

# **Do Banks or VCs Spur Growth?**

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# Academic Relevance

- According to the U.S. Department of Treasury and Internal Revenue Service:
  - There were more than 23 million nonfarm sole proprietorships, more than 2 million partnerships with less than \$1 million in assets and more than 5 million corporations with less than \$1 million in assets that filed tax returns for 2006.
- Small firms are vital to the U.S. economy.
  - According to the U.S. Small Business Administration, small businesses account for half of all U.S. private-sector employment and produce 2/3rds of net job growth in the U.S.

## Academic Relevance

- Looking at more than 40,000 firms in 80 countries over 2006 – 2011, Cole and Dietrich (2013) find that:
  - 67% Needed credit
  - 28% Needed credit but were discouraged from applying
  - 16% applied for credit but were turned down.
  - Only 26% needed credit and got credit.
- SME Funding is important.

# Policy Relevance

- *Small Business Jobs Act of 2010*

Extended SBA enhanced loan provisions; offered billions more in lending support, tax cuts, and other opportunities for small businesses. Authorized creation of the Small Business Lending Fund

- *Small Business Lending Fund*

U.S. Treasury funding of \$30 billion in equity of small banks that were supposed to increase lending to small businesses.

- *U.S. Small Business Administration VC programs:*

Small Business Investment Companies (SBICs)

New Markets Venture Capital Companies

- *Jumpstart Our Business Startups Act (JOBS Act) 2012*

- Regulatory relief from reporting requirement for new public companies and for large privately held companies

- *Small Business Lending Enhancement Act of 2013*

- Legislation to enhance SBL by credit unions by raising loan limits.

## What we do in this paper?

- ❖ We compare the effects of two main sources of entrepreneurial finance on SME activities:
  - Debt: Small loans by commercial banks
  - Equity: investments by venture-capital (VC) firms.

# What we do in this paper?

❖ We consider

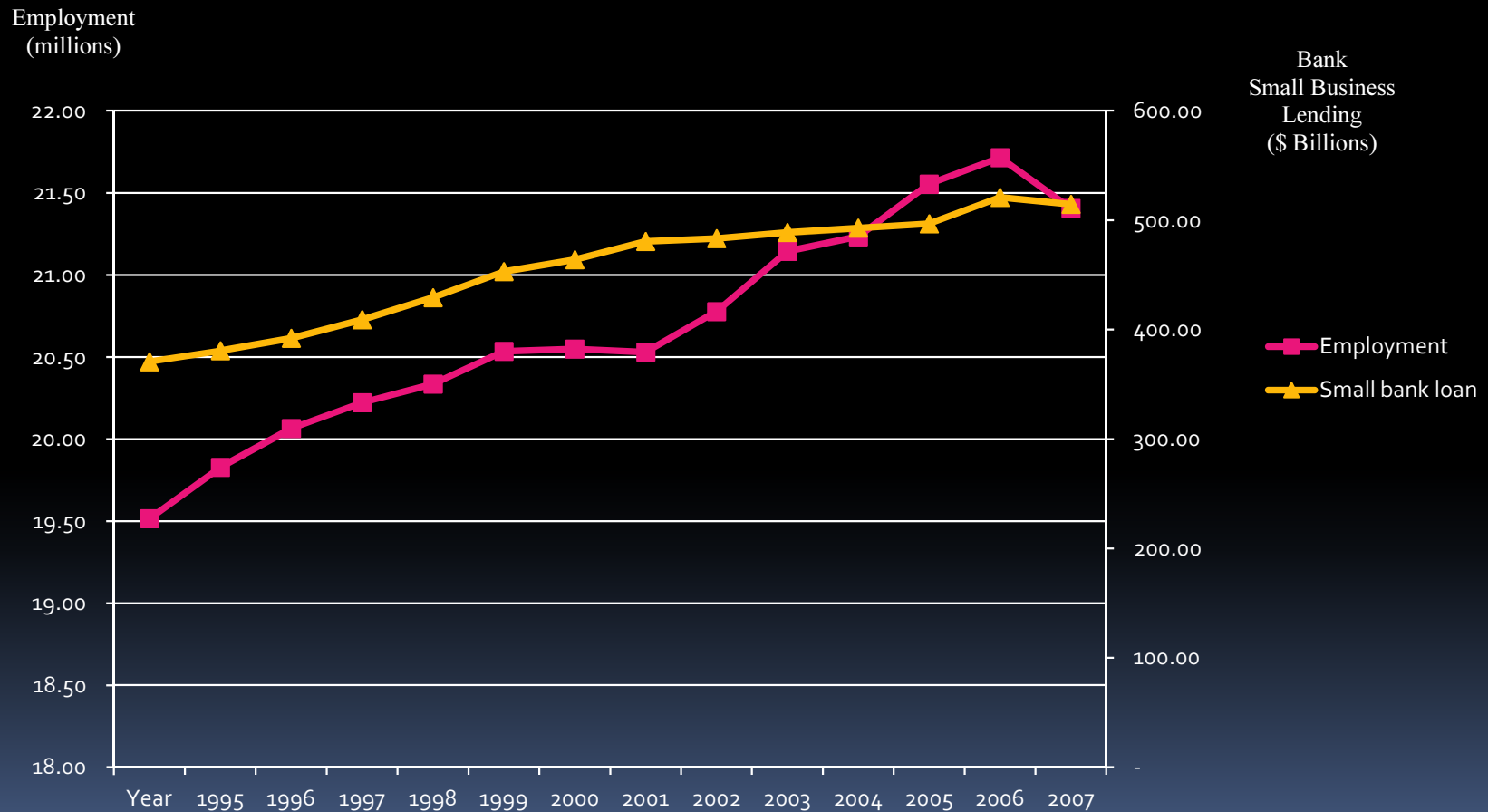
four main indicators of entrepreneurship:

- Growth rate for the number of new firms,
- Growth rate for the number of new establishments,
- Growth rate for new firm employment, and
- Growth rate for new firm payroll.

# What we do in this paper?

- ❖ We analyze
- ❖ four types of firm by employment size:
  - ❖ 0 – 4
  - ❖ 5 – 19
  - ❖ 20 – 99
  - ❖ 100 – 499

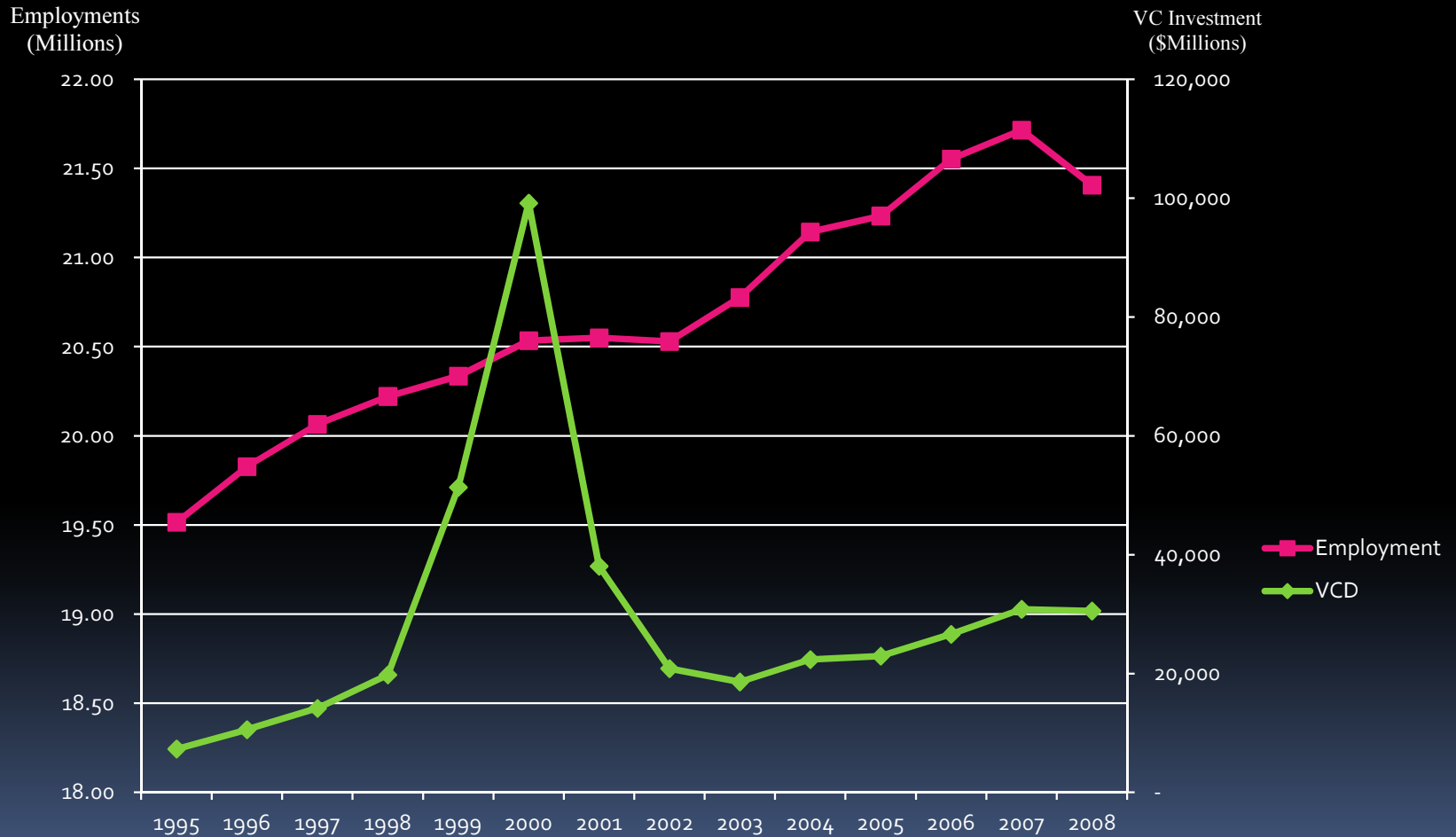
# Dynamics of Employment and Bank Small Business Lending



\* The above graph is based on firms with less than 20 employees.



# Dynamics of Employment and VC Equity Investment



\* The above graph is based on firms with less than 20 employees.

## Summary of Results:

- ❖ We find the effect of VC to be both economically and statistically significant in stimulating new firms, new establishments, new employment, and new payroll.
- ❖ A 1-standard deviation increase in VC finance gives rise to an increase in the growth of:
  - ❖ new establishments by approximately 33%,
  - ❖ firms by approximately 37%,
  - ❖ employment by approximately 22%, and
  - ❖ payroll by approximately 6%.
- ❖ Results are robust to controls for endogeneity.
- ❖ We do not find similar evidence for small bank loans.

## Relevant literature:

### ❖ Bank lending to small businesses

- Cole , Wolken and Woodburn (1996); Black and Strahan (2002); Petersen and Rajan (2002); Berger *et al.* (2005); Puri, Rocholl, and Steffen (2009); Berger and Black (2011); Cole and Sokolyk (2013); Robb and Robinson (2013)

### ❖ Venture capital and entrepreneurship

- Gompers and Lerner (1999); Bertoni, Colombo and Grilli (2011); Samila and Sorrensen (2009)

### ❖ Venture Capital vs. Bank Credit

- Berger and Schaeck (2011); Robb and Robinson (2013)

# Data

## ❖ Entrepreneurial activities:

- ❖ U.S. Small Business Administration

## ❖ Venture capital investment:

- ❖ PWC/National Venture Capital Association Money Tree™ report

## ❖ Small business lending:

- ❖ U.S. FFIEC Reports of Condition and Income (“Call Reports”)

## ❖ Other control variables:

- ❖ population, GDP, education, banking market structure, policy indices, Patent counts. Various sources.

