When Credit Bites Back: Leverage, Business Cycles, and Crises

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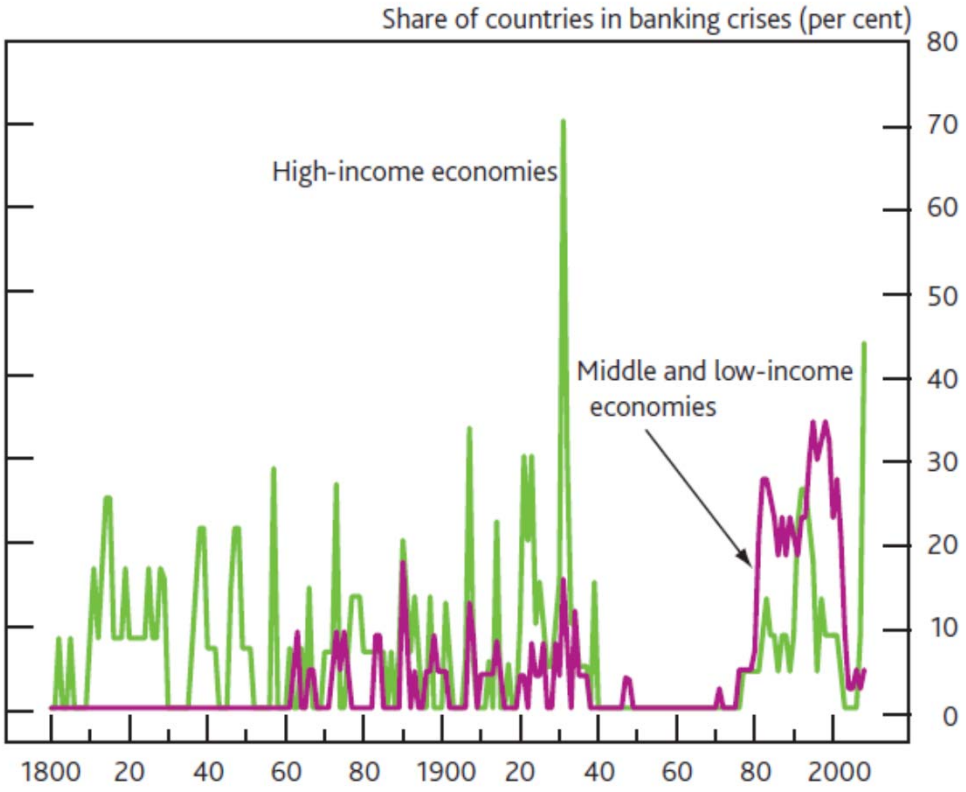
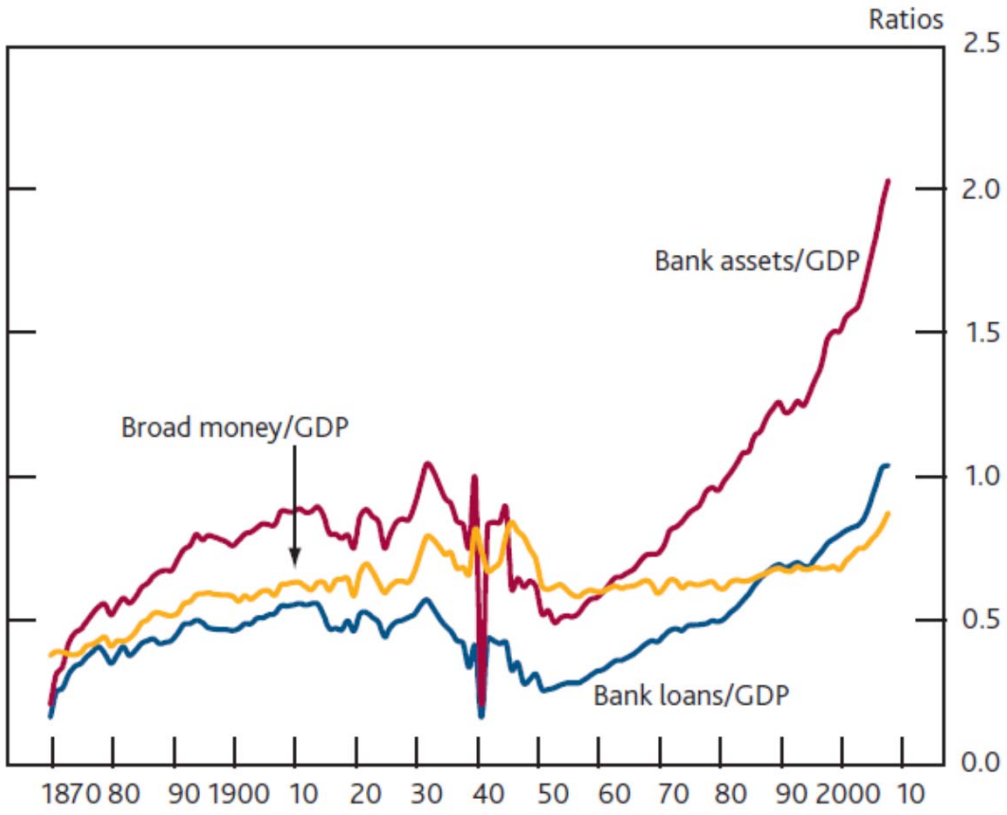
Financial Crises Are Back

- A long standing problem
- Exception: 1940 to 1970 oasis of calm. Why?



