

Cambridge Judge Business School

Corporate Finance II

# Financial Contracting Theory Meets the Real World: An Empirical Analysis of Venture Capital Contracts

- Paper by Steven N. Kaplan and Per Strömberg
- Discussion by Jinhua Wang



UNIVERSITY OF  
CAMBRIDGE  
Judge Business School

# Structure

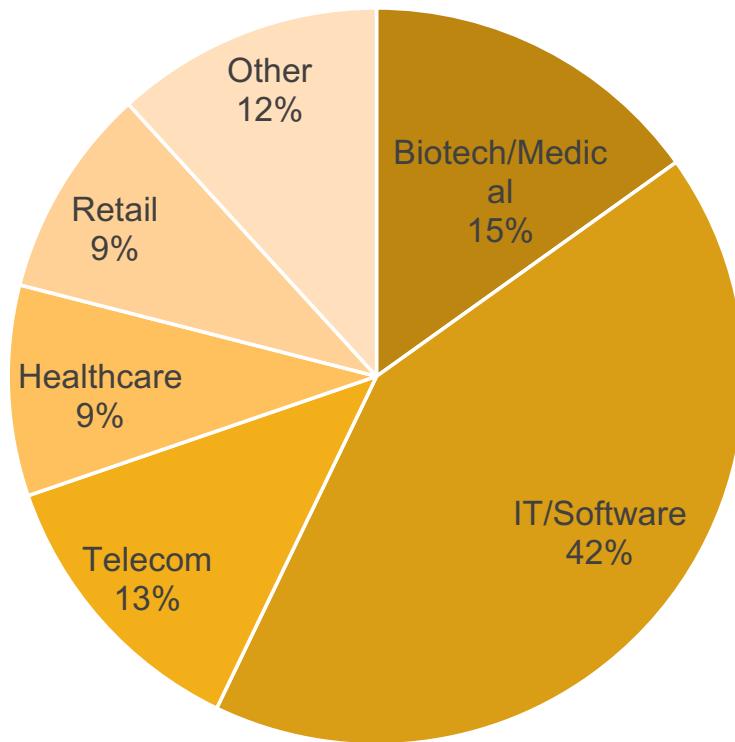
1. Introduction
2. Data Sample
3. Descriptive Results
4. Relation to Financial Contracting Theories
5. Complexity of Real World Contracts
6. Critique

# Introduction

- Cash Flow Rights
  - Principle Agent Theory
  - Holmstrom (1979) and Lazear (1986)
- Board Rights and Voting Rights
  - Incomplete Contract Theory
  - Grossman and Hart (1986) and Hart and Moore (1990)
- Liquidation Rights
  - Moral Hazard Theories, Signalling and Screening Theories
  - Stealing Theories

