DECISION MAKING AND SCENARIOS
MODULE 4.2 – New Product Venture

Forecasting Future Cash Flows

Professor Robert Holthausen
Professor Richard Lambert

Agenda – Valuation of a Proposed New Product Venture and Evaluation of Alternative Scenarios

- Introduction and Spreadsheet Set up
- **Forecasting of Future Cash Flows**
- Valuation (NPV and IRR)
- Formulation and Evaluation of Alternative Scenarios
- Expanding the Time Horizon

- **OPEN THE SPREADSHEET AND FOLLOW ALONG!**

Forecasting Financial Statements

- Forecasts often start with sales (and sales growth)
- Use the projected sales figures to estimate the remaining income statement lines (which are often at least partially a function of sales volume)
- Use the forecasted Sales numbers to construct a schedule for producing the product or service (production volume, inventory levels)
- Use the forecasted sales and production schedules to estimate
  - The resources needed to accomplish the plans (assets)
  - The timing of resource acquisition and use
- Use the income statement and balance sheets to construct the statement of cash flows.
- We'll focus on the cash flows from project itself and not worry about the specifics as to how it is financed

Forecasting Revenues

- Try to Assess Consumer Demand
- Forecast Industry Sales and Firm Market Share
  - Management Estimates
  - Analysts Forecasts
- Production/ Technology Constraints
- Demand will also depend on the Sales Price
- For Newer Ventures
  - How long until we can get to market?
  - How long will the “high growth” phase last?
  - What will steady state and “phase out/decline” phases look like?

Forecasting The Other Income Statement Lines

- Cost of Goods (or Services) Sold
  - What combination of material, labor and overhead is required?
  - What Profit Margin is expected?
  - How much of the Costs are Fixed vs Variable?
- Selling General and Administrative:
  - What are the marketing and advertising plans?
  - How do they Vary Over Time?
  - How much do these costs go up when sales go up?
- Prior (or Competitor) Income Statements can be helpful

Income Statement - Depreciation Expense

- Based on acquisitions of property, plant, and equipment up through that year
- Estimates of Useful Lives and Salvage Value

Income Statement – Income Tax Expense

- Where will the income be (what tax jurisdiction)?
- What are our tax rates?
- Income for tax purposes is generally different than financial statement income
  - Accelerated depreciation for tax purposes vs straight line depreciation for book purposes
- We'll assume that this venture is part of a bigger company that has plenty of taxable income
  - So if this venture incurs losses early on, we're able to utilize those losses to reduce our taxes
  - If that's not the case, you have to worry about more complicated features of the tax law involving Loss Carryforwards and Carrybacks

Income Statement -- Disposal Year

- In the “Other” line on the Income Statement
- There is a Gain on Sale of the PPE (its book value is $0 at the time of sale, but we sold it for $5000)
- There are Other Disposal costs of $2000

Forecasted Income Statements

INCOME STATEMENT	1	2	3	4	5	6	7	8
Sales Revenue	$0	$0	$200,000	$200,000	$200,000	$200,000	$200,000	$9,000
Cost of Goods Sold	$0	$0	$90,000	$90,000	$90,000	$90,000	$90,000	$9,000
Gross Margin	$0	$0	$110,000	$110,000	$110,000	$110,000	$110,000	$0
Depreciation Expense	$10,000	$10,000	$10,000	$10,000	$10,000	$10,000	$10,000	$0
Research & Development	$20,000	$20,000	$0	$0	$0	$0	$0	$0
SG&A	$25,000	$25,000	$55,000	$55,000	$55,000	$55,000	$55,000	$0
Other Losses (Gains)	$0	$0	$0	$0	$0	$0	$0	($3,000)
Pre-tax Income (Loss(	($55,000)	($55,000)	$45,000	$45,000	$45,000	$45,000	$45,000	$3,000
Tax Expense (Benefit)	($26,120)	($23,600)	$17,800	$19,200	$19,760	$20,320	$20,600	$1,200
Net Income (Loss)	**($28,880)**	**($31,400)**	**$27,200**	**$25,800**	**$25,240**	**$24,680**	**$24,400**	**$1,800**

