Teaching Notes to accompany *Venture Capital and the Finance of Innovation*

Chapter 1

The VC Industry

CHAPTER OUTLINE

1.1   What is Venture Capital?
1.2   What do Venture Capitalists do?
1.3   The History of Venture Capital
1.4   Patterns of VC Investment in the United States
        1.4.1   Investments by Stage
        1.4.2   Investments by Industry
        1.4.3   Investments by U.S. Region
Summary
Key Terms

KEY TERMS

Venture capital (VC) and Venture capitalists (VCs)	Corporate venture capital
Screen	Preboom, boom, postboom periods
Monitor	Early-stage, mid-stage (expansion), late-stage
Exit	Mezzanine
Financial intermediary	Growth capital
Limited partnership, limited partner, general partner	Leveraged buyouts (LBOs)
Portfolio companies	Distress investing = special situations
Small Business Investment Companies (SBICs)	Hedge funds
Initial public offering (IPO)	Term sheet
Angel investors = angels	Due diligence
Alternative investments	Management fees
Private equity	Carried interest
Strategic investing	Seed stage, Startup stage
	Financing round, First round (Series A), Second round (Series B)

TEACHING NOTES

1.1   What is Venture Capital?

Students should be able to define the following terms: venture capital (VC), venture capitalists (VCs), financial intermediary, portfolio company, exiting, initial public offering (IPO), limited partnership, general partner (GP), limited partner (LP), angel investor or angel, private equity, strategic investing, corporate venture capital, early-stage, mid-stage or expansion-stage, late stage, hedge fund, growth capital, leveraged buyouts (LBOs), and distress investing or special situations.

This section seeks to give students an understanding of the five defining characteristics of VC investing.

(1) A VC is a financial intermediary, meaning that it takes the investors' capital and invests it directly in portfolio companies.

(2) VCs invest in private companies. This makes investments difficult to mark to market and less liquid.

(3) VCs leverage their knowledge and network to create value for their portfolio companies. Typically, VCs take at least one position on a portfolio company's board. This allows them to provide advice and support at the company's highest level and also influence the company's material decisions.

(4) A VC's objective is to exit through an IPO or an acquisition. Therefore, VCs must invest in businesses with abnormally high growth potential.

(5) VCs seek to grow their portfolio companies organically, rather than through acquisitions. This "internal growth" strategy distinguishes VC investing from other types of private equity.

Exhibit 1-2 illustrates the different types of alternative investments. The two rectangles represent hedge funds and private equity. Hedge funds invest primarily in public companies over short time horizons. In contrast, private equity funds invest in illiquid assets and use a long term strategy. VC investing falls into the category of private equity. The spheres show the overlap between different types of alternative investments.

1.2   What do Venture Capitalists do?

Students should be able to define the following terms: investing, monitoring, screening, term sheet, due diligence, closing, and exiting.

VC activities can be broken into three main groups: investing, monitoring, and exiting.

Investing activities include the following:
- Sorting through hundreds of possible investments to find those that merit a preliminary offer (screening).
- Extending a preliminary offer with a term sheet. A term sheet outlines the proposed valuation, type of security, and proposed control rights for the investors.
- Performing extensive due diligence.
- Negotiating the final terms, drafting the formal contract, and closing the deal.

Through monitoring activities, the VC seeks to add value to the company. These activities include attending board meetings, recruiting, and giving regular advice.

Successfully exiting investments allows VCs to fulfill their obligation to return capital to their investors. The IPO historically represents the most lucrative exit. Sales to strategic buyers (i.e. a large corporation) can also be very profitable if there is significant competition for the deal.

1.3   The History of Venture Capital

Students should be able to define the following terms: Small Business Investment Companies (SBICs), management fees, carried interest, preboom period, boom period, postboom period.

The modern organizational form of venture capital dates back to 1946. A decade later, the government still recognized a significant need for VC investments. The Small Business Act of 1958 created Small Business Investment Companies (SBICs). SBICs succeeded in training many future VC professionals.

The limited partnership arrangement, developed in the 1960s, requires LPs to pay management fees and carried interest to the GPs (the VC firm). Chapter 2 discusses limited partnerships in detail. For now, it is sufficient for the students to recognize that the limited partnership contributed to the modernization of the VC industry by creating incentives to pursue risky ventures with significant upside.

In 1979, the relaxation of investment rules for U.S. pension funds freed up substantial capital for VC investing. Pension funds continue to supply nearly half of all the money for venture capital in the United States.

Investment climbed steadily throughout from 1980 to 1994: the preboom period. The dawn of the Internet era led to a jump in VC investments during the boom period. The boom period ended abruptly in 2000.

Exhibit 1-3 illustrates the relatively small amount of investment in VC during the preboom period.

Exhibit 1-4 shows the dramatic increase in VC investments during the boom period, as well as the subsequent drop in investing activity investments during the postboom period. Despite the drop, yearly VC investments in the postboom period far exceed those during the preboom period.

1.4   Patterns of VC Investment in the United States

Investments by Stage:

Early Stage Financing – Includes the seed/start-up stage and early stage. Seed stage financing provides the entrepreneur with capital to prove a concept. Early stage financing gives capital to companies in the testing or pilot production phase of product development.

Expansion Stage Financing – Applies working capital to facilitate the initial expansion of a company. The company's business is growing rapidly, but it may or may not be profitable.

Later Stage Financing – Contributes capital to companies that have reached a stable growth rate and may be considering an IPO.

VC firms primarily invest in health care and information technology (IT). Businesses in these industries have large, addressable markets and potential for rapid growth.