# Data Sample

Industry Distribution of Companies



14 VC Partnerships

213 VC Investments

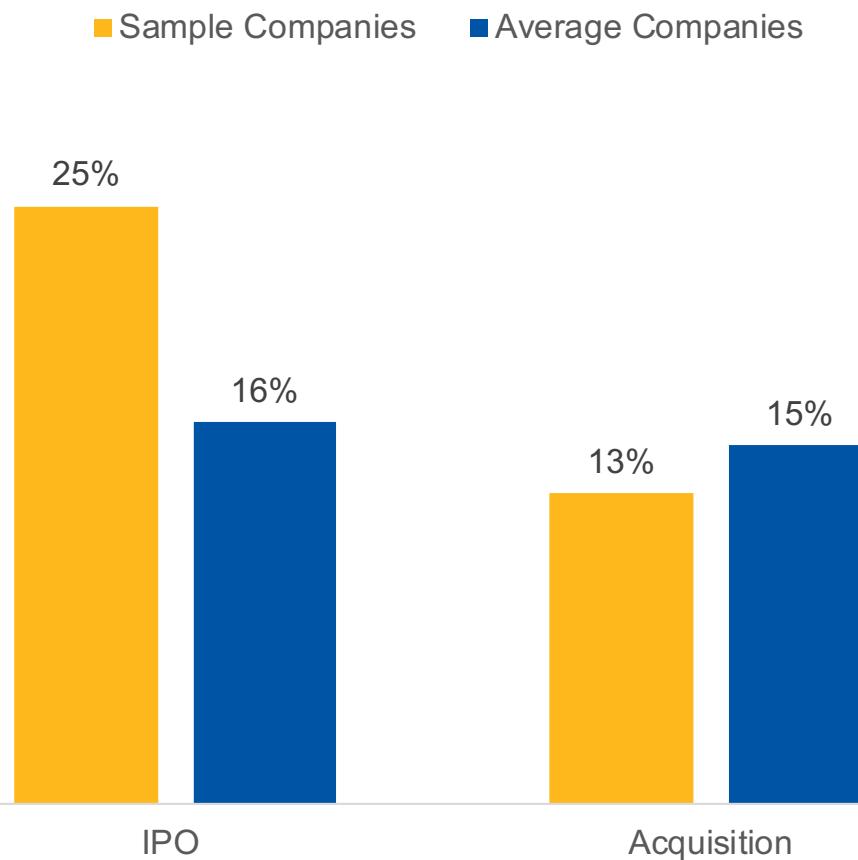
119 Portfolio Companies



# Data Sample

## Selection Bias

### Sample vs Average Companies



- The IPO rate of VC funded companies in the sample is significantly higher than average.
- Missing information on some financing rounds. Only 59% of the financing rounds completed are included in the sample.
- Selection bias strengthens the results as the purpose is to identify sophisticated and value maximizing principals.



# Descriptive Results

## Residual Cash Flow Rights

TABLE 2

*Distribution of cash flow, control, and liquidation rights*

	A. Residual cash flow rights		Minimum VC ownership contingency		Max. founder and employee vesting contingency		Maximum VC ownership		Difference, min. and max. VC ownership	
			Mean	Median	Mean	Median	Mean	Median	Mean	Median
	All rounds, N = 212	VC%	46.7	47.3	47.9	47.9	55.5	57.5	-8.8	-4.2
VC%	Founders%	Others%	31.1	29.8	30.0	27.1	24.3	20.1	6.8	0.0
Others%			22.2	20.4	22.1	20.4	20.2	17.2	2.0	0.0
First VC rounds only, N = 98										
VC%	Founders%	Others%	40.4	41.0***	42.4	43.1***	53.0	50.5*	-12.6	-8.0***
Others%			39.5	38.7***	37.7	37.6***	29.6	29.5***	9.9	3.7***
Others%			20.31	18.8**	19.9	18.8**	17.4	13.2***	2.7	0.0

VC: 50% cash flow rights

Founders: 30% cash flow rights

# Descriptive Results

## Board Rights

### B. Board rights

Mean (median)	<i>All rounds, N = 201</i>		<i>First VC rounds, N = 95</i>	
	Normal	Adverse state	Normal	Adverse state
Number of board seats	6.0 (6.0)	6.3 (6.0)	5.7 (5.0)***	6.0 (5.0)***
% VC seats	41.4 (40.0)	46.0 (42.9)	37.0 (40.0)***	42.6 (40.0)***
% Founder seats	35.4 (37.5)	32.9 (33.3)	38.5 (40.0)***	35.4 (40.0)*
% Outsider seats	23.2 (20.0)	21.0 (20.0)	24.5 (20.0)	22.0 (20.0)
% VC board majority	25.4	35.8	11.6***	27.4**
% Founder majority	13.9	12.4	20.0**	16.8*
% Neither board majority	60.7	51.7	68.4**	55.8
% of cases with adverse state board provisions	18.4		21.1	
% Seats to cash flow rights, VC	1.00 (0.89)		1.09 (0.92)	
% Seats to cash flow rights, founder	1.77 (1.12)		1.27 (0.99)	
Signed rank test Z-stat [P-value] VC vs. F	-5.50***		-0.59	

Firms perform poorly in adverse state.

