Monetary Policy and The Maturity Structure of Public Debt

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Motivation

- Does the maturity of public debt matter for monetary policy transmission?

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- Ambiguous ex-ante: valuation, rollover, higher fiscal spending.
- High debts following Covid and heterogeneous maturity.

This Paper

- Propose metric to study insurance properties of long debt.
- Test conditional effect of public debt maturity on monetary policy transmission on US and UK data

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- Propose metric to study insurance properties of long debt.
- Test conditional effect of public debt maturity on monetary policy transmission on US and UK data
- Narrative account of maturity choices. Exogenous with respect to the monetary policy cycle.
- Model with financial accelerator and primary market friction.
- Friction microfounded and estimated with novel high frequency identification.

Main Results

- Monetary policy is twice as effective on output when debt is very short term.
- No differential effect on inflation across maturities.

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- Monetary policy is twice as effective on output when debt is very short term.
- No differential effect on inflation across maturities.
- Monetary policy tightening with higher debt duration: government borrows less, corporates borrow more at a cheaper rate and invest more.

$\Rightarrow$ *Financing channel* of monetary policy.

- Direct evidence: exogenous decrease in public debt supply decreases government and corporate yields.

Main Results

- Model matches empirical result with small friction.
- Complementarity between financial accelerator and primary market friction.
- Maturity is key.
- Increasing rates is not be as costly to fight inflation with long maturity.
- Segmented asset markets are crucial for transmission of monetary policy.

Literature

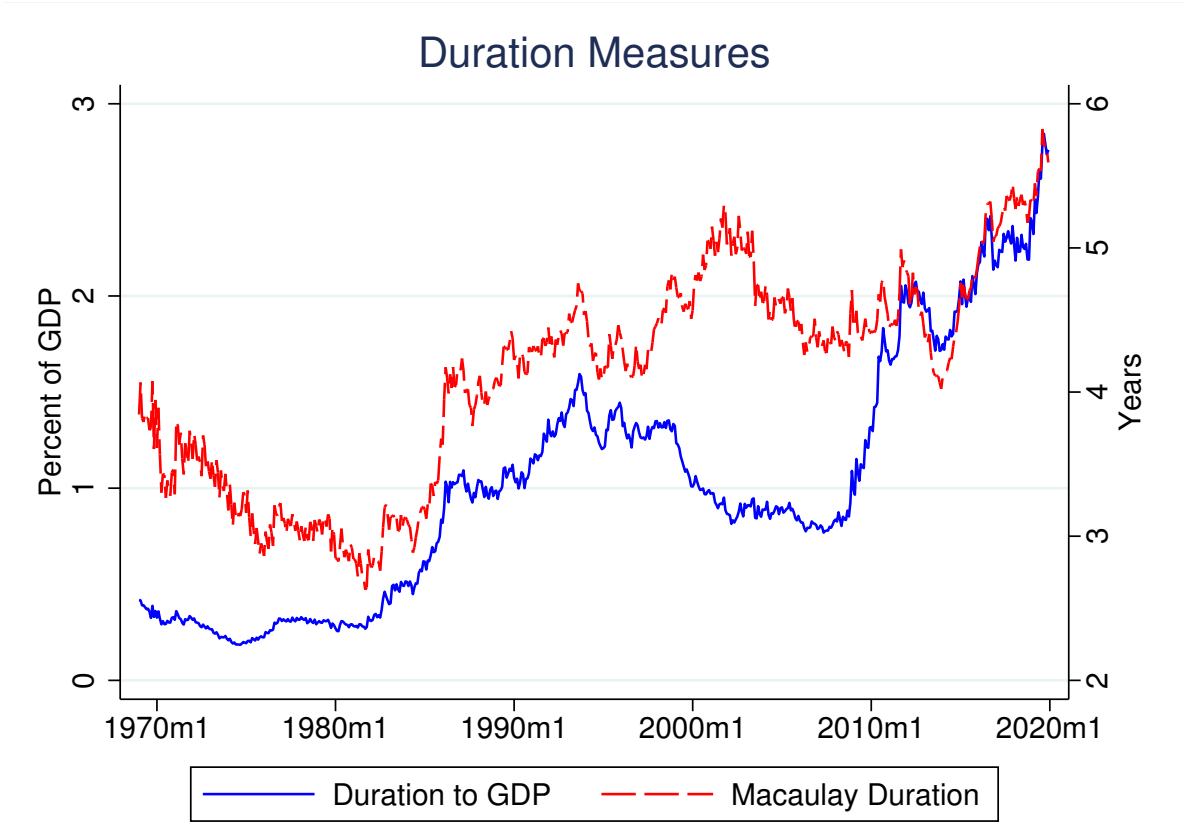
- State dependent effect of monetary policy and debt maturity: (Ippolito, Ozdagli and Perez-Orive, 2018; Darmouni, Giesecke and Rodnyansky, 2020; Jungherr et al., 2020; Calza, Monacelli and Stracca, 2013; Garriga, Kydland and Šustek, 2017; Beraja et al., 2019; Wong, 2021; Auclert, 2019; Sterk and Tenreyro, 2018).
- Public debt supply and asset prices: (Vayanos and Vila, 2021; Greenwood, Hanson and Stein, 2010; Greenwood and Vayanos, 2010, 2014; Greenwood, Hanson and Stein, 2015; Krishnamurthy and Vissing-Jorgensen, 2012)
- Interaction between public debt and monetary regimes: (Hall and Sargent, 2011; Giannitsarou and Scott, 2008; Hilscher, Raviv and Reis, 2021; Krause and Moyen, 2016; Leeper, 1991; Cochrane, 2001, 2020)
- Public debt maturity and distortionary taxes: (Bohn, 1988; Missale, 1997; Angeletos, 2002; Faraglia, Marcet and Scott, 2010; Faraglia et al., 2013, 2018; Bhandari et al., 2017, 2021; Bigio, Nuño and Passadore, 2019).
- Long maturity debt in macro models: (Kydland, Rupert and Šustek, 2016; Gomes, Jermann and Schmid, 2016; Hatchondo and Martinez, 2009; Arellano and Ramanarayanan, 2012; Krause and Moyen, 2016)
- Financial accelerator: (Bernanke, Gertler and Gilchrist, 1999; Christiano, Motto and Rostagno, 2014; Dmitriev and Hoddenbagh, 2017)