The Silicon Valley is the epicenter of VC activity, with a consistent share of about one third of the total U.S. VC investment per year.

Exhibits 1-6, 1-7, and 1-8 compare VC investments by stage, industry and U.S. region. You may wish to ask students to identify specific trends apparent in these exhibits.

Chapter 2

VC Players

CHAPTER OUTLINE

KEY TERMS

VC firm
General partner (GP)
VC fund
Limited partner (LP)
Capital call
  = drawdown
  = takedown
Committed capital
Investment period = commitment period
Follow-on investments
Early-stage fund, late-stage fund, multistage
  fund
Raised, closed
Vintage year
Fund-of-funds (FOF)

Management fees
Lifetime fees
Investment capital
Invested capital, net invested capital
Carried interest = carry
Carried interest basis = carry basis
Contributed capital, net contributed capital
Priority returns
  = preferred returns
  = hurdle returns
Realized returns, unrealized returns
Catch-up provision
Clawback
Restrictive covenants
Call option

TEACHING NOTES

2.1   Firms and Funds

Students should be able to define the following terms: VC firm, general partner (GP), VC fund, limited partners (LPs), raised, capital call or drawdown or takedown, committed capital, closed, investment period or commitment period, follow-on investments, early-stage fund, late-stage fund, multistage fund, and vintage year.

A VC fund has a finite lifetime, which is typically 10 years plus optional extensions of a few years. Limited partners, mostly institutional investors, commit to providing a fixed amount of capital (committed capital). The VC charges an annual management fee over the life of the fund, which is often two percent of committed capital. Funds invest the remaining capital over the investment period: generally the first five years.

Most VC firms specialize their funds by stage, industry, and/or geography. Successful VCs raise funds every few years so that there is always at least one fund in the investment period at all times.

Staggering funds allows LPs to balance capital inflows and outflows. It also decreases the likelihood that their VC portfolio will miss out on a good vintage year. As economic environments differ across time, some years are better to start a VC fund than others.

Exhibit 2-1 provides a timeline for several funds of EarlyBird Ventures (EBV): a prototypical VC firm. This exhibit gives a feel for how VC firms space out their funds. It also allows students make conjectures about each fund's performance and corresponding investment environment.

VC firms are typically small and top-heavy. Though the backgrounds of VC professionals vary significantly, certain commonalities exist. VCs often have experience in IT or health care, a degree in science or engineering, and an MBA.

2.2   The Limited Partners

Students should be able to define the following term: fund-of-funds (FOF).

Exhibit 2-4 shows the relative prevalence of VC investment by investor class. Since 1980, pension funds have provided 44 percent of the committed capital in the VC industry, which

makes them the largest contributor by a significant margin. The other investor classes include endowments and foundations, individuals and families, corporations, and financial and insurance companies.

Fund-of-funds (FOF) represent a special type of financial intermediary that aggregates capital, mostly from wealthy individuals and small institutions, to invest in a portfolio of VC funds. By pooling their resources, FOF gives smaller investors access to a diversified portfolio of funds.

2.3   VC Partnership Agreements

Students should be able to define the following terms: management fees, lifetime fees, investment capital, realized investments, unrealized investments, cost basis, invested capital, net invested capital, carried interest or carry, carried interest basis or carry basis, priority returns or preferred returns or hurdle returns, clawback, contributed capital, net contributed capital, catch-up provision, write downs, restrictive covenants, and call option.

Management fees fund the day-to-day operations of VC firms. The most common initial fee is two percent of committed capital. Often, this fee will drop after the five-year investment period.

Students will need to know these definitions to solve the text's exercises:
- *lifetime fees* = the total amount of fees paid over the lifetime of a fund
- *investment capital* = committed capital - lifetime fees
- invested capital = cost basis for the investment capital of the fund that has already been deployed
- net invested capital = invested capital - cost basis of all exited and written-off investments

Carried interest enables GPs to participate in the profits of the fund. Variations occur in the percentage level of carried interest, the carried interest basis, the timing of the carried interest, priority returns, and clawbacks.

The level and basis of carried interest are the main determinants of the total dollar amount of GP carried interest. Most VC firms receive 20 percent carry, although top VCs may be able to charge a higher percentage. The vast majority of firms use committed capital as the carry basis. A small percentage of firms use invested capital (committed capital - management fees), which generates more carry for the GPs.

Regarding the timing of distributions, the LP-friendly method requires GPs return the whole basis the LPs before receiving carry. GP-friendly methods allow for early carry distributions.

For example, funds may require invested capital or contributed capital (invested capital + management fees paid to date) be returned to the LPs before the GPs earn any carry.

Priority return structures promise the LPs a certain rate of return before the GPs collect carry. Priority returns typically have a catch-up period. Upon reaching the priority threshold, the GPs then receive a disproportionately high ratio of the profit until the aggregate profit is split according to the chosen carry level. If there is no catch-up period, the priority return provision will permanently affect the aggregate profit split.

A fund with an early carry distribution rule experiencing declining performance may initially exceed the carry threshold and subsequently drop closer to or below it. Such a situation causes the aggregate carry earned by GPs to fall. Clawback provisions allow LPs to recoup the previously distributed carry.

To better align incentives, LPs often restrict GP behavior with covenants written into the partnership agreement. Gompers and Lerner (1996) break restrictive covenants down into the following categories: covenants relating to the management of the fund, covenants relating to the activities of the general partners, and covenants relating to the types of investment.

Appendices: Key Terms and Conditions

Appendix 2.A-C gives excerpts from the private placement memorandum for three (fictional) VC funds.

The fund durations (also called terms), commitment periods, and general partner clawback obligations are the same across all three funds and representative of industry norms.

