Funding Liquidity Without Banks: Evidence from a Shock to the Cost of Very Short-Term Debt

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&

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Bank as Liquidity Suppliers (1)

- Banks play a key role as **suppliers of liquidity and payments mechanisms**
  - Payment products provided almost uniquely by banks:
    - Bank Deposits
      - Demand deposits used for payments
      - Costly liquidity (e.g., worsens agency problems; Jensen, 1986; Yun, 2010)

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- Trade Credit: Another mechanism to manage liquidity
  - Like bank credit lines, trade credit acts as a means to manage liquidity and allows lower cash balances
    - Firms can delay payments to match outflows and inflows of cash
    - But at a cost: early-payment discounts, late payment penalties

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  - Firms with low access to TC experience
    - Large increase in Cash
    - Large decrease in Investment

Identification Problem

1. Correlations between very ST bank debt and liquidity outcomes reflect supply (cost) and demand for liquidity
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2. What about the vast literature looking at shocks to bank-loan supply?
   - Existing instruments affect both credit and liquidity role of banks!
     - Monetary policy shocks affect both
     - Solvency shocks affect both
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- Our study can look specifically at banks' role in providing very short term credit for liquidity purposes

Identification solution: Colombia initiated a tax on loan payments, 2011

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   - Because it adds this fixed cost to all loans irrespective of their maturity, the 'all-in' cost of debt increases the shorter the maturity

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5-day loan example:

- *Day 0*: Firm XYZ obtains loan for $1M at a 8% APR
- *Day 5*: Firm XYZ pays:

  + $1M principal back

  + $1M * 8% * 5/365 = $1,096 interest

  + ($1M + $1,096) * 0.4% = $4,004 in BAD tax

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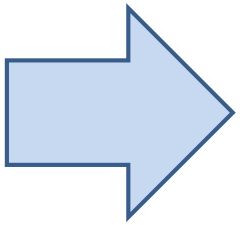

Resulting all-in cost of debt:
37.25% annual rate

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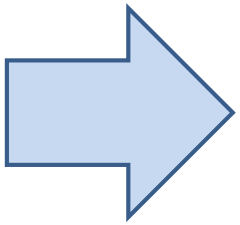

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→ Resulting all-in cost of debt: **8.04% annual rate**

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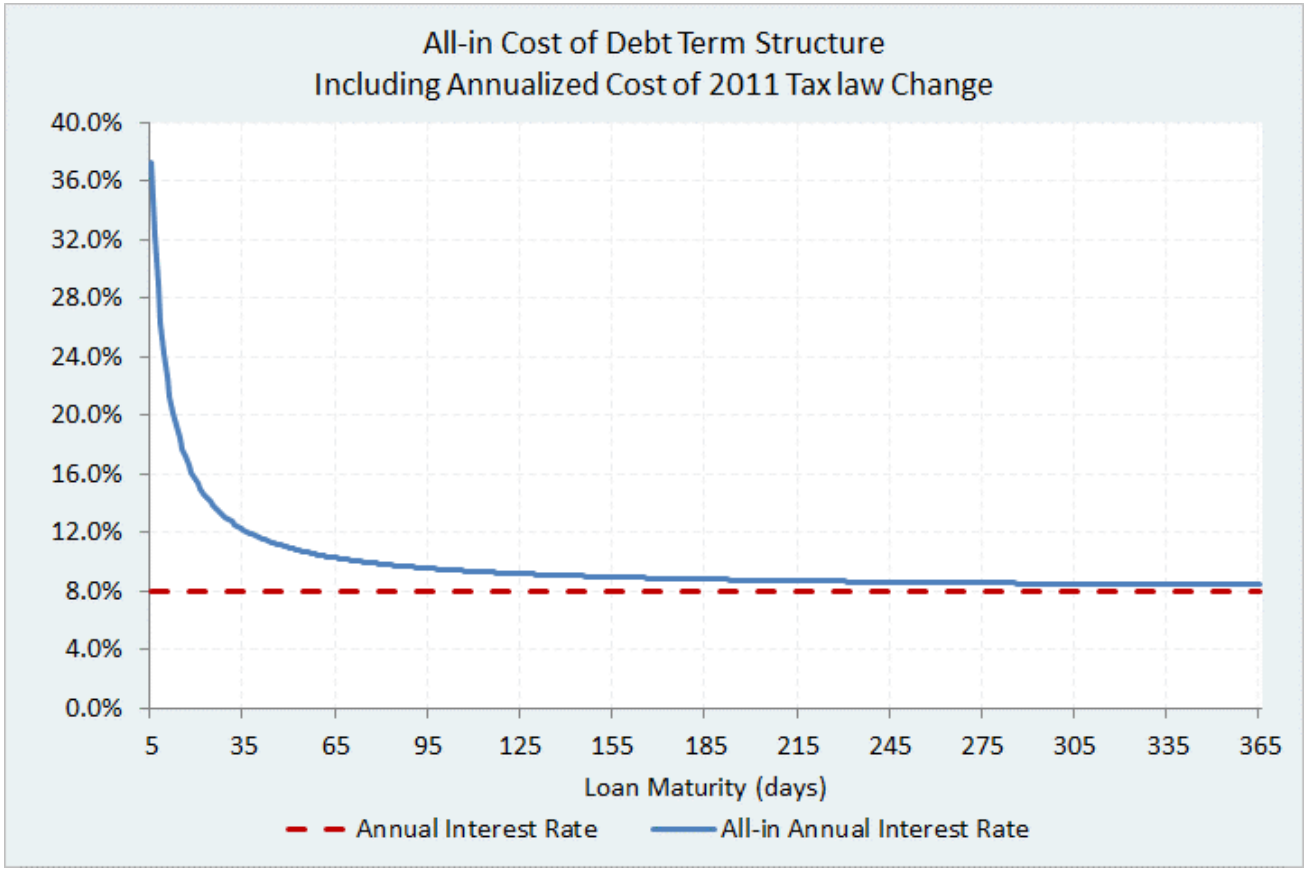

