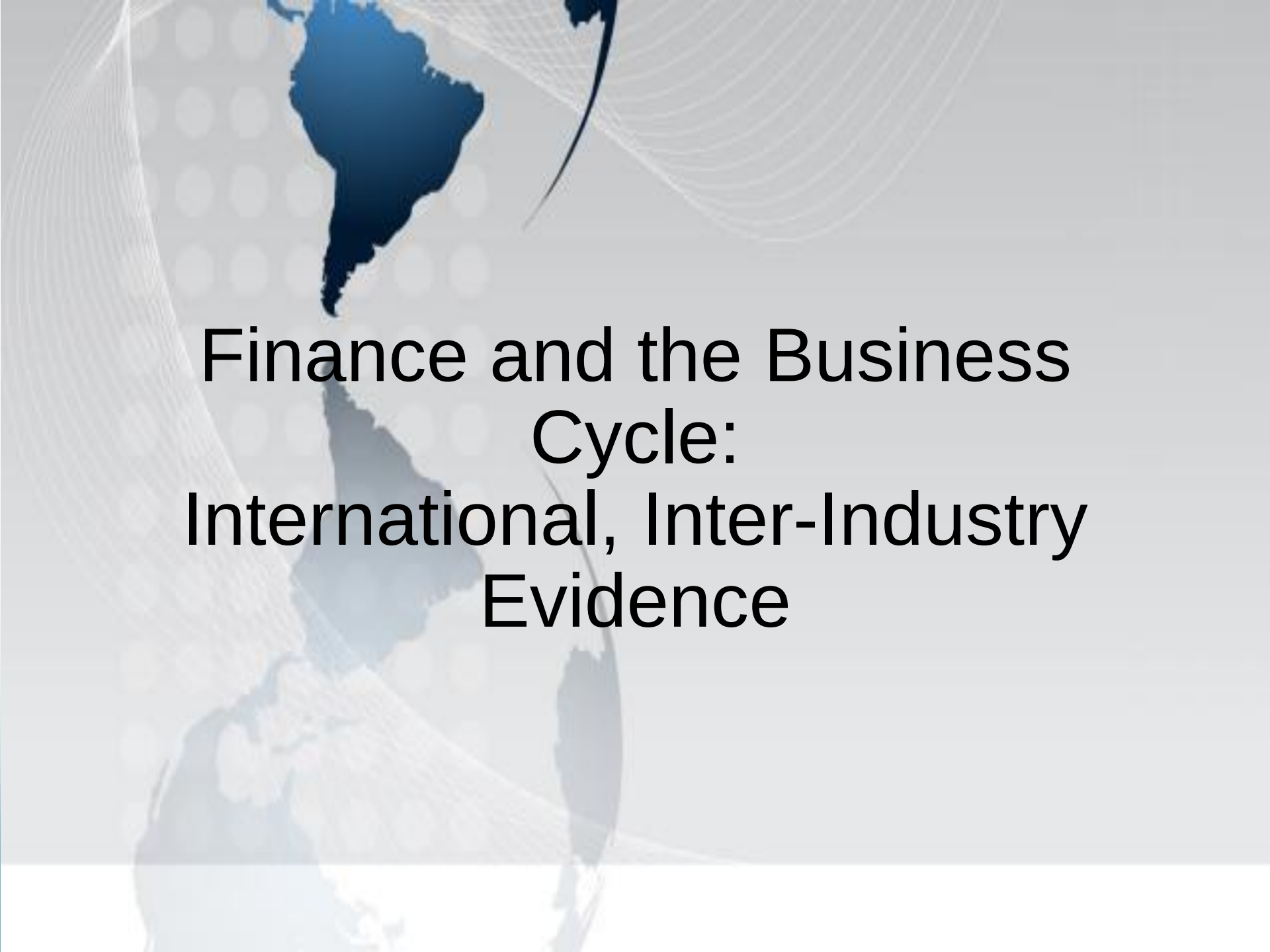

Finance and the Business Cycle: International, Inter-Industry Evidence

Outline

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Abstract

- Industries that are more dependent on external finance are hit harder during recessions
- The observed difference in the behavior of industries is larger when financial frictions are thought to be more prevalent
- More dependent industries are more strongly affected in recessions when they are located in countries with poor financial contractibility and when their assets are softer or less protective of financiers

