Do high levels of household debt affect the size of the fiscal multiplier?

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Research Objective

1. We measure whether the fiscal multiplier is affected by differing levels of household debt.

2. GAP in the literature: Many theoretical explanations have been put forward to account for the effects of household debt on fiscal expansion, **but not much empirical research** (Bernandini & Peersman (2018)).

Paper in a Nutshell

1. **Fact:** The GFC constituted a turning point in the ratio of household debt to GDP for many economies.
    - ▶ This ratio continued increasing in highly indebted economies such as Australia, Norway and Sweden.

2. **Methodology:**
    - ▶ Empirical Model: Smooth Transition VAR (STVAR) Model and Bayesian Inference.
    - ▶ We study the effect of government spending on the world's seven largest economies and three highly indebted economies (Australia, Sweden, Norway)

3. **Key Result:**
    - ▶ The *short-term effects* of government spending tend to be higher if fiscal expansion takes place during periods of low household debt.

▸ Mechanism

Fact: The GFC constituted a turning point in the ratio of household debt to GDP for many economies
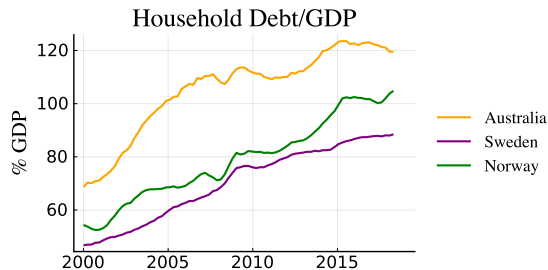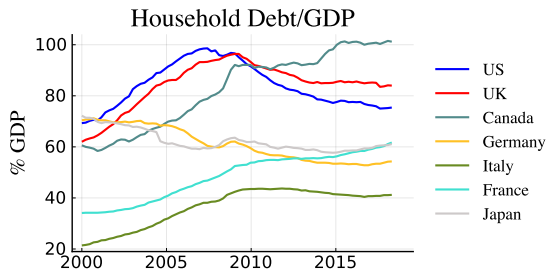

Source: Bank for International Settlements

A Simple Model

We use an OLS model to explain how household debt affect the size of the fiscal multiplier.

$$GDP_t = \beta_1 \times GovExp_{t-1} + \beta_2 \times HDebt_{t-1} + \beta_3 \times GovExp_{t-1} \times HDebt_{t-1} + \beta_4 \times x_t + \epsilon_t$$

where GDP_t, $GovExp_{t-1}$ and $HDebt_{t-1}$ represent real gross domestic product, real government consumption expenditures and household debt. x_t represents a vector of control variables. All variables are stationary time series expressed in log differences.

A Simple Model
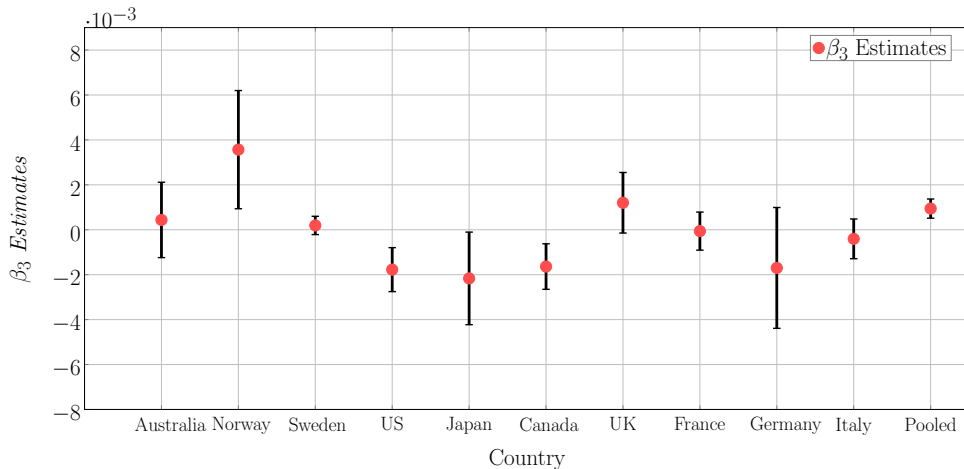
Note: This figure shows our OLS estimates for β_3. The upper and lower bound is plus and minus one standard deviation. Source: FRED data.