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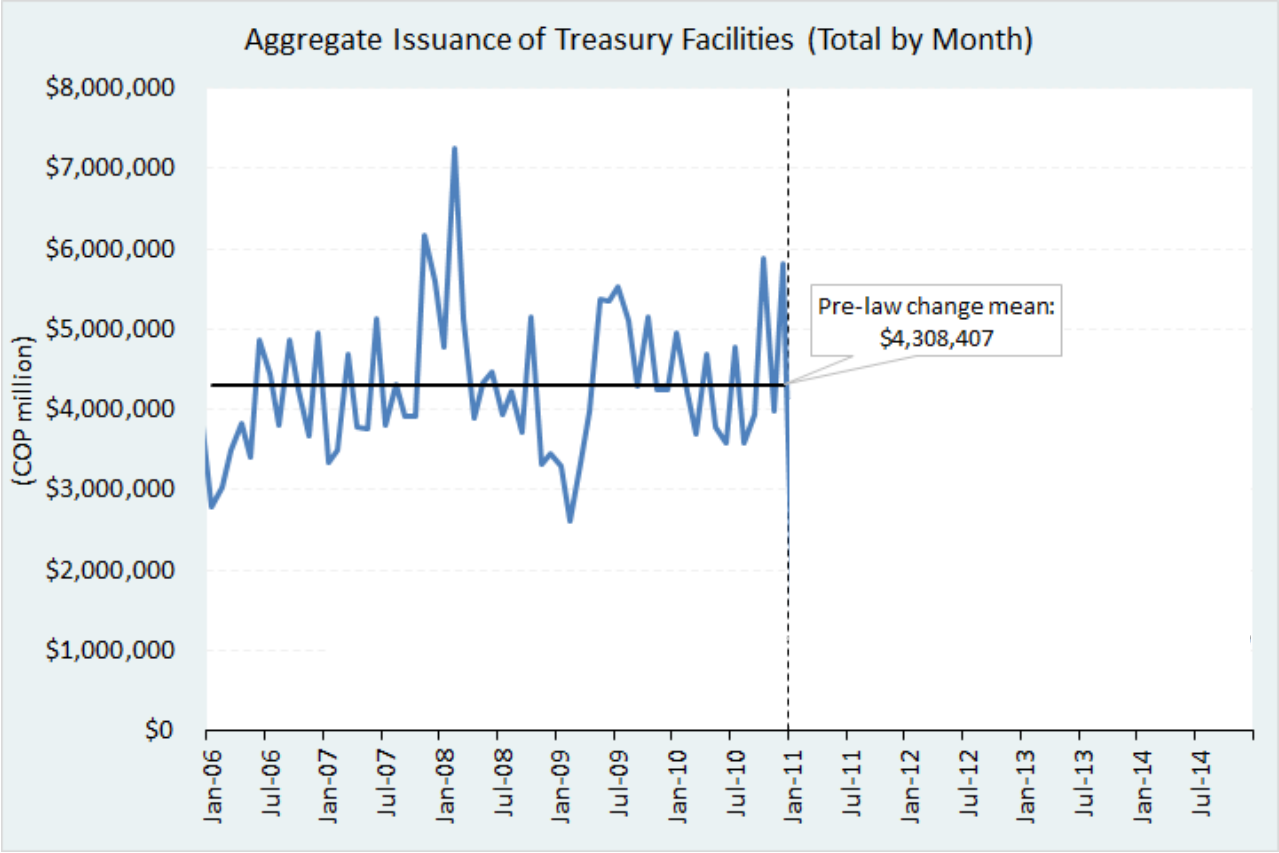