Duration-to-GDP

- DEFINITION Duration-to-GDP: how much the market value of public debt to GDP declines following a one percent increase in interest rates.
- PROPOSITION: If change is permanent, duration-to-GDP is the NPV of debt servicing costs savings compared with overnight debt on existing debt.

$$DurGDP_t = \frac{\sum_{j=1}^{\infty} \frac{j}{12} q_{t,j} b_{t,j}}{GDP_t}$$

Duration-to-GDP in the US



- Long regimes.
- Negatively correlated with UK measure: UK Duration-to-GDP
- Build from bond data: marketable, held by the private sector.
- Alternative duration metrics.

Narrative Account of Maturity Choices in the US

- Political and legal constraint made the maturity structure choices *exogenous* with respect to the monetary policy cycle.
- In 1918, a law instituted a 4.25% rate ceiling on bonds.
- Gradual repeal from the early 70s up to 1988.
- Change in objective in 1993 (more focus on costs) and in mid aught (more focus on insurance).

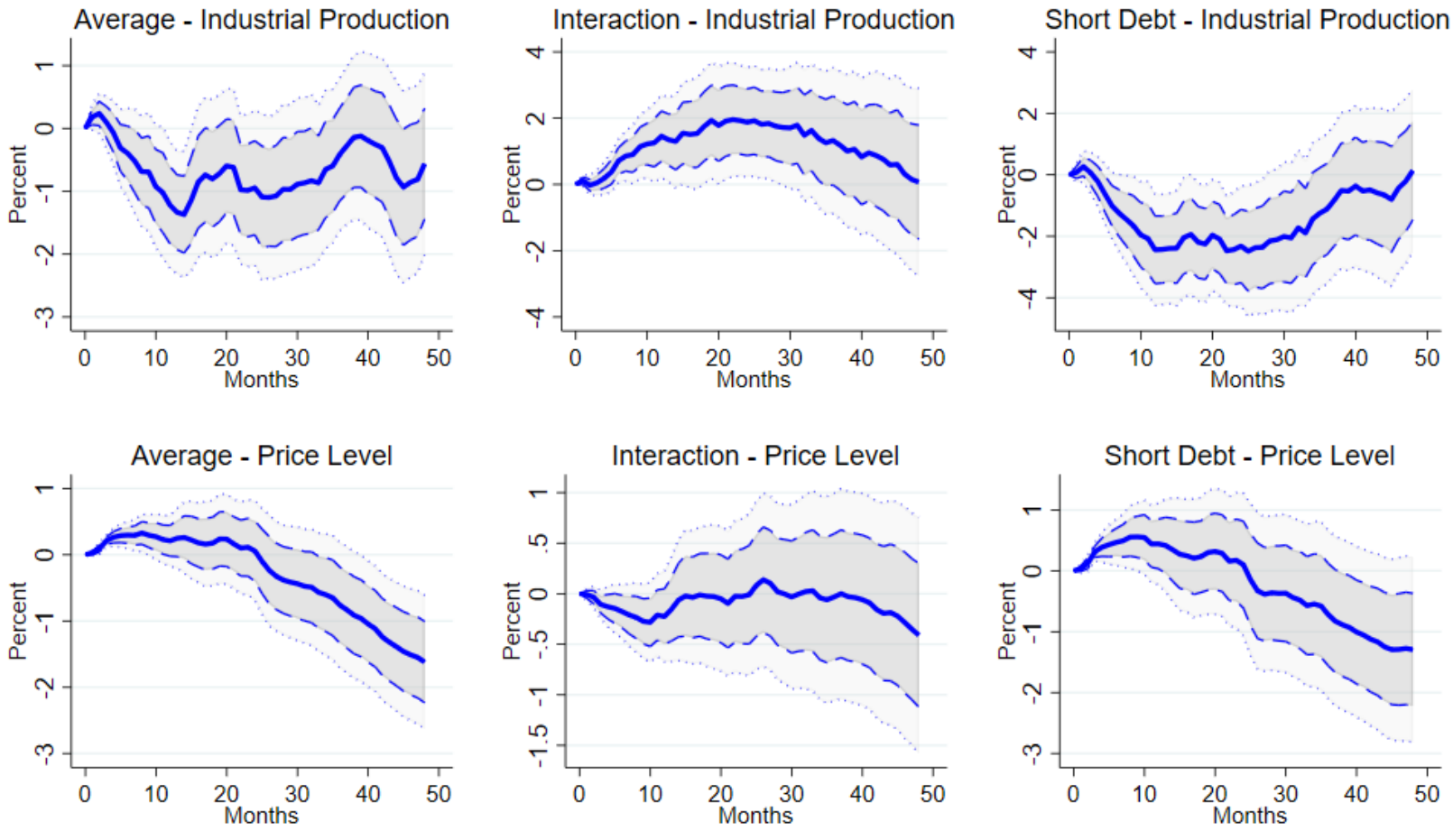
Empirical Methodology

- Non-linear univariate local projections à la Jordà.
- Reduced form regressions: LP - IV

$$y_{t+h} = \beta_{0,h} + \beta_{1,h} Shock_t + \beta_{2,h} Shock_t DurGDP_{t-1} + \beta_{3,h}(L)' W_t + \varepsilon_{t+h}$$

- Identification of monetary policy shocks: narrative, high frequency, and recursive.

Baseline Results US



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All IRFs Controls UK Results

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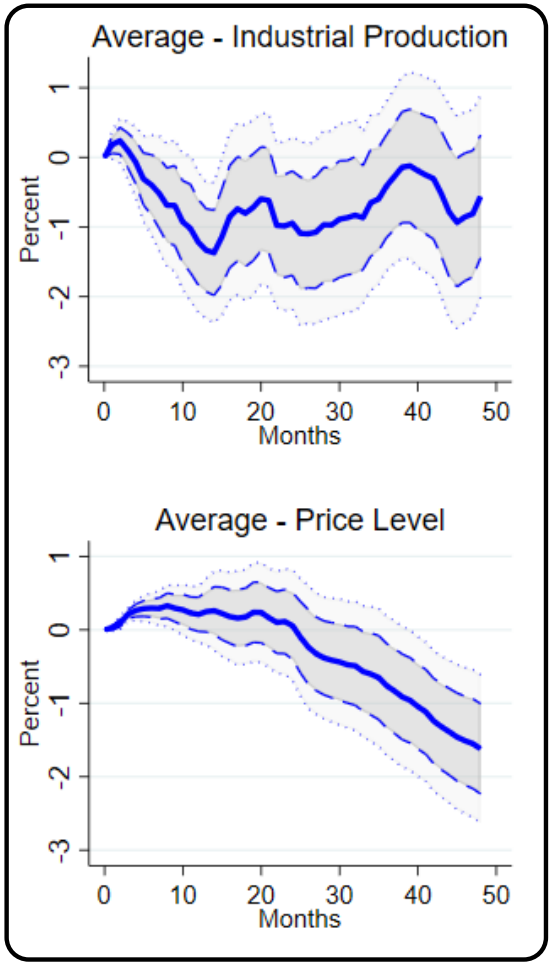