Model

- Smooth Transition Vector Autoregression (STVAR) (Rothman et al (2001), Gefang and Strachan(2009))

  ▶ Ability to identify regime changes through a transition variable *endogenously*.

- Bayesian Estimation

- Fiscal Multiplier - Generalised Impulse Response Functions

Smooth Transition Vector Error Correction Model

Main equation:

$$x_t = \mu + \sum_{h=1}^{p} \Gamma_h x_{t-h} + F(z_t)\left(\mu^z + \sum_{h=1}^{p} \Gamma_h^z x_{t-h}\right) + \varepsilon_t$$

where $x_t = (y_t, g_t, c_t, h_t, r_t)$ {Output, Consumption Public Expenditure, Private Consumption, Household Debt to GDP, Interest Rate}, μ & μ^z are linear deterministic trends (Villani, 2009).

Transition function:

$$F(z_t) = \{1 + exp[-\gamma(z_t - c)]\}^{-1}$$

where γ is the speed of the smooth transition, c the point of inflection and z_t the transition function. $F(z_t) \ni [0, 1]$

Transition Functions

1. **Household Debt to GDP**

2. **Residential Housing Prices**
   - ▶ Strong synchronization between housing prices and household debt during financial cycles(Terrones et al, 2011) `▸ Debt and Housing Prices`

We consider the first difference in *year-to-year* and *quarter-to-quarter* variations for each time series.

Periods of Low and High Debt State

- Bernandini & Peersman (2018) identify periods of low and high household debt states as positive deviations of the debt-to-GDP ratio from its Hodrick-Prescot long-term trend.

- We define an economy to be in a **low debt state** if $F(z_t) < 0.5$
  - ▶ Robustness $F(z_t) < 0.4$

- We define an economy to be in a **high debt state** if $F(z_t) > 0.5$
  - ▶ Robustness $F(z_t) > 0.6$