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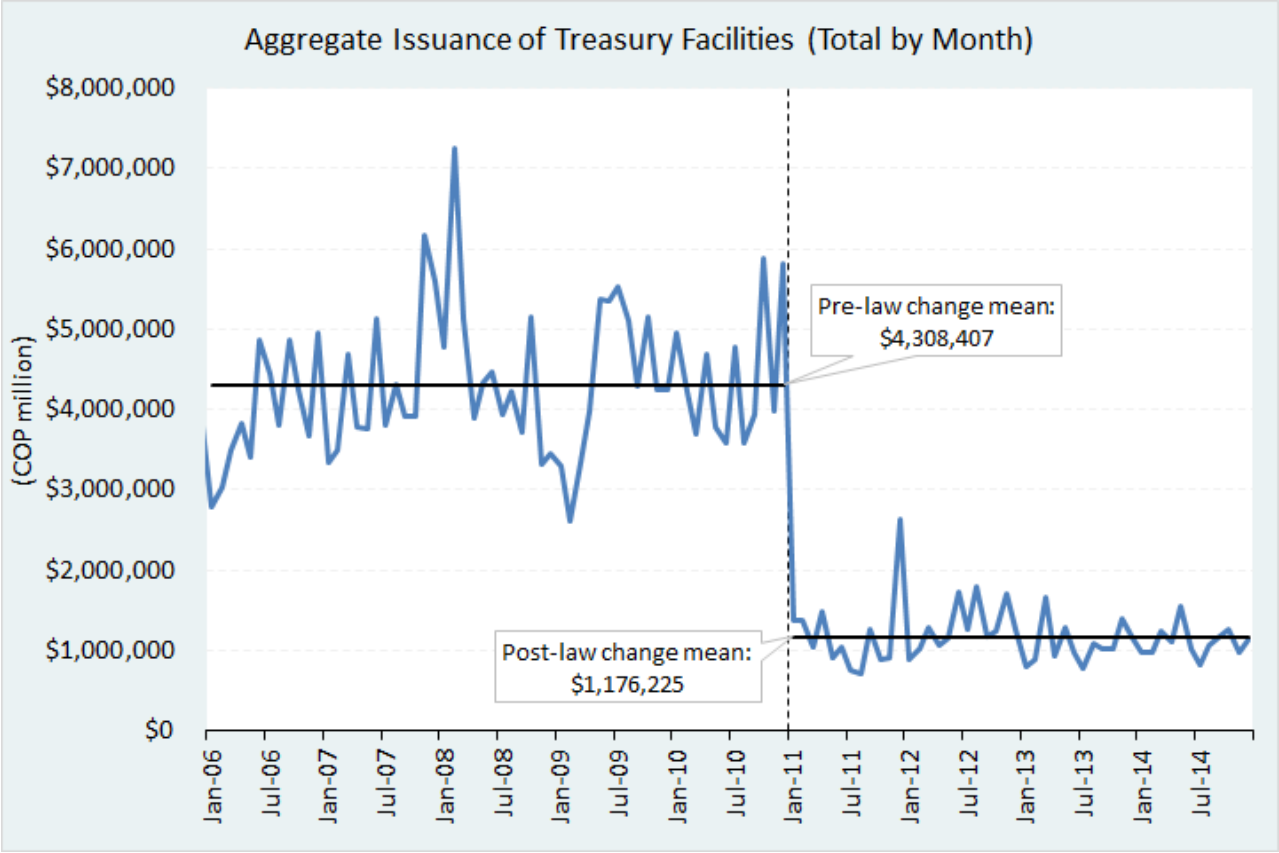

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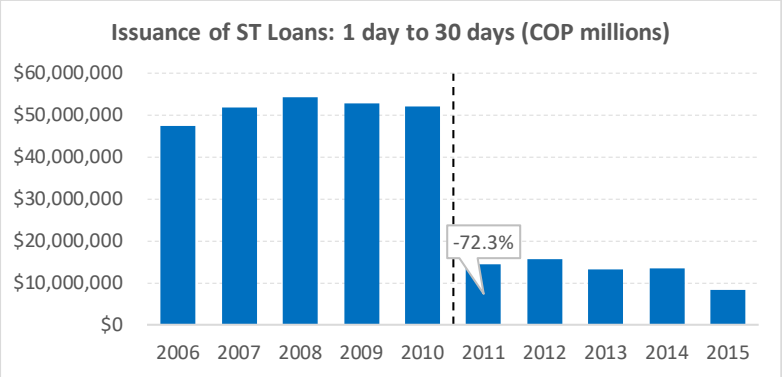