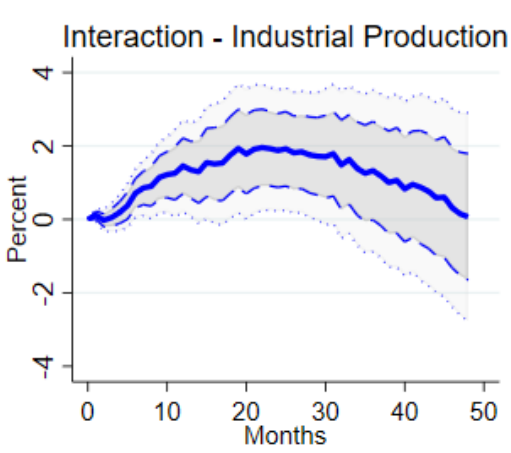

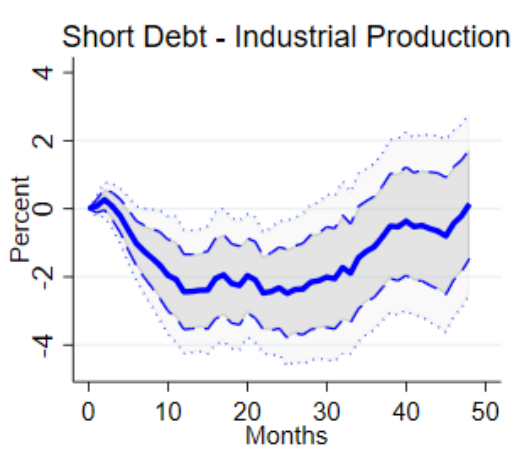

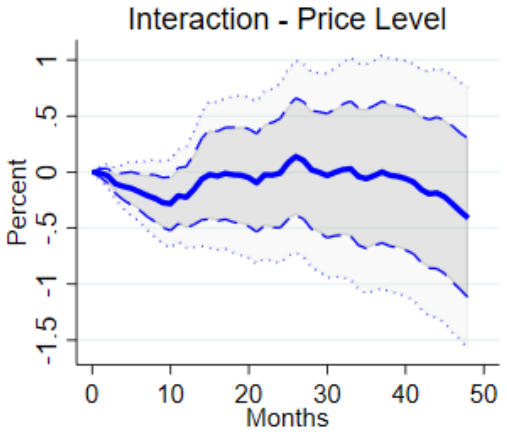

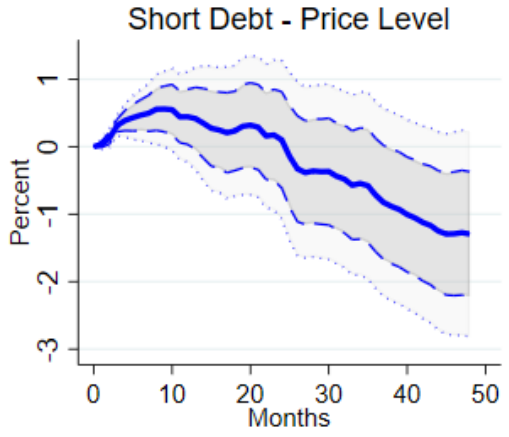

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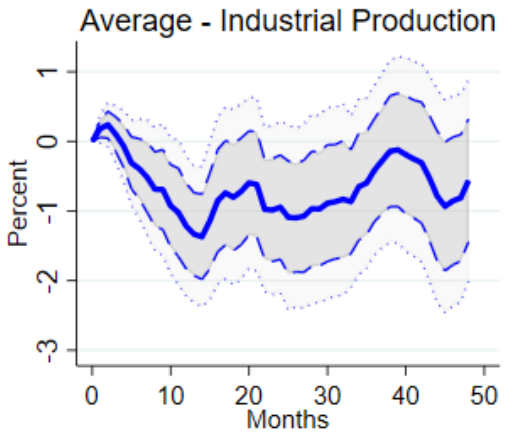