Transition Function and High Debt State Probability for Australia
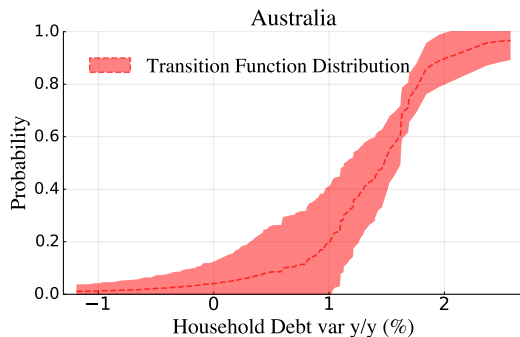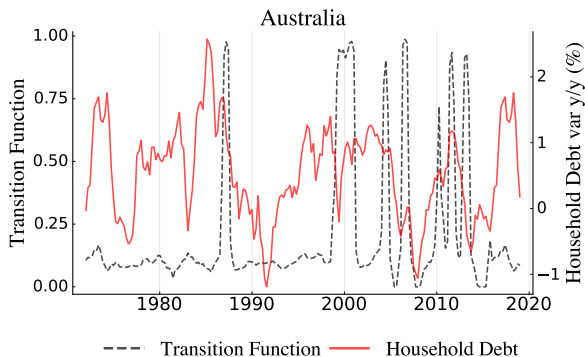
Transition Function and High Debt State Probability for the US
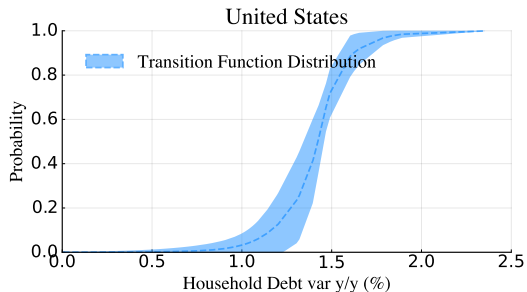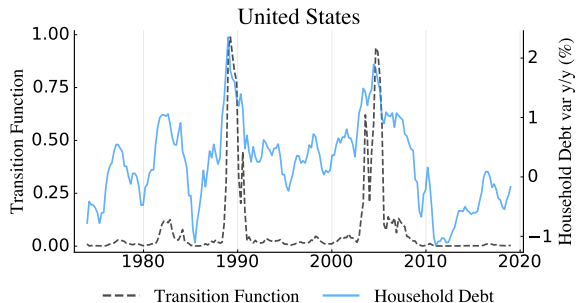
Transition Function and High Debt State Probability for Italy
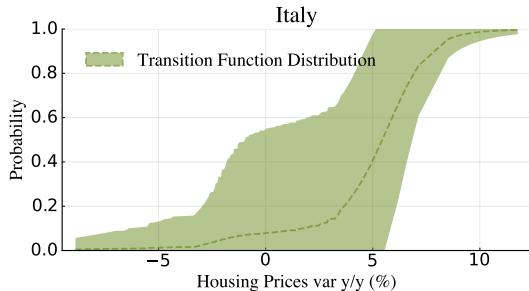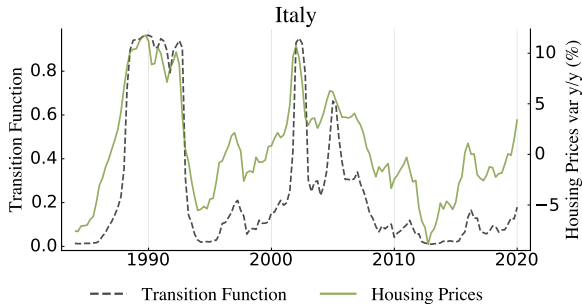
Generalised Impulse Response Functions (GIRFs)

- Countries: Australia, Sweden, Norway, United States and Germany

- Bayesian Model Averaging

- Fiscal Multipliers in periods of low and high household debt

Fiscal Multipliers
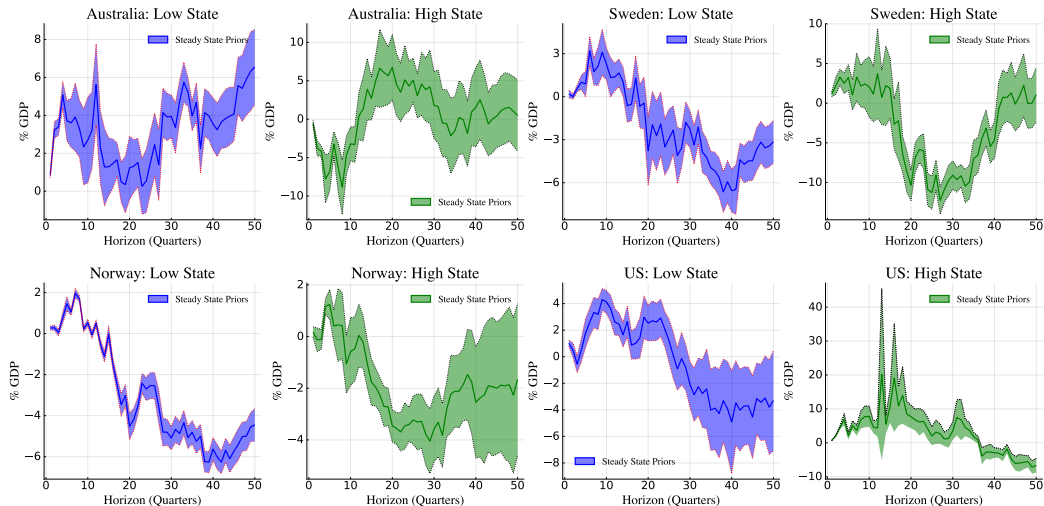
Fiscal Multipliers: Robustness
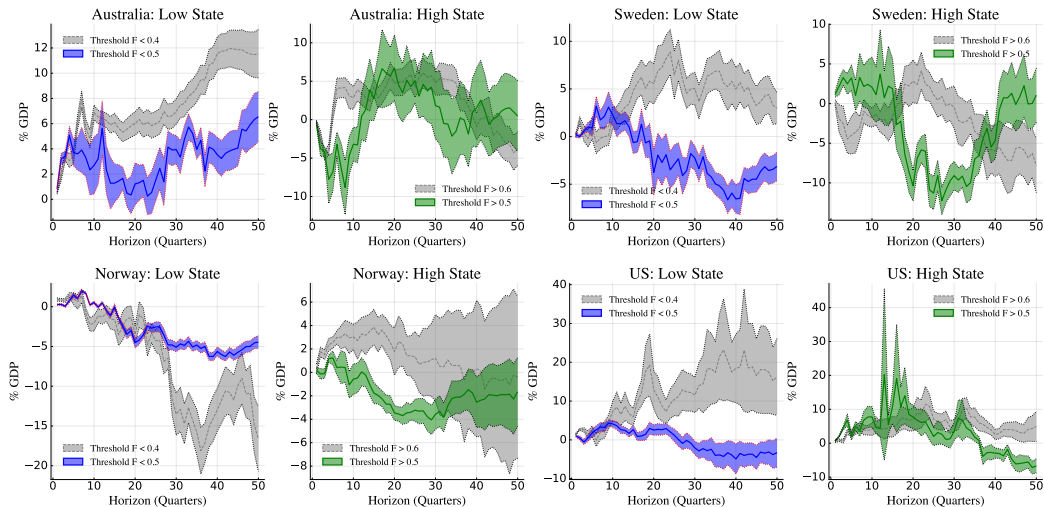
Fiscal Multipliers (On Impact): Comparison