Source: Qian, Reinhart and Rogoff (2010).

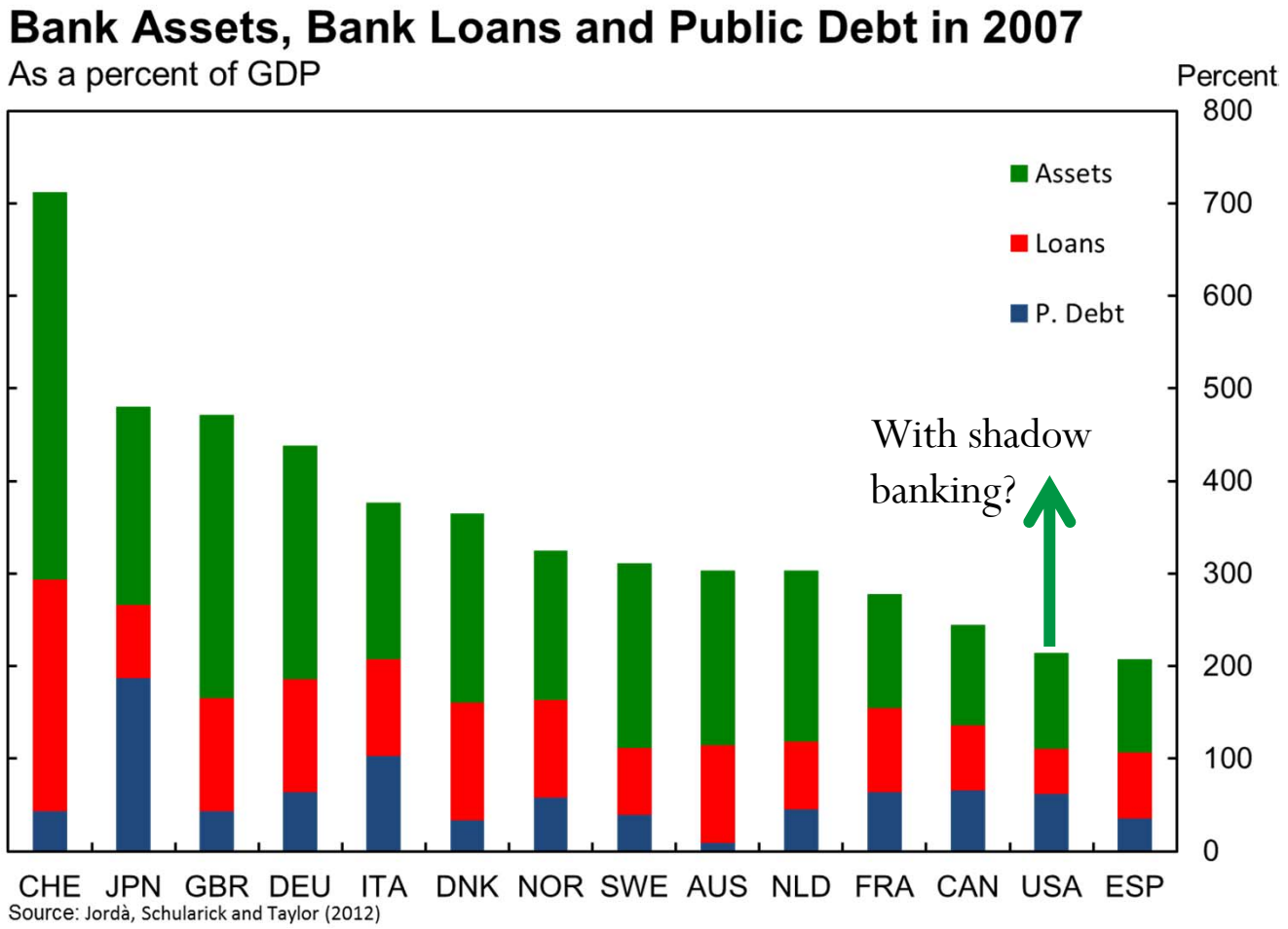
Growth of Leverage



Source: Schularick and Taylor (2009).

(a) Fourteen-country averages by year.

The Dawn of the Great Stagnation



The Question

Is credit an epiphenomenon?

And if it is not,

How does it affect the business cycle?

