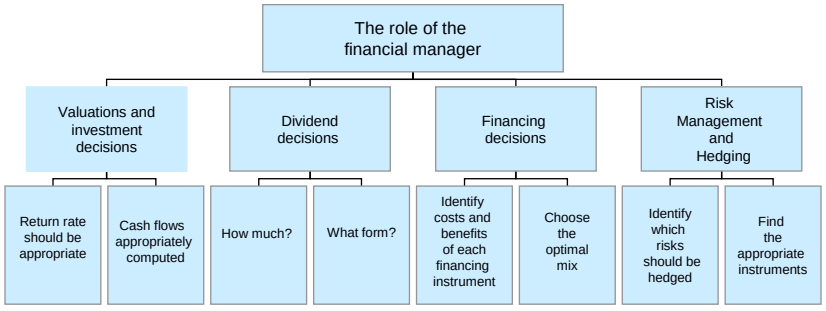
Risk Management and Hedging

1

Corporate finance



2

Risk management

- What is hedging?
- Optimal hedging
- Reasons for hedging
- Hedging instruments
- Costs of hedging

3

Hedging

- **Definition:** Financial transactions which offsets the risk of a real asset. When the real asset rises in value, the hedge loses money. When the real asset falls in value, the hedge makes money. **Perfect vs. imperfect hedging.** If the hedge is perfect, the gains from one and the losses from the other sum to zero.
- Note:
  - Risks are transferred, not eliminated
  - If the risk is systematic you must pay someone else to bear the risk
  - This means even the most well implemented hedging strategy loses money on average.

4

Optimal Hedging

- When are investors willing to pay to hedge risk? Which shareholders-companies are more willing to hedge? How can you be sure that the management is hedging and not speculating?
- In a MM world there is no place for hedging…:
  - Reducing the risk to security holders has little value if they can hedge themselves
- For hedging to be optimal some of MM assumptions must be violated.

5

Reasons for hedging

1. Lowering the cost of financial distress via the reduction of the probability of financial distress.

   Is there an alternative way to reduce CFD?

- Lowering financial leverage can achieve same results.
- Lowering operating leverage is also an alternative but often is more difficult for firms to reduce operating risks
- Other financial alternative. Suppose the main source of risk exposure is the drop in value in the local currency. They may:
  - reduce its holding of cash and marketable securities in the local currency
  - delay account payables
  - export in the foreign currency and import in the local currency
  - tighten trade credit in the foreign currency
  - borrow in the local currency

6

Lowering the probability of financial distress:

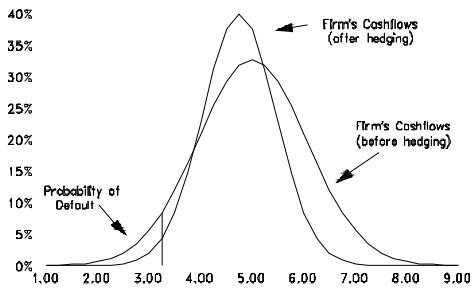


Figure 3

7

Reasons for hedging

2. Fund positive NPV investments

Assume:

a) Security sales are not 0 NPV:

– Imperfect capital markets

– perceived risk is higher

b) Investment opportunities may arrive when the company's cash flow is low.

8

Investment opportunities are not constant

- If investment opportunities and cashflows are not constant then hedging can be value enhancing or value destroying (MM is violated)
  - Summary of the cases:
  - Cashflows and Positive NPV opportunities are not correlated ⇒Hedging may be beneficial
  - Cashflows and Positive NPV opportunities are positively correlated ⇒Hedging is not beneficial
  - Cashflows and Positive NPV opportunities are negatively correlated ⇒Hedging is beneficial

9

Investment opportunities are not constant

- An example: CF and investment opportunities are not correlated

  Suppose that cashflow is either 60 or 100. Suppose that the firm may have an investment project that costs 75 and gives you a NPV of 20. In this case,

	State 1	State 2
Unhedged Asset Cashflow	60	100+20
Hedged Asset Cashflow	80+20	80+20

  If the firm hedges it has a CF of 100 in both states. If it does not its expected CF is 90 (60 or 120). Consider borrowing.

