Small Periphery under Flexible Exchange Rate and in a Currency Union

- Periphery Nominal Interest Rate (APR)
- Core Nominal Interest Rate (APR)
- Periphery Real Interest Rate (APR)
- Core Real Interest Rate (APR)
- Periphery CPI Inflation (APR)
- Core CPI Inflation (APR)
- Periphery Output
- Core Output
- Periphery/Core Real Exchange Rate
- Periphery/Core Nominal Exchange Rate
- Periphery Government Debt as Share of GDP
- Core Government Debt as Share of GDP
- Periphery Government Spending (trend GDP share)
- Core Government Spending (trend GDP share)

Legend:
- Black: Flex ex rate: Normal
- Red: Curr Union: Normal
- Green: Curr Union: ZLB
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Large periphery

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- However, when the economy is at the ZLB, we obtain larger drop in periphery output when periphery is large,
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- Periphery/Core Nominal Exchange Rate
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- Core Govt Debt as Share of GDP
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Effects of fiscal shocks
Size of spending cut important in large periphery

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- In Figure 4, we illustrate this for three different spending cut sizes (-1, 2, and -3%).

Since large periphery is 1/3 of total currency union, a 3% cut is equivalent to a one percent aggregate cut. Since aggregate currency union output fall with about 2.8 percent, the multiplier is as high as 2.8 for the largest spending cut. Notice also budgetary implication, larger cuts in the periphery are associated with a runup in debt in the short run for the periphery, and persistent rise in debt in core.
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Effects of fiscal shocks
Different sized government spending cuts in large periphery

Figure 4: Responses to Government Spending Cuts of Different Magnitudes for Large Periphery Currency Union Member in a Liquidity Trap

- Periphery Nominal Interest Rate (APR)
- Core Nominal Interest Rate (APR)
- Periphery Real Interest Rate (APR)
- Core Real Interest Rate (APR)
- Periphery CPI Inflation (APR)
- Core CPI Inflation (APR)
- Periphery Output
- Core Output
- Periphery/Core Real Exchange Rate
- Aggregate Currency Union Output
- Periphery Govt Debt as Share of GDP
- Core Govt Debt as Share of GDP
- Periphery Govt Spend (trend GDP share)
- Core Govt Spend (trend GDP share)

Quarter

- 1% decrease: ZLB
- 2% decrease: ZLB
- 3% decrease: ZLB
We now consider the effects of a coordinated spending cut in large periphery and core.
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The idea is that policymakers in periphery and core want to reduce deficit and debt levels against the background of the severe recession scenario.
Effects of fiscal shocks
Coordinated spending cut in large periphery and core

- We now consider the effects of a coordinated spending cut in large periphery and core
  - The idea is that policymakers in periphery and core want to reduce deficit and debt levels against the background of the severe recession scenario
- In Figure 5, we show results of this spending coordinated spending cut
Effects of fiscal shocks

Coordinated spending cut in large periphery and core

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- Given our parameterization of the large periphery, this spending cut equals the -3% periphery cut in previous figure at the aggregate union level, and as a consequence the results for aggregate currency union are identical to those in Figure 4
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- Given our parameterization of the large periphery, this spending cut equals the -3% periphery cut in previous figure at the aggregate union level, and as a consequence the results for aggregate currency union are identical to those in Figure 4.
  - But compositional effects on periphery and core output levels.
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But compositional effects on periphery and core output levels.

In normal times, cuts would be very effective in reducing deficits and debts; opposite results obtain when nominal interest rate is at the zero lower bound.
Effects of fiscal shocks
Coordinated spending cut in large periphery and core

- We now consider the effects of a coordinated spending cut in large periphery and core.
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- Given our parameterization of the large periphery, this spending cut equals the -3% periphery cut in previous figure at the aggregate union level, and as a consequence the results for aggregate currency union are identical to those in Figure 4.
  - But compositional effects on periphery and core output levels.

- In normal times, cuts would be very effective in reducing deficits and debts; opposite results obtain when nominal interest rate is at the zero lower bound.
  - Policymakers chasing their own tail.
Effects of fiscal shocks
Coordinated and non-coordinated government spending cuts

Figure 5: Responses to Government Spending Cut in Large Periphery Currency Union Member With and Without Core Spending Adjustment

Periphery Nominal Interest Rate (APR)
Periphery Real Interest Rate (APR)
Periphery CPI Inflation (APR)
Periphery Output
Periphery/ Core Real Exchange Rate
Periphery Govt Debt as Share of GDP
Periphery Govt Spend (trend GDP share)

Core Nominal Interest Rate (APR)
Core Real Interest Rate (APR)
Core CPI Inflation (APR)
Core Output
Aggregate Currency Union Output
Core Govt Debt as Share of GDP
Core Govt Spend (trend GDP share)
Sensitivity analysis
No HM households in the model

- Results above also holds for financial spread shocks that affects the borrowing costs of firms and the government.
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Therefore, instead do sensitivity analysis w.r.t. shown results above.
Sensitivity analysis
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- Results above also holds for financial spread shocks that affects the borrowing costs of firms and the government.
- Therefore, instead do sensitivity analysis w.r.t. shown results above
- First, take out the HM consumers of the model, i.e. we set $\varsigma = 0$
Sensitivity analysis
No HM households in the model