Credit and leverage have an important role in shaping the business cycle, in particular, the intensity of recessions and the likelihood of financial crisis (IMFER, 2011)

The Approach

- Reinhart and Rogoff (2009a,b) look at history of public-sector debt and its links to crises and economic performance.
- We have a new panel database of *private bank credit creation*:
  - 14 advanced countries
  - Yearly from 1870 to 2008
  - Local projections (Jordà, 2005)
  - Separate responses in normal and financial recessions

The Findings

- A close relationship exists between the build-up of leverage during the expansion and the severity of the subsequent recession.
- This relationship is more pronounced in financial crises but still visible in normal recessions.
- This relationship has evolved somewhat over time but the core has remained remarkably unchanged

The Findings II

- In a financial crisis, the more credit builds up in the expansion:
  - The deeper the fall in output, consumption and investment and the slower the recovery.
  - The bigger the fall in lending.
  - In the aftermath of credit-fueled expansions that end is a systemic financial crisis, downward pressure on inflation are pronounced and long-lasting

The Findings III

- The costs of financial crises are high:
  - Similar result to Cerra and Saxena (2008), Reinhart and Rogoff (2009a,b); Coelings and Zubanov (2010)
  - But the magnitude of these costs depends on the leverage incurred during the preceding expansion

The Implications

- For policy:
  - in the aftermath of the most severe financial crisis of the last 80 years, fear of inflation appears to be a phantom menace. Inflation targeting alone not sufficient.
  - Rethink how macro-finance interactions integrated into broader policy framework.
  - It is important to monitor credit formation as it can affect the severity of the recession.
  - Credit formation and systemic risk also appear to go hand-in-hand.
- For Macro: credit does not seem to be an epiphenomenon, but rather an integral part of how economies behave over the business cycle. And this is true even during normal recessions. Models need to reflect this.

Data

- 14 countries: Canada, Australia, Denmark, France, Germany, Italy, Japan, the Netherlands, Norway, Spain, Sweden, Switzerland, U.K. and U.S.

- Variables: growth rate of real GDP and C per capita, real private loans, and real M2. I/GDP, and CA/GDP. CPI inflation, short- and long-term interest rates.

- Recessions and Crises: Bry and Boschan (1971) for recessions. Jordà, Schularick and Taylor (2011) for normal vs. financial recessions.

Four Eras of Financial Development

- From Schularick and Taylor (AER, 2012)

1. Pre-WWI: stable ratio of loans to GDP, with leverage and economic growth in sync.

2. Interwar period: break-down of the gold standard and the Great Depresssion.

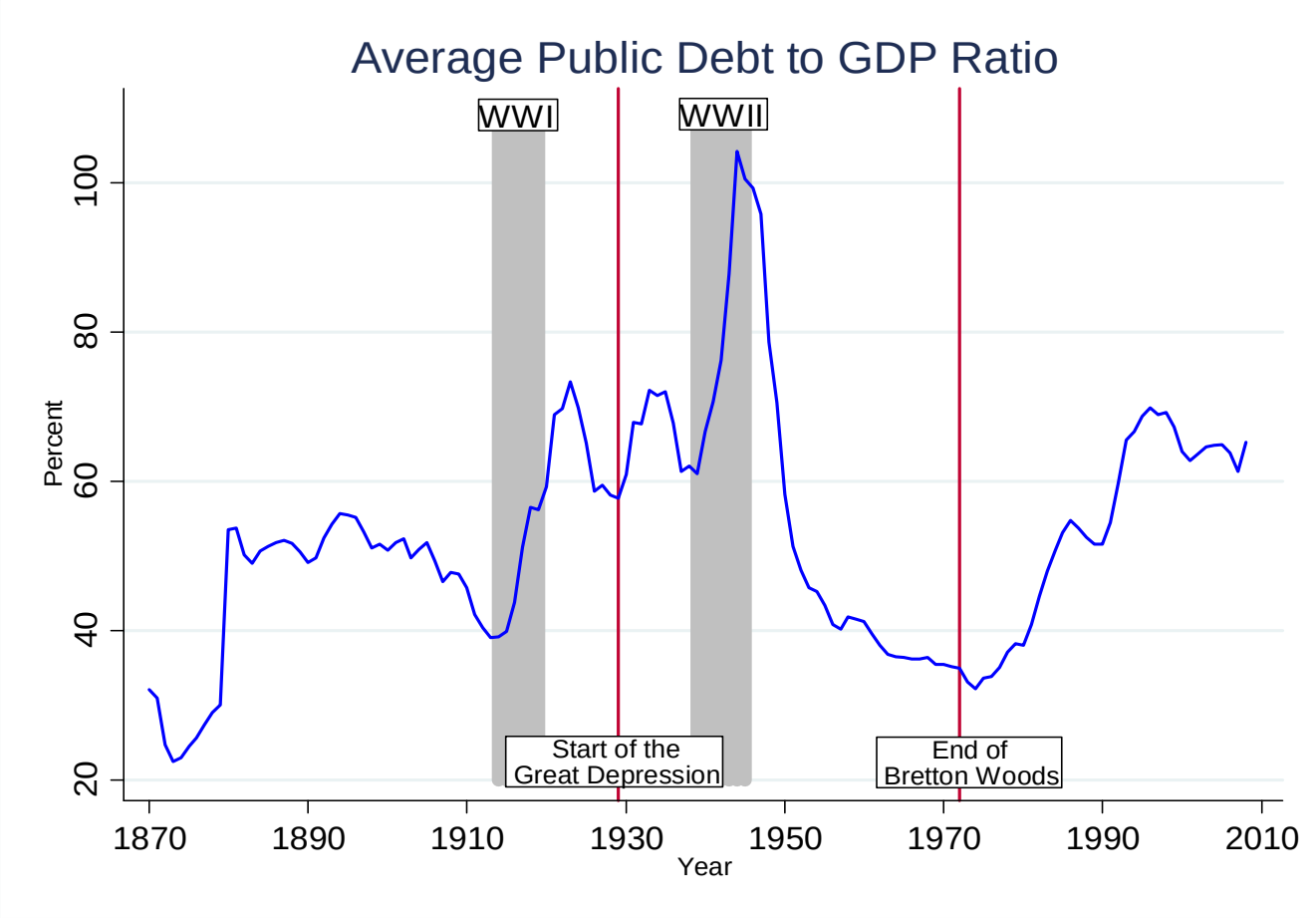
3. Bretton Woods: a new international financial regulatory framework and the *oasis of calm*.