Abstract

- Focuses on short-run fluctuations in production and on how financial frictions amplify them.
- Theoretical reference for this paper
  - Credit channel of the business cycle
- Expand the macroeconomic literature on financial constraints

Abstract

- Methodology
  - Data Set
    - Early production observations for 28 manufacturing industries in over 100 countries from 1963 to 1999
  - 3 building blocks of the test
    - Determine business cycle shocks
      - Identify recessions by looking at fluctuations of aggregate output in each country
    - Rank industries according to the degree to which they naturally finance their activities with external funds
      - Using RZ index
    - Measure the differences in financial frictions
      - Country level: number of international accounting standards used by firms
      - Industry level: tangibility of the assets

Abstract

- Hypotheses
  1. Since capital markets are imperfect, recessions should have a larger impact on industries with higher external dependence
  2. As frictions increase, the difference between highly dependent industries vis-à-vis less dependent ones should be larger

- Findings
  - For typical industry, recessions are associated with a decrease in growth of 4.7 percentage points
  - Industries that are highly dependent on external finance shows a 0.9 points larger drop than those industries with little dependence
  - Differential impact of recessions over industries sorted by their dependence on external funds is not homogenous

Abstract

- Extension from previous literature
  - Expand the macroeconomic literature on financial constraints in terms of country experiences and time period
  - Show that financial mechanism is not just a peculiarity of US or other developed economies, but is a widespread feature of business cycle around the world and that is not peculiar to some particular kind of shocks
  - Date vary along three dimensions
    - Time, country, and industry (instead of just time and productive unit)
    - Can better controls and obtain cleaner results

Related Literature and Hypotheses

Related Literature and Hypotheses – Main Hypotheses

- Basic financial mechanism hypotheses
- If we vary the frictions that exist in the external finance
  - Change related to the environment in which these firms seek external finance
  - Change in the firm's characteristics
- Firm that has less internal funds is disproportionately affected by recessions in the presence of financial frictions
  - with both conditions tightening the borrowing constraint that the firm faces.

Related Literature and Hypotheses – Main Hypotheses

- Two hypotheses
  1. In a given financial environment, firms that depend more on external funds are hit harder during recessions

  1. An increase in the severity of the financial frictions makes the pre $\partial^2 g_{it}/\partial R_t \partial D_i < 0$;
     - Our approach with respect to the previous credit channel literature

$$\partial^3 g_{it}/\partial R_t \partial D_i \partial F < 0$$

Related Literature and Hypotheses –Literature Review

- The Credit Channel
  - The link between financial frictions and the business cycle and is considered a propagation mechanism of primitive shocks
  - First branch
    - Balance sheet channel
  - Second line of research
    - Bank lending channel

- Existing evidence
  - Shows the impact of financial constraints on firm level fluctuations in:
    - employment, inventories , pricing strategies, investment, sales, and short-term borrowing
  - Kashyap, Stein, and Wilcox (1993) and Kashyap and Stein (2000)
    - bank lending mechanism
  - Overall, the evidence is mainly based on US data and a few other industrialized economies
    - Typically refers to the more recent recessive episodes
    - Operates with a dichotomous definition of financially constrained firms (small vs. large)

- What we do
  - We extend the evidence in these three dimensions and link cross-firm differences to the degree of financial frictions faced by the agents.