10

Investment opportunities are not constant

- An example: CF and investment are + correlated

  Suppose that the firm is now more able to have positive NPV projects when its cashflows are high. Suppose that the investment opportunity occurs only in state 2.

	State 1	State 2
Unhedged Asset Cashflow	60	100+20
Hedged Asset Cashflow	80	80+20

If the firm hedges it has an expected CF of 90. If it does not hedge the expected CF is 90 (60 or 120). No gains from hedging.

11

Investment opportunities are not constant

- An example: CF and investment are - correlated

  Suppose that the firm is now more able to have positive NPVprojects when its cashflows are low Suppose that the investment opportunity occurs only in state 1.

	State 1	State 2
Unhedged Asset Cashflow	60	100
Hedged Asset Cashflow	80+20	80

If the firm hedges it has an expected CF of 90. If it does not hedge the expected CF is 80 (60 or 100). Gains from hedging. Consider borrowing again

12

Investment opportunities are not constant

- Bottom line: when NPV of financing is not zero, hedging adds value if cashflow and investment opportunities are not positively correlated across states?
- Is this likely to be the case?
- What would you do to check that this is the case?

13

Reasons for hedging

3. Managers are risk averse

  - Managers' human capital is tied to the firm. Managers cannot diversify the risk, though from the point of view of investors the risk is idiosyncratic.
  - It may make sense to insure the manager, but the firm should hedge only if there is not a cheaper way to provide the managers with insurance.
  - Why managers are forced to bear firm risk?

14

Who should hedge more?

- Closely held or private firms (investors are not diversified)
- Firms that experience significant asymmetric information problem. Managers and bondholders may otherwise forego +NPV projects
- Firms that are more exposed to costs of financial distress

15

Reasons for hedging (a bad one)

4. Speculation.

- Hedging risk requires sophistication. Many treasury depts. Of many firms do not have knowledge and guidance on how to reduce risk. Especially at the highest level.
- In many cases those hedging get more credit if they make money rather than avoiding losing money.
- Trading derivatives is more fun than letting shareholders diversifying the risk.

$\Rightarrow$ many firms speculated and lost

$\Rightarrow$urgency of developing sound monitoring systems within the firms

16

Hedging

- **Typical instruments.** Insurance and derivatives are the most common way of hedging. Derivatives are defined as "financial agreements/ instruments/ contracts whose returns are linked to, or derived from, the performance of underlying assets such as bonds, currencies or commodities".
  - Insurance
  - Forward and future contracts
  - Swaps

17

Insurance

- Definition: The firm pays a fixed amount (the insurance premium) in exchange for the insurance company paying the variable cash flow (the loss) instead of the firm. This exchanges a variable cashflow for a fixed one.
  - Insurance is against (mostly idiosyncratic) risk. The insurance company diversifies much of the risk internally by selling many policies. The remaining risk passed to shareholders through the securities market, where the security holders diversify the risk.

18

Forward and future contracts

Description. Agreement to sell a commodity at a future date at a fixed price set today. The transaction price set today is called the futures price.

- The product can be agricultural commodities (corn and soybeans), non-agricultural commodities (gold or fuel oil), or a financial instrument (30 year government bonds or Swiss Francs).
- Delivery: the actual commodity is not usually delivered (sometime delivery is not allowed). Traders reverse their position before the contract expires.