- No Growth In Sales Volume During Operating Phase (by assumption)
- Big Drop in Sales (and Sale Price) During the Termination Phase
- Decline in Income During Operating Phase is because of the tax expense (and the declining tax shield provided by depreciation)

Forecasted Income Statements

INCOME STATEMENT	1	2	3	4	5	6	7	8
Sales Revenue	$0	$0	$200,000	$200,000	$200,000	$200,000	$200,000	$9,000
Cost of Goods Sold	$0	$0	$90,000	$90,000	$90,000	$90,000	$90,000	$9,000
Gross Margin	$0	$0	$110,000	$110,000	$110,000	$110,000	$110,000	$0
Depreciation Expense	$10,000	$10,000	$10,000	$10,000	$10,000	$10,000	$10,000	$0
Research & Development	$20,000	$20,000	$0	$0	$0	$0	$0	$0
SG&A	$25,000	$25,000	$55,000	$55,000	$55,000	$55,000	$55,000	$0
Other Losses (Gains)	$0	$0	$0	$0	$0	$0	$0	($3,000)
Pre-tax Income (Loss(	($55,000)	($55,000)	$45,000	$45,000	$45,000	$45,000	$45,000	$3,000
Tax Expense (Benefit)	($26,120)	($23,600)	$17,800	$19,200	$19,760	$20,320	$20,600	$1,200
Net Income (Loss)	**($28,880)**	**($31,400)**	**$27,200**	**$25,800**	**$25,240**	**$24,680**	**$24,400**	**$1,800**

- No Growth In Sales Volume During Operating Phase (by assumption)
- Big Drop in Sales (and Sale Price) During the Termination Phase
- Decline in Income During Operating Phase is because of the tax expense (and the declining tax shield provided by depreciation)

Forecasted Income Statements

INCOME STATEMENT	1	2	3	4	5	6	7	8
Sales Revenue	$0	$0	$200,000	$200,000	$200,000	$200,000	$200,000	$9,000
Cost of Goods Sold	$0	$0	$90,000	$90,000	$90,000	$90,000	$90,000	$9,000
Gross Margin	$0	$0	$110,000	$110,000	$110,000	$110,000	$110,000	$0
Depreciation Expense	$10,000	$10,000	$10,000	$10,000	$10,000	$10,000	$10,000	$0
Research & Development	$20,000	$20,000	$0	$0	$0	$0	$0	$0
SG&A	$25,000	$25,000	$55,000	$55,000	$55,000	$55,000	$55,000	$0
Other Losses (Gains)	$0	$0	$0	$0	$0	$0	$0	($3,000)
Pre-tax Income (Loss(	($55,000)	($55,000)	$45,000	$45,000	$45,000	$45,000	$45,000	$3,000
Tax Expense (Benefit)	($26,120)	($23,600)	$17,800	$19,200	$19,760	$20,320	$20,600	$1,200
Net Income (Loss)	**($28,880)**	**($31,400)**	**$27,200**	**$25,800**	**$25,240**	**$24,680**	**$24,400**	**$1,800**

- No Growth In Sales Volume During Operating Phase (by assumption)
- Big Drop in Sales (and Sale Price) During the Termination Phase
- Decline in Income During Operating Phase is because of the tax expense (and the declining tax shield provided by depreciation)

Forecasted Income Statements

INCOME STATEMENT	1	2	3	4	5	6	7	8
Sales Revenue	$0	$0	$200,000	$200,000	$200,000	$200,000	$200,000	$9,000
Cost of Goods Sold	$0	$0	$90,000	$90,000	$90,000	$90,000	$90,000	$9,000
Gross Margin	$0	$0	$110,000	$110,000	$110,000	$110,000	$110,000	$0
Depreciation Expense	$10,000	$10,000	$10,000	$10,000	$10,000	$10,000	$10,000	$0
Research & Development	$20,000	$20,000	$0	$0	$0	$0	$0	$0
SG&A	$25,000	$25,000	$55,000	$55,000	$55,000	$55,000	$55,000	$0
Other Losses (Gains)	$0	$0	$0	$0	$0	$0	$0	($3,000)
Pre-tax Income (Loss(	($55,000)	($55,000)	$45,000	$45,000	$45,000	$45,000	$45,000	$3,000
Tax Expense (Benefit)	($26,120)	($23,600)	$17,800	$19,200	$19,760	$20,320	$20,600	$1,200
Net Income (Loss)	**($28,880)**	**($31,400)**	**$27,200**	**$25,800**	**$25,240**	**$24,680**	**$24,400**	**$1,800**