Owl Ventures IX employs a different management fee structure than the other two funds. The fund's percentage fee changes depending on the fund's year. Notably, the management fees start declining following the initial investment period (the most common structure).

Distributions vary across all three funds. Talltree Ventures IV exhibits the most complex structure. The fund has a priority return and catch-up provision. All three funds require the return of contributed capital, which allows for early carry distribution.

SUGGESTED ANSWERS TO EXERCISES

2.1 Suppose that a $200M VC fund has a management fee of 2.5 percent per year for the first five years, with a reduction of 0.25 percent (25 basis points) in each year thereafter. All fees are paid on committed

capital, and the fund has a ten-year life. What are the lifetime fees and investment capital for this fund?

Lifetime Fees = $42.5
Investment Capital = $157.5

Please see Excel Solutions for the full, worked solution to this exercise.

2.2 (This is a little bit tricky.) Suppose that a $1000M VC fund has fees of 2.0 percent per year in all years, with these fees paid on committed capital in the first five years and on *net invested* capital for years 6 through 10. You can assume the fund is fully invested by the beginning of year 6, and then realizes 20 percent of its investment capital in each of the following five years. What are the lifetime fees and investment capital for this fund? (Make assumptions for any information that you think is still missing from the problem.)

Lifetime Fees = $150.94
Investment Capital = $849.06

Please see Excel Solutions for the full, worked solution to this exercise.

2.3 A VC firm is considering two different structures for its new $250M fund. Both structures would have management fees of 2 percent per year (on committed capital) for all ten years. Under Structure I, the fund would receive an X percent carry with a basis of all committed capital. Under Structure II, the fund would receive a Y percent carry with a basis of all investment capital. For a given amount of (total) exit proceeds = $Z, solve for the amount of carried interest under both structures.

Carried Interest under Structure 1 = X% * (Z - 250)
Carried Interest under Structure 2 = Y% * (Z - 200)

Please see Excel Solutions for the full, worked solution to this exercise.

2.4 Talltree Ventures has raised their $250M fund, Talltree Ventures IV, with terms as given in Appendix 2.B of this chapter. Construct an example of fund performance where the clawback provision would be triggered. In this example, compute the carried interest paid in each year, and show the total amount that must be paid back by the GPs upon the liquidation of the fund.

Answers may vary

Please see Excel Solutions for the full, worked solution to this exercise.

Year	Fee percentag	Fees ($M)
1	2.5	5
2	2.5	5
3	2.5	5
4	2.5	5
5	2.5	5
6	2.25	4.5
7	2	4
8	1.75	3.5
9	1.5	3
10	1.25	2.5

Lifetime fees   =   42.5

Investment capital   =   157.5

Solution 2.2

There are two main ways to approach this problem. One is via algebra the other is by constructing a set of calculations that captures the relationships outlined in the question,
with the annual investment amount unknown. Then, you can use the goalseek function to set the contributed capital (cell L15) to 1000 by changing the annual investment (cell C8)

Year	1	2	3	4	5	6	7	8	9	10
annual investment	$ 169.81	$ 169.81	$ 169.81	$ 169.81	$ 169.81					
cummulative annual investmen	$ 169.81	$ 339.62	$ 509.43	$ 679.25	$ 849.06					
Beg Bal of NIC	$ -	$ 169.81	$ 339.62	$ 509.43	$ 679.25	$ 849.06	$ 679.25	$ 509.43	$ 339.62	$ 169.81
mgmt fee	$ 20.00	$ 20.00	$ 20.00	$ 20.00	$ 20.00	$ 16.98	$ 13.58	$ 10.19	$ 6.79	$ 3.40
change in NIC	$ 169.81	$ 169.81	$ 169.81	$ 169.81	$ 169.81	$ (169.81)	$ (169.81)	$ (169.81)	$ (169.81)	$ (169.81)
End Bal of NIC	$ 169.81	$ 339.62	$ 509.43	$ 679.25	$ 849.06	$ 679.25	$ 509.43	$ 339.62	$ 169.81	$ -
accum mgmt fee	$ 20.00	$ 40.00	$ 60.00	$ 80.00	$ 100.00	$ 116.98	$ 130.57	$ 140.75	$ 147.55	$ 150.94
contrib capital	$ 189.81	$ 379.62	$ 569.43	$ 759.25	$ 949.06	$ 966.04	$ 979.62	$ 989.81	$ 996.60	$ 1,000.00

Lifetime fees =	$ 150.94
Investment capital =	$ 849.06

Assumptions
commited capital = total amount of capital promised by the LPs over a lifetime of a fund
management fees = fees to keep lights on
net invested capital = invested capital LESS cost basis of realized investments

Solution 2.3

Carried Interest Under Structure 1 =   X% * (z - 25(

Carried Interest Under Structure 2 =   Y% * (z - 25(
Carried Interest Under Structure 2 =   Y% * (z - 20(

The easiest way to solve this problem is algebraically.

committed capital	250
gross returns	10.0%
carry	20.0%
management fee	2.0%
priority return	8.0%
Year	1
investments	50.0
portfolio value	50.0
total returned capital	0.0
carried interest	0.0
returned capital to LPs	0.0
cumulative returned capital to LPs	0.0
port value after capital returned	50.0
management fee	5.0
cash flows to GP	5.0
cash flows to LPs	-55.0
contributed capital	55.0
running NPV with hurdle, not counting this periods returned capital	-55.0
catch up amount	
Clawback	0