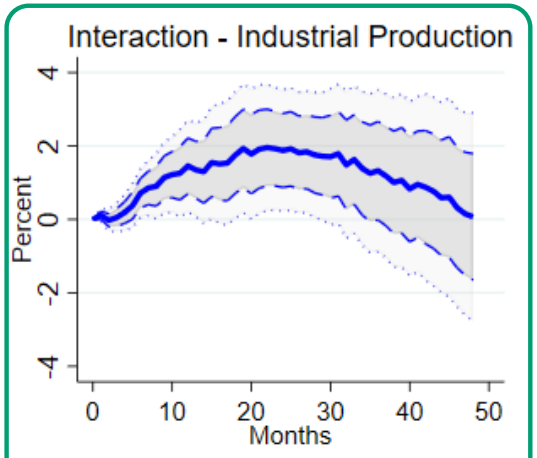

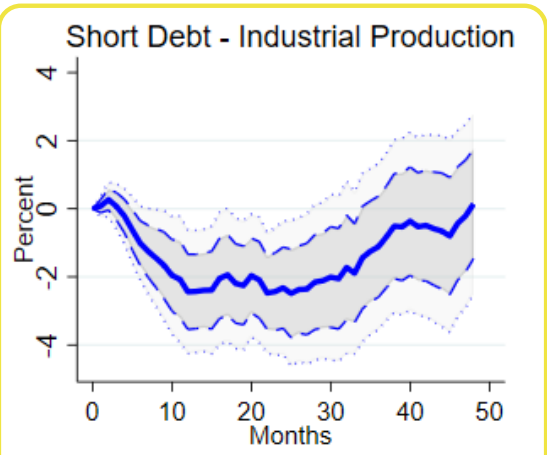

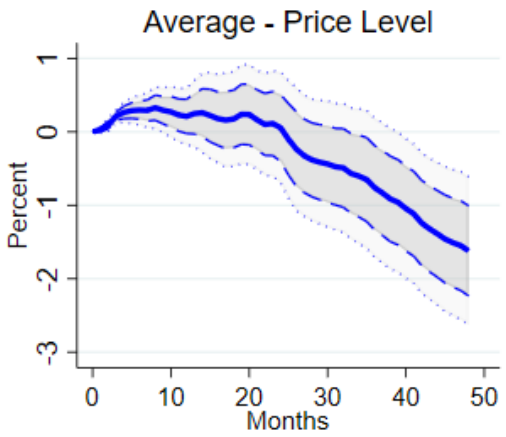

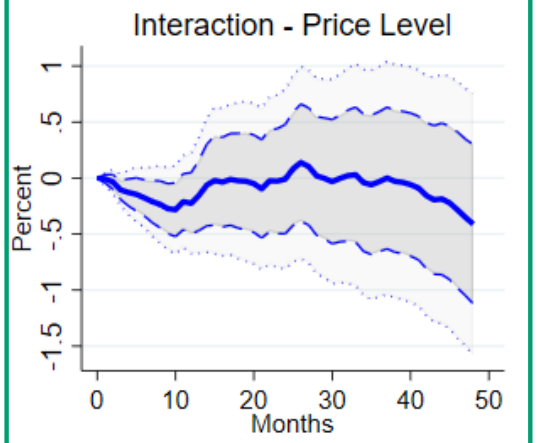

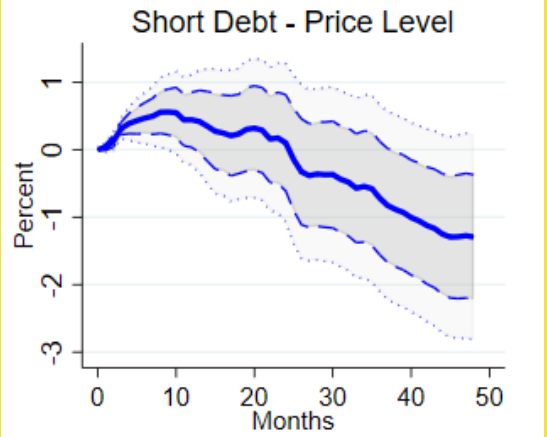

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Sensitivity

- Quarterly results.
- Econometric Method:
  - LP-IV results.
  - Lag-Augmentation.
- Measuring debt maturity:
  - Macaulay duration.
  - Inclusion of inflation linked debt.
  - Face Value Debt.
  - Also FED Holdings.
  - Long debt over GDP.
  - Smooth Transition.
- Identification of monetary policy:
  - High frequency identification.
  - No Recursiveness assumption.
  - Recursive/Cholesky identification.
  - Original Romer and Romer (2004) shock.
- Identification of maturity structure:
  - Narrative Account.
  - Confounding factors and IV approach.