Country	STVAR			STVAR for Robustness			State Dependent Local Projections		
	Low State	High State	Difference	Low State	High State	Difference	Low State	High State	Difference
	(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)	(9)
Australia	0.831	-0.461	1.292	0.493	-0.210	0.703	0.198	0.386	-0.188
	(0.059)	(0.151)		(0.040)	(0.062)		(0.094)	(0.173)	
Norway	0.271	0.178	0.093	0.902	0.290	0.612	0.212	NA	
	(0.042)	(0.100)		(0.102)	(0.218)		(0.086)	()	
United States	1.019	0.603	0.416	1.427	0.641	0.786	0.719	-0.208	0.927
	(0.118)	(0.032)		(0.099)	(0.249)		(0.199)	(0.372)	
Germany	1.215	1.560	-0.345	0.541	0.566	-0.025	0.323	-0.049	0.372
	(0.131)	(0.071)		(0.070)	(0.042)		(0.092)	(0.138)	
Sweden	0.192	1.115	-0.923	0.111	0.137	-0.026	0.317	-0.396	0.713
	(0.139)	(0.155)		(0.088)	(0.171)		(0.243)	(0.633)	

What are the policy implications of this research?

- As household debt increases, the demand for targeting fiscal policy increases.

- Financial cycles, as business cycles, are important for assessing the effectiveness of fiscal policy.

Conclusion

Do high levels of household debt affect the size of the fiscal multiplier?

- Short-term effects of government spending tend to be higher if fiscal expansion takes place during periods of low household debt.
- Contrary to Bernardini & Peersman (2018), we did not find higher spending multipliers during periods of high household debt in the United States.

Comments and feedback welcome! Thank you!

Household Debt and Fiscal Expansions: Two Perspectives

1. Household Debt increases MPCs:
   - Marginal propensity to consumption (MPCs) of indebted households are higher (than non-indebted households) due to credit constraints and, thus, responds strongly to fiscal stimulus (Eggertsson And Krugman, 2012; Galí, López-Salido, And Vallés, 2007).