(for most years)

| ... | ... | | | | |
2	3	4	5	6	7
50.0	50.0	50.0	0.0	0.0	0.0
200.0	72.0	129.2	50.0	33.0	21.8
180.0	0.0	0.0	20.0	13.2	8.7
14.0	0.0	0.0	0.0	0.0	0.0
166.0	0.0	0.0	20.0	13.2	8.7
166.0	166.0	166.0	186.0	199.2	207.9
20.0	72.0	129.2	30.0	19.8	13.1
5.0	5.0	5.0	5.0	5.0	5.0
19.0	5.0	5.0	5.0	5.0	5.0
111.0	-55.0	-55.0	15.0	8.2	3.7
110.0	165.0	220.0	225.0	230.0	235.0
-114.4	-3.4	-54.3	-59.2	-48.6	-43.8
1.1	0.0	0.0	0.0	0.0	0.0
0	0	0	0	0	0

8	9	10 close	
0.0	0.0	0.0	0.0
14.4	9.5	6.3	0.0
5.7	3.8	6.3	0.0
0.0	0.0	0.0	0.0
5.7	3.8	6.3	0.0
213.7	217.5	223.7	223.7
8.6	5.7	0.0	0.0
5.0	5.0	5.0	0.0
5.0	5.0	5.0	0.0
0.7	-1.2	1.3	0.0
240.0	245.0	250.0	250.0
-43.2	-45.5	-50.0	-47.3
0.0	0.0	0.0	
0	0	0	14.0

committed capital		250				
gross returns		10.0% (for most years)				
carry		20.0%				
management fee		2.0%				
priority return		8.0%				

...   ...

(1) One key thing here is that priority return starts accumulating once LPs contribute capital to GPs. Not all of committed capital is contributed on the first day of the fund, however. Instead, investments are paced over the first four years, and management fees (part of contributed capital) are paced over the 10 years of fund's life. This means priority return is computed for different durations for each year's contribution. Another key thing is to compute the catch-up amount for GPs.

(2) What happens if a large early distribution occurs and the fund returns capital in excess of contributed capital (to date)+ priority returns? Can such early excess distributions be used to offset against future priority return payments or not? The fund terms described in the Appendix of the text are sufficiently ambiguous. Therefore making either assumption seems equally valid here. (see below for two versions)

Year		1	2	3	4	5	6
investments		50.0	50.0	50.0	50.0	0.0	0.0
portfolio value		50.0	200.0	72.0	129.2	50.0	33.0
total returned capital		0.0	180.0	0.0	0.0	20.0	13.2
carried interest		0.0	14.0	0.0	0.0	0.0	0.0
returned capital to LPs		0.0	166.0	0.0	0.0	20.0	13.2
cumulative returned capital to LPs		0.0	166.0	166.0	166.0	186.0	199.2
port value after capital returned		50.0	20.0	72.0	129.2	30.0	19.8
management fee		5.0	5.0	5.0	5.0	5.0	5.0
cash flows to GP		5.0	19.0	5.0	5.0	5.0	5.0
cash flows to LPs		-55.0	111.0	-55.0	-55.0	15.0	8.2
contributed capital		55.0	110.0	165.0	220.0	225.0	230.0
contributed capital in each year		55.0	55.0	55.0	55.0	5.0	5.0
contributed capital + compound priority return							
	year 1	55.0	59.4	**0.0**	0.0	0.0	0.0
	year 2		55.0	**0.0**	0.0	0.0	0.0
	year 3			55.0	59.4	64.2	**47.7**
	year 4				55.0	59.4	64.2
	year 5					5.0	5.4
	year 6						5.0
	year 7						
	year 8						

| | | | year 9 | | | |
			year 10			
amount owed to LPs v1: allowing for early return to offset priority return			-0.7	54.2	63.6	52.0
early return (if allowed to offset future priority returns)		51.6	55.7	60.2	65.0	70.2
Amount owed to LPs v2: not allowing early return to offset future priority return	55.0	114.4	55.0	114.4	128.6	122.2
carry test (1 if carry occurs)		1.0	0.0	0.0	0.0	0.0
amount in excess of cont. cap + priority		65.6	0.0	0.0	0.0	0.0
catch up amount		1.1	0.0	0.0	0.0	0.0
catch up test (1 if catchup ends this period)		1.0	0.0	0.0	0.0	0.0
additional cary amount		12.9	0.0	0.0	0.0	0.0
total carry		14.0	0.0	0.0	0.0	0.0
returned capital to LPs	0	166.0	0.0	0.0	20.0	13.2
cumulative returned capital to LPs	0	166.0	166.0	166.0	186.0	199.2
clawback						

7	8	9	10	close
0.0	0.0	0.0	0.0	0.0
21.8	14.4	9.5	6.3	0.0
8.7	5.7	3.8	6.3	0.0
0.0	0.0	0.0	0.0	0.0
8.7	5.7	3.8	6.3	0.0
207.9	213.7	217.5	223.7	223.7
13.1	8.6	5.7	0.0	0.0
5.0	5.0	5.0	5.0	0.0
5.0	5.0	5.0	5.0	-14.0
3.7	0.7	-1.2	1.3	14.0
235.0	240.0	245.0	250.0	250.0
5.0	5.0	5.0	5.0	

0.0	0.0	0.0	0.0	
0.0	0.0	0.0	0.0	
37.2	**30.8**	**27.1**	**25.1**	**20.4**
69.3	74.8	80.8	87.3	94.3
5.8	6.3	6.8	7.3	7.9
5.4	5.8	6.3	6.8	7.3
5.0	5.4	5.8	6.3	6.8
	5.0	5.4	5.8	6.3