- Standard methodology
  - Comparing the behavior of constrained to unconstrained firms around recessions

Related Literature and Hypotheses-Literation Review

- Our hypotheses
  - Similar set of issues is behind both the bank lending and the balance sheet views
    - Both suggest that firms that rely more on external finance should exhibit a disproportionate response to negative shocks.
      - Reasons for the differential impact
        - Balance sheet channel
        - Bank lending view
      - The differential effect is also likely to be stronger when financial frictions are more important
  - In practice, the distinction between the balance sheet and the bank lending view becomes blurred when the correlation between dependence on external funds and dependence on bank loans is high
- This paper aims to get an empirical sense of the general idea of a financial mechanism of business cycles.

Data and Empirical Approach

Data and empirical approach

- Framework to test the two hypotheses.
- Empirical approach
  - Exploiting the differential behavior of various industries around the cycle.
  - Data
    - Industry data are taken from the UNIDO Indstat-3 (2001) data set.
      - Provides yearly observations for 28 ISIC-3 manufacturing industrial segments in a large number of countries from 1963 to 1999.
    - Basic sample
      - 57,538 observations that correspond to 2,395 country-industry data points for 111 different countries, and for 28 industries, during 36 years.
      - The panel is unbalanced due to data availability
      - Sample size varies
        - Country-level data are not always available for all economies
    - Data vary along three dimensions: time, industry, and country

Data and empirical approach

- Empirical approach
  - 3 basic steps
    1. Identifying recessions in each country
    2. Measuring the extent to which each industry depends on external funds
    3. Finding proxies for the severity of financial frictions
  - Benchmark regressions

$$Growth_{i,c,t} = \alpha_1 Size_{i,c,t-1} + \alpha_2 Recession_{c,t} + \alpha_3 (Recession_{c,t} \times External\ Finance\ Dependence_i) + \alpha_4 \mathbf{Dummy\ Variables} + \varepsilon_{i,c,t}.$$

Data and empirical approach

$$Growth_{i,c,t} = \alpha_1 Size_{i,c,t-1} + \alpha_2 Recession_{c,t} + \alpha_3 (Recession_{c,t} \times External\ Finance\ Dependence_i) + \alpha_4 \mathbf{Dummy\ Variables} + \varepsilon_{i,c,t}.$$

$Growth_{i,c,t}$	Log-change in the production index of industry I in country c between year t-1 and t.
Dummy Variables	Includes indicator variables that identify each country-industry and each year-industry pair, respectively.
$Size_{i,c,t-1}$ -	Share of industry i in country's total value added in year t-1
$Recession_{c,t}$	Dummy variables that takes the value 1 if country c is experiencing a recession in year t
$External\ Finance\ Dependence_i)$	External finance dependence for industry I.
$\varepsilon_{i,c,t}.$	Heteroskedastic and correlated in time for each country-industry series.

Data and Empirical Approach – Identifying recessions.

- Identifying assumption
  - Recessions do not systematically affect investment returns of industries as ranked by their dependence on external funds.
  - Recessions are periods of tighter credit conditions that do not necessarily reflect the stance of investment opportunities in these industries.
- Procedure
  - Identify recessions from the fluctuations of total real GDP
  - Take the cyclical component of GDP as a proxy for the overall state of the economy.
    - HP filter
  - Definition of recession follows a peak-to-trough criterion.
- Recessions are not likely to be concentrated in countries grouped by a particular set of characteristics.
- Biases
  - Data availability
    - Can only rely on annual GDP

Data and Empirical Approach – External Finance Dependence.

- Identify financially constrained agents
  - RZ index
    - Constant across countries for a given industry.
  - Assumption
    - There are technological differences persist across countries.
    - Identification does not require that industries have exactly the same external dependence level in every country, just that their ranking remains stable.
  - Counter argument for using RX index
  - Robustness
    - There are other explanations for industry cyclicality besides external finance dependence
    - Later include other industry characteristics that help explain their cyclicality and show that, in general, their effect is no different across samples based on the degree of financial imperfections.