# Descriptive Results

## Voting Rights

### C. Voting rights

Mean (median)	All rounds, N = 212			First VC rounds, N = 98		
	Minimum VC votes	Maximum VC votes	Difference min. – max.	Minimum VC votes	Maximum VC votes	Difference min. – max.
% VC votes	53.6 (52.9)	62.3 (64.3)	-8.7 (-1.6)	46.3 (45.4)***	58.9 (59.6)*	-12.6 (-6.4)***
% Founder votes	33.7 (31.1)	24.5 (20.1)	9.2 (1.5)	42.9 (42.5)***	29.8 (29.5)**	13.0 (6.2)***
% Others votes	12.6 (7.1)	13.1 (9.1)	-0.5 (0.0)	10.9 (5.4)**	11.3 (5.5)***	-0.4 (0.0)
% VC control	52.8	68.9		40.8***	61.2**	
% Founder control	23.6	12.3		37.8***	21.4***	
% Neither control	23.6	18.9		21.4	17.3	
% Switch in control	17.8			24.5**		
% Votes to cash flow:						
VC	1.16 (1.13)	1.15 (1.09)		1.16 (1.13)	1.16 (1.07)**	
Founder	1.08 (1.09)	1.02 (1.04)		1.06 (1.08)	0.98 (1.00)*	
Others	0.49 (0.49)	0.61 (0.64)		0.47 (0.43)	0.66 (0.72)	
Signed rank Z, VC vs. F	4.26***	5.01***		3.14***	3.00***	

Voting rights measure the percentage of votes that investors and management have to effect corporate decisions.

# Descriptive Results

## Liquidation and Cash Flow Rights

### D. Liquidation rights and redemption rights

	All rounds, N = 213			First VC rounds only, N = 98		
	% of obs.	Mean	(Med.)	% of obs.	Mean (Med.)	
VC liq. rights < cumulative investment	1.5%			1.1%		
VC liq. rights = cum. investment	27.3%			29.0%		
<b>VC liquidation rights &gt; cum. investment</b>	<b>71.2%</b>			69.9%		
Cumulative accruing dividend rate	43.8%	0.081	(0.080)	48.9%	0.079	(0.080)
Participating preferred stock	40.5%			30.8%***		
Common/conv. plus straight preferred	7.5%			10.2%		
Other cases with liq. rights > inv.	2.4%			2.1%		
Non-VC liq. rights senior or par to VC/VC cumulative investment	49.8%	0.167	(0.000)	38.9%***	0.116	(0.000)**
Founder claims sen. or par to VC/cum. inv.	34.3%	0.059	(0.000)	24.5%***	0.092	(0.000)**
<b>VC has redemption/put rights</b>	<b>78.7%</b>			81.7%		
<i>Among firms with redemption/put rights only:</i>						
Maturity, years		4.87	(5.00)		5.28	(5.00)***
Redemption includes cum. div.	54.0%			59.2%		
Redemption at fair market value	12.9%			18.4%**		
Other redemption > cum. investment	9.8%			6.6%		
VC gets board control and/or right to sell company upon failed redemption	31.9%			38.2%		



# Descriptive Results

## Auto. Conversion and Anti-dilution

### E. Other terms

	<i>All rounds, N = 213</i>			<i>First VC rounds only, N = 98</i>		
	% of cases	Mean	(Med.)	% of cases	Mean	(Med.)
<b>Automatic conversion provisions</b>	95.2			92.6		
<b>Auto. conv. price/round price</b>		<b>3.6</b>	<b>(3.0)</b>		4.4	(3.0)%***
Any anti-dilution protection	94.7			91.0**		
<b>Full ratchet</b>	<b>21.9</b>			24.7		
Weighted average	78.1			75.3		
Founder vesting	41.2			48.0*		
Founder non-compete clauses	70.4			71.2		
Founder non-compete, excl. California	73.5			78.4		

- The security held by the VCs automatically converts into common stock when the firm performs well.
- Protected security receives a claim to enough additional shares in the subsequent financing to reduce the price of the protected issue to the price of the new issue.