4. Post-Bretton Woods: abandonment of the gold stantard, deregulation and explosion of credit.

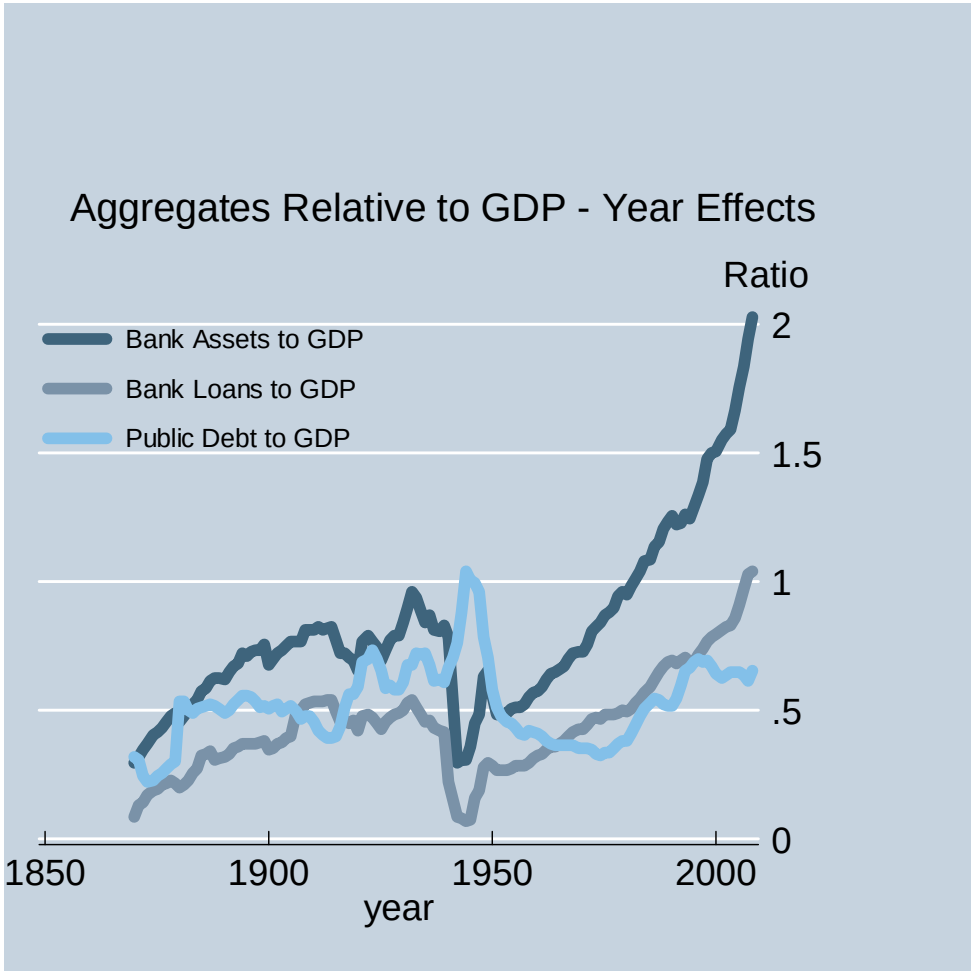
The End of Bretton Woods

- In the U.S., the ratio of financial assets to GDP goes from 150% in 1975 to 350% in 2008
- In the U.K., the financial sector's balance sheet was 34% in 1964. By 2007 it was 500%
- For the 14 countries in our sample the ratio of bank loans to GDP almost doubled since 1970