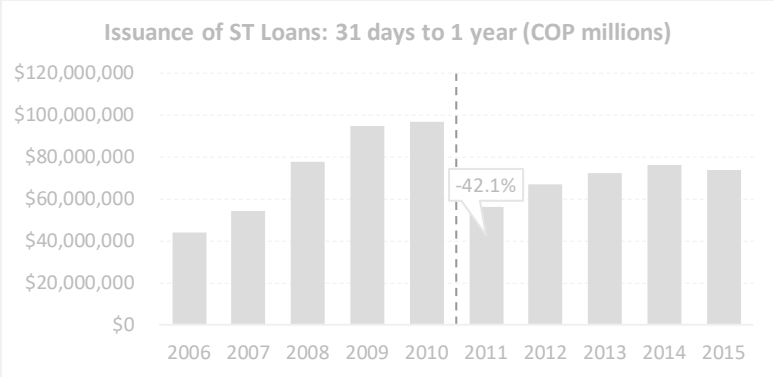

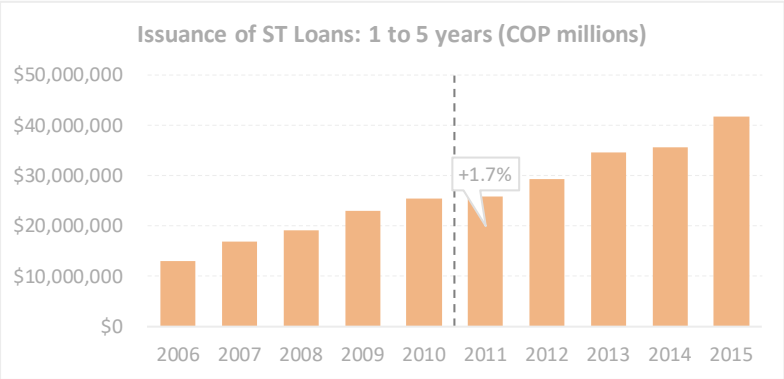

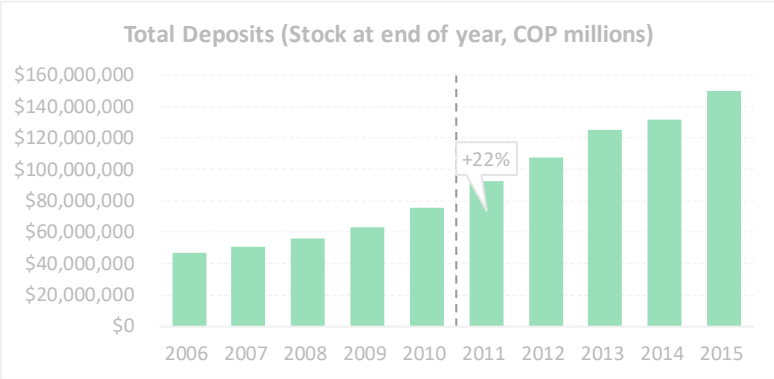

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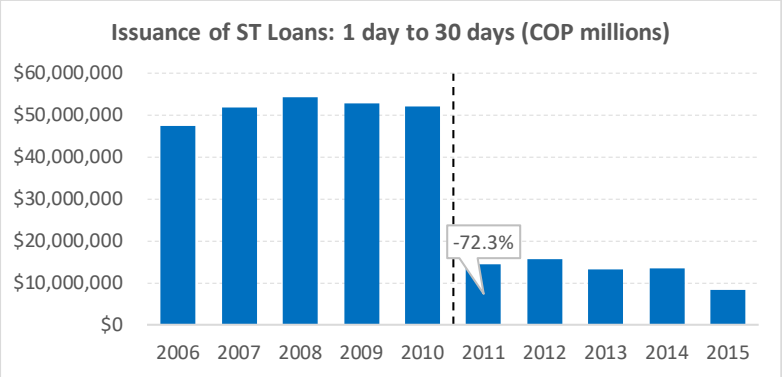