		5.0	5.4	5.8
			5.0	5.4
46.9	46.3	48.8	53.6	51.1
75.8	81.9	88.4	95.5	103.1
122.8	128.2	137.2	149.1	154.3
0.0	0.0	0.0	0.0	
0.0	0.0	0.0	0.0	
0.0	0.0	0.0	0.0	
0.0	0.0	0.0	0.0	
0.0	0.0	0.0	0.0	
0.0	0.0	0.0	0.0	14.0
8.7	5.7	3.8	6.3	
207.9	213.7	217.5	223.7	
				14.0

Year		2010	2011	2012	2013	2014
Beginning Value		10000	10300	13105	5563	6332
New Investments		2000	2000	2000	2000	2000
Ending Value (before distributions)		13800	16605	9063	9832	12498
Distributions to LPs		3000	3000	3000	3000	3000
Distributions to GPs		500	500	500	500	500
Management Fees		200	200	200	200	200
Gross Return		15.0%	35.0%	-40.0%	30.0%	50.0%
		115.0%	135.0%	60.0%	130.0%	150.0%
Net Return		9.0%	28.8%	-44.1%	20.2%	40.6%
		109.0%	128.8%	55.9%	120.2%	140.6%
gross compound	81.6%					
gross annualized	12.7%					
net compound	32.8%					
net annualized	5.8%					

GVM = K

From Example 3.3 we know that Lifetime fees = $20M and investi

a)

Carried interest = 0.20 * (K * $80M - $100M)

From Equation (3.8) we have,

Value Multiple = ((K * $80M) - 0.20 * (K * $80M - $100M)) / $10

From Equation (3.15) we have,

GP% = 0.20 * (K * $80M - $100M) / (K * $80M)

b)

Solve for a value multiple > 3

((K * $80M) - 0.20 * (K * $80M - $100M)) / $100M > 3

0.80 * K * $80M + $20M > $300M

		check
K > 4.375		3

c) NOTE that the formulas must change when we use ivnestment c

Redoing all the answers to (a) and (b) yields

Carried interest = 0.20 * (K * $80M - $80M) = 0.20 * (K-1) * $80

Value Multiple = ((K * $80M) - 0.20 * (K-1) * $80M)) / $100M

GP% = (0.20 * (K-1) * $80M) / (K * $80M)

Solve for a value multiple > 3

((K * $80M) - 0.20 * (K-1) * $80M)) / $100M > 3

0.80 * K * $80M + $16M > $300M

		check
K > 4.4375		3

Solution 3.3

	EBV	Owl
Commited Capital	$100.00	$500.00
Mgmt Fee	$20.00	$83.75
Investment Capital	$80.00	$416.25
Carry	20%	25%

One approach to solving this question is to solve for the VM's of EBV and OWL algebraically. Following the definition of VM, we derive the following two linear equations.

Value Multiple of EBV

$= $ (total distributions - carried interest) / commited capital
$= [(GVM)(80) - (.2)(GVM)(80) + (.2)100] / 100$
$= .64(GVM) + .2$

Value Multiple of Owl

$= $ (total distributions - carried interest) / commited capital
$= [(GVM)(416.25) - (.25)(GVM)(416.25) + (.25)500] / 500$
$= .624(GVM) + .25$

These linear equations have different slopes. By setting the equations equal to each other, we can derive that GVM equals 3.125.

$$.64(GVM) + .2 = .624(GVM) + .25$$
$$.016(GVM) = .05$$
$$GVM = 3.125$$

For GVM's less than 3.125, Owl has the higher value multiple. For GVM's greater than 3.125, EBV has the higher value multiple. Thus, the answer is UNCERTAIN.

Solution 3.4

The data below is given in exhibit 3.10. The shaded cells show how to calculate the cash flows to Accel and LPs.
The "ending year" data gives us a terminal value assuming the portfolio is liquidated that year.

	year 1	year 2	year 3	year 4	year 5	year 6	year 7	year 8	year 9	year 10
investments	$ 50.0	$ 100.0	$ 100.0	$ 150.0	$ 100.0	$ -	$ -	$ -	$ -	$ -
portfolio value	$ 50.0	$ 167.5	$ 326.1	$ 387.8	$ 353.5	$ 381.8	$ 412.3	$ 445.3	$ 480.9	$ 519.4
carried interest	$ -	$ -	$ -	$ -	$ -	$ -	$ 15.9	$ 17.8	$ 19.2	$ 103.9
returned capital to LPs	$ -	$ -	$ 150.0	$ 200.0	$ 70.7	$ 76.4	$ 66.6	$ 71.2	$ 76.9	$ 415.5
cumulative returned capital to LPs	$ -	$ -	$ 150.0	$ 350.0	$ 420.7	$ 497.1	$ 563.6	$ 634.9	$ 711.8	$ 1,127.3
port value after capital returned	$ 50.0	$ 167.5	$ 176.1	$ 187.8	$ 282.8	$ 305.4	$ 329.8	$ 356.2	$ 384.7	$ -
management fee	$ 10.0	$ 10.0	$ 10.0	$ 10.0	$ 10.0	$ 10.0	$ 10.0	$ 10.0	$ 10.0	10.0
cash flows to XYZ	*$ 10.0*	*$ 10.0*	*$ 10.0*	*$ 10.0*	*$ 10.0*	*$ 10.0*	*$ 25.9*	*$ 27.8*	*$ 29.2*	*$ 113.9*
cash flows to LPs	*$ (60.0)*	*$ (110.0)*	*$ 40.0*	*$ 40.0*	*$ (39.3)*	*$ 66.4*	*$ 56.6*	*$ 61.2*	*$ 66.9*	*$ 405.5*
if ending year	*$ (10.0)*	*$ 57.5*	*$ 216.1*	*$ 227.8*	*$ 243.5*	*$ 371.8*	*$ 386.4*	*$ 417.5*	*$ 451.7*	*$ 405.5*