- Results above also holds for financial spread shocks that affects the borrowing costs of firms and the government.
- Therefore, instead do sensitivity analysis w.r.t. shown results above
- First, take out the HM consumers of the model, i.e. we set $\varsigma = 0$
- Consider the effects of spending cuts in large periphery only and coordinated spending cut in the currency union as a whole with 1% of baseline GDP
Sensitivity analysis
No HM households in the model

- Results above also holds for financial spread shocks that affects the borrowing costs of firms and the government.
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- First, take out the HM consumers of the model, i.e. we set $\varsigma = 0$
- Consider the effects of spending cuts in large periphery only and coordinated spending cut in the currency union as a whole with 1% of baseline GDP
  - Results reported in figure below
Sensitivity analysis
No HM households in the model

- Results above also holds for financial spread shocks that affects the borrowing costs of firms and the government.
- Therefore, instead do sensitivity analysis w.r.t. shown results above
- First, take out the HM consumers of the model, i.e. we set $\varsigma = 0$
- Consider the effects of spending cuts in large periphery only and coordinated spending cut in the currency union as a whole with 1% of baseline GDP
  - Results reported in figure below
- Qualitative aspects unchanged, but need larger cuts to see as large quantitative effects as in the model with HM households
Sensitivity analysis
Non-coordinated and coordinated spending cuts with no HM households in model

Figure X: Responses to Government Spending Cut in Large Periphery
Curr Union Member With and Without Core Spending Adjustment: No HM

Periphery Nominal Interest Rate (APR)
Core Nominal Interest Rate (APR)

Periphery Real Interest Rate (APR)
Core Real Interest Rate (APR)

Periphery CPI Inflation (APR)
Core CPI Inflation (APR)

Periphery Output
Core Output

Periphery/ Core Real Exchange Rate

Periphery Govt Debt as Share of GDP
Core Govt Debt as Share of GDP

Periphery Govt Spend (trend GDP share)
Core Govt Spend (trend GDP share)

Quarter
How should then a spending cut be designed to prevent rise in government debt and mitigating the effects on output in a liquidity trap?
Sensitivity analysis
Gradual spending decline profile helpful

- How should then a spending cut be designed to prevent rise in government debt and mitigating the effects on output in a liquidity trap?

- As the potential real interest rate is related to the growth rate of government consumption, spending cut should be gradual so that most of the spending cut occurs when monetary policy is no longer constrained by the ZLB
How should then a spending cut be designed to prevent rise in government debt and mitigating the effects on output in a liquidity trap?

As the potential real interest rate is related to the growth rate of government consumption, spending cut should be gradual so that most of the spending cut occurs when monetary policy is no longer constrained by the ZLB.

Illustrate this by allowing spending in large periphery to follow an AR(2) where coefficients are set so that net present value of spending decline identical to the front-loaded spending decline.
Sensitivity analysis
Gradual spending decline profile helpful

- How should then a spending cut be designed to prevent rise in government debt and mitigating the effects on output in a liquidity trap?
- As the potential real interest rate is related to the growth rate of government consumption, spending cut should be gradual so that most of the spending cut occurs when monetary policy is no longer constrained by the ZLB
- Illustrate this by allowing spending in large periphery to follow an AR(2) where coefficients are set so that net present value of spending decline identical to the front-loaded spending decline
- Results of this exercise reported in figure below
Sensitivity analysis
Effects of a coordinated gradual spending decline

Figure X: Responses to Government Spending Cuts in Large Periphery Currency Union Member Under Perfect and Imperfect Credibility in a Liquidity Trap

- Periphery Nominal Interest Rate (APR)
- Core Nominal Interest Rate (APR)
- Periphery Real Interest Rate (APR)
- Core Real Interest Rate (APR)
- Periphery CPI Inflation (APR)
- Core CPI Inflation (APR)
- Periphery Output
- Core Output
- Periphery/Core Real Exchange Rate
- Aggregate Currency Union Output
- Periphery Govt Debt as Share of GDP
- Core Govt Debt as Share of GDP
- Periphery Govt Spend (trend GDP share)
- Core Govt Spend (trend GDP share)

Legend:
- Black: Front-Load Perfect Cred: ZLB
- Red: Gradual Perfect Cred: Normal
- Green: Gradual Perfect Cred: ZLB
- Blue: Gradual Imperfect Cred: ZLB
Concluding remarks

- Overall, our results indicate that the usual optimal currency argument suggesting that the effects of shocks are mitigated to the extent that they are common across members of a currency union is not valid in an environment with monetary and fiscal constraints.
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- Overall, our results indicate that the usual optimal currency argument suggesting that the effects of shocks are mitigated to the extent that they are common across members of a currency union is not valid in an environment with monetary and fiscal constraints.

- From a European policy perspective, our analysis suggests that fiscal consolidation via spending cuts should be announced but come into full effect first when monetary policy is unconstrained by the ZLB.
Concluding remarks

- Overall, our results indicate that the usual optimal currency argument suggesting that the effects of shocks are mitigated to the extent that they are common across members of a currency union is not valid in an environment with monetary and fiscal constraints.

- From a European policy perspective, our analysis suggests that fiscal consolidation via spending cuts should be announced but come into full effect first when monetary policy is unconstrained by the ZLB.
  - Economies where policy is deemed to be on a sustainable path (e.g. Germany) should not cut spending.