# Methodology

Panel model with state and year fixed effects.

$$\Delta E_{i,t} = \alpha X_{i,t} + \beta T_t + \delta S_i + \eta Z_{i,t} + \varepsilon_{i,t}$$

- E: Measures of Entrepreneurial Activity
- X: Bank Lending / VC Investment variables
- Y: Time Fixed Effects
- S: State Fixed Effects
- Z: State-Level Control Variables

# Methodology

- ❖ For each dependent variable, we disaggregate into four employee-size buckets:
  - 0 – 4 employees,
  - 5 – 19 employees,
  - 20 – 99 employees,
  - 100 – 499 employees

# Methodology

- ❖ Four measures of entrepreneurial activity:
  - Growth rate of number of firms
  - Growth rate of number of establishments
  - Growth rate of number of employees
  - Growth rate of total payroll

## Methodology

- ❖ Our state-level measure of bank lending to small businesses observed as of year (t-1) is disaggregated into three dollar-size buckets:
  - \$1 - \$100,000
  - \$100,001 - \$500,000
  - \$500,001 - \$1,000,000



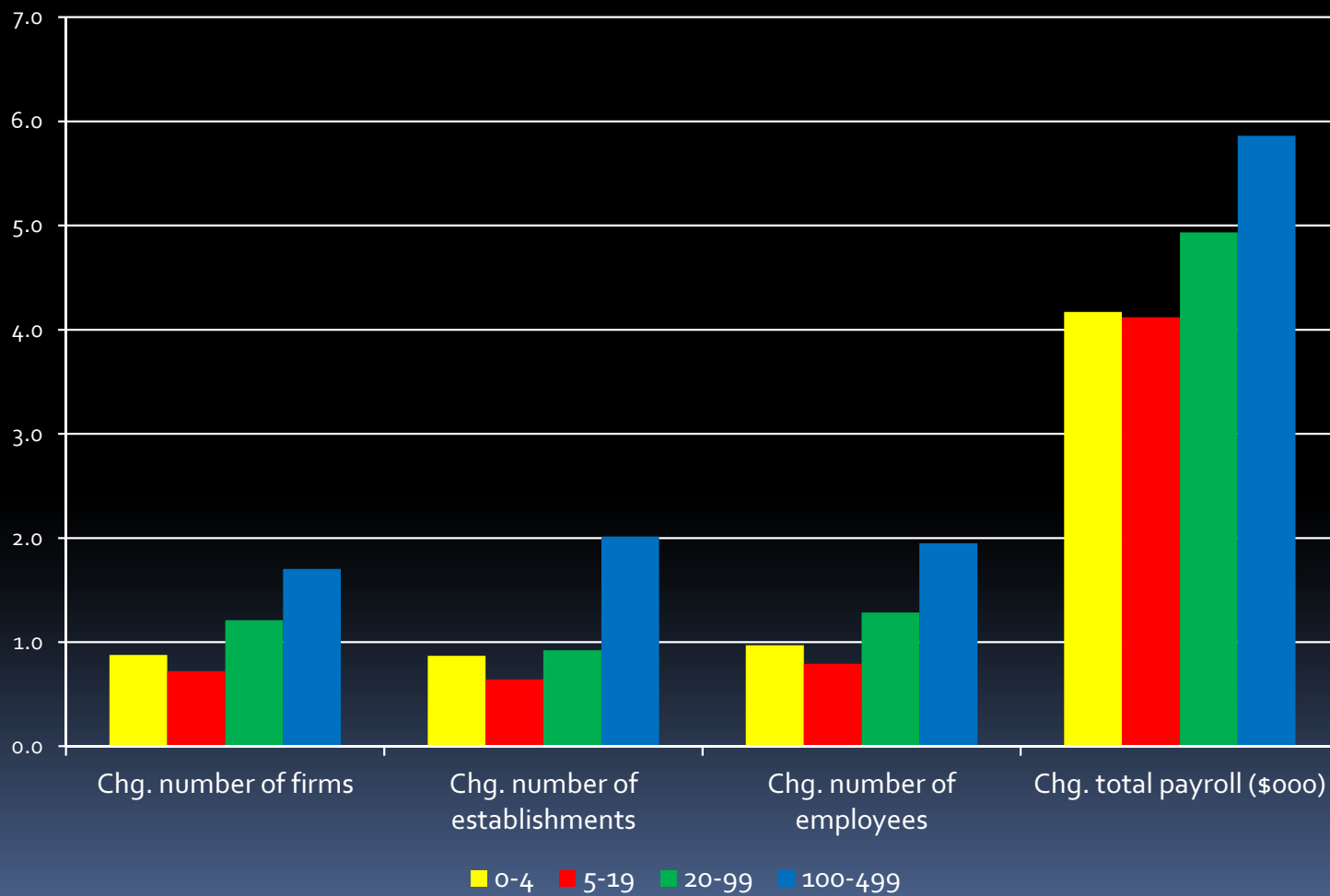
# Methodology

## ❖ State-level control variables

(lagged for one period):

- Growth rate of personal income (BEA)
- Log of cumulative 20-year patent counts
- Fraction of population with college education
- Public policy indices (Fraser Institute):
  - Size of Government
  - Takings/Taxation
  - Labor Freedom

# Growth Rates for Entrepreneurship Variables:



# Descriptive Statistics for Explanatory Variables

Variable	Definition	Median	Mean	Std. Err.
Log(SBL)	Logarithm of total small bank lending in year t-1	15.64	15.63	0.04
Log(VCD)	Logarithm of total venture capital investment in year t-1	14.01	13.72	0.08
Pct. Personal Income	Growth rate of personal income in year t-1	-0.01	0.31	0.13
Education	Fraction of persons 25 years old and over with a bachelor's degree or more	0.25	0.25	0.00
Log(Patent 20yr)	Logarithm of cumulative patent counts during the 20-year period from t-20 to t-1 year	8.96	8.35	0.10