NOTE: DO NOT FORGET TO ADD THE "PORT VALUE" AT THE END OF EACH YEAR AS A TERMINAL CASH FLOW -- MANY PEOPLE FORGOT TO DO THIS

											IRR
At year end 1											0.00%
At year end 2	$ (60.0)	$ 57.5									-4.17%
At year end 3	$ (60.0)	$ (110.0)	$ 216.1								19.10%
At year end 4	$ (60.0)	$ (110.0)	$ 40.0	$ 227.8							22.78%
At year end 5	$ (60.0)	$ (110.0)	$ 40.0	$ 40.0	$ 243.5						24.36%
At year end 6	$ (60.0)	$ (110.0)	$ 40.0	$ 40.0	$ (39.3)	$ 371.8					25.85%
At year end 7	$ (60.0)	$ (110.0)	$ 40.0	$ 40.0	$ (39.3)	$ 66.4	$ 386.4				25.95%
At year end 8	$ (60.0)	$ (110.0)	$ 40.0	$ 40.0	$ (39.3)	$ 66.4	$ 56.6	$ 417.5			26.02%
At year end 9	$ (60.0)	$ (110.0)	$ 40.0	$ 40.0	$ (39.3)	$ 66.4	$ 56.6	$ 61.2	$ 451.7		26.09%
At year end 10	$ (60.0)	$ (110.0)	$ 40.0	$ 40.0	$ (39.3)	$ 66.4	$ 56.6	$ 61.2	$ 66.9	$ 405.5	24.56%

If we count year 0 as "zero" then this is an example of a J-curve
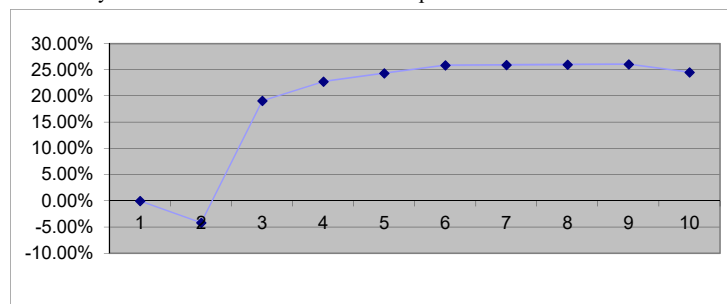
Month	Ri	Rm	Rf		Ri-Rf	Rm-Rf
January	1.51%	2.24%	0.07%		1.44%	2.17%
February	1.34%	1.49%	0.06%		1.28%	1.43%
March	-0.39%	-1.16%	0.09%		-0.48%	-1.25%
April	-2.45%	-2.50%	0.08%		-2.53%	-2.58%
May	1.74%	1.35%	0.06%		1.68%	1.29%
June	2.33%	2.08%	0.08%		2.25%	2.00%
July	-3.81%	-3.87%	0.10%		-3.91%	-3.97%
August	0.32%	0.16%	0.11%		0.21%	0.05%
September	2.25%	1.95%	0.11%		2.14%	1.84%
October	2.01%	1.67%	0.11%		1.90%	1.56%
November	3.76%	4.68%	0.15%		3.61%	4.53%
December	2.43%	3.36%	0.16%		2.27%	3.20%

monthly alpha =	0.07% (not significant)	Performance evaluation gives a point estimate of 7 basi
beta =	0.88	
cost of capital	10.1%	

SUMMARY OUTPUT

Regression Statistics	
Multiple R	0.977137
R Square	0.954798
Adjusted R Squ	0.950277
Standard Error	0.00484
Observations	12

ANOVA

	df	SS	MS	F	gnificance F
Regression	1	0.004949	0.004949	211.2268	4.73E-08
Residual	10	0.000234	2.34E-05		
Total	11	0.005183			

	Coefficients	ndard Err	t Stat	P-value	Lower 95%	Upper 95%	ower 95.0%	pper 95.0%
Intercept	**0.000702**	0.00149	0.471132	0.647656	-0.00262	0.004022	-0.00262	0.004022
X Variable 1	**0.878059**	0.060416	14.53364	4.73E-08	0.743445	1.012673	0.743445	1.012673

FALSE

Failure rate
expected v
As an illus
a high failu

Solution 4.3

Higest cost of capital	Gasco
Middle cost of capital	Combco
Lowest cost of capital	Fuelco

> If cost of capital is driven by non-diversifiable market risk, then Gasco will have the highest because fuel consumption is correlated to overall economic activity. Fuelco will have the lowest cost of capital because its returns are the least correlated and if we assume its risk is idiosyncratic, then it can be diversified in a portfolio of other companies. Combo will have a moderate cost of capital because it combines the operations of both.

Solution 4.4

a) **Invalid, survivor bias is not an issue because they have the whole portfolio. Survivor bias typically comes into play in evaluating industry returns.**

   Common mistakes:
   Not addressing survivor bias while discussing reasons for alpha value.

b) **Valid. Stale value applies because reported returns are not adjusted frequently enough. Fix is to put in lags.**

   Common mistakes:
   Misunderstood definition of stale value.
   Failure to provide fix.

c) **Invalid. Probability of failure already incorporated in returns.**

   Common mistakes:
   Assigning probability to beta

d) **Valid. Illiquidity is an issue for venture investments. One would apply the Pastor Stambaugh Model (PSM) to adjust.**

   Common mistakes:
   Correct answers either named PSM or provided the appropriate formula.
   Confuse LP liquidity with portfolio company liquidity.

e) **Valid. Model missed Fama and French factors for value and size.**

   Common mistakes:
   Confusing portfolio company size with size of dollar investment.