19

Swaps

- Sequence of futures contracts. A swap is an exchange on one set of cash flows, (e.g. cash flows on a floating rate loan) for another of equivalent market value (e.g. cash flows on a fixed rate loan).
  - Example: CRST and Hanson PLT. Hanson PLT pays a fixed interest rate to CRST (8%) and CRST agrees to pay a floating rate to Hanson (LIBOR). 5 yrs maturity and a notional amount of $100Million

20

Swap contracts

- The main risk in swap contracts is counterparty risk:
  - Hedge evaporates

21

Cost of Hedging

- Risk premium
  - The risk premium depends on the type of risk. In general, you will have to pay to hedge systematic risk.
- Transaction costs
  - To complete a hedge, the firm will have to pay transactions costs (e.g. brokerage commissions and losses to more informed traders). In the early 1980s the bid-ask spread for swaps exceeded 100 basis points at times. By 1995, it can be as low as 2 basis points
- An example on how the risk premium is incorporated in future prices

22

Cost of Hedging

- Future prices and expected spot prices.
  - Definitions. The future price is set today but will be paid next year. The spot price is the price at which you can buy the commodity today.
  - Is the future price an unbiased estimate of the future spot price? No. If there is a positive risk premium then the 2 prices differ.

23

Future prices and expected spot prices

$$NPV(Future\_contract/seller) = 0$$

$$= \frac{Future\_price}{(1+r_{future})} - \frac{E_0(spot\_price)}{(1+r_{commodity\_value})} ==$$

$$\frac{Future\_price}{(1+r_{risk\_free})} - \frac{E_0(spot\_price)}{(1+r_{risk\_free})} * \frac{(1+r_{risk\_free})}{(1+r_{commodity\_value})} = 0$$

$$\frac{Future\_price - E_0(spot\_price) * \frac{(1+r_{risk\_free})}{(1+r_{commodity\_value})}}{(1+r_{risk\_free})} = 0$$

$$Future\_price - E_0(spot\_price) * \frac{(1+r_{risk\_free})}{(1+r_{commodity\_value})} = 0$$

$$Future\_price = E_0(spot\_price) * \frac{(1+r_{risk\_free})}{(1+r_{commodity\_value})}$$

$$r_{commodity\_value} = r_{risk\_free} + \beta * (.085)$$

Only if beta=0 implies Future price=E(spot price)!!
Beta>0 implies Future price<E(spot price)
Beta<0 implies Future price>E(spot price) ....

24

Future prices and expected spot prices

- By looking up future price you can calculate implicit expected spot prices
- The market risk premium is .085. Suppose that the risk free rate =6%. Suppose that the risk premium is .11. What is beta?

  $\beta=(.11/0.085)=1.29>0$
- What is the $r_{commodity}$?

- Suppose that the future price is 40. What is the expected spot price?

25

Risk management in practice: empirical findings

- Most firms view risk management as an important function, but seldom they make formal statement about their objectives in risk management.
- Most firms do not communicate their risk management policies to their stockholders (only 35% do)
- Many firms speculate
- Many firms do not know what they are doing

26

IOMEGA CORPORATION ANNUAL 10-K FOR 1994

Foreign Exchange Contracts - The Company has commitments to sell foreign currencies relating to forward exchange contracts in order to hedge against future currency fluctuations. The contracts mature at various dates through May 1995. At December 31, 1994, the Company had 7,500,000 Deutsche Marks in forward exchange sales contracts outstanding.

Gains and losses on foreign currency contracts intended to be used to hedge operating requirements are reported currently in income. Gains and losses on foreign currency contracts intended to meet firm commitments are deferred and are recognized as part of the cost of the underlying transaction being hedged. At December 31, 1994, **all of the Company's forward exchange contracts were speculative**. The Company's theoretical risk in these transactions is the cost of replacing, at current mark

27

A good hedging strategy (read carefully Froot and Scharfstein)

- Capital is costly to raise when a firm need it (because of asymmetric information, or costs of fin. Distress, or conflict of interest)
- Investment opportunities arise when your cashflow is low (you need to estimate the correlation between cashflow and investment opportunities for your firm)

28

Takeaway

- Definition of hedging
- When is it optimal to hedge (i.e. identify underlying reasons to hedge and distinguish them from speculative reasons).
- Understanding hedging instruments (review lecture 4-5). Hedging instruments are combinations of basic financial instruments (futures and options)
- Practice problems: (end of the lecture notes, hw5, exams questions)

29