- No Growth In Sales Volume During Operating Phase (by assumption)
- Big Drop in Sales (and Sale Price) During the Termination Phase
- Decline in Income During Operating Phase is because of the tax expense (and the declining tax shield provided by depreciation)

Balance Sheet -- Working Capital

- Accounts Receivable
  - What will be our credit policy?
  - How much of sales will be cash vs credit?
  - How quickly will we get paid?
- Inventory – What are production plans?
  - Strategy: Make to Order / Make to Stock ?
  - How long does production take?
  - How much inventory do we want to hold?
- Accounts Payables – when do we pay for
  - Inventory
  - Wages and Benefits
- Others

Balance Sheet - Long Term Assets

- What are our Production / Capital Expenditure Plans?
- Will we need to add capacity later?
- Disposal Cost or Resale Value
- Tangible vs Intangible Assets
  - Intangible Assets Like R&D aren't Capitalized
- Depreciation and Amortization Policies
  - Book vs Tax

Forecasted Balance Sheets

Assets	0	1	2	3	4	5	6	7	8
Current Assets									
Cash	($70,000)	($81,380)	($102,780)	($80,630)	($45,280)	($10,040)	$24,640	$59,040	$68,840
Accounts Receivable	$0	$0	$0	$20,000	$20,000	$20,000	$20,000	$20,000	$0
Inventory	$0	$0	$0	$9,000	$9,000	$9,000	$9,000	$9,000	$0
Total Current Assets	($70,000)	($81,380)	($102,780)	($51,630)	($16,280)	$18,960	$53,640	$88,040	$68,840
Property Plant and Equipment	$70,000	$70,000	$70,000	$70,000	$70,000	$70,000	$70,000	$70,000	$0
Less Accumulated Depreciation	$0	$10,000	$20,000	$30,000	$40,000	$50,000	$60,000	$70,000	$0
Long Term Assets	$70,000	$60,000	$50,000	$40,000	$30,000	$20,000	$10,000	$0	$0
Total Assets	$0	($21,380)	($52,780)	($11,630)	$13,720	$38,960	$63,640	$88,040	$68,840
Liabilities									
Current Liabilities									
Accounts Payable	$0	$0	$0	$4,950	$4,500	$4,500	$4,500	$4,500	$0
Wages and Benefits Payable	$0	$7,500	$7,500	$16,500	$16,500	$16,500	$16,500	$16,500	$0
Other Liabilties	$0	$0	$0	$0	$0	$0	$0	$0	$0
Total Liabilites	$0	$7,500	$7,500	$21,450	$21,000	$21,000	$21,000	$21,000	$0
Owners Equity									
Contributed Capital	$0	$0	$0	$0	$0	$0	$0	$0	$0
Retained Earnings	$0	($28,880)	($60,280)	($33,080)	($7,280)	$17,960	$42,640	$67,040	$68,840
Total Owners Equity	$0	($28,880)	($60,280)	($33,080)	($7,280)	$17,960	$42,640	$67,040	$68,840