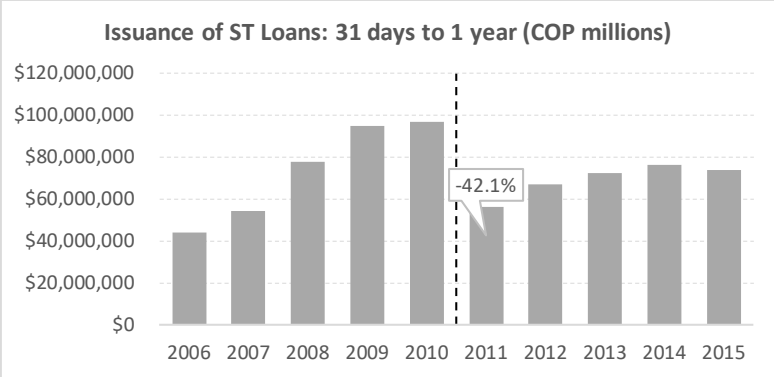

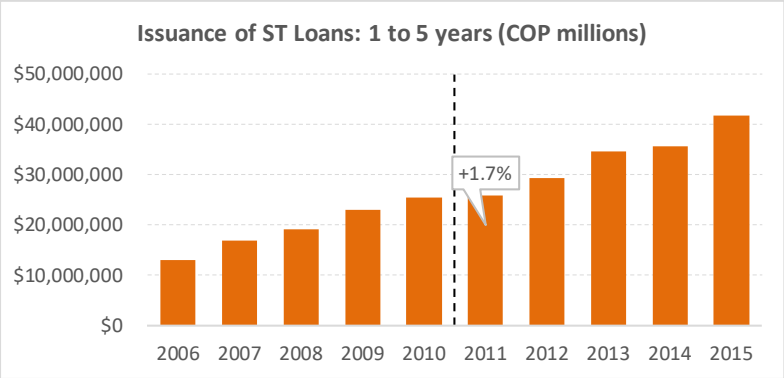

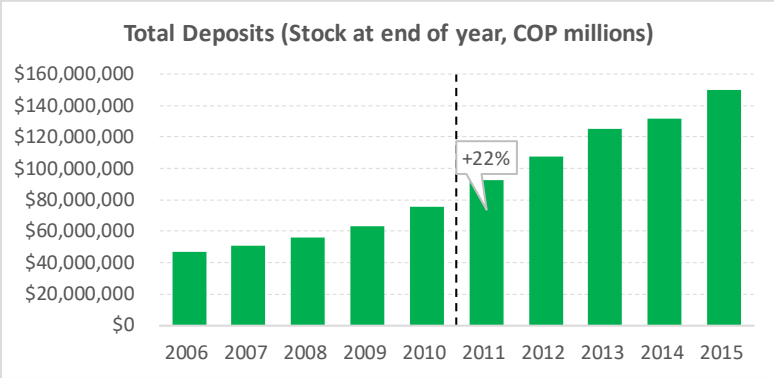

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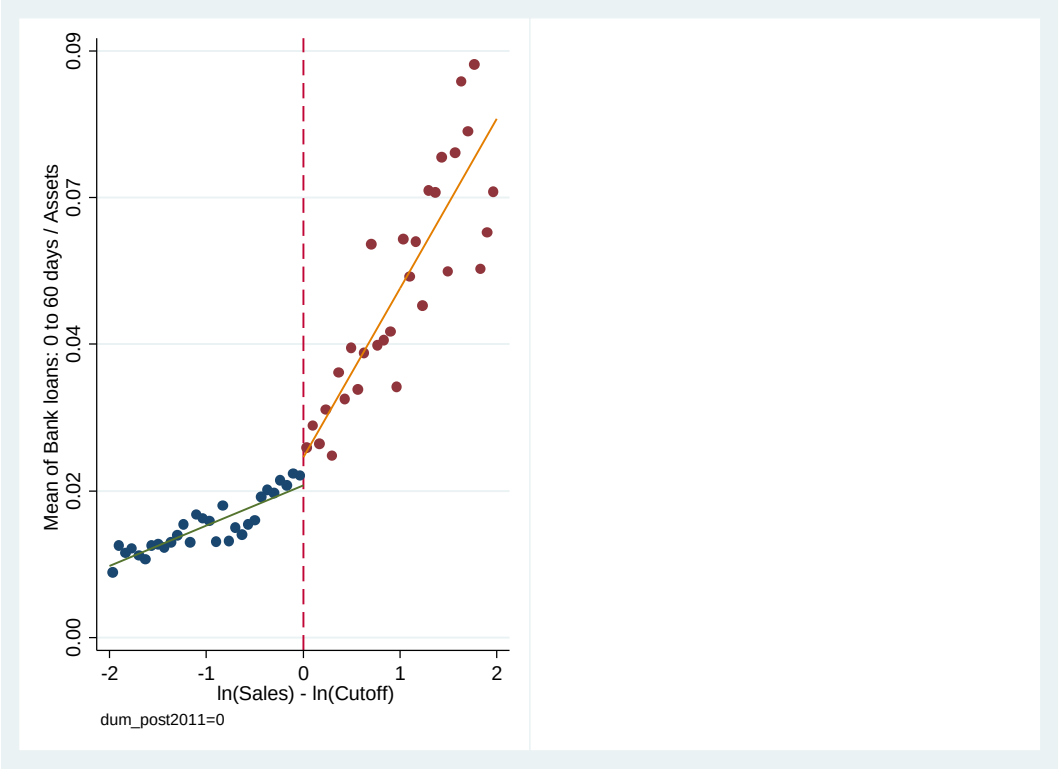
Use of Short-Term Debt by Firm Size (Pre v. Post)



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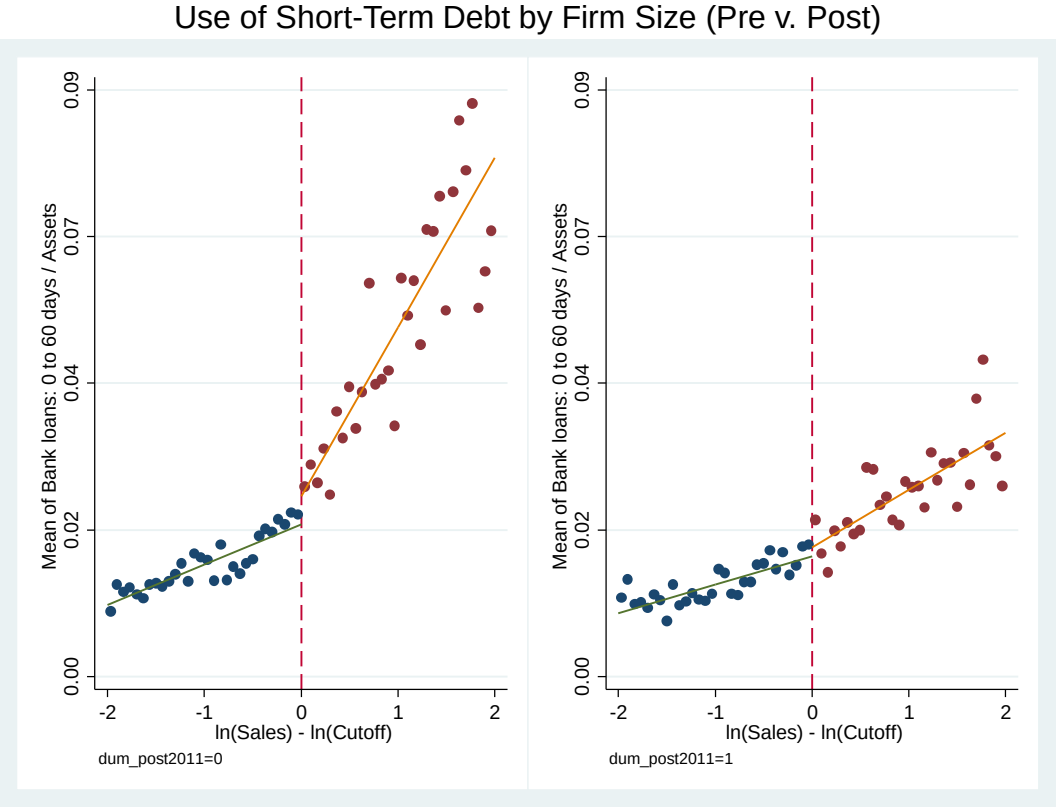
2. There is a strong discontinuity for firms above a fixed sales-size cutoff
   - And tax affected large firms more than small firms