2. Household Debt decreases MPCs:
   - Households might use additional income to pay down debt rather than to spend (Sahm et al., 2015; Jappelli & Pistaferri, 2014, Olivier Coibion, Yuriy Gorodnichenko, and Michael Weber, 2020).

Strong synchronization between housing prices and household debt during financial cycles
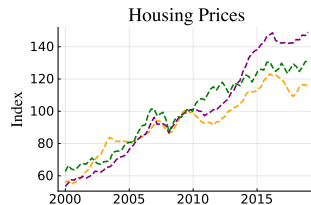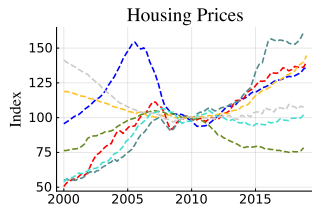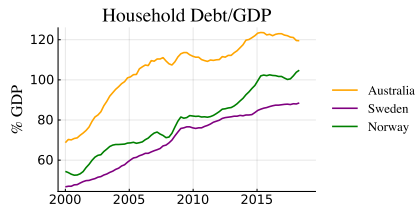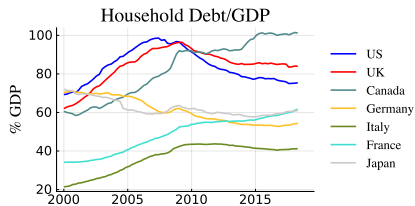
Source: Bank for International Settlements

Priors

Parameter	Distribution	Values	Source
b	Normal	$N(0, \eta^{-1}I_k)$	Strachan & Van Dijk (2006)
Σ	InvWishart	$(E(ee')^{-1}, n)$	Zhang (2021)
μ	Normal	(μ_0, Σ_μ)	Villani (2009)
γ	Gamma	(1,0.001)	Gefang & Strachan (2009)
c	Uniform	(0.25,0.75)	Gefang (2012)
η	Gamma	(3,4)	Ni & Sun (2003)