New: Public Debt over Time



The Long Run View



Credit and the Boom

Table 2: Expansions and Leverage

	Amplitude		Duration		Rate	
	Low Leverage	High Leverage	Low Leverage	High Leverage	Low Leverage	High Leverage
Full Sample						
Mean	16%	19%	4.0	5.5	4.3%	3.4%
Standard Deviation	(23)	(28)	(5.5)	(5.6)	(2.5)	(1.9)
Observations	87	159	87	159	87	159
Pre-World War II						
Mean	12%	10%	2.6	3.1	5.0%	3.5%
Standard Deviation	(12)	(8)	(2.0)	(2.8)	(2.6)	(2.0)
Observations	59	110	59	110	59	110
Post-World War II						
Mean	28%	38%	8.9	9.7	2.7%	3.4%
Standard Deviation	(35)	(45)	(8.0)	(7.3)	(1.4)	(1.7)
Observations	36	41	36	41	36	41

Notes: Amplitude is peak to trough change in real real GDP per capita. Duration is peak to trough time in years. Rate is peak to trough growth rate of real real GDP per capita. High leverage denotes credit/GDP above its full sample mean at the peak. Low leverage denotes credit/GDP above its full sample mean at the peak.

Local Projections and Dynamic Multipliers: Methods

- Let $y_{k,t}$ denote the vector of $n \times 1$ country-observations for variable *k* at time *t* in the system of *k* = *1, …, K* variables for *t* = *1, …, T* periods.

- Collect the *K* variables into Y_t .

- Let x_t denote the excess leverage indicator amplitude of loan growth relative to GDP divided by duration. This is a rate of excess loan formation per year

The Response

- We are interested in:

$$R(y_{k,t(r)}, h, \delta) =$$
$$E_{t(r)}(y_{k,t(r)+h}|x_{t(r)} = \bar{x} + \delta; Y_{t(r)}, Y_{t(r)-1}, ...) -$$
$$E_{t(r)}(y_{k,t(r)+h}|x_{t(r)} = \bar{x}; Y_{t(r)}, Y_{t(r)-1}, ...)$$

- The notation *t(r)* denotes the calendar time period *t* associated with the *r-th* recession.
- δ denotes a "treatment" if it were exogenous (and then $R(\,.\,)$ would be an average treatment effect).
- $E_{t(r)}$ denotes the linear projection operator.

Warm-up: Cumulative Effects

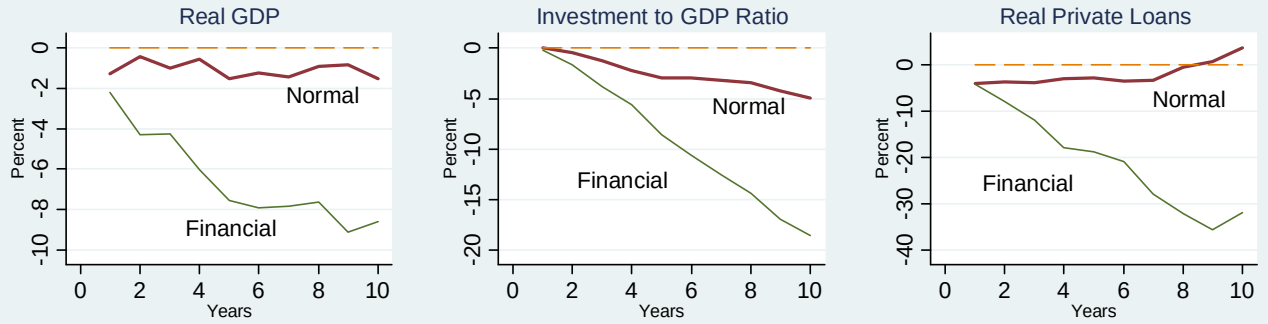
- Some derivative plots that tell the story by cumulating the response over time.
- Experiment: 10% excess loan growth relative to GDP per year. Average over the sample is 1.5% with 6.5% S.E. so yes, high, but makes scaling easy
- U.S. in 2008 recession: excess leverage about 3.5% (not including shadow banking, perhaps as high as 5%)
- The effects reported are *marginal* because, while still not making causal claims, less problematic