Identification solution: Colombia initiated a tax on loan payments, 2011

1. Tax had large impact on the cost of using bank loans for liquidity management
2. Tax affected large firms more than small firms
   - And there is a strong discontinuity for firms above a fixed sales-size cutoff

- Instrument short-term debt with:

SalesSize x Post × Above Cutoff

  - Passes exclusion restriction if flattening occurred only due to tax innovation
  - We pass placebo tests analogous to 'parallel trends'

Research Design

- Reduced form approach:

$$STD_{i,t} = \alpha_i + \gamma_t + \beta_1 SalesSize_i \times AboveCutoff_i \times Post_t + \beta_2 AboveCutoff_i \times Post_t$$
$$+ \beta_3 SalesSize_i \times Post_t + Other\ Controls_{i.t} + \varepsilon_{i,t}$$

- Treatment – Control interpretation of our regressions:
  - Firms above sales cutoff are 'treatment' group
  - Firms below cutoff are 'control'
  - $SalesSize_i$ = $ln(Sales_i) - ln(Cutoff)$
  - β_1 estimate the heterogeneous treatment effect of the tax shock

Data

- Sample: Annual firm-level data between 2008 and 2013
  - All private firms (very few large, public companies in Colombia)
  - 3 years in pre period, 3 years in post period

Summary Statistics

	Firms Below Sales Cutoff		Firms Above Sales Cutoff	
	Mean	Std. Deviation	Mean	Std. Deviation
Bank Debt / Assets	0.146	0.156	0.194	0.179
ST Bank Debt (1 year or less) / Assets	0.088	0.118	0.129	0.149
LT Bank Debt (more than 1 year) / Assets	0.058	0.111	0.065	0.109
Accounts Payable / Assets	0.127	0.148	0.147	0.151
Accounts Receivable / Assets	0.209	0.182	0.232	0.179
Cash Holdings / Assets	0.072	0.101	0.057	0.080
ST Debt Issuance (0 to 60 days) / Assets	0.015	0.051	0.039	0.093
Capex / Assets	0.041	0.084	0.045	0.080
Profit Margin	0.044	0.107	0.034	0.089
Asset Tangibility	0.183	0.183	0.157	0.148
Ln(Assets)	15.358	0.922	17.288	1.304
Asset Growth	0.157	0.321	0.162	0.309
Age	19.290	11.804	24.633	15.786
Number of Firm-Years	49,004		18,208	
Number of Distinct Firms	9,418		3,231	

Industry Distribution

	Number of Observations	Number of Firms
A - Agriculture, hunting and forestry	3,856	722
B - Fishing	99	19
C - Mining and quarrying	1,335	257
D - Manufacturing	16,899	3,070
F - Construction	6,503	1,330
G - Wholesale and retail trade	25,269	4,703
H - Hotels and restaurants	1,329	252
I - Transport, storage and communications	2,287	443
K - Real estate, renting and business activities	7,759	1,498
M - Education	380	71
N - Health and social work	149	32
O - Other community, social and personal service activities	1,300	243
P - Domestic staff	47	9
Total	67,212	12,649

Results

- First Stage
- Reduced Forms
- Split by Trade Credit Access

Effect on Issuance of ST Debt (Bank debt ≤ 60 days)

	Issuance of ST Debt (≤ 60 days) / Assets			Placebo Test		
	(1)	(2)	(3)	(4)	(5)	(6)
Sales Size * Post 2011	-0.001*	-0.002***	-0.002***	-0.002*	-0.002**	-0.002**
	(0.001)	(0.001)	(0.001)	(0.001)	(0.001)	(0.001)
Above Cutoff * Post 2011	-0.006**	-0.006**	-0.005**	-0.007**	-0.006**	-0.006**
	(0.002)	(0.003)	(0.003)	(0.003)	(0.003)	(0.003)
Sales Size * Above Cutoff * Post 2011	-0.012***	-0.012***	-0.013***	-0.013***	-0.013***	-0.013***
	(0.002)	(0.002)	(0.002)	(0.002)	(0.002)	(0.002)
Sales Size * Year=2010				-0.001	0.001	0.001
				(0.001)	(0.001)	(0.001)
Above Cutoff * Year=2010				-0.002	-0.001	-0.001
				(0.003)	(0.003)	(0.003)
Sales Size * Above Cutoff * Year=2010				-0.002	-0.001	-0.001
				(0.002)	(0.002)	(0.002)
Year FE	Yes	Yes	Yes	Yes	Yes	Yes
Firm FE	Yes	Yes	Yes	Yes	Yes	Yes
Firm Controls	No	Yes	Yes	No	Yes	Yes
Industry × Year FE	No	No	Yes	No	No	Yes
Observations	61,461	56,535	56,535	61,461	56,535	56,535
r^2 (within Firm FE)	0.027	0.032	0.036	0.028	0.032	0.036