Transition Function and High Debt State Probability for the UK
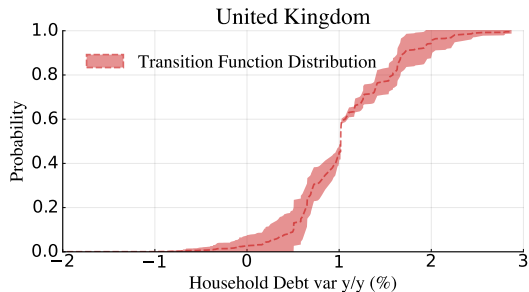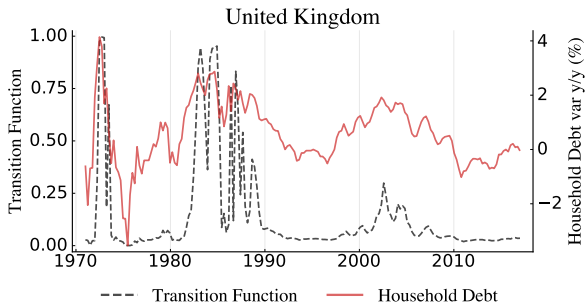
Transition Function and High Debt State Probability for Canada
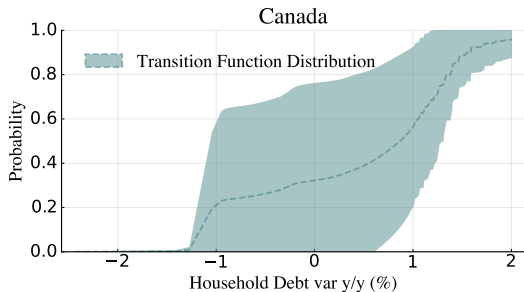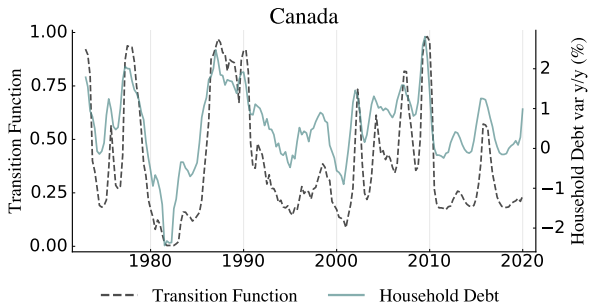
Transition Function and High Debt State Probability for Germany
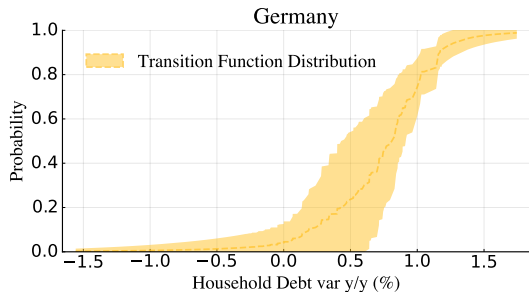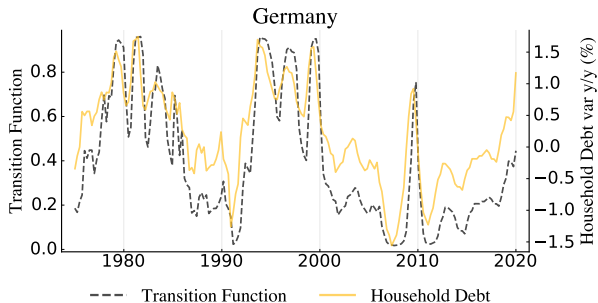
Transition Function and High Debt State Probability for France
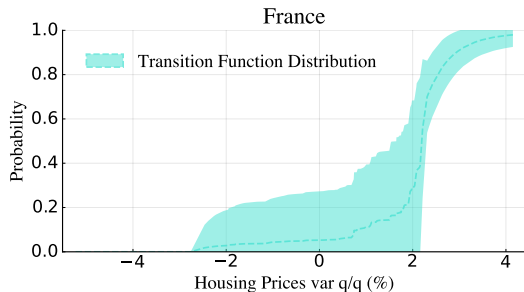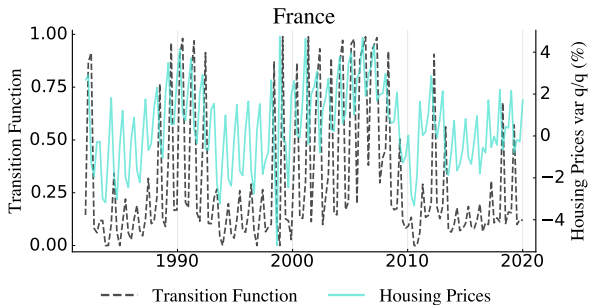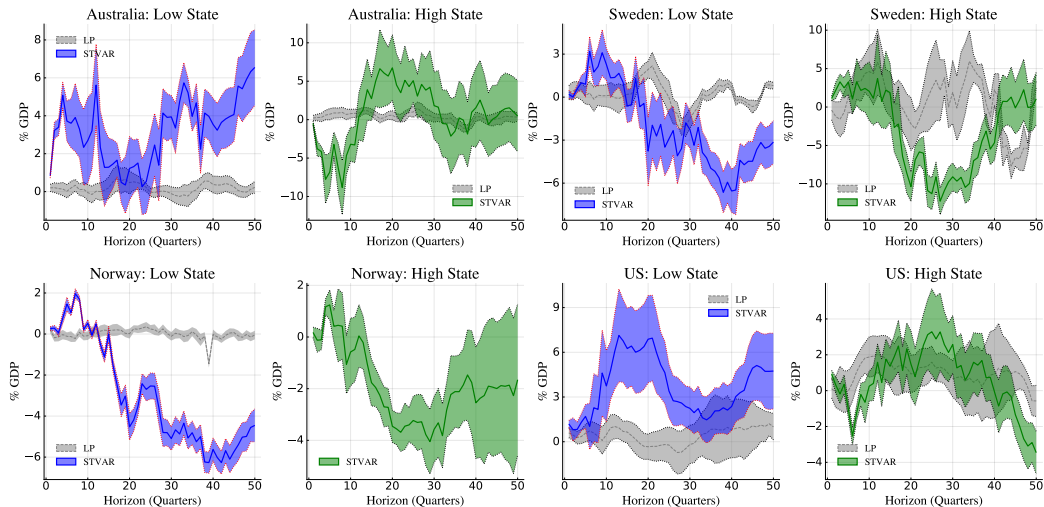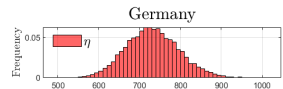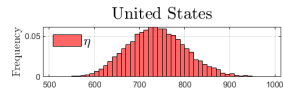