# Descriptive Results

## Vesting

### E. Other terms

	All rounds, N = 213 % of cases	Mean (Med.)	First VC rounds only, N = 98 % of cases	Mean (Med.)
Automatic conversion provisions	95.2		92.6	
Auto. conv. price/round price		3.6 (3.0)		4.4 (3.0)%***
Any anti-dilution protection	94.7		91.0**	
Full ratchet	21.9		24.7	
Weighted average	78.1		75.3	
Founder vesting	41.2		48.0*	
Founder non-compete clauses	70.4		71.2	
Founder non-compete, excl. California	73.5		78.4	

- Hart and Moore (1994): Entrepreneurs cannot contractually commit to staying with the firm.
- Vesting is a contractual provision that makes it more costly for entrepreneurs to leave.

# Descriptive Results

## Contingencies

TABLE 3

*Contingencies and the contracting space*

### A. Percentage of rounds with contingent contracts

	Cash flow rights	Voting rights	Board rights	Right to force sale	Liquidation or dividend amount	Redempt. rights	Release of committed funds	Any rights
Contingent on financial performance	8.0% [11.2]*	5.6% [7.1]	0.5% [1.0]	1.4% [2.0]	3.3% [2.0]	0.5% [1.0]	4.2% [7.1]*	17.4% [22.4]*
Contingent on non-financial performance	6.1 [6.1]	4.2 [3.1]	0.0 [0.0]	0.0 [0.0]	0.0 [0.0]	0.0 [0.0]	3.3 [5.1]	8.9 [11.2]
Contingent on actions	1.9 [2.0]	0.5 [0.0]	0.5 [1.0]	0.0 [0.0]	0.0 [0.0]	0.5 [0.0]	8.9 [12.2]	11.3 [14.3]
Contingent on default on dividend or redemption payment	5.2 [6.1]	5.2 [6.1]	19.2 [21.4]	1.4 [2.0]	2.8 [1.0]	0.5 [0.0]	0.0 [0.0]	27.7 [29.6]
Contingent on future securities offerings or "fair market value"	8.9 [13.3]**	7.5 [9.2]	0.0 [0.0]	3.8 [5.1]	11.7 [16.3]*	0.9 [1.0]	0.9 [1.0]	21.1 [27.6]**
Any of the above	18.8 [23.5]*	15.5 [16.3]	19.2 [22.4]	6.1 [8.2]	15.5 [19.4]	2.3 [2.0]	14.6 [20.4]**	52.6 [60.2]**
Contingent on founder remaining with firm	44.6 [51.0]*	40.4 [48.0]**	— —	0.0 [0.0]	0.0 [0.0]	0.0 [0.0]	0.9 [1.0]	40.8 [51.0]*
Any contingent contracting	52.6 [61.2]**	50.7 [58.2]**	19.2 [22.4]	6.1 [8.2]	15.5 [19.4]	2.3 [2.0]	14.6 [20.4]**	72.8 [79.6]**



# Financial Contracting Theories

## Cash Flow Rights and Pay Performance Incentives (Theory)

Principal-Agent Approach:

- Holmström (1979) assumes that agent's effort is unobservable to the principal.
- Signals, such as firm output, are correlated with effort and can be contracted on.
- The investor maximizes compensation sensitivity for a risk-neutral investor.
- For risk-averse investor, contingency on performance is costly because she requires a higher level of compensation to offset the extra risk.
- **The higher the asymmetric information, the higher the pay-performance sensitivity in the contracts offered by the investor.**

Multitasking Models:

- There are several activities for which the entrepreneur needs to exert effort.
- She only exerts effort in the activity **whose signal is most rewarded**.

# Financial Contracting Theories

## Cash Flow Rights and Pay Performance Incentives (Empirical Results)

- FRCF
  - percentage of the residual cash flow rights allocated to the founder
- Pre-revenue
  - equals one if the company had no revenues at the time of financing, and zero otherwise
  - companies have greater uncertainty and asymmetric information
- Months since first VC funding round:
  - is a measure of asymmetric information
- Repeat entrepreneur
  - takes the value of one if the founders previously founded a company
  - reduces the likelihood of adverse selection and the uncertainty of the venture