Data and Empirical Approach – Financial Frictions

- Country level
  - Focus on the quality of accounting standards
  - Data
    - Index of international accounting standards is taken from La Porta et al. (LLSV 1998)
  - Robustness test
    - Use other measures of cross-country financial frictions
- Industry level
  - Concentrate on industry tangibility
    - In a world with incomplete financial contractibility, having assets that can be easily transferred to investors (hard assets) improves a firm's access to external funding.
  - Data
    - Measure of tangibility developed by Braun(2002)

Results

Results

- Basic Results

Variable	Subsamples				
	Entire Sample	Countries w/High Accounting Quality	Countries w/Low Accounting Quality	High Tangibility Industries	Low Tangibility Industries
Size ($t-1$)	−0.1580***	−0.2536***	−0.2870***	−0.0982**	−0.3266***
	(0.0415)	(0.0689)	(0.1069)	(0.0470)	(0.0668)
Recession	−0.0444***	−0.0345***	−0.0483***	−0.0426***	−0.0471***
	(0.0023)	(0.0030)	(0.0044)	(0.0034)	(0.0032)
Recession × external finance dependence	**−0.0312*** **	**−0.0011**	**−0.0612*** **	**−0.0174***	**−0.0486*** **
	(0.0078)	**(0.0086)**	**(0.0166)**	**(0.0102)**	**(0.0115)**
R^2	0.1458	0.2733	0.1801	0.1408	0.1507
Number of obs	57538	16630	13959	29082	28456
Change in growth rate for high dependence industry	−5.4%	−3.5%	−6.6%	−4.8%	−6.2%
Change in growth rate for low dependence industry	−4.5%	−3.5%	−4.9%	−4.3%	−4.8%
Implied differential effect	−0.9%	0.0%	−1.7%	−0.5%	−1.4%
Differential effect larger than in preceding sample (p-value)			0.1%***		2.1%**

(*continued*)

Results

Table I—*Continued*

Variable	Subsamples			
	Countries w/High Accounting Quality		Countries w/Low Accounting Quality	
	High Tangibility Industries	Low Tangibility Industries	High Tangibility Industries	Low Tangibility Industries
Size $(t-1)$	−0.1983	−0.2873***	−0.1267	−0.6294***
	(0.1291)	(0.0764)	(0.1249)	(0.1809)
Recession	−0.0323***	−0.0360***	−0.0401***	−0.0565***
	(0.0042)	(0.0041)	(0.0066)	(0.0059)
Recession × external finance dependence	**−0.0090**	**0.0063**	**−0.0424***	**−0.0926*****
	(0.0102)	**(0.0141)**	**(0.0251)**	**(0.0205)**
R^2	0.2889	0.26	0.1625	0.2006
Number of obs	8330	8300	6975	6984
Change in growth rate for high dependence industry	−3.5%	−3.4%	−5.3%	−8.4%
Change in growth rate for low dependence industry	−3.2%	−3.6%	−4.1%	−5.8%
Implied differential effect	−0.3%	0.2%	−1.2%	−2.6%
Differential effect larger than in preceding sample (p-value)		19.0%		6.0%*

Results – Country and Industry Characteristics

Variable	Subsamples			
	Countries w/High Effective Creditors Rights	Countries w/Low Effective Creditors Rights	Countries w/Higher than Median GDPpc 1960–2000	Countries w/Lower than Median GDPpc 1960–2000
Size ($t-1$)	−0.1785***	−0.2185***	−0.1874***	−0.1536***
	(0.0659)	(0.0818)	(0.0604)	(0.0564)
Recession	−0.0481***	−0.0376***	−0.0378***	−0.0526***
	(0.0032)	(0.0048)	(0.0024)	(0.0044)
Recession × external finance dependence	**−0.0147**	**−0.0414*** **	**−0.0269*** **	**−0.0353** **
	(0.0100)	**(0.0157)**	**(0.0082)**	**(0.0146)**
R^2	0.1835	0.1593	0.178	0.1511
Number of obs	22407	19895	32088	25170
Change in growth rate for high dependence industry	−5.2%	−5.0%	−4.6%	−6.3%
Change in growth rate for low dependence industry	−4.8%	−3.8%	−3.8%	−5.3%
Implied differential effect	−0.4%	−1.2%	−0.8%	−1.0%
Differential effect larger than in preceding sample (p-value)		7.3%*		25.2%