Leverage and Cash

	Leverage = Bank Debt / Assets			Cash / Assets		
	(1)	(2)	(3)	(4)	(5)	(6)
Sales Size * Post 2011	0.005***	0.002	0.002	-0.003***	-0.003**	-0.003**
	(0.002)	(0.002)	(0.002)	(0.001)	(0.001)	(0.001)
Above Cutoff * Post 2011	0.004	0.001	0.001	0.003	0.005**	0.005**
	(0.004)	(0.004)	(0.004)	(0.002)	(0.002)	(0.002)
Sales Size * Above Cutoff * Post	-0.012***	-0.009***	-0.008***	0.005***	0.004**	0.004**
	(0.002)	(0.003)	(0.003)	(0.001)	(0.002)	(0.002)
Year FE	Yes	Yes	Yes	Yes	Yes	Yes
Firm FE	Yes	Yes	Yes	Yes	Yes	Yes
Firm Controls	No	Yes	Yes	No	Yes	Yes
Industry × Year FE	No	No	Yes	No	No	Yes
Observations	65,243	56,535	56,535	65,243	56,535	56,535
r^2 (within Firm FE)	0.004	0.020	0.022	0.002	0.008	0.010

Leverage: Short v. Long

	Short-term Bank Debt / Assets (< 1 year)			Long-term Bank Debt / Assets (>= 1 year)		
	(1)	(2)	(3)	(4)	(5)	(6)
Sales Size * Post 2011	0.004***	0.004**	0.003**	0.000	-0.001	-0.002
	(0.001)	(0.002)	(0.002)	(0.001)	(0.001)	(0.001)
Above Cutoff * Post 2011	-0.001	-0.002	-0.002	0.005*	0.003	0.003
	(0.003)	(0.003)	(0.003)	(0.003)	(0.003)	(0.003)
Sales Size * Above Cutoff * Post 2011	-0.009***	-0.009***	-0.008***	-0.003	0.000	0.000
	(0.002)	(0.002)	(0.002)	(0.002)	(0.002)	(0.002)
Year FE	Yes	Yes	Yes	Yes	Yes	Yes
Firm FE	Yes	Yes	Yes	Yes	Yes	Yes
Firm Controls	No	Yes	Yes	No	Yes	Yes
Industry × Year FE	No	No	Yes	No	No	Yes
Observations	65,243	56,535	56,535	65,243	56,535	56,535
r^2 (within Firm FE)	0.003	0.007	0.010	0.005	0.017	0.020

Trade Credit

	Accounts Payable / Assets			Net Accounts Payable / Assets		
	(1)	(2)	(3)	(4)	(5)	(6)
Sales Size * Post 2011	-0.004***	-0.002	-0.002	0.000	-0.001	-0.001
	(0.001)	(0.001)	(0.001)	(0.002)	(0.002)	(0.002)
Above Cutoff * Post 2011	-0.001	0.000	0.000	0.000	0.001	0.001
	(0.003)	(0.003)	(0.003)	(0.004)	(0.004)	(0.004)
Sales Size * Above * Post	0.010***	0.007***	0.006***	0.003	0.003	0.003
	(0.002)	(0.002)	(0.002)	(0.002)	(0.003)	(0.003)
Year FE	Yes	Yes	Yes			
Firm FE	Yes	Yes	Yes	Yes	Yes	Yes
Firm Controls	No	Yes	Yes	Yes	Yes	Yes
Industry × Year FE	No	No	Yes	No	Yes	Yes
Observations	65,243	56,535	56,535	No	No	Yes
r^2 (within Firm FE)	0.017	0.021	0.024	65,243	56,535	56,535

Investment (Cap Ex. / Assets)

	(1)	(2)	(3)
Sales Size * Post 2011	-0.001	0.001	0.000
	(0.001)	(0.001)	(0.001)
Above Cutoff * Post 2011	0.003	0.005**	0.003
	(0.002)	(0.002)	(0.002)
Sales Size * Above * Post	-0.003	-0.006***	-0.004**
	(0.002)	(0.002)	(0.002)
Year FE	Yes	Yes	Yes
Firm FE	Yes	Yes	Yes
Firm Controls	No	Yes	Yes
Industry × Year FE	No	No	Yes
Observations	61,461	56,535	56,535
r^2 (within Firm FE)	0.012	0.085	0.093

Magnitudes

- Compare firm 2 Log-Points above cutoff with firms at the cutoff:
  - Cash increases 2*0.004 = 0.8%
  - Average Cash = 5.7% of assets
  - AP increases 2*0.006 = 1.2%
  - Average = 14.7%
  - Investment declines 2*0.004 = 0.8%
  - Average = 4.5%

How do results vary with access to TC?

- Our setting allows us to identify a shock to trade credit demand stemming from the tax on short term bank credit

- Use 3-digit SIC Industry median TC usage from U.S. *Compustat* firms (Rajan & Zingales and many others)

  - Payable days > Receivable days ➔ **High TC Access**
  - Payable days <= Receivable days ➔ **Low TC Access**
    - Payable days = Accounts payable / ((COGS + Change inventories)/365)
    - Receivable days = Accounts receivable / (Sales/365)