# Financial Contracting Theories

## Cash Flow Rights and Pay Performance Incentives (Empirical Results)

TABLE 4  
*Determinants of founder cash flow incentives*

	% Founder residual cash flow rights (FRCF), best case	% FRCF sensitivity, performance benchmarks	Relative % FRCF sensitivity, performance benchmarks	% FRCF sensitivity, vesting	Relative % FRCF sensitivity, vesting	Founder has liquidation CF rights (logit)
Sample	All, N = 189	All, N = 189	All, N = 188	All, N = 189	All, N = 188	All, N = 163
Constant	—	—	—	—	—	—
Pre-revenue	-3.68 (3.17)	1.61 (0.63)**	4.74 (1.69)***	8.47 (2.33)***	23.62 (6.04)***	0.06 (0.56)
Repeat entrepr.	6.14 (3.76)	-0.67 (0.47)	-2.20 (1.24)*	-0.06 (2.30)	1.96 (7.09)	1.78 (0.62)***
Months since 1st VC round	-0.70 (0.12)***	-0.06 (0.03)**	-0.13 (0.06)**	-0.063 (0.06)	-0.37 (0.20)*	0.028 (0.013)**
VC cum. invest (instrumented)	3.67 (2.79)	1.13 (0.67)*	3.20 (1.72)*	-0.37 (1.76)	3.51 (5.38)	—
Return	-1.35 (2.44)	-0.81 (0.36)**	-2.34 (1.02)**	0.08 (1.01)	1.86 (3.36)	0.25 (0.44)
Ind. volatility	-2.57 (2.36)	-0.45 (0.38)	-2.03 (0.93)**	4.16 (1.69)**	10.76 (4.19)**	0.012 (0.38)
Ind. R&D/sales	35.0 (37.6)	-20.1 (11.2)*	-69.4 (31.4)**	23.4 (21.7)	17.48 (67.66)	-6.74 (5.76)
Industry size	1.53 (1.20)	0.68 (0.28)**	2.43 (0.81)***	-0.72 (0.75)	-0.34 (2.42)	-0.094 (0.20)
California	1.86 (3.55)	-2.02 (0.70)***	-6.61 (1.91)***	-1.82 (2.36)	-19.01 (7.01)***	-0.99 (0.58)*
Midwest	12.9 (4.30)***	-0.44 (0.89)	-0.55 (2.17)	-2.40 (2.06)	-20.91 (6.89)***	-0.67 (0.58)
North-east	4.67 (4.00)	-1.21 (0.93)	-4.78 (2.29)**	-1.42 (2.09)	-10.16 (7.13)	-1.63 (0.60)***
$\chi^2/F$ -test, location [P-value]	3.70 [0.03]**	6.18 [0.002]***	6.23 [0.002]***	0.08 [0.92]	0.95 [0.38]	2.49 [0.29]
VC dummies	Yes	Yes	Yes	Yes	Yes	Yes
$\chi^2/F$ -test, VC [P-value]	2.30 [0.02]**	2.72 [0.008]***	2.94 [0.004]***	1.67 [0.11]	0.84 [0.57]	8.94 [0.18]
Adj. / Ps. R2	0.31	0.33	0.40	0.27	0.30	0.22



# Financial Contracting Theories

Cash Flow Rights and Pay Performance Incentives (Empirical Results)

Regression 2 & 3:

- Consistent with asymmetric information and moral hazard models where pay-performance sensitivity increases when **uncertainty about venture quality** is higher

Regression 4 & 5:

- Time vesting is significantly higher when there is **higher information asymmetry** (pre-revenue ventures and early VC-founder relations)
- Contracts in high volatility, high R&D, and smaller industries use time-vesting instead of performance benchmarks to induce pay-performance sensitivity

Regression 6:

- When the founder has been successful in the past, and as VC learns more about the company over time, the founder has more liquidation rights
- **Less pay-for-performance as information asymmetry decline**

# Financial Contracting Theories

## Control (Theory)

- Grossman and Hart (1986) and Hart and Moore (1990)
  - assumes that actions are **observable but not verifiable in court**
- Aghion and Bolton (1992)
  - Monetary benefits (verifiable) to investors
  - Private benefits or actions (non-verifiable) to entrepreneur
  - When external financing capacity increases, conflict of interests lowers
  - **When external financing capacity decreases, investors should have more control**
- Dewatripont and Tirole (1994)
  - Entrepreneur tends to make risky decision when project is doing badly