Transition Function and High Debt State Probability for Japan
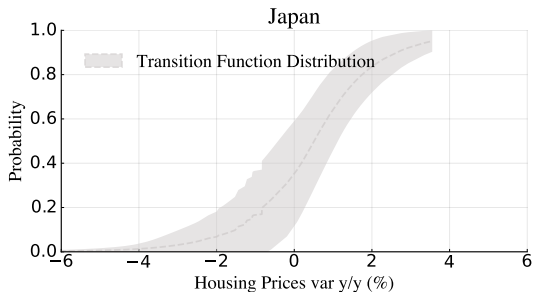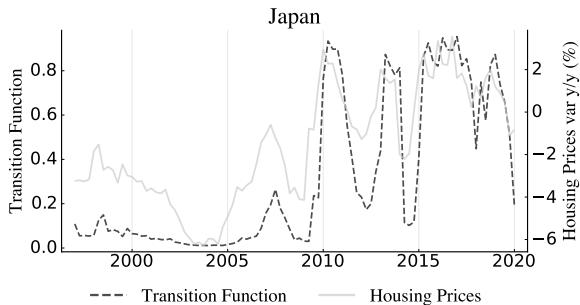
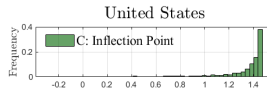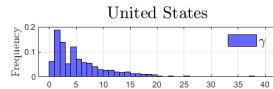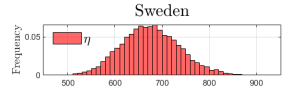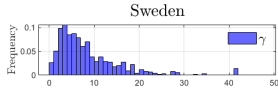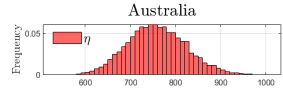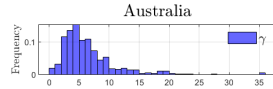# Transition Function and High Debt State Probability for Norway
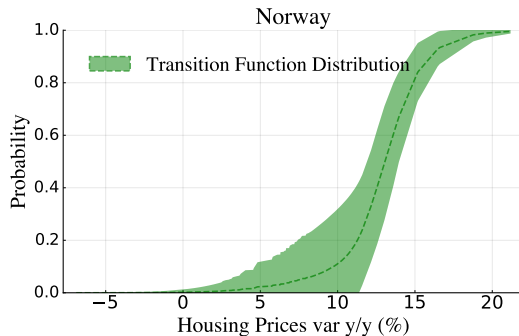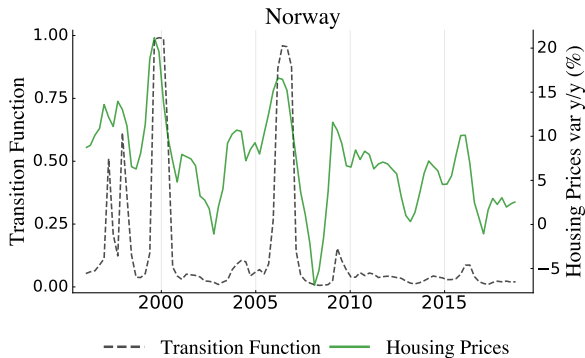
Transition Function and High Debt State Probability for Sweden
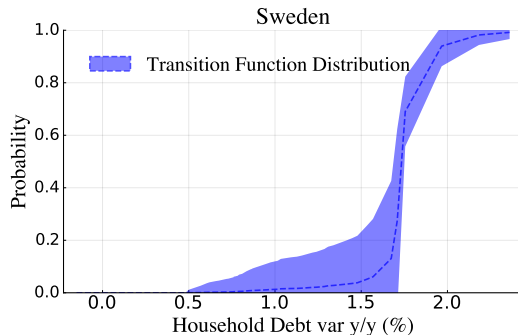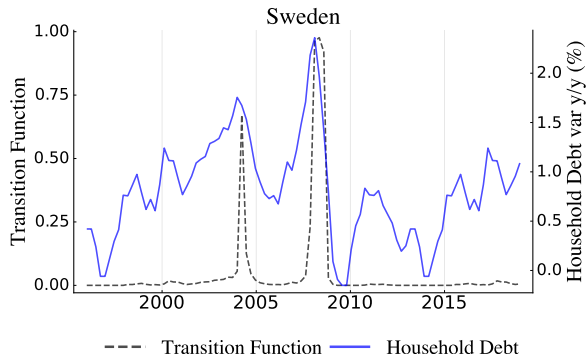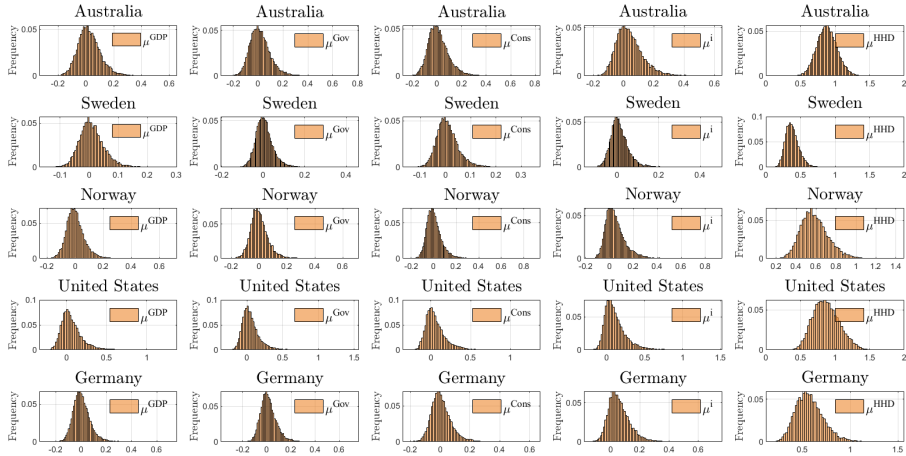
STVAR vs State Dependent Local Projections