Size of Government Index	Computed by the Fraser Institute, the index measures the government intervention in the economy, The index has a scale from 0 to 10, with a high score indicating a smaller government sector.	7.20	7.20	0.03
Takings and Dis. Tax Index	Computed by the Fraser Institute, the index measures the general tax revenues collected by government. The index has a scale from 0 to 10, with a higher score indicating a lower degree of takings and discriminatory taxation.	5.90	5.92	0.03
Labor Freedom Index	Computed by the Fraser Institute, the index measures the general labor conditions. The index has a scale from 0 to 10, with a higher score indicating a lower level of labor regulation.	7.20	7.22	0.02

# Fixed-Effects Regression Results

Firm	Funding	(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)
Size	Variable	% Chg. Firms		% Chg. Establ		% Chg. Emp		% Chg. Payroll	
0-4	Log(SBL)	-0.18		-0.19		-0.33	***	-0.19	
	Log(VCD)		0.07 *		0.07 *			0.02	0.01
	R-square	0.74	0.75	0.74	0.75	0.66	0.66	0.37	0.37
5-19	Log(SBL)	-0.02		-0.01		0.03		-0.17	
	Log(VCD)		0.11 ***		0.12 ***			0.09 *	0.06
	R-square	0.64	0.64	0.63	0.63	0.55	0.55	0.50	0.49
20-99	Log(SBL)	0.12		0.22		0.10		-0.31	
	Log(VCD)		0.15 ***		0.06			0.16 **	0.20 **
	R-square	0.57	0.56	0.77	0.76	0.61	0.60	0.62	0.60
100-499	Log(SBL)	-0.32		-0.89 **		-0.49		-0.53	
	Log(VCD)		0.04		-0.17			0.03	-0.03
	R-square	0.48	0.47	0.55	0.55	0.45	0.46	0.37	0.36

# Fixed-Effects Regression Results

Firm Size	Funding Variable	(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)
		% Chg. Firms		% Chg. Establ		% Chg. Emp		% Chg. Payroll	
0-4	Log(SBL)	-0.18		-0.19		-0.33	***	-0.19	
	Log(VCD)		0.07 *		0.07 *		0.02		0.01
	R-square	0.74	0.75	0.74	0.75	0.66	0.66	0.37	0.37
5-19	Log(SBL)	-0.02		-0.01		0.03		-0.17	
	Log(VCD)		0.11 ***		0.12 ***		0.09 *		0.06
	R-square	0.64	0.64	0.63	0.63	0.55	0.55	0.50	0.49
20-99	Log(SBL)	0.12		0.22		0.10		-0.31	
	Log(VCD)		0.15 ***		0.06		0.16 **		0.20 **
	R-square	0.57	0.56	0.77	0.76	0.61	0.60	0.62	0.60
100-499	Log(SBL)	-0.32		-0.89 **		-0.49		-0.53	
	Log(VCD)		0.04		-0.17		0.03		-0.03
	R-square	0.48	0.47	0.55	0.55	0.45	0.46	0.37	0.36