(*continued*)

Results – Country and Industry Characteristics

Table II—*Continued*

Variable	Subsamples			
	Countries w/Good Property Rights Institutions IV Settler Mortality	Countries w/Poor Property Rights Institutions IV Settler Mortality	Countries w/Good Contracting Institutions IV Legal Origin	Countries w/Poor Contracting Institutions IV Legal Origin
Size $(t-1)$	−0.2554***	−0.2270***	−0.1665**	−0.2085***
	(0.0808)	(0.0580)	(0.0660)	(0.0545)
Recession	−0.0586***	−0.0451***	−0.0394***	−0.0515***
	(0.0077)	(0.0043)	(0.0025)	(0.0045)
Recession × external finance dependence	**−0.0027**	**−0.0505*** **	**−0.0225*** **	**−0.0337** **
	(0.0276)	**(0.0149)**	**(0.0083)**	**(0.0156)**
R^2	0.2111	0.1539	0.1824	0.1528
Number of obs	9017	20040	28691	23005
Change in growth rate for high dependence industry	−5.9%	−6.0%	−4.6%	−6.2%
Change in growth rate for low dependence industry	−5.9%	−4.6%	−4.0%	−5.2%
Implied differential effect	−0.1%	−1.4%	−0.6%	−1.0%
Differential effect larger than in preceding sample (p-value)		2.3%**		15.9%

Results – Country and Industry Characteristics

Variable	Subsamples			
	Countries w/High Accounting Quality	Countries w/Low Accounting Quality	Countries w/High Accounting Quality	Countries w/Low Accounting Quality
Size ($t-1$)	−0.2640***	−0.2821***	−0.2561***	−0.2872***
	(0.0693)	(0.1061)	(0.0690)	(0.1052)
Recession	−0.0124**	−0.0368***	−0.0089**	−0.0203***
	(0.0054)	(0.0082)	(0.0045)	(0.0076)
Recession × external finance dependence	**0.0036**	**−0.0443****	**0.0155***	**−0.0432****
	(0.0089)	**(0.0183)**	**(0.0090)**	**(0.0170)**
Recession × durable goods producer	−0.0295***	−0.0219*		
	(0.0078)	(0.0115)		
Recession × investment goods producer	0.0114	−0.0346		
	(0.0130)	(0.0232)		
Recession × tradable goods producer	−0.0210**	0.0056		
	(0.0096)	(0.0161)		
Recession × U.S. cyclicality			−0.0161***	−0.0177***
			(0.0027)	(0.0047)
R^2	0.2804	0.1842	0.2758	0.1815
Number of obs	16082	13483	16630	13595
Change in growth rate for high dependence industry	−1.1%	−5.0%	−0.4%	−3.3%
Change in growth rate for low dependence industry	−1.2%	−3.7%	−0.9%	−2.1%
Implied differential effect	0.1%	−1.3%	0.4%	−1.2%
Differential effect larger than in preceding sample (p-value)		1.8%**		0.0%***

