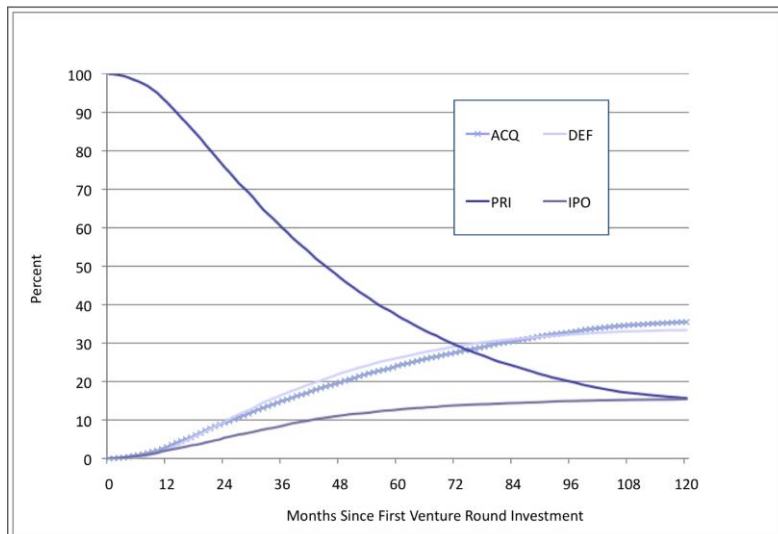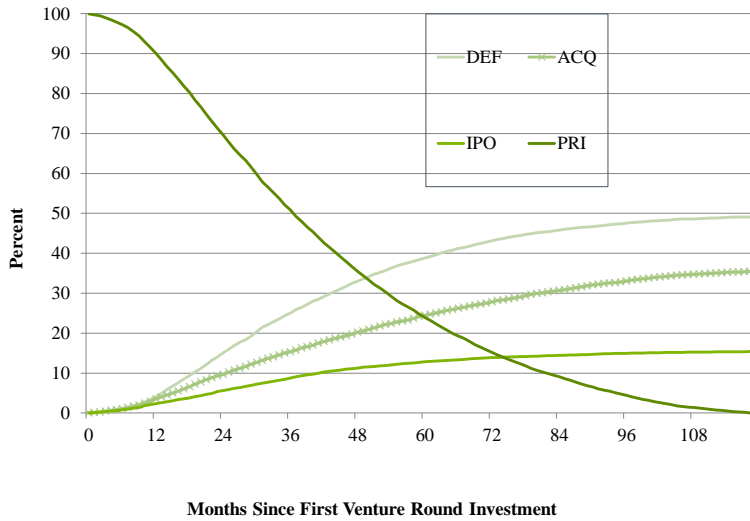# Finance of Innovation
[ITMDI 703]

Valuation of New Ventures and Innovations

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PORTFOLIO COMPANY STATUS OVER TIME: FIRST ROUNDS

PORTFOLIO COMPANY STATUS OVER TIME, ASSUMING NO PRIVATE COMPANIES AFTER TEN YEARS, 1ST ROUNDS
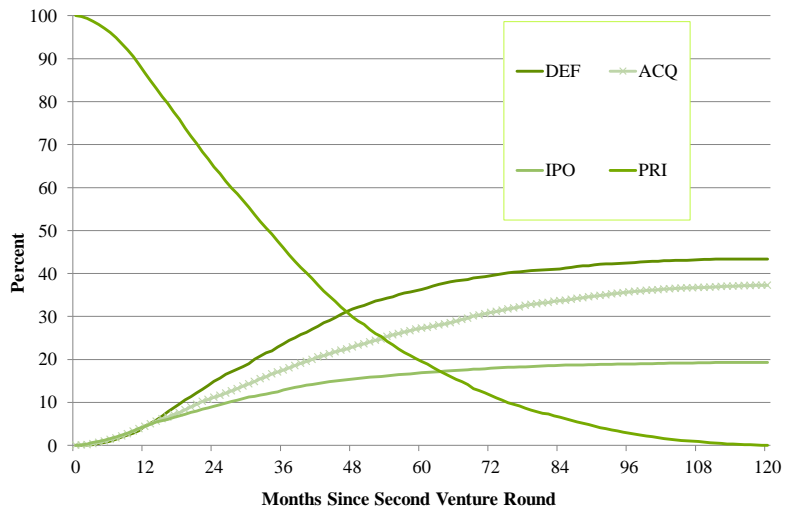

