

## Chapter 9 The Rationale for Hedging Currency Risk

- 9.1 A Perfect Model for an Imperfect World
- 9.2 When Hedging Adds Value
- 9.3 Convexity in the Tax Schedule
- 9.4 Costs of Financial Distress
- 9.5 Agency Costs
- 9.6 The Hedging Decision
- 9.7 Summary

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## Corporate hedging and firm value

$$V = \sum_t [E[CF_t] / (1+i_t)^t]$$

For hedging to have value, it must

- increase expected future cash flows
- or
- decrease investors' required return

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## The perfect market assumptions ...a starting point

- > **No market frictions**
  - No transactions costs
  - No taxes or government intervention
  - No costs of financial distress
  - No agency costs
- > **Equal access to market prices**
  - Perfect competition
  - No barriers to entry
- > **Equal access to costless information**
- > **Rational investors**
  - Return is good and risk is bad

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## Perfect financial markets and corporate financial policy

- > If financial markets are perfect, then **financial policy is irrelevant**
- > If financial policy is to increase firm value, then it must either
  - increase expected future cash flows, or
  - decrease the discount ratein a way that cannot be replicated by individual investors

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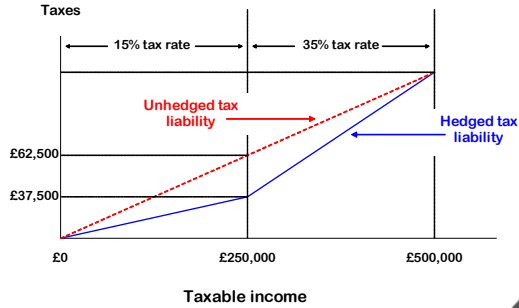
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## When hedging matters

- > **Tax schedule convexity**
  - Progressive taxation
  - Tax preference items
    - Tax loss carryforwards and carrybacks
    - Investment tax credits
- > **Costs of financial distress**
  - Direct costs
  - Indirect costs
    - Lost credibility (lower sales, higher expenses)
    - Conflicts of interest between debt and equity
- > **Agency costs** – Arising from conflicts of interest between the firm's stakeholders

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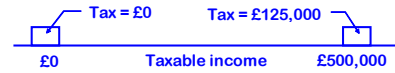
## Progressive taxation



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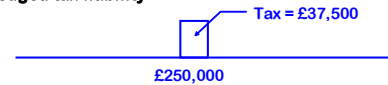
## Progressive taxation

### Unhedged tax liability



$$\begin{aligned} \text{Expected taxable income} &= (\frac{1}{2})(£0) + (\frac{1}{2})(£500,000) = £250,000 \\ \text{Expected taxes} &= (\frac{1}{2})(£0) + (\frac{1}{2})(£125,000) = £62,500 \end{aligned}$$

### Hedged tax liability



$$\text{Taxes} = (.15)(£250,000) = £37,500$$

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## Value of US tax incentives to hedge

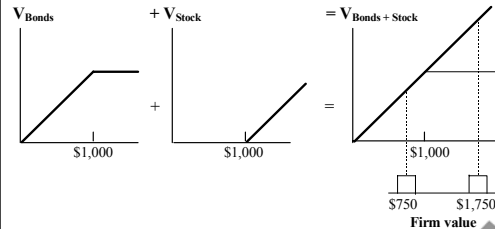
- Most countries have convex tax schedules
- Graham and Smith simulate the tax savings achieved through hedging within the U.S. tax code
  - For a typical NYSE/AMEX firm, a 5% reduction in the volatility of taxable income results in a 3% reduction in expected tax liabilities
  - This is a savings of \$142,360

Graham and Smith, "Tax Incentives to Hedge," *Journal of Finance*, December 1999.

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## Equity as a call option

- Promised payment to bondholders is