Results – Recession Characteristics

Variable	Countries w/High Accounting Quality	Countries w/Low Accounting Quality	High Tangibility Industries	Low Tangibility Industries
		Recession Points		
Recession points elasticity of high dependence industry	−1.03	−1.49	−0.99	−1.18
Recession points elasticity of low dependence industry	−1.06	−1.14	−0.89	−0.95
Implied differential effect	0.04	−0.36	−0.09	−0.23
Differential effect larger than in preceding sample (p-value)		1.2%**		10.9%
		Monetary Recessions		
Change in growth rate for high dependence industry	−3.2%	−6.2%	−5.3%	−7.7%
Change in growth rate for low dependence industry	−2.4%	−5.2%	−4.9%	−5.1%
Implied differential effect	−0.8%	−1.0%	−0.4%	−2.6%
Differential effect larger than in preceding sample (p-value)		37.3%		2.1%**
		World Recessions		
Change in growth rate for high dependence industry	−2.3%	−5.1%	−5.4%	−6.6%
Change in growth rate for low dependence industry	−2.5%	−3.6%	−5.0%	−5.8%
Implied differential effect	0.3%	−1.4%	−0.5%	−0.8%
Differential effect larger than in preceding sample (p-value)		1.1%**		28.0%
		Recessions with Credit Crunch		
Change in growth rate for high dependence industry	−0.2%	−7.1%	−5.1%	−5.9%
Change in growth rate for low dependence industry	−1.3%	−4.0%	−4.7%	−4.3%
Implied differential effect	1.0%	−3.1%	−0.3%	−1.6%
Differential effect larger than in preceding sample (p-value)		0.6%***		15.7%

Results – External Finance Dependence

- Earlier assumptions 1
  - Industry ranking on external dependence does not change rapidly, but its is not natural to assume that they do not change at all
- Relaxing assumption 1
  - Use RZ index for the 1970s for the pre-1980 observations and the index for the 1980s afterwards.
  - More dependent industries are still hit disproportionately harder during recessions and especially so if they are more exposed to financial frictions.
- Earlier assumption 2
  - The ranking of external finance dependence remains relatively stable across countries
    - We argue that this is plausible if we think that technology is an important determinant of financing needs.
    - This implicitly assumes that a given industry uses a similar technology in every country, which is not necessarily he case
- Relaxing assumption 2
  - Time variation in the ranking od external finance dependence can be linked to country characteristics
    - The results do not change much.