Split by TC Access: Accounts Payable & Receivable

	Accounts Payable / Assets			Net Accounts Payable / Assets		
	(1)	(2)	(3)	(4)	(5)	(6)
Sales Size * Post 2011	-0.001	0.003	0.003	0.004	0.004	0.004
	(0.002)	(0.002)	(0.002)	(0.003)	(0.003)	(0.003)
Above Cutoff * Post 2011	-0.001	-0.001	-0.001	-0.002	0.000	0.000
	(0.003)	(0.003)	(0.003)	(0.005)	(0.005)	(0.005)
Hi TC Access * Post 2011	-0.014***	-0.017***	-0.008	-0.011*	-0.013**	-0.016**
	(0.004)	(0.005)	(0.006)	(0.006)	(0.006)	(0.008)
Hi TC Access * Sales Size * Post 2011	-0.006*	-0.010***	-0.010***	-0.007*	-0.009*	-0.009*
	(0.003)	(0.004)	(0.004)	(0.004)	(0.005)	(0.005)
Hi TC Access * Above Cutoff * Post 2011	0.000	0.005	0.004	0.005	0.004	0.004
	(0.006)	(0.007)	(0.007)	(0.009)	(0.009)	(0.009)
Sales Size * Above Cutoff * Post	0.005**	0.000	0.000	-0.003	-0.005	-0.005
	(0.002)	(0.002)	(0.002)	(0.004)	(0.004)	(0.004)
Hi TC Access * Sales Size * Above * Post	0.012***	0.017***	0.017***	0.012**	0.016**	0.016**
	(0.005)	(0.005)	(0.005)	(0.006)	(0.006)	(0.007)
Year FE	Yes	Yes	Yes			
Firm FE	Yes	Yes	Yes	Yes	Yes	Yes
Firm Controls	No	Yes	Yes	Yes	Yes	Yes
Industry × Year FE	No	No	Yes	No	Yes	Yes
Observations	52,287	45,245	45,245	No	No	Yes
R2 (within Firm FE)	0.017	0.021	0.025	52,287	45,245	45,245

Split by TC Access: Cash & Leverage

	Leverage = Bank Debt / Assets			Cash / Assets		
	(1)	(2)	(3)	(4)	(5)	(6)
Sales Size * Post 2011	0.004*	0.001	0.001	-0.003**	-0.003	-0.003
	(0.002)	(0.003)	(0.003)	(0.002)	(0.002)	(0.002)
Above Cutoff * Post 2011	0.006	0.002	0.002	-0.001	0.003	0.003
	(0.005)	(0.005)	(0.005)	(0.003)	(0.003)	(0.003)
Hi TC Access * Post 2011	0.003	0.004	-0.002	0.002	0.001	-0.003
	(0.005)	(0.006)	(0.007)	(0.003)	(0.003)	(0.004)
Hi TC Access * Sales Size * Post 2011	0.001	0.002	0.002	0.004	0.003	0.003
	(0.004)	(0.004)	(0.004)	(0.002)	(0.003)	(0.003)
Hi TC Access * Above Cutoff * Post 2011	0.000	0.001	0.001	0.003	0.001	0.001
	(0.008)	(0.008)	(0.008)	(0.004)	(0.005)	(0.005)
Sales Size * Above Cutoff * Post 2011	-0.012***	-0.008**	-0.008**	0.007***	0.005**	0.005**
	(0.003)	(0.004)	(0.004)	(0.002)	(0.002)	(0.002)
Hi TC Access * Sales Size * Above * Post	0.000	-0.004	-0.004	-0.008**	-0.006*	-0.006*
	(0.006)	(0.006)	(0.006)	(0.003)	(0.004)	(0.004)
Year FE	Yes	Yes	Yes	Yes	Yes	Yes
Firm FE	Yes	Yes	Yes	Yes	Yes	Yes
Firm Controls	No	Yes	Yes	No	Yes	Yes
Industry × Year FE	No	No	Yes	No	No	Yes
Observations	52,287	45,245	45,245	52,287	45,245	45,245
R2 (within Firm FE)	0.005	0.021	0.022	0.002	0.008	0.010

Split by TC Access: Real Investment (CapX)

	(1)	(2)	(3)
Sales Size * Post 2011	-0.001	0.001	0.000
	(0.002)	(0.002)	(0.002)
Above Cutoff * Post 2011	0.005	0.008**	0.006*
	(0.003)	(0.004)	(0.004)
Hi TC Access * Post 2011	0.003	0.005	-0.008*
	(0.003)	(0.004)	(0.004)
Hi TC Access * Sales Size * Post 2011	-0.003	-0.002	-0.001
	(0.003)	(0.003)	(0.003)
Hi TC Access * Above Cutoff * Post 2011	0.001	-0.002	0.000
	(0.005)	(0.005)	(0.005)
Sales Size * Above Cutoff * Post 2011	-0.006**	-0.008***	-0.006**
	(0.003)	(0.003)	(0.003)
Hi TC Access * Sales Size * Above * Post	0.008**	0.007*	0.005
	(0.004)	(0.004)	(0.004)
Year FE	Yes	Yes	Yes
Firm FE	Yes	Yes	Yes
Firm Controls	No	Yes	Yes
Industry × Year FE	No	No	Yes
Observations	49,208	45,245	45,245
R2 (within Firm FE)	0.012	0.088	0.096

Conclusion

- Contribution
  - We isolate how a shock to bank-supplied liquidity via very short-term debt affects trade credit, cash and investment
  - Earlier papers cannot separate credit role of banking from liquidity role
- Results
  - Higher cost of bank liquidity leads to substitution to cash and trade credit, but not to longer term bank debt
  - Trade credit is an efficient alternate source for some firms
  - But not all: firms that substitute into cash cut investment