Economic Mechanism

- Government has a *relative* windfall following rate hike with more long duration debt.
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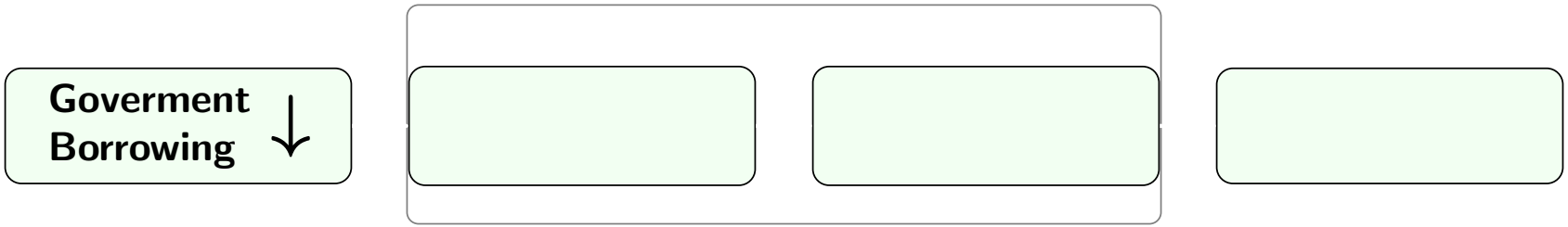

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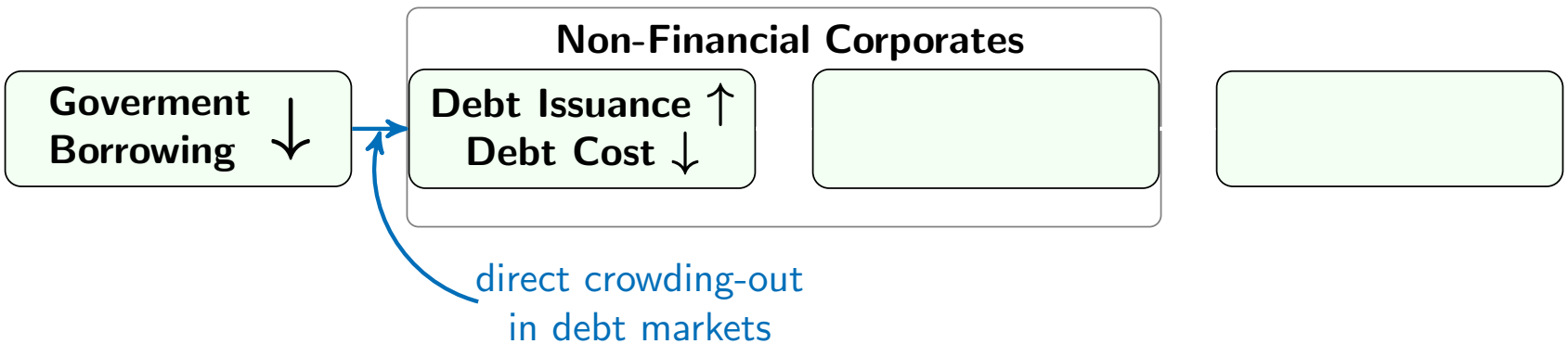