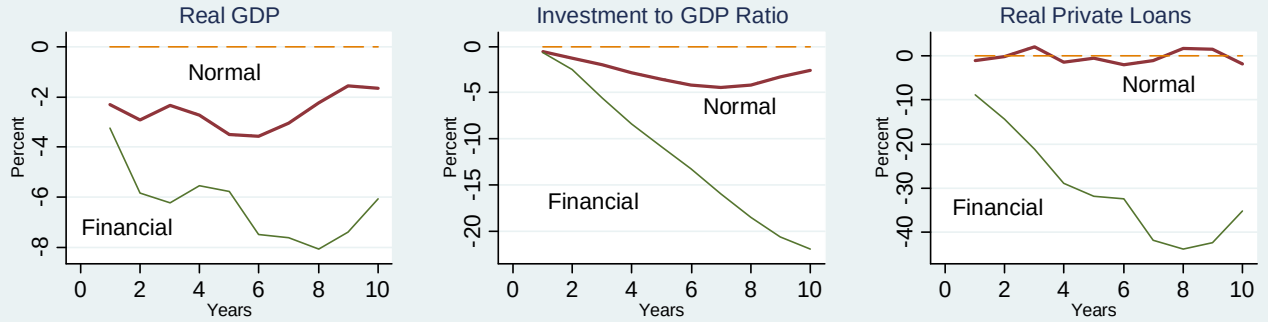
Cumulated Dynamic Multiplier

Cumulated Dynamic Multiplier Effect During Normal and Financial Recessions

Experiment: 10% per Year Excess Leverage

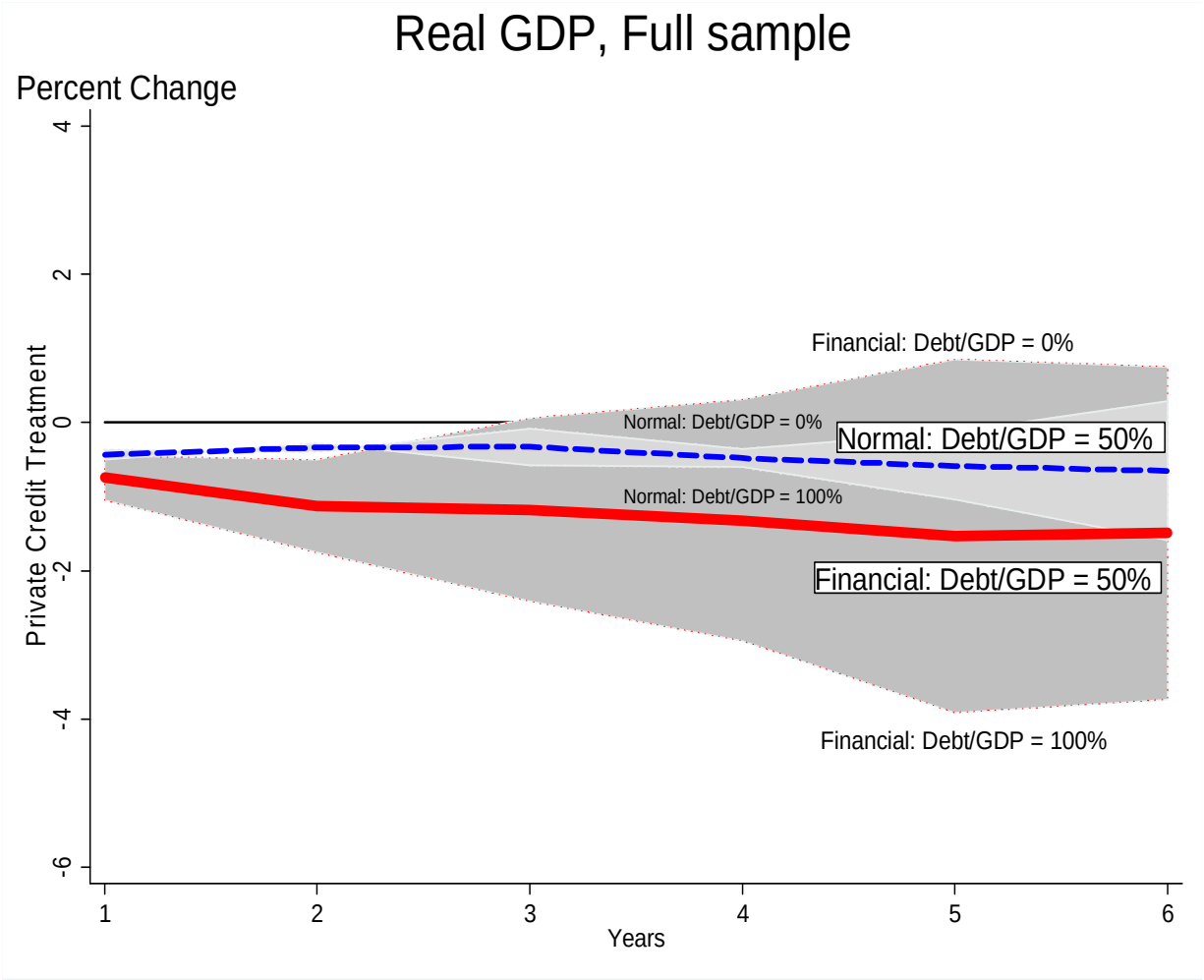
FULL SAMPLE





Post-WWII SAMPLE

What About Public Debt? A Preview



Remarks

- Numbers in the ball-park of those calculated by Cerra and Saxena (2008) –7.5% GDP loss over 10 years– or Reinhart and Rogoff (2009a,b) –peak to trough decline is about 9%.