# FE Regression Results – Firm Size 5 – 19

	Pct Firms			Pct Establishmen			Pct Employment			Pct Payroll		
Log(SBL)	-0.06			-0.04			0.00			-0.22		
	-0.13			-0.13			-0.16			-0.22		
Log(VCD)			0.11 ***			0.11			0.08 *			0.11 ***
			-0.04			-0.04			-0.05			-0.04
Pct. Personal Income	-0.01	-0.01	-0.01	-0.01	-0.01	0.00	-0.01	0.00	-0.01	0.00	-0.01	-0.01
	-0.01	-0.01	-0.01	-0.01	-0.01	-0.01	-0.01	-0.01	-0.01	-0.02	-0.01	-0.01
Education	0.37	-0.44	0.28	-0.75	1.58	1.25	1.66	-0.44				
	-2.74	-2.66	-2.77	-2.69	-3.53	-3.41	-4.78	-2.66				
Log(Patent 20yr)	0.84 ***	0.87 ***	0.82 ***	0.87 ***	0.80 ***	0.86 ***	1.03 **	0.87 ***				
	-0.24	-0.22	-0.24	-0.22	-0.30	-0.28	-0.42	-0.22				
Size of Government Index	0.83 ***	0.88 ***	0.81 ***	0.83 ***	0.90 ***	0.93 ***	0.23	0.88 ***				
	-0.16	-0.16	-0.17	-0.16	-0.21	-0.21	-0.29	-0.16				
Takings and Dis. Tax Index	-0.63 ***	-0.62 ***	-0.61 ***	-0.60 ***	-0.69 ***	-0.67 ***	-0.54 **	-0.62 ***				
	-0.14	-0.14	-0.15	-0.14	-0.19	-0.18	-0.25	-0.14				
Labor Freedom Index	0.96 ***	0.68 ***	0.90 ***	0.66 ***	1.15 ***	0.85 ***	2.86 ***	0.68 ***				
	-0.26	-0.25	-0.27	-0.25	-0.34	-0.32	-0.46	-0.25				
N	660	694	660	694	659	693	659	694				

\* All regressions include both year and state fixed effects.

# Causality? IV Regression Approach

## ❖ Instrumental Variables (IV) for VC investment:

- Samila and Sorenson (2011)

$$LP\ returns_{it} = \sum_j \sum_{s=t-1}^{t-3} \frac{ER_s \ln(1 + LP_j)}{1 + dist_{ij}},$$

## ❖ Instrumental Variables (IV) for small bank loans:

- Fraction of banks with adjusted capital ratio less than 4%,
- Banking sector Herfindahl–Hirschmann Index
- Fraction of assets held by banks with assets < \$100/ \$300M