VALUE MULTIPLES FOR FIRST-ROUND INVESTMENTS: IPOS AND ACQUISITIONS

Value Multiple	IPO	ACQ
<0.25	0.7%	15.1%
0.25 to <0.50	1.6%	9.3%
0.50 to <1.00	3.9%	13.6%
1.00 to <1.50	6.5%	10.7%
1.50 to <2.00	6.6%	8.2%
2 to <3	12.1%	10.8%
3 to <5	15.0%	11.4%
5 to <10	24.3%	11.4%
10 to <20	15.6%	5.6%
20 to <50	10.5%	3.0%
50 to <100	2.4%	0.6%
>=100	0.8%	0.3%

VALUE MULTIPLES
ALL FIRST-ROUND INVESTMENTS

Value Multiple	Percentage
0	49.10%
>0 to <0.25	10.68%
0.25 to <0.50	7.69%
0.50 to <1.00	6.74%
1.00 to <1.50	3.53%
1.50 to <2.00	2.62%
2 to <3	3.65%
3 to <5	3.99%
5 to <10	5.66%
10 to <20	3.41%
20 to <50	2.24%
50 to <100	0.49%
>=100	0.19%

PORTFOLIO COMPANY STATUS OVER TIME, ASSUMING NO PRIVATE COMPANIES AFTER TEN YEARS (2ND ROUNDS)

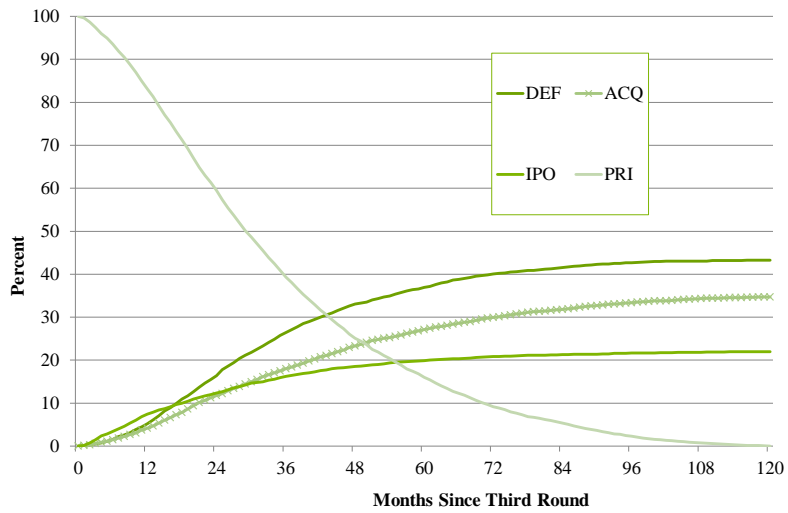## VALUE MULTIPLES FOR SECOND-ROUND INVESTMENTS: IPOS AND ACQUISITIONS

Value Multiple	IPO	ACQ
<0.25	0.8%	20.2%
0.25 to <0.50	1.1%	11.2%
0.50 to <1.00	6.4%	14.5%
1.00 to <1.50	9.9%	9.0%
1.50 to <2.00	9.9%	8.9%
2 to <3	15.4%	10.2%
3 to <5	19.8%	13.1%
5 to <10	22.0%	8.3%
10 to <20	10.4%	3.0%
20 to <50	3.6%	1.1%
50 to <100	0.5%	0.3%
>=100	0.1%	0.1%

VALUE MULTIPLES FOR ALL SECOND-ROUND INVESTMENTS

Value Multiple	Percentage
0	46.56%
>0 to <0.25	13.34%
0.25 to <0.50	7.95%
0.50 to <1.00	6.54%
1.00 to <1.50	3.69%
1.50 to <2.00	3.31%
2 to <3	4.39%
3 to <5	5.46%
5 to <10	5.35%
10 to <20	2.43%
20 to <50	0.82%
50 to <100	0.14%
>=100	0.03%