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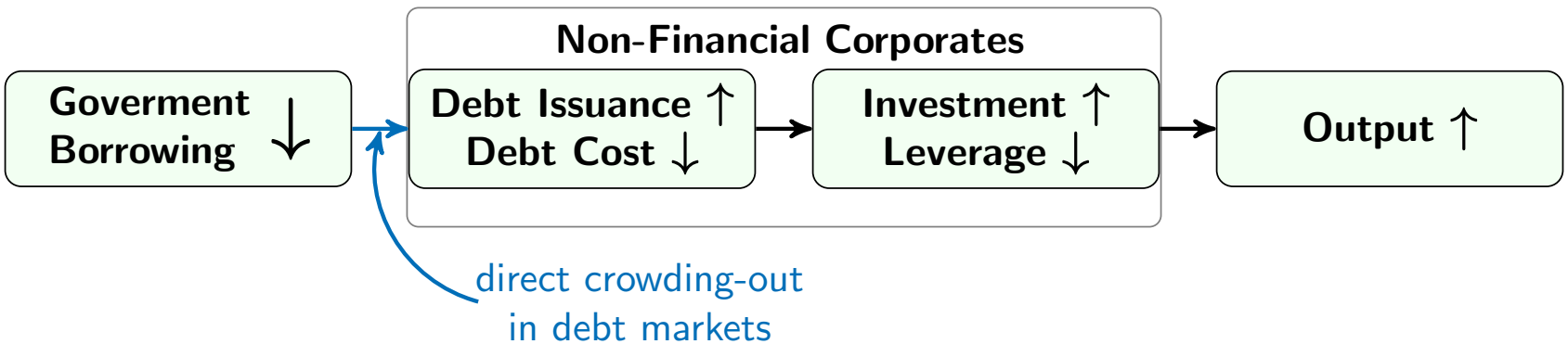

- IRF: Goverment Spending | Goverment Borrowing | Corporates
- Alternative economic mechanisms are not supported.

Model of the Financing Channel

- Build on New Keynesian model with financial accelerator, from Bernanke, Gertler and Gilchrist (1999).
  - Firms' balance sheets matter.
  - Mapping between spreads, leverage, and investment.

Model of the Financing Channel

- Build on New Keynesian model with financial accelerator, from Bernanke, Gertler and Gilchrist (1999).
- Long maturity fixed nominal interest rate government debt.
  - Parsimonious and keep track of only 2 state variables.

Model of the Financing Channel

- Build on New Keynesian model with financial accelerator, from Bernanke, Gertler and Gilchrist (1999).
- Long maturity fixed nominal interest rate government debt.
- Financial friction on primary market dealers.
  - Congestion effects.
  - Microfounded.
  - Estimated with new high frequency identification on exogenous public debt supply shocks.
  - Small but with macro effects.

Model of the Financing Channel

- Build on New Keynesian model with financial accelerator, from Bernanke, Gertler and Gilchrist (1999).
- Long maturity fixed nominal interest rate government debt.
- Financial friction on primary market dealers.
- Counterfactual analysis.
  - Effect of contractionary monetary policy shock.
  - Compare short (1 quarter) vs long (4 years) maturity regimes.

Model Results

- Prove in close form duration-to-GDP equivalence.
  - Market value $\longleftrightarrow$ debt servicing costs.

  $\Rightarrow$ For a permanent increase in interest rates, duration-to-GDP measures:

  1. Decline in market value in public debt to GDP.
  2. Net present value of debt servicing cost saving to GDP that the current maturity allows on existing debt compared to a one period debt maturity.

Model Results

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- With low maturity debt more amplification.
- Complementarity between primary market friction and financial accelerator.
  - Small primary market friction in partial equilibrium
  - Large macro effects in general equilibrium.

Model Results

- Prove in close form duration-to-GDP equivalence.
- With low maturity debt more amplification.
- Complementarity between primary market friction and financial accelerator.
- Maturity is key.
  - Experiment: fix debt, vary maturity.

Debt (% of GDP)	Maturity	Difference in output
40%	From 4 years to 1 quarter	31%

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Debt (% of GDP)	Maturity	Difference in output
40%	From 4 years to 1 quarter	31%
From 0% to 700%	4 years	31%

Conclusion

Public debt maturity matters for monetary policy

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What?	From long to short debt: monetary policy on output x2. Impact on activity, not on price level.

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What?	From long to short debt: monetary policy on output x2. Impact on activity, not on price level.
How?	Crowding-out in debt markets: *financing channel*. Small primary market friction. Maturity is key.

Conclusion

Public debt maturity matters for monetary policy	
What?	From long to short debt: monetary policy on output x2. Impact on activity, not on price level.
How?	Crowding-out in debt markets: *financing channel*. Small primary market friction. Maturity is key.
So what?	With longer maturity, not as costly to increase rates on output. Segmented asset markets are crucial for monetary policy.

Thank You!

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