Posterior Probabilities γ, η and c
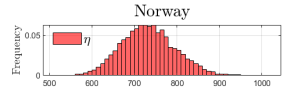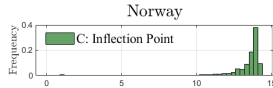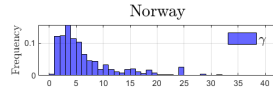
Posterior Probabilities μ

Fiscal Multiplier

$$Multiplier_h = \frac{\sum_{j=0}^{h} y_j}{\sum_{j=0}^{h} g_j} \times \frac{1}{\sigma_g}$$

where y_j and g_j are output and the government spending response parameter of period j. σ_g represents the standard deviation of government expenditures that we include to normalize the fiscal expenditure shock to one percent.

SD LP Norway: Household Debt in the transition function

Horizon	Norway	
	GIRF *Low*	GIRF *High*
	(1)	(2)
1	0.364 (0.153)	0.158 (0.319)
2	-0.091 (0.103)	0.197 (0.301)
4	-0.088 (0.118)	0.895 (0.216)
8	-0.163 (0.173)	0.411 (0.539)
12	0.050 (0.139)	-0.974 (0.329)
16	-0.203 (0.152)	1.363 (0.329)
20	0.011 (0.209)	-1.210 (0.502)