- Jump in Working Capital in Period 3, Released in Period

Forecasted Balance Sheets

Assets	**0**	**1**	**2**	**3**	**4**	**5**	**6**	**7**	**8**
Current Assets									
Cash	($70,000)	($81,380)	($102,780)	($80,630)	($45,280)	($10,040)	$24,640	$59,040	$68,840
Accounts Receivable	$0	$0	$0	$20,000	$20,000	$20,000	$20,000	$20,000	$0
Inventory	$0	$0	$0	$9,000	$9,000	$9,000	$9,000	$9,000	$0
Total Current Assets	($70,000)	($81,380)	($102,780)	($51,630)	($16,280)	$18,960	$53,640	$88,040	$68,840
Property Plant and Equipment	$70,000	$70,000	$70,000	$70,000	$70,000	$70,000	$70,000	$70,000	$0
Less Accumulated Depreciation	$0	$10,000	$20,000	$30,000	$40,000	$50,000	$60,000	$70,000	$0
Long Term Assets	$70,000	$60,000	$50,000	$40,000	$30,000	$20,000	$10,000	$0	$0
Total Assets	$0	($21,380)	($52,780)	($11,630)	$13,720	$38,960	$63,640	$88,040	$68,840
Liabilities									
Current Liabilities									
Accounts Payable	$0	$0	$0	$4,950	$4,500	$4,500	$4,500	$4,500	$0
Wages and Benefits Payable	$0	$7,500	$7,500	$16,500	$16,500	$16,500	$16,500	$16,500	$0
Other Liabilties	$0	$0	$0	$0	$0	$0	$0	$0	$0
Total Liabilites	$0	$7,500	$7,500	$21,450	$21,000	$21,000	$21,000	$21,000	$0
Owners Equity									
Contributed Capital	$0	$0	$0	$0	$0	$0	$0	$0	$0
Retained Earnings	$0	($28,880)	($60,280)	($33,080)	($7,280)	$17,960	$42,640	$67,040	$68,840
Total Owners Equity	$0	($28,880)	($60,280)	($33,080)	($7,280)	$17,960	$42,640	$67,040	$68,840

- Jump in Working Capital in Period 3, Released in Period

Forecasted Balance Sheets

Assets	0	1	2	3	4	5	6	7	8
Current Assets									
Cash	($70,000)	($81,380)	($102,780)	($80,630)	($45,280)	($10,040)	$24,640	$59,040	$68,840
Accounts Receivable	$0	$0	$0	$20,000	$20,000	$20,000	$20,000	$20,000	$0
Inventory	$0	$0	$0	$9,000	$9,000	$9,000	$9,000	$9,000	$0
Total Current Assets	($70,000)	($81,380)	($102,780)	($51,630)	($16,280)	$18,960	$53,640	$88,040	$68,840
Property Plant and Equipment	$70,000	$70,000	$70,000	$70,000	$70,000	$70,000	$70,000	$70,000	$0
Less Accumulated Depreciation	$0	$10,000	$20,000	$30,000	$40,000	$50,000	$60,000	$70,000	$0
Long Term Assets	$70,000	$60,000	$50,000	$40,000	$30,000	$20,000	$10,000	$0	$0
Total Assets	$0	($21,380)	($52,780)	($11,630)	$13,720	$38,960	$63,640	$88,040	$68,840
Liabilities									
Current Liabilities									
Accounts Payable	$0	$0	$0	$4,950	$4,500	$4,500	$4,500	$4,500	$0
Wages and Benefits Payable	$0	$7,500	$7,500	$16,500	$16,500	$16,500	$16,500	$16,500	$0
Other Liabilties	$0	$0	$0	$0	$0	$0	$0	$0	$0
Total Liabilites	$0	$7,500	$7,500	$21,450	$21,000	$21,000	$21,000	$21,000	$0
Owners Equity									
Contributed Capital	$0	$0	$0	$0	$0	$0	$0	$0	$0
Retained Earnings	$0	($28,880)	($60,280)	($33,080)	($7,280)	$17,960	$42,640	$67,040	$68,840
Total Owners Equity	$0	($28,880)	($60,280)	($33,080)	($7,280)	$17,960	$42,640	$67,040	$68,840

- Jump in Working Capital in Period 3, Released in Period 8

Forecasting The Cash Flow Statement

- Use the forecasted Balance Sheets and Income Statements to forecast the Cash Flow Statements
- Operating Cash Flow =

  Net Income + Depreciation – Change in Working Capital
- Investing Cash Flows
  - During the Start up Period
    - Purchase of PPE
  - During the Disposal Period
    - Sale of PPE

* Note that in the Terminal Period, there is a gain on sale of PPE in Net Income. We moved that out of the operating section to be part of the investing cash flows. This doesn't change the overall cash flow, just its classification