File: Chapter 02 Operational Procedures

Multiple Choice

[QUESTION]
1. What should you avoid learning at all costs?
A. Dependability
B. Customer passwords
C. Versatility
D. Responsibility
Ans: B
Page: 20
Difficulty: Easy

[QUESTION]
2. To show that you are dependable, you should always be _____.
A. versatile
B. on time
C. adaptable
D. reciprocal
Ans: B
Page: 21
Difficulty: Easy

[QUESTION]
3. How do you show users the error of their ways without creating anger or conflict?
A. Using a stern tone of voice
B. Electrical potential
C. Doing their job for them
D. Assertive communication
Ans: D
Page: 23
Difficulty: Easy

[QUESTION]
4. Which one of the following is not an assertive fact-seeking question?
A. When did it last work?
B. Has software or hardware changed recently?
C. What did you do to cause the problem?
D. What applications were running when it locked up?
Ans: C
Page: 25
Difficulty: Medium

[QUESTION]

5. Which phrase best describes the process of asking questions once a person has described a situation?
A. Respectful communication
B. Sensitivity awareness
C. Eliciting answers
D. Showing versatility
Ans: C
Page: 25
Difficulty: Medium

[QUESTION]
6. What is the most important thing you should do at the completion of any work?
A. Document your work.
B. Ask to be paid.
C. Elicit solutions.
D. Elicit answers.
Ans: A
Page: 27
Difficulty: Easy

[QUESTION]
7. What do antistatic mats and wrist straps use to prevent anti-static charges from racing through devices?
A. Extractors
B. Resistors
C. Potential depressors
D. Multimeters
Ans: B
Page: 28
Difficulty: Medium

[QUESTION]
8. Who should you contact if you notice dangerous cables or other hazardous materials at a customer site?
A. Your boss
B. Hasmat
C. MSDS
D. Building services
Ans: D
Page: 30
Difficulty: Medium

[QUESTION]
9. Which device or appliance emits radio waves?
A. Toaster
B. Refrigerator

C. Cordless drill
D. Microwave oven
E. Hemostat
Ans: D
Page: 30
Difficulty: Hard

[QUESTION]
10. Which tool is generally included in a typical technician toolkit?
A. Crescent wrench
B. Hammer
C. Measuring tape
D. Parts retriever
E. Measuring tape
Ans: D
Page: 31
Difficulty: Medium

[QUESTION]
11. What is an important item to a technician that usually contains a Torx wrench, a Phillips-head screwdriver, a pair of plastic tweezers, and a hemostat?
A. Tech toolkit
B. Boot bag
C. FRU box
D. ZIP tote
Ans: A
Page: 31
Difficulty: Easy

[QUESTION]
12. What is the first step of the troubleshooting theory?
A. Identify the problem.
B. Establish theory of probable cause.
C. Test the theory.
D. Verify full system functionality.
Ans: A
Page: 32
Difficulty: Medium

[QUESTION]
13. If a theory is not confirmed during troubleshooting, what is the technician's next step?
A. Make changes
B. Implement the solution
C. Establish a new theory or escalate
D. Verify full functionality

Ans: C
Page: 32
Difficulty: Hard

[QUESTION]
14. What action is always recommended before making any major changes to a critical system?
A. Test your theory.
B. Add more RAM.
C. Make backups.
D. Reboot using Low Resolution mode.
Ans: C
Page: 33
Difficulty: Easy

[QUESTION]
15. Regarding an onsite accident, what kind of report should detail what happened and where it happened?
A. Down time
B. Formalized
C. Incident
D. Performance
Ans: C
Page: 36
Difficulty: Easy

[QUESTION]
16. If a user or a technician becomes injured on the job, what should be done?
A. Keep the incident private.
B. Escalate the problem.
C. Establish a theory of probable cause.
D. Create an incident report.
Ans: D
Page: 36
Difficulty: Medium

Fill in the Blank

[QUESTION]
1. _____ means to tell the truth and _____ means to do the right thing.
Ans: Honesty, integrity
Page: 20
Difficulty: Easy

[QUESTION]

2. You should respect other people's property and follow the _____, also known as the Golden Rule.
Ans: Ethic of Reciprocity
Page: 21
Difficulty: Medium

[QUESTION]
3. Most companies require a signed _____ to perform work.
Ans: Work Authorization
Authorization of Work
Page: 22
Difficulty: Easy

[QUESTION]
4. When engaging with a user, explaining a situation clearly and eliciting answers in a non-judgmental and non-accusatory manner are examples of _____.
Ans: assertive communication
Page: 23
Difficulty: Medium

[QUESTION]
5. At the completion of work, you should _____ the problem and solution and _____ up with the customer to verify satisfaction.
Ans: document, follow
Page: 27
Difficulty: Easy

[QUESTION]
6. Antistatic wrist straps, mats, and bags are used to prevent _____.
Ans: electrostatic discharge (ESD)
electrostatic discharge
ESD
Page: 28
Difficulty: Medium

[QUESTION]
7. Taking a moment to touch the power supply before working on a computer and every once in a while as you work to keep yourself at the same electrical potential as the computer is a method of _____.
Ans: self-grounding
self grounding
Page: 29
Difficulty: Easy

[QUESTION]
8. _____ bags help prevent ESD while parts are stored.