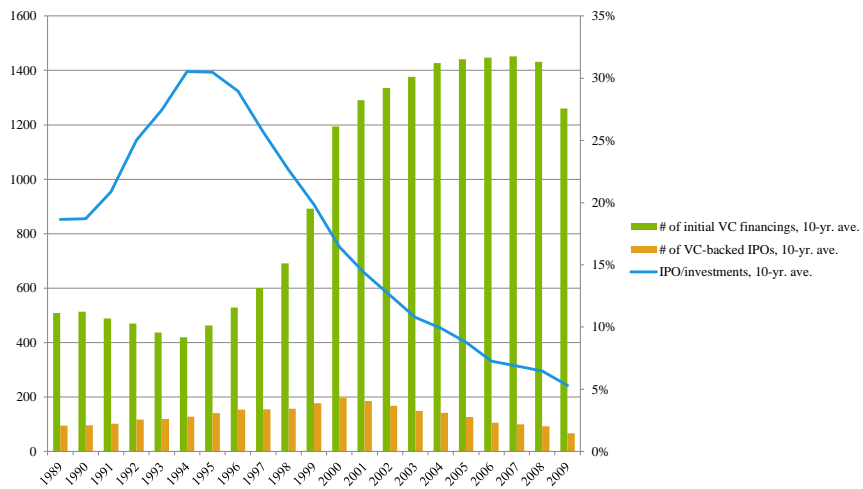**PORTFOLIO COMPANY STATUS OVER TIME, ASSUMING NO PRIVATE COMPANIES AFTER TEN YEARS (3RD ROUNDS)**

VALUE MULTIPLES FOR THIRD-ROUND INVESTMENTS: IPOS AND ACQUISITIONS

Value Multiple	IPO	ACQ
<0.25	0.5%	21.6%
0.25 to <0.50	1.4%	13.2%
0.50 to <1.00	8.2%	15.2%
1.00 to <1.50	14.1%	10.2%
1.50 to <2.00	13.0%	8.7%
2 to <3	19.2%	11.3%
3 to <5	23.5%	11.1%
5 to <10	14.5%	6.6%
10 to <20	4.6%	1.2%
20 to <50	1.1%	0.9%
50 to <100	0.1%	0.1%
>=100	0.0%	0.0%

VALUE MULTIPLES FOR ALL THIRD-ROUND INVESTMENTS

Value Multiple	Percentage
0	44.71%
>0 to <0.25	13.54%
0.25 to <0.50	7.88%
0.50 to <1.00	6.92%
1.00 to <1.50	4.94%
1.50 to <2.00	4.11%
2 to <3	5.73%
3 to <5	6.57%
5 to <10	3.98%
10 to <20	1.14%
20 to <50	0.43%
50 to <100	0.05%
>=100	0.00%

10-YEAR AVERAGE VC FINANCINGS AND IPO EXITS, BY ENDING YEAR

Legend:
- # of initial VC financings, 10-yr. ave.
- # of VC-backed IPOs, 10-yr. ave.
- IPO/investments, 10-yr. ave.

THE INVESTMENT PROCESS

Screening	[100-1000]
↓	
Preliminary Due Diligence	[10]
↓	
Term Sheet	[3]
↓	
Final Due Diligence	[2]
↓	
Closing	[1]
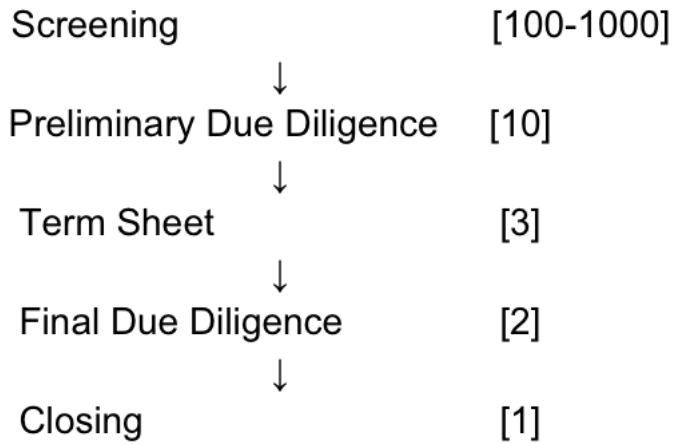
Term Sheets – The Basics

➢ Expropriation

➢ Charter

➢ Investor Rights Agreement

➢ Rounds

➢ Series A, Series B, etc.