Results – Asymmetry: Recessions and Booms

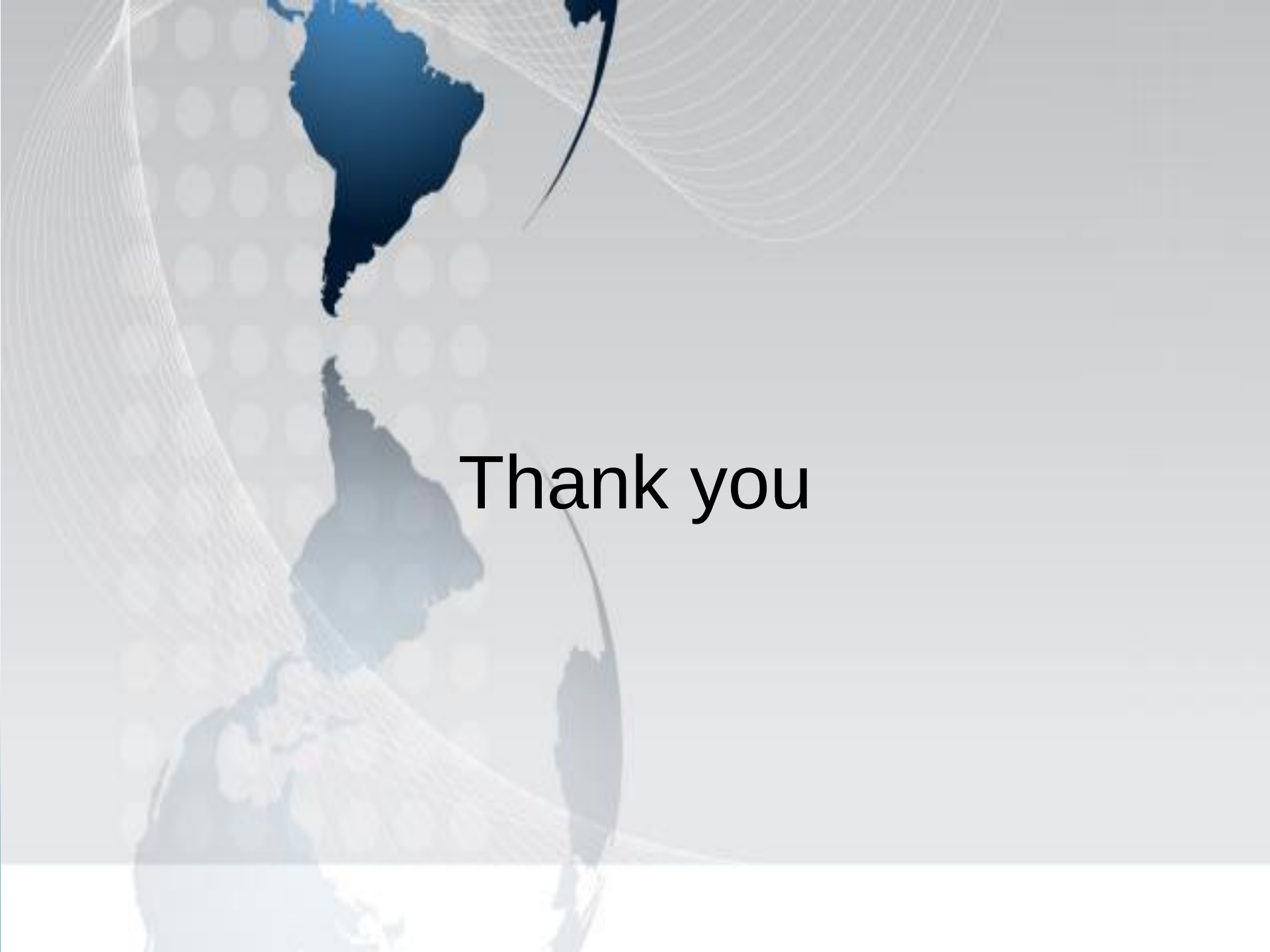
Variable	Subsamples			
	Countries w/High Accounting Quality	Countries w/Low Accounting Quality	High Tangibility Industries	Low Tangibility Industries
Size $(t-1)$	−0.2508***	−0.2876***	−0.0981**	−0.3273***
	(0.0654)	(0.1064)	(0.0469)	(0.0654)
Recession	−0.0284***	−0.0440***	−0.0371***	−0.0402***
	(0.0032)	(0.0047)	(0.0035)	(0.0035)
Recession × external finance dependence	**0.0050**	**−0.0575*** **	**−0.0169***	**−0.0458*** **
	(0.0092)	**(0.0169)**	**(0.0097)**	**(0.0121)**
Boom	0.0164***	0.0118***	0.0165***	0.0207***
	(0.0026)	(0.0036)	(0.0027)	(0.0025)
Boom × external finance dependence	0.0176**	0.0100	0.0017	0.0077
	(0.0089)	(0.0108)	(0.0097)	(0.0093)
R^2 =	0.2786	0.1812	0.1425	0.1531
Number of obs	16630	13959	29082	28456
Recessions				
Change in growth rate for high dependence industry	−2.7%	−6.1%	−4.2%	−5.4%
Change in growth rate for low dependence industry	−2.8%	−4.5%	−3.7%	−4.1%
Implied differential effect in recessions	0.1%	−1.6%	−0.5%	−1.3%
Differential effect larger than in preceding sample (p-value)		0.1%***		4.2%**
Booms				
Change in growth rate for high dependence industry	2.2%	1.5%	1.7%	2.3%
Change in growth rate for low dependence industry	1.7%	1.2%	1.7%	2.1%
Implied differential effect in booms	0.5%	0.3%	0.0%	0.2%
Differential effect larger than in preceding sample (p-value)		4.9%**		15.1%

Results – industry outcome

- Aggregate production growth
  - Commonly used to identify and summarize business cycle
  - Can also be used as benchmark
    - More data is available for production
    - Less subject to measurement problems.

Conclusion

- The existence of a financial channel of business cycles.
- Higher impact of recessions on industries that naturally rely more on external funds
- The differences very with the degree of financial frictions
- Financial mechanism is asymmetric over the cycle, and is especially strong when recessions are accompanied by credit crunches.


Thank you