Ans: Antistatic
Page: 29
Difficulty: Easy

[QUESTION]
9. _____ can affect PC speakers and wireless networks, among other equipment.
Ans: Radio frequency interference (RFI)
Radio frequency interference
RFI
Page: 30
Difficulty: Easy

[QUESTION]
10. When building out a computer space and cutting drywall, wear a(n) _____ for breathing protection.
Ans: air filter mask
Page: 31
Difficulty: Easy

[QUESTION]
11. The _____ follows a set of steps to diagnose and fix a computer.
Ans: troubleshooting theory
Page: 32
Difficulty: Medium

[QUESTION]
12. After you test a theory to determine cause, you should establish a(n) _____ to resolve the problem and implement a solution.
Ans: plan of action
Page: 32
Difficulty: Medium

[QUESTION]
13. While attempting to identify the problem, you should _____ the user and identify user changes to the computer.
Ans: question
Page: 32
Difficulty: Medium

[QUESTION]
14. The best way to verify _____ is to have the user do whatever she needs to do on the repaired system for a few minutes while you watch.
Ans: full system functionality
Page: 35
Difficulty: Medium

[QUESTION]
15. As a tech, the last step of every troubleshooting job should be to document your findings, _____, and _____.
Ans: actions, outcomes
outcomes, actions
Page: 35
Difficulty: Medium

Short Answer

[QUESTION]
1. What are the keys to effective relationships when dealing with customers?
Ans: Being on time, avoiding accusatory questions, demonstrating honesty and integrity, treating others with respect, and using other assertive communications are guidelines you should always follow to deal with customers effectively.
Page: 19-26
Difficulty: Easy

[QUESTION]
2. Should you build customer confidence and trust in your technical abilities by memorizing customer passwords and confidential document locations?
Ans: No. Avoid learning other folks' passwords, and always respect confidential customer property.
Page: 20
Difficulty: Medium

[QUESTION]
3. What information is included in a Work Authorization form?
Ans: A Work Authorization form includes the customer's name, billing information, time and date, and scope of work.
Page: 22
Difficulty: Easy

[QUESTION]
4. What is the first step in assertive communication?
Ans: Assertive communication first requires you to show the other person that you understand and appreciate the importance of his feelings. The second part of assertive communication is making sure you state the problem clearly without accusing the user directly.
Page: 23
Difficulty: Easy

[QUESTION]
5. What should you do if a coworker calls you for assistance while you are working with a customer?
Ans: If you get a work-related call, politely excuse yourself, walk away for privacy, and keep the call brief.

Page: 23
Difficulty: Medium

[QUESTION]
6. What environmental conditions increase the risk of ESD?
Ans: Static electricity, and therefore the risk of ESD, is much more prevalent in dry, cool environments.
Page: 28
Difficulty: Easy

[QUESTION]
7. Briefly describe the manner in which sensitive parts should be stored to help prevent damage from ESD.
Ans: Any electrical component not in a computer case needs to be stored in an antistatic bag, a specially designed bag that sheds whatever static electricity you have when you touch it, thus preventing any damage to components stored within it.
Page: 29
Difficulty: Easy

[QUESTION]
8. Is EMI more dangerous than ESD? Explain.
Ans: No. EMI (electromagnetic interference) is not nearly as dangerous as ESD (electrostatic discharge). Although EMI can cause damage, ESD is the greatest killer of PCs and components.
Page: 29
Difficulty: Hard

[QUESTION]
9. What is the best way to prevent RFI?
Ans: The best way to prevent RFI is to keep radio-emitting devices as far away as possible from other electronics.
Page: 30
Difficulty: Easy

[QUESTION]
10. If you have long hair, why might you consider tying it back in a pony-tail?
Ans: You don't want anything getting caught in a fan or stuck on a component. Preventing this type of situation can save you and your components a lot of pain.
Page: 31
Difficulty: Easy

[QUESTION]
11. List three tools found in a typical technician toolkit.
Ans: Most kits have a star-headed Torx wrench, a nut driver or two, a pair of plastic tweezers, a little grabber tool (the technical term is parts retriever), a hemostat, an IC extractor for removing various chips, and both Phillips-head and flat-head screwdrivers.
Page: 31

Difficulty: Medium

[QUESTION]
12. Good techs bring essential software tools to every troubleshooting scenario. Name two types of tasks performed by software in a troubleshooting situation.
Ans: These software tools may be used for scanning for malware (malicious software, like viruses), checking memory, and other diagnostic scenarios.
Page: 32
Difficulty: Easy

[QUESTION]
13. What are the six major steps in troubleshooting?
Ans: The six major steps in troubleshooting are to identify the problem; establish a theory of probable cause; test the theory; establish a plan of action; verify full system functionality; and document findings, actions, and outcomes.
Page: 32
Difficulty: Medium

[QUESTION]
14. At what stage of the troubleshooting theory process should backups be performed?
Ans: Backups should be performed during the identification stage of the troubleshooting theory process, before making any changes.
Page: 33
Difficulty: Medium

[QUESTION]
15. Briefly describe escalation.
Ans: Escalation is the process your company (or sometimes just you) goes through when you—the person assigned to repair a problem—are not able to get the job done. It's okay to escalate because no one can fix every problem.
Page: 34
Difficulty: Easy

[QUESTION]
16. What is a critical preventive measure to consider in almost every case?
Ans: Educate the user. Take advantage of the time with the user to informally train him about the problem.
Page: 35
Difficulty: Easy

[QUESTION]
17. What is the best way to verify full system functionality?
Ans: The best way to verify full system functionality is to have the user do whatever she needs to do on the repaired system for a few minutes while you watch.
Page: 35
Difficulty: Medium