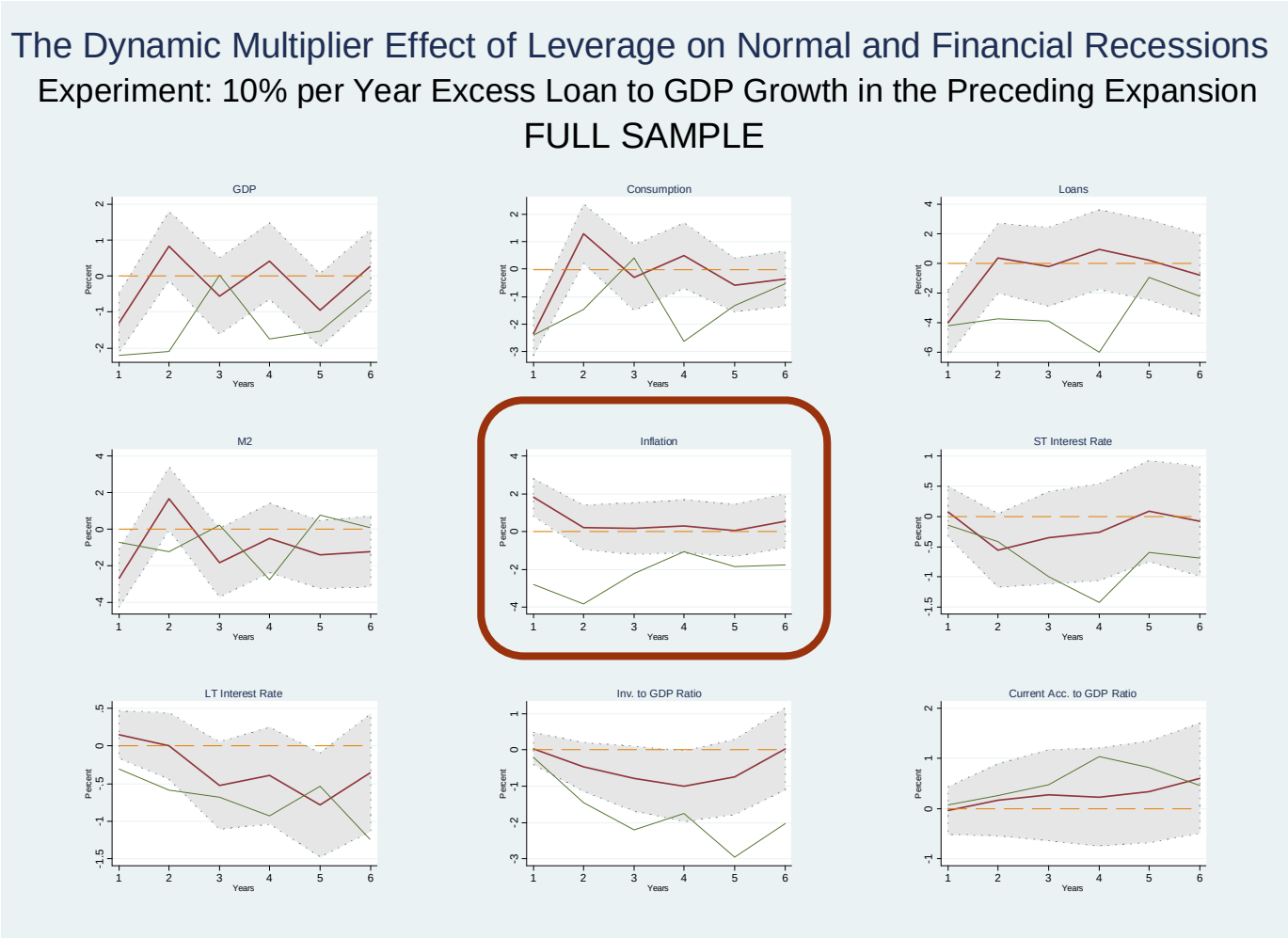
- But the effects on lending and investment can be quite nasty.

- In the U.S. given excess leverage into the 2008 financial crises (3 to 3.5%), scale by 1/3. So let's say about 7% drop in I/Y and 10% in lending