Forecasted Cash Flow Statements

CASH FLOW STATEMENT	0	1	2	3	4	5	6	7	8
Net Income		($28,880)	($31,400)	$27,200	$25,800	$25,240	$24,680	$24,400	$1,800
Add Depreciation		$10,000	$10,000	$10,000	$10,000	$10,000	$10,000	$10,000	$0
Minus Change in Accts Rec		$0	$0	($20,000)	$0	$0	$0	$0	$20,000
Minus Change in Inventory		$0	$0	($9,000)	$0	$0	$0	$0	$9,000
Plus Change in Accts Payable		$0	$0	$4,950	($450)	$0	$0	$0	($4,500)
Plus Change in Wages Payable		$7,500	$0	$9,000	$0	$0	$0	$0	($16,500)
Other		$0	$0	$0	$0	$0	$0	$0	($5,000)
Cash From Operations		($11,380)	($21,400)	$22,150	$35,350	$35,240	$34,680	$34,400	$4,800
Investment in PPE	($70,000)	$0	$0	$0	$0	$0	$0	$0	$0
Disposal of PPE	$0	$0	$0	$0	$0	$0	$0	$0	$5,000
Net Cash Inflow (Outflow)	**($70,000)**	**($11,380)**	**($21,400)**	**$22,150**	**$35,350**	**$35,240**	**$34,680**	**$34,400**	**$9,800**

- Negative Cash Flows during the start-up period
- Positive Cash Flows during Operating Period
  - Cash Lags Income Because of the investment in working capital
- Termination phase has a positive cash flow in this case (collection of receivables)

Forecasted Cash Flow Statements

CASH FLOW STATEMENT	0	1	2	3	4	5	6	7	8
Net Income		($28,880)	($31,400)	$27,200	$25,800	$25,240	$24,680	$24,400	$1,800
Add Depreciation		$10,000	$10,000	$10,000	$10,000	$10,000	$10,000	$10,000	$0
Minus Change in Accts Rec		$0	$0	($20,000)	$0	$0	$0	$0	$20,000
Minus Change in Inventory		$0	$0	($9,000)	$0	$0	$0	$0	$9,000
Plus Change in Accts Payable		$0	$0	$4,950	($450)	$0	$0	$0	($4,500)
Plus Change in Wages Payable		$7,500	$0	$9,000	$0	$0	$0	$0	($16,500)
Other		$0	$0	$0	$0	$0	$0	$0	($5,000)
Cash From Operations		($11,380)	($21,400)	$22,150	$35,350	$35,240	$34,680	$34,400	$4,800
Investment in PPE	($70,000)	$0	$0	$0	$0	$0	$0	$0	$0
Disposal of PPE	$0	$0	$0	$0	$0	$0	$0	$0	$5,000
Net Cash Inflow (Outflow)	**($70,000)**	**($11,380)**	**($21,400)**	**$22,150**	**$35,350**	**$35,240**	**$34,680**	**$34,400**	**$9,800**

- Negative Cash Flows during the start-up period
- Positive Cash Flows during Operating Period
  - Cash Lags Income Because of the investment in working capital
- Termination phase has a positive cash flow in this case (collection of receivables)

Forecasted Cash Flow Statements

CASH FLOW STATEMENT	0	1	2	3	4	5	6	7	8
Net Income		($28,880)	($31,400)	$27,200	$25,800	$25,240	$24,680	$24,400	$1,800
Add Depreciation		$10,000	$10,000	$10,000	$10,000	$10,000	$10,000	$10,000	$0
Minus Change in Accts Rec		$0	$0	($20,000)	$0	$0	$0	$0	$20,000
Minus Change in Inventory		$0	$0	($9,000)	$0	$0	$0	$0	$9,000
Plus Change in Accts Payable		$0	$0	$4,950	($450)	$0	$0	$0	($4,500)
Plus Change in Wages Payable		$7,500	$0	$9,000	$0	$0	$0	$0	($16,500)
Other		$0	$0	$0	$0	$0	$0	$0	($5,000)
Cash From Operations		($11,380)	($21,400)	$22,150	$35,350	$35,240	$34,680	$34,400	$4,800
Investment in PPE	($70,000)	$0	$0	$0	$0	$0	$0	$0	$0
Disposal of PPE	$0	$0	$0	$0	$0	$0	$0	$0	$5,000
Net Cash Inflow (Outflow)	**($70,000)**	**($11,380)**	**($21,400)**	**$22,150**	**$35,350**	**$35,240**	**$34,680**	**$34,400**	**$9,800**