# Financial Contracting Theories

## Control (Empirical Results)

- Degree of VC board control and degree of VC voting control
  - 0 if the founder always has control
  - 1 if neither the VC nor the founder has control
  - 2 if the VCs have control only in the bad state
  - 3 if the VCs always have control
  - ordered logistic regression
- Automatic Conversion Price
  - the price VC's securities are automatically converted to common equity
  - the lower the price, the more control VC gives up in uncertain states
  - is normalized by dividing by the round price and then taking logs

# Financial Contracting Theories

## Control (Empirical Results)

TABLE 5

*Determinants of control allocations*

	Degree of VC board control (ordered logit)	Degree of VC voting control (ordered logit)	Ln auto. conv. price/round price (2SLS)
Observations	All rounds <i>N</i> = 182	All rounds <i>N</i> = 192	All rounds <i>N</i> = 158
Constant	—	—	—
Pre-revenue	0.81 (0.39)**	1.27 (0.43)***	0.24 (0.10)**
Repeat entrepr.	0.07 (0.50)	-0.83 (0.47)*	0.25 (0.12)**
Months since 1st VC round	0.066 (0.012)***	0.066 (0.014)***	-0.005 (0.005)
VC cum. invest (instrumented)	—	—	-0.084 (0.088)
Return	0.58 (0.35)*	0.24 (0.32)	-0.36 (0.12)***
Ind. volatility	0.63 (0.29)**	0.87 (0.35)**	0.071 (0.074)
Ind. fixed assets	6.25 (2.51)**	5.54 (3.18)*	-0.67 (0.81)
Industry size	-0.08 (0.17)	-0.29 (0.19)	-0.090 (0.049)*
California	-0.45 (0.48)	-0.74 (0.52)	-0.24 (0.13)*
Midwest	0.44 (0.49)	-1.36 (0.53)**	-0.27 (0.12)**
North-east	1.14 (0.47)**	-1.35 (0.50)**	-0.20 (0.14)
$\chi^2/F$ -test, location	$\chi^2(2) = 9.6^{***}$	$\chi^2(2) = 1.8$	$F(2, 138) = 0.12$
[P-value]	[0.01]	[0.42]	[0.89]
VC dummies?	Yes	Yes	Yes
$\chi^2/F$ -test, VC [P-value]	$\chi^2(7) = 20.1^{***}$ [0.01]	$\chi^2(7) = 11.8^*$ [0.11]	$F(8, 138) = 1.26$ [0.27]
Adj. / Ps. R2	0.17	0.17	0.57
Ord. logit cut-offs:			
Cut-off group 1	2.91	1.19	
Cut-off group 2	6.12	2.72	
Cut-off group 3	6.90	3.53	



# Financial Contracting Theories

## Control (Empirical Results)

Regression 1 & 2:

- **When uncertainty about the venture and the quality of the founder is higher, the VC is allocated more control.**
- Consistent with Aghion and Bolton (1992): As time evolves, **VC invests more funds and thus require more control and cash flow rights.**
- Higher fixed to total asset ratio, more VC control (**less reliant on original founder**)

Regression 3:

- **More uncertainty, more VC control.**
- More return, less VC control.

# Financial Contracting Theories

## Liquidation Rights (Theory)

Seniority:

- Innes (1990)
  - Principle-agent theory: giving investors senior claim makes managers' residual claim more sensitive to performance
- Myers and Majluf (1984) and Duffie and Demarzo (1999)
  - Managers can signal success by offering investors senior claim

Liquidation rights (stealing models):

- Townsend (1979) and Gale and Hellwig (1985)
  - Costly verification state model: profits are unobservable unless a verification cost is paid
  - Entrepreneur should make a fixed payment to the investor
  - The investor takes control or liquidates the project if the payment is not made.

# Financial Contracting Theories

## Liquidation Rights (Empirical Results)

- Industry median long-term debt ratio
  - Debt capacity of the venture
- Staging of the investment
  - Similar to redemption rights, staging can force liquidation of bad performing firms.
  - Ex-ante staging: committed funding conditional on performances
  - Ex-post staging: future financing will be needed to support the firm until IPO
  - Provide less funding in a giving round means shortening the timing until next round

# Financial Contracting Theories

## Liquidation Rights (Empirical Results)

TABLE 6  
*Determinants of VC redemption rights, staging, and liquidation claims*

	VC liq. claim> cum. invest. (logit)	VC has redemption rights (logit)	Months until next fin. round (2SLS)	Months until next fin. round (OLS)	% of funds up front (2SLS)	% of funds up front (2SLS)	% of funds up front (OLS)
Observations	1st firm observ. <i>N</i> = 108	1st firm observ. <i>N</i> = 106	All observ. <i>N</i> = 164	1st firm obs. <i>N</i> = 98	All observ. <i>N</i> = 191	All observ. <i>N</i> = 191	1st firm obs. <i>N</i> = 98
Constant	—	—	—	14.7 (7.8)*	—	103.9 (20.8)***	92.6 (30.4)***
Pre-revenue	-0.20 (0.75)	-0.32 (0.63)	-0.10 (1.10)	-1.81 (1.23)	-0.30 (3.87)	-3.69 (3.62)	-4.50 (5.19)
<b>Repeat entrepreneur</b>	0.28 (0.98)	-0.83 (0.81)	4.39 (1.86)**	2.36 (1.39)*	3.58 (3.69)	7.69 (3.50)**	9.83 (5.91)*
Months since 1st VC round	—	—	-0.003 (0.034)	—	0.21 (0.08)**	0.28 (0.11)**	—
Investment in round (instr.)	—	—	1.86 (1.85)	—	-3.37 (3.33)	-4.24 (4.22)	—
<b>Return</b>	—	—	-0.30 (1.11)	—	6.36 (3.25)*	6.55 (3.14)**	—
Ind. volatility	-0.06 (0.52)	-0.20 (0.62)	-0.37 (0.89)	-1.39 (0.86)	-1.72 (2.72)	-3.65 (2.83)	-4.56 (4.37)
Ind. fixed assets	-3.75 (4.94)	-3.80 (5.08)	5.87 (9.98)	—	-17.1 (30.4)	-56.7 (33.4)*	-24.8 (44.4)
<b>Ind. LT debt to assets</b>	11.84 (5.29)**	5.14 (4.33)	-20.8 (7.1)***	-10.7 (4.9)**	-68.2 (32.4)**	-69.2 (30.9)**	-107.2 (33.9)***
Industry size	-0.33 (0.31)	-0.20 (0.35)	0.91 (0.57)	0.62 (0.66)	1.47 (1.75)	2.59 (2.02)	0.65 (0.79)
California	-2.41 (1.06)**	-1.93 (0.91)**	1.50 (1.43)	—	7.23 (4.39)	—	—
Midwest	-1.04 (0.87)	-0.50 (1.21)	-0.90 (1.61)	—	4.67 (6.16)	—	—
North-east	-3.41 (1.18)***	-2.66 (0.92)***	1.77 (1.78)	—	5.56 (5.01)	—	—
$\chi^2/F$ -test, location	$\chi^2(3) = 9.59**$ [0.02]	$\chi^2(3) = 11.36***$ [0.01]	$F(2, 143) = 1.56$ [0.21]	—	$F(2, 170) = 0.37$ [0.90]	—	—
VC dummies	Yes	Yes	Yes	No	Yes	No	No
$\chi^2/F$ -test, VC dummies	$\chi^2(8) = 6.32$ [0.61]	$\chi^2(8) = 9.85$ [0.28]	$F(8, 143) = 1.57$ [0.14]	—	$F(8, 170) = 3.50$ [0.00]***	—	—
Adj. / Ps. R2	0.25	0.23	0.19	0.10	0.39	0.29	0.24

Regressions of degree of VC liquidation rights on various independent variables for 213 investments in 119 portfolio companies by 14 VC partnerships. Industry LT debt to assets is the median ratio of long-term debt to assets for public firms in the venture's three-digit SIC industry according to COMPUSTAT. For remaining variable definitions, see Table 5, above. Investments were made between 1987 and 1999. White (1980) robust standard errors are in parentheses. Asterisks indicate statistical significance at the 1%\*\*\*, 5%\*\*, and 10%\* levels.

# Financial Contracting Theories

## Liquidation Rights (Empirical Results)

Regression 1:

- Analyze the determinants of the size of VC's liquidation rights
- No evidence that VC liquidation claim is larger when asymmetric information problems are more severe.
- Debt Capacity of the venture related to VC liquidation claim

Regression 2:

- All results are weak.

Regression 3 & 4:

- Alternative measure for VC exercising liquidation rights
- Use of between-round staging seems to be complementary with the use of debt in the industry

Regression 5, 6, & 7:

- Alternative measure for VC exercising liquidation rights
- When return is higher, more funds are provided up front

# Financial Contracting Theories

## Complexity of Real World Contracts

- Complementarity and substitutability of contract provisions
  - Simultaneous use of different governance mechanisms: pay performance compensation, board and voting control, and liquidation rights
  - Voting and board control are positively correlated (not perfect)
  - Pay performance sensitivity is lower when founders control the venture
  - Liquidation claims and redemption rights are largely independent
  - The size of the VC commitment and the release of funds are related to control
- Dynamic evolution of contracts
  - Founders' cash flow, voting, and board rights decline over financing rounds while VC rights increase
  - Contract terms sometimes are re-negotiated (30% cases)

# Critique

- The paper uses variable *repeat entrepreneur* as “a measure of the extent to which VC may have prior information on the quality of the founders.”
- However, a repeat-entrepreneur has more experience negotiating with venture capitalists. Her ability to negotiate better deals might go into the error term and cause endogeneity bias.
- One solution is to include a regressor that measures information asymmetry while exogenous to the residuals. An ideal regressor would be media coverage.
- If an entrepreneur had media coverage in the past, the dummy variable media coverage equals one, otherwise, the dummy variable equals 0.

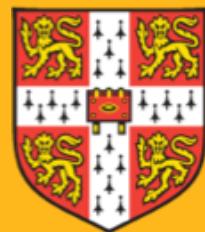
# Critique

- On table 5, months since 1<sup>st</sup> VC round has a positive coefficient. According to theory, as time moves on, information asymmetry reduces and VC control rights should reduce. The coefficient contradicts the theory.
- The paper attribute the contradiction to increasing VC committed funding over time.
- VC committed funding is endogenous to VC control.
- However, the regression didn't control for VC committed funding (partly because the amount of financing cannot be instrumented in ordered logit framework).
- The argument would have been stronger if the paper showed that VC committed funding increases with months since 1<sup>st</sup> VC round.

	Degree of VC board control (ordered logit)	Degree of VC voting control (ordered logit)
Observations	All rounds <i>N</i> = 182	All rounds <i>N</i> = 192
Constant	—	—
Pre-revenue	0.81 (0.39)**	1.27 (0.43)***
Repeat entrepr.	0.07 (0.50)	-0.83 (0.47)*
Months since 1st VC round	0.066 (0.012)***	0.066 (0.014)***

# Critique

- On table 6, the regression uses “months until next financing round” as a proxy for VC liquidation rights.
- However, this is inaccurate. Another significant factor that determines “month until next financing round” is the capital-burn-rate of the start-up. This factor goes into the error term  $u$ .
- Pre-revenue firms burn revenue faster than revenue-generating firms.
- Therefore, there are endogeneity issues with the regression as  $\text{COV}(\text{pre-revenue}, u)$  is not equal to 0.
- A way to mitigate this endogeneity issue is to include the capital-burn-rate of the start-up into the regression as a regressor.



UNIVERSITY OF  
CAMBRIDGE  
Judge Business School

Jinhua Wang  
[jw983@cam.ac.uk](mailto:jw983@cam.ac.uk)