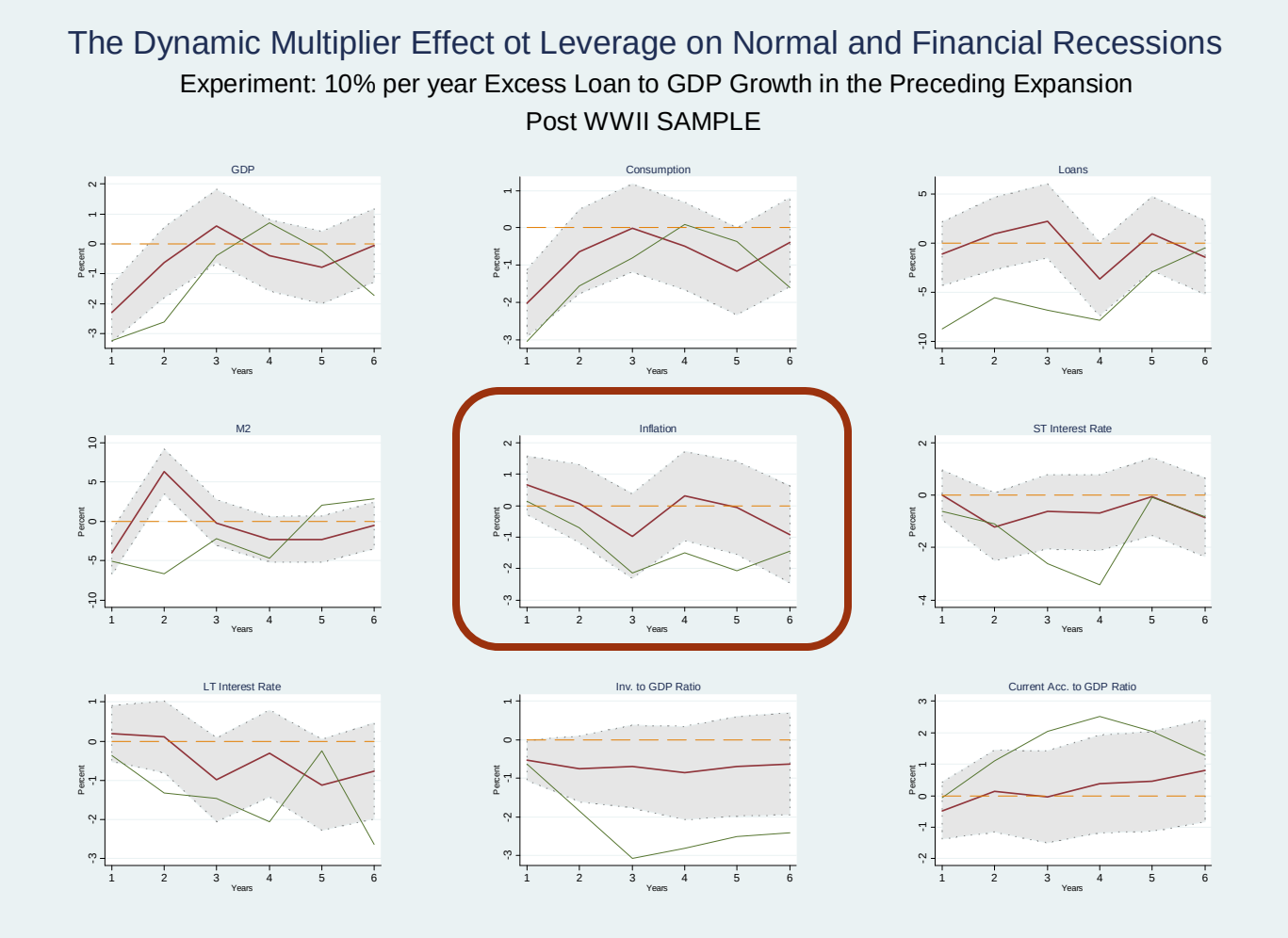
Leverage and the Recession Path

- Now let's look at the year-to-year variation
- Look at all the variables in the system
- Add some error-bands
- Use the same experiment (10% excess leverage) to facilitate scaling.
- Still only considering *marginal* effects

The Dynamic Multiplier: Full Sample



The Dynamic Multiplier: Post WWII



A Calibrated Example: The U.S.

- Suppose in 2008 excess leverage close to the 5% mark (due to shadow banking, say).
- Implications:
  - Trim GDP forecasts in 2012-2014 by about 0.5-0.75% relative to normal
  - Trim inflation forecasts in 2012-2014 by about 0.75-1% relative to normal
- Suggests the policy balance of risks should be tilted toward closing the output gap rather than on inflation

Leverage and the Cost of Financial Crises

- In a financial crisis, 1 SD excess leverage from mean results in about 2-3% accumulated per capita GDP loss over 6 years.
- In normal recessions the cumulated drop in lending is about 5%. It is 3 times that in financial recession and add an extra 5-10% more if leverage coming into the recession is high.
- Interest rates also drop by a larger amount in financial crises and considerably more if there is excess credit creation in the preceding boom

Leverage and the Cost of Financial Crises (cont.)

- A fall in lending and a fall in interest rates seems to suggest the story is: demand for credit shrivels
- This conclusion is premature:
  - The analysis makes no effort to address the issue of endogeneity. Why was credit formation more elevated during the preceding expansion?
  - The data on interest rates refer to government securities. Unfortunately we do not have data on rates for private loans. There could be a significant spread.
- And what about the Great Depression? Post-WWII data exhibit the same features

Conclusion

- The credit intensity of the boom matters for the path of the recession.
- Leverage can make economies more vulnerable to shocks.
- These effects are compounded in a financial crisis.
- But in looking at the economic costs of crises, inflation does not seem to be cause for concern (quite the contrary).
- Clearly, this has important policy implications in the current environment.

Future Research

- So far the analysis is deliberately descriptive.
- But we hope to make progress toward more causal explanations: does the supply or the demand for credit shift?
- And we have collected data on the public sector – many have argued that the level of public AND private indebtedness matters during a financial crisis and we want to look into this. Stay tuned…