- Negative Cash Flows during the start-up period
- Positive Cash Flows during Operating Period
  - Cash Lags Income Because of the investment in working capital
- Termination phase has a positive cash flow in this case (collection of receivables)

Forecasted Cash Flow Statements

CASH FLOW STATEMENT	0	1	2	3	4	5	6	7	8
Net Income		($28,880)	($31,400)	$27,200	$25,800	$25,240	$24,680	$24,400	$1,800
Add Depreciation		$10,000	$10,000	$10,000	$10,000	$10,000	$10,000	$10,000	$0
Minus Change in Accts Rec		$0	$0	($20,000)	$0	$0	$0	$0	$20,000
Minus Change in Inventory		$0	$0	($9,000)	$0	$0	$0	$0	$9,000
Plus Change in Accts Payable		$0	$0	$4,950	($450)	$0	$0	$0	($4,500)
Plus Change in Wages Payable		$7,500	$0	$9,000	$0	$0	$0	$0	($16,500)
Other		$0	$0	$0	$0	$0	$0	$0	($5,000)
Cash From Operations		($11,380)	($21,400)	$22,150	$35,350	$35,240	$34,680	$34,400	$4,800
Investment in PPE	($70,000)	$0	$0	$0	$0	$0	$0	$0	$0
Disposal of PPE	$0	$0	$0	$0	$0	$0	$0	$0	$5,000
Net Cash Inflow (Outflow)	**($70,000)**	**($11,380)**	**($21,400)**	**$22,150**	**$35,350**	**$35,240**	**$34,680**	**$34,400**	**$9,800**

- Negative Cash Flows during the start-up period
- Positive Cash Flows during Operating Period
  - Cash Lags Income Because of the Investment in Working Capital
- Termination phase has a positive cash flow in this case (collection of receivables)

Forecasted Cash Flow Statements

CASH FLOW STATEMENT	0	1	2	3	4	5	6	7	8
Net Income		($28,880)	($31,400)	$27,200	$25,800	$25,240	$24,680	$24,400	$1,800
Add Depreciation		$10,000	$10,000	$10,000	$10,000	$10,000	$10,000	$10,000	$0
Minus Change in Accts Rec		$0	$0	($20,000)	$0	$0	$0	$0	$20,000
Minus Change in Inventory		$0	$0	($9,000)	$0	$0	$0	$0	$9,000
Plus Change in Accts Payable		$0	$0	$4,950	($450)	$0	$0	$0	($4,500)
Plus Change in Wages Payable		$7,500	$0	$9,000	$0	$0	$0	$0	($16,500)
Other		$0	$0	$0	$0	$0	$0	$0	($5,000)
Cash From Operations		($11,380)	($21,400)	$22,150	$35,350	$35,240	$34,680	$34,400	$4,800
Investment in PPE	($70,000)	$0	$0	$0	$0	$0	$0	$0	$0
Disposal of PPE	$0	$0	$0	$0	$0	$0	$0	$0	$5,000
Net Cash Inflow (Outflow)	**($70,000)**	**($11,380)**	**($21,400)**	**$22,150**	**$35,350**	**$35,240**	**$34,680**	**$34,400**	**$9,800**

- Negative Cash Flows during the Start-Up Phase
- Positive Cash Flows during Operating Phase
  - Cash Lags Income Because of the investment in working capital
- Termination phase has a positive cash flow in this case (collection of receivables)

Look at the Numbers Again

- Do They Make Sense?
- Are the Sales Levels achievable?
- Is the Production Schedule achievable?
- Are there Cleanup or Disposal Costs at the end we've forgotten?

Financing Cash Flows

- Remember that we're ignoring the specifics how the project is financed and concentrating on the **project's** cash flows
- The discount rate (6%) reflects whatever the opportunity cost of capital is
- If you're worried that our Cash Balance (not just the cash flow) is Negative during the early periods, assume that **whatever cash is needed for the project comes from another part of the firm on an as needed basis**


Wharton
University of Pennsylvania

ONLINE