# IV Regression Results

Firm		% Chg. Firms				% Chg. Estab				% Chg. Payroll							
Size																	
0-4	Log(SBL hat)	-0.48		-0.49		-0.48		-0.49		-0.78	**	-0.84	**	-1.55		-2.04	**
		(-0.32)		(-0.33)		(-0.32)		(-0.33)		(-0.32)		(-0.33)		(-1.03)		(-1.03)	
	Log(VCD hat)	0.09	**	0.09	**	0.09	**	0.09	**	0.02		0.03		-0.02		-0.02	
		(0.04)		(0.04)		(0.04)		(0.04)		(-0.04)		(-0.04)		(-0.13)		(-0.13)	
19-May	Log(SBL hat)	0.00		-0.13		0.10		-0.03		0.20		0.09		-1.04	*	-1.51	***
		(0.32)		(0.34)		(0.32)		(0.33)		(0.41)		(0.40)		(0.57)		(0.56)	
	Log(VCD hat)	0.11	***	0.13	***	0.12	***	0.14	**	0.08		0.08		0.00		0.02	
		(0.04)		(0.04)		(0.04)		(0.04)		(-0.053)		(-0.052)		(-0.073)		(-0.071)	
20-99	Log(SBL hat)	-0.08		-0.06		-0.80		-0.79		-0.38		-0.34		-0.73		-0.64	
		(-0.46)		(-0.48)		(-0.50)		(-0.52)		(-0.51)		(-0.54)		(-0.64)		(-0.66)	
	Log(VCD hat)	0.21	***	0.19	***	0.10		0.07		0.21	***	0.22	***	0.20	**	0.22	***
		(0.06)		(0.06)		(0.07)		(0.07)		(0.07)		(0.07)		(0.08)		(0.09)	
100-499	Log(SBL hat)	0.27		0.20		0.31		0.62		0.01		-0.15		-0.21		-0.70	
		(0.68)		(0.70)		(0.91)		(0.94)		(0.85)		(-0.890)		(-1.094)		(-1.121)	
	Log(VCD hat)	0.02		0.03		-0.25	**	-0.27	**	0.05		0.06		-0.04		0.02	
		(0.09)		(0.09)		(-0.118)		(-0.122)		(0.11)		(0.12)		(-0.141)		(0.15)	



# IV Regression Results

Firm		% Chg. Firms				% Chg. Estab				% Chg. Payroll					
Size															
0-4	Log(SBL hat)	-0.48	-0.49	-0.48	-0.49	-0.78	**	-0.84	**	-1.55	-2.04	**			
		(-0.32)	(-0.33)	(-0.32)	(-0.33)	(-0.32)		(-0.33)		(-1.03)	(-1.03)				
	Log(VCD hat)	0.09	**	0.09	**	0.09	**	0.09	**	0.02	0.03	-0.02	-0.02		
		(0.04)		(0.04)		(0.04)		(0.04)		(-0.04)	(-0.04)	(-0.13)	(-0.13)		
19-May	Log(SBL hat)	0.00	-0.13	0.10	-0.03	0.20	0.09	-1.04	*	-1.51	***				
		(0.32)	(0.34)	(0.32)	(0.33)	(0.41)	(0.40)	(0.57)	(0.56)						
	Log(VCD hat)	0.11	***	0.13	***	0.12	***	0.14	**	0.08	0.08	0.00	0.02		
		(0.04)		(0.04)		(0.04)		(0.04)		(-0.053)	(-0.052)	(-0.073)	(-0.071)		
20-99	Log(SBL hat)	-0.08	-0.06	-0.80	-0.79	-0.38	-0.34	-0.73	-0.64						
		(-0.46)	(-0.48)	(-0.50)	(-0.52)	(-0.51)	(-0.54)	(-0.64)	(-0.66)						
	Log(VCD hat)	0.21	***	0.19	***	0.10	0.07	0.21	***	0.22	***	0.20	**	0.22	***
		(0.06)		(0.06)		(0.07)	(0.07)	(0.07)	(0.07)	(0.08)	(0.09)	(0.09)			
100-499	Log(SBL hat)	0.27	0.20	0.31	0.62	0.01	-0.15	-0.21	-0.70						
		(0.68)	(0.70)	(0.91)	(0.94)	(0.85)	(-0.890)	(-1.094)	(-1.121)						
	Log(VCD hat)	0.02	0.03	-0.25	**	-0.27	**	0.05	0.06	-0.04	0.02				
		(0.09)	(0.09)	(-0.118)	(-0.122)	(0.11)	(0.12)	(-0.141)	(0.15)						

## Robustness check

- ❖ Exclude California and Massachusetts
- ❖ Re-estimate small bank loan based on the location of loan recipient

## Summary and Conclusions

- ❖ We find the effect of VC to be both economically and statistically significant in stimulating growth in the number of new firms, the number of new establishments, new employment, and new payroll.
- ❖ Results are robust to controls for endogeneity
- ❖ We do not find similar evidence for small bank loans.



*Thanks for your attention!*