Capitalization Table

Security	Pre-Financing		Post-Financing	
	# of Shares	%	# of Shares	%
Common – Founders	7,750,000	77.5	7,750,000	51.7
Common – Employee Stock Pool	2,250,000	22.5	2,250,000	15.0
Issued	300,000	3.0	300,000	2.0
Unissued	1,950,000	19.5	1,950,000	13.0
Series A Preferred	0	0.0	5,000,000	33.3
Total	10,000,000	100	15,000,000	100

Investors and Prices

- *$investment*
- Fully diluted share count
- *Proposed ownership percentage*
- Original purchase price (OPP)
- *Aggregate purchase price (APP)*
- Tranche

Post-Money Valuation

Post-money valuation = $investment / proposed ownership percentage.

Pre-Money Valuation

Pre-money valuation = post-money valuation - $investment.

Liquidation

➤ Deemed liquidation event

➤ Liquidation preference (2X, 3X, etc.)

➤ Qualified public offering (QPO)

Dividends

➤ Dividend Preference
➤ Cumulative vs. non-cumulative dividends
➤ Accrued cash dividends
➤ Simple interest, compound interest
➤ Stock dividends = Payment-in-kind (PIK)
  dividends

Restricted Stock & Registration Rights

- Registration rights
  - Demand
  - S-3
  - Piggyback
- Redemption rights
- In-kind distributions
- Rule 144, rule 144A
- Qualified Institutional Buyers (QIBs)
- Lockup restrictions

Other issues

- Step vesting, cliff vesting
- Right of first refusal, Right of first offer
- Drag-along rights
- Take-me-along = tag-along rights
- Anti-dilution rights, down rounds
- Pay-to-Play
- No Shop

The VC Method of Valuation

➢ KEY IDEA: Estimate the value of the company in a successful exit. Discount that value back to today at a very high rate.

VC Method: Main Elements

➢ "Successful" exit valuation

➢ Target multiple-of-money

➢ Expected retention percentage

➢ Investment recommendation

Exit Valuation

➢ To be discussed at length in the next two chapters.

➢ We want to estimate the valuation conditional on a successful outcome.

➢ Key distinction is between absolute valuation (discounted cash flow analysis) and relative valuation (comparables analysis).

The Standard VC Method

Step 1) What is the required investment today? (= *$I*)

Step 2) What is the exit valuation for this company? (*$ exit valuation)*

Step 3) What is the target multiple-of-money on our investment? (*M*)

Step 4) What is the expected retention percentage? *(retention)*

Step 5) Estimate the total valuation for the company today:
     *total valuation = $ exit valuation * retention / M.*

Step 6) What is the proposed ownership percentage today? (*proposed %*)

Step 7) Estimate the partial valuation for this investment:
     *partial valuation = proposed % * total valuation.*

Step 8) Investment Recommendation: Compare partial valuation to $I.

The Modified VC Method

Step 8) Estimate the LP cost for the investment:
  LP cost = $I (committed capital / investment capital).

Step 9) What is the expected GP% for this investment?
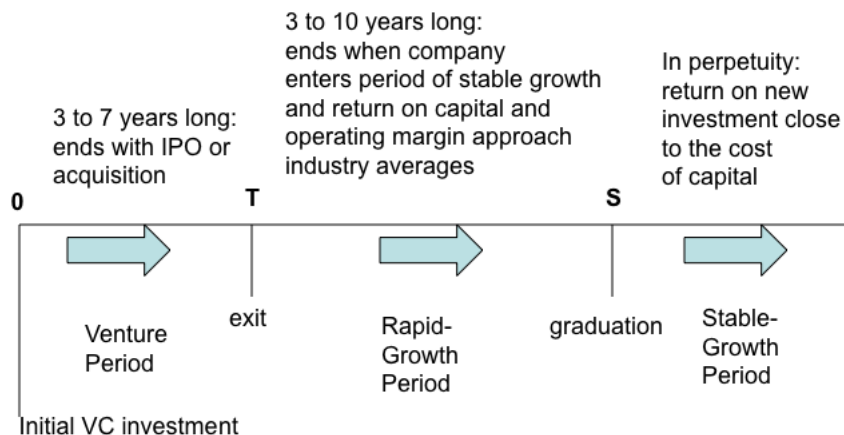 *GP% = carry% * (GVM*investment capital – carry basis) / (GVM * investment capital).*

