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Determining the Transmission Channels of Fiscal Policy: Do Exchange Rate Regimes drive Fiscal Multipliers?

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IWH/INFER-Workshop on Applied Economics & Economic Policy
17 March 2014



Motivation and Research Question

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Is there a case for examining the transmission channels of fiscal policy across exchange rate regimes?

- Fiscal Policy at forefront of macroeconomic research.
- Debate still exists regarding fiscal shocks and the underlying transmission mechanism.
- Importance of exchange rate regime conditional on modelling assumptions across theoretical literature.

To what extent can the prevailing exchange rate regime explain the transmission of fiscal shocks to the economy and the strength of their effect?



Overview of Results

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Controlling for unanticipated shocks to government consumption

- Impact and cumulative multipliers larger under fixed exchange rates.
- Broad consistency of estimated effects Mundell-Flemming transmission channels.
- Financial Crisis does not materially effect differences across regimes or scale of multipliers.



Theoretical Research: Exchange Rate Regimes and Fiscal Multipliers

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Mundell-Fleming Model

- Flexible Exchange Rates: Increased government spending \Rightarrow Upward pressure on interest rates, exchange rate appreciation, reduced net exports \Rightarrow effect on output smaller than initial change in public spending.
- Fixed Exchange Rates: Increased government spending \Rightarrow monetary accommodation, increased domestic demand, unchanged net exports \Rightarrow effect on output greater than initial change in public spending.
- Multiplier larger under fixed versus flexible exchange rates regimes.



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Baxter and King-type RBC Models

- Private consumption determined by inter-temporal optimization.
- Increased government spending \Rightarrow reduced private consumption and investment \Rightarrow effect on output smaller than initial change in public spending.

Results unconditional with respect to exchange rate regime; effect on output smaller than initial change in public spending.



Empirical Research: Exchange Rate Regimes and Fiscal Multipliers

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Estimates of Impact Multipliers

- Born, Jüßen & Müller: 0.4 under flexible regimes, 1.25 under fixed regimes.
- Corsetti, Meier & Müller : -0.1 under flexible regimes, 0.64 under fixed regimes.
- Ilzetzi, Mendoza & Végh: -0.1 under flexible regimes, 0.09 under fixed regimes.

Estimates of Cumulative Multipliers

- Born, Jüßen & Müller: 0.75 under flexible regimes, 1.2 under fixed regimes.
- Corsetti, Meier & Müller : -0.36 under flexible regimes, 0.72 under fixed regimes.
- Ilzetzi, Mendoza & Végh: -0.41 under flexible regimes, 1.65 under fixed regimes.



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Standard Approach: Vector Autoregression

- Represent n-equation, n-variable system using current and lagged values of the n-variables to explain system dynamics

$$Az_t = B_1z_{t-1} + B_2z_{t-2} + \dots + B_pz_{t-p} + u_t$$

- Define the impulse response function as

$$IRF(t, s, d_i) = \hat{E}(z_{t+s} | v = d_i; z_{t-1} \dots z_{t-p}) - \hat{E}(z_{t+s} | v = 0; z_{t-1} \dots z_{t-p})$$

- By converting the VAR equation into its reduced form and applying the Choleski decomposition

$$Z_{t+h} = v_{t+h} + Kv_{t+h-1} + \dots + K^h v_t + K^{h+1} Z_{t-1}$$

where

$$Z_t = \begin{pmatrix} z_t \\ z_{t-1} \\ \vdots \\ z_{t-p+1} \end{pmatrix}$$



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Standard Approach: Vector Autoregression

- Component forecasts of the system can then be calculated as

$$z_{t+h} = v_{t+h} + K_1^1 v_{t+h-1} + \dots + K_1^h v_t + K_1^{h+1} z_{t-1} + K_2^{h+1} z_{t-2} + \dots + K_p^{h+1} z_{t-p}$$

- Assuming Z_t is covariance stationary

$$z_t = v_t + K_1^1 v_{t-1} + K_1^2 v_{t-2} + \dots + K_1^h v_{t-h} + \dots$$

- The impulse response function for the system can then be expressed as

$$IRF(t, h, d_i) = K_1^h d_i \quad h = 0, 1, 2, \dots$$



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Issues with the Vector Autoregression Method

- Key Assumption: Wold Decomposition Theorem holds.
- Decomposes the vector stochastic process z_t into linear predictable and unpredictable components.
- Imposes invertible MA representation onto the data.
- Unlikely that variance-covariance matrix of reduced form residuals is diagonal.



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Direct Projections Method

- Uses a sequential regression structure to estimate z_t for each forecast horizon period.
- By projecting z_{t+h} onto the linear space generated by Z_{t-1} such that

$$z_{t+h} = \psi_1^{h+1} z_{t-1} + \psi_2^{h+1} z_{t-2} \cdots + \psi_p^{h+1} z_{t-p} + u_{t+h}^h$$

ψ_i^{h+1} is the set of coefficients for the i^{th} lag of z_t in period $h+1$, such that

$$IRF(t, h, d_i) = \psi_1^h d_i \quad h = 0, 1, 2, \dots$$



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Advantages of Direct Projections

- Does not require use of Wold Decomposition.
- Has been shown to outperform iterative methodologies for autoregressive models with artificially short lag length.
- Can recover true impulse responses when DGP does not possess a VAR representation, measuring unbiased impacts of the economic shock.
- If there is policy anticipation in the private sector, moving average representations of the series contain a non-invertible component. VAR estimation will recover non-fundamental innovations from the invertible representation of the stochastic process.



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Regression Framework

- Baseline structure similar to Born, Jüßen & Müller (2012).
- Estimate the impact of government spending shocks through the use of professional forecasts.
- Derive the dynamic responses of the system by directly projecting each variable of interest onto current and lagged values of the vector of variables influencing the system,

$$z_{i,t} = [fe_{i,t} \ g_{i,t} \ y_{i,t} \ r_{i,t} \ ex_{i,t} \ nx_{i,t}]$$

where $fe_{i,t}$ is the forecast error of government spending, $g_{i,t}$ is government spending, $y_{i,t}$ is gross domestic product, $r_{i,t}$ is the short run interest rate, $ex_{i,t}$ is the real effective exchange rate and $nx_{i,t}$ is net exports.



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Example

- The estimated equation to determine the effect of spending shocks on output at horizon h is

$$y_{i,t+h} = \alpha_h + \Gamma_h fe_{i,t} + \Gamma_h^{fix} fe_{i,t} + \sum_{\tau=1}^T \Theta_{h,\tau} y_{i,t-\tau} + \sum_{\tau=1}^T \Theta_{h,\tau}^{fix} y_{i,t-\tau} + \sum_{\tau=1}^T \Pi_{h,\tau} g_{i,t-\tau} + \sum_{\tau=1}^T \Pi_{h,\tau}^{fix} g_{i,t-\tau} + \sum_{\tau=1}^T \Upsilon_{h,\tau} r_{i,t-\tau} + \sum_{\tau=1}^T \Upsilon_{h,\tau}^{fix} r_{i,t-\tau} + \sum_{\tau=1}^T \Phi_{h,\tau} ex_{i,t-\tau} + \sum_{\tau=1}^T \Phi_{h,\tau}^{fix} ex_{i,t-\tau} + \sum_{\tau=1}^T \Psi_{h,\tau} nx_{i,t-\tau} + \sum_{\tau=1}^T \Psi_{h,\tau}^{fix} nx_{i,t-\tau}$$

- The equation can be considered as consisting of two components
 - The set of coefficients $\{\Theta_{h,\tau}^j, \Pi_{h,\tau}^j, \Upsilon_{h,\tau}^j, \Phi_{h,\tau}^j, \Psi_{h,\tau}^j\}$, which act as controls for the history of the system through lagged values.
 - The Γ_h^j coefficients, which dictate the dynamics of the system.

$$IRF^{flex} = \{\Gamma_h\}_{h=0}^H \quad IRF^{fix} = \{\Gamma_h + \Gamma_h^{fix}\}_{h=0}^H$$



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- OECD Statistics and Projections' "Economic Outlook" Series and BIS.
- Available semi-annually for 7 countries from 1985s2 and for 23 additional countries from 1996s2. Limitation due to availability of government expenditure forecast data.
- Four countries dropped due to missing values.
- **g**, **y**, and **fe** all enter the regressions as percentage changes in output units. **r** is measured in levels. **ex** measured in terms of percentage deviation from trend. **nx** calculated as the deviation from trend ratio to GDP. All variables measured in real terms.
- Exchange rate regime classification follows Ilzetzi, Reinhart Rogoff (2011), with the exception of Canada.



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IRF Construction

- Impulse response functions are initially estimated for the response of government spending to the forecast shock.
- Results are then scaled to represent a fiscal shock that causes a contemporaneous increase of one percent of output in government spending.
- Output, interest rate, exchange rate and net export regressions are then estimated and scaled accordingly.
- Note: Confidence bands are shown at the 90% level and are based on panel corrected standard errors.



Government Spending

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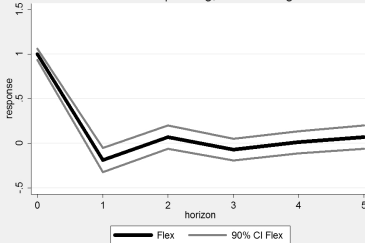
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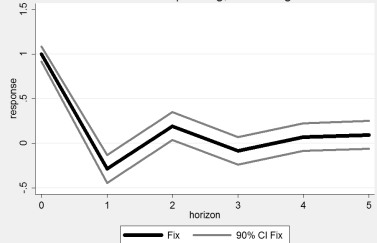
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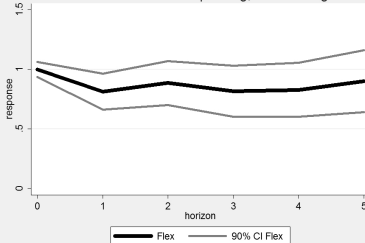
Government Spending, Flexible Regimes



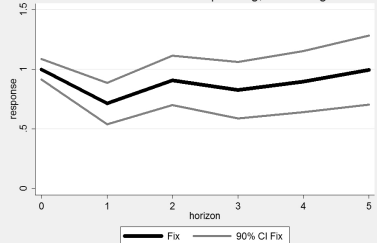
Government Spending, Fixed Regimes



Cumulative Government Spending, Flexible Regimes



Cumulative Government Spending, Fixed Regimes





Output

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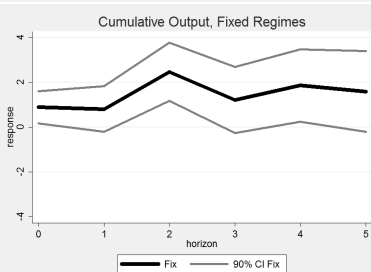
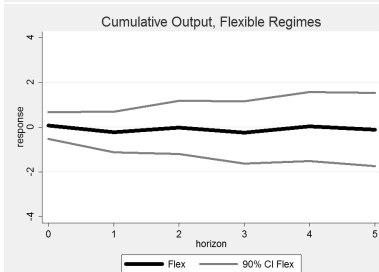
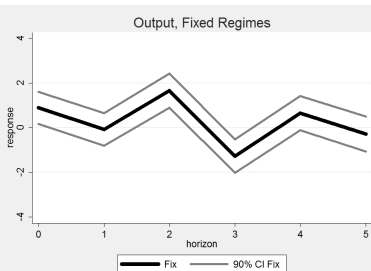
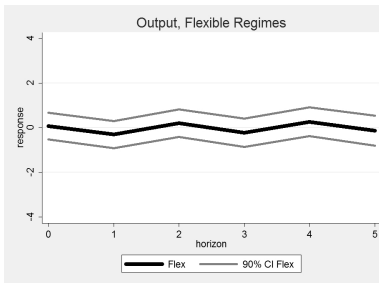
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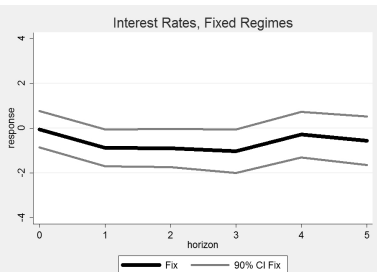
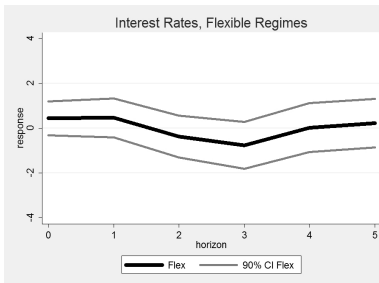
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Exchange Rates

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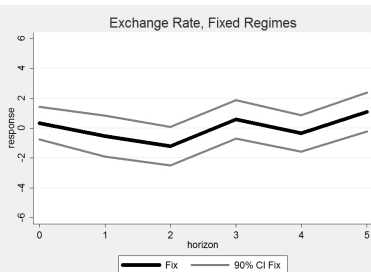
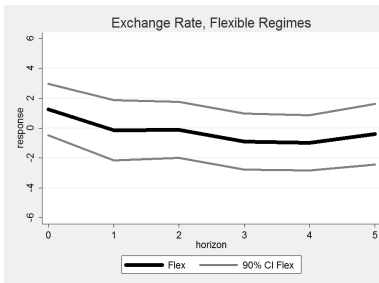
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Net Exports

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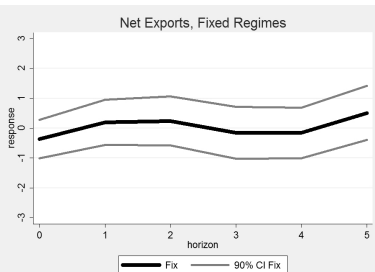
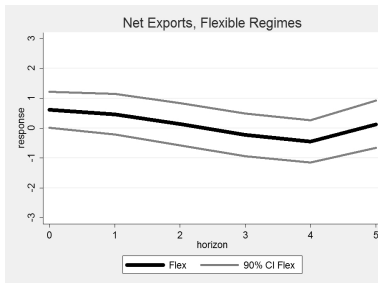
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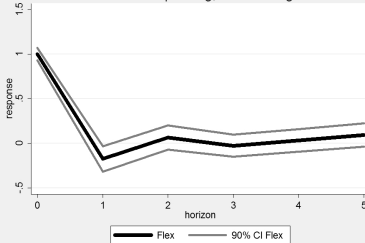
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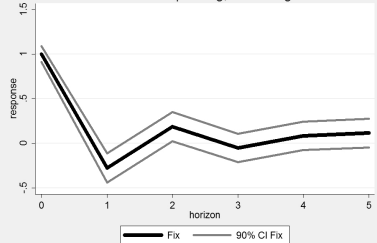
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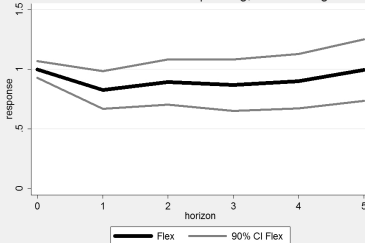
Government Spending, Flexible Regimes



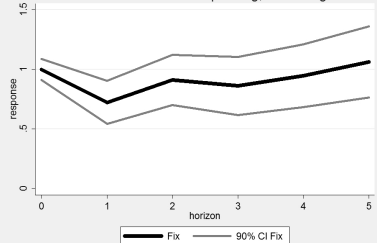
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Cumulative Government Spending, Flexible Regimes



Cumulative Government Spending, Fixed Regimes





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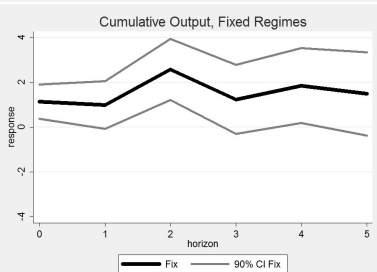
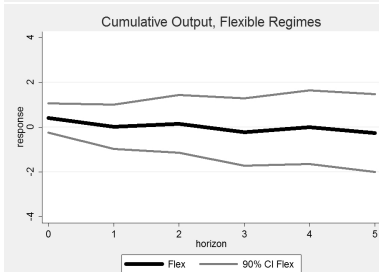
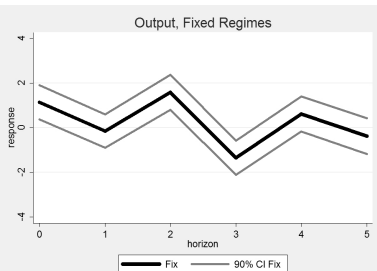
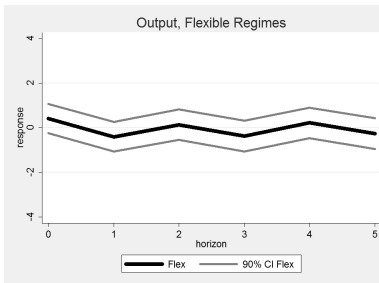
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Summary of Results

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Summary of Results

- Fiscal multipliers (both impact and cumulative) larger under fixed vs. flexible exchange rates regimes.
- Monetary accommodation appears greater under fixed exchange rates.
- Evidence of net export transmission limited.