Step 10) Estimate the LP valuation from this investment:
  *LP valuation = (1 – GP%) * partial valuation.*
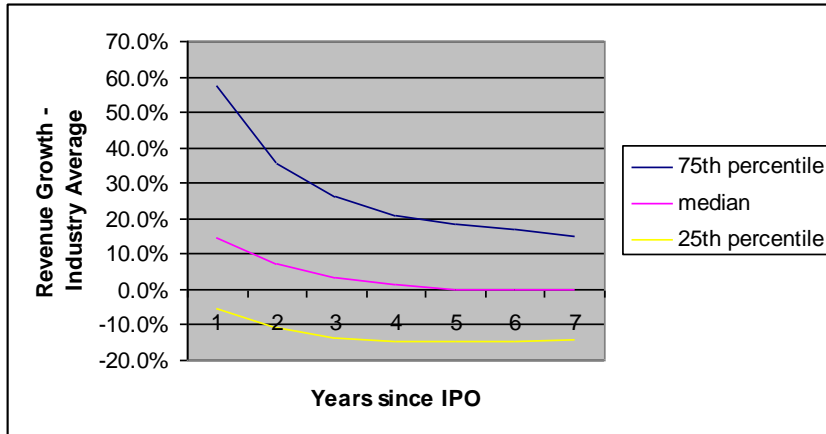
Step 11) Investment Recommendation:
  Compare LP valuation to LP cost.

PHASES OF GROWTH

Growth vs. Age

Revenue Growth - Industry Average vs. **Years since IPO**

- 75th percentile
- median
- 25th percentile

Y-axis: 70.0%, 60.0%, 50.0%, 40.0%, 30.0%, 20.0%, 10.0%, 0.0%, -10.0%, -20.0%

X-axis: 1, 2, 3, 4, 5, 6, 7

Assumptions for exit-value DCFs

➢ All-equity structure

➢ No amortization costs

➢ No non-operating assets

Leverage of VC-backed companies

Years Since IPO	Mean	Median
0	4.7%	1.2%
1	4.0%	1.9%
2	5.7%	2.8%
3	6.8%	3.8%
4	7.2%	3.9%
5	8.1%	4.4%
6	8.2%	5.1%
7	9.1%	6.0%
8	8.7%	5.6%
9	10.6%	6.2%
10	11.0%	6.0%
11	11.8%	6.4%
12	12.4%	8.9%
13	11.0%	7.8%
14	7.7%	4.8%
15	11.0%	6.4%

DCF – Mechanics

$CF = EBIT(1\text{-}t) + \text{depreciation}$
        $- \text{Capital expenditures } - \Delta \text{NWC}$

where,

CF = cash flow,

$EBIT$ = earnings before interest and taxes,

t = the corporate tax rate, and

$\Delta \text{NWC} = \Delta$ net working capital $= \Delta$ net current assets $- \Delta$ net current liabilities.

CF and Investment

NI = capital expenditures $+ \Delta$ NWC
      - depreciation

Investment rate (IR) = Plowback ratio =
   revinvestment rate = NI / E

CF = E − NI = E − IR * E = (1 − IR) * E

NPV

NPV of perpetuity = X /(r − g)

Graduation Value = GV = CF_{S+1} / (r − g)

$$NPV \text{ of firm at exit} = \frac{CF_{T+1}}{1+r} + \frac{CF_{T+2}}{(1+r)^2} + ... + \frac{CF_{T+n}}{(1+r)^n} + ... + \frac{CF_S + GV}{(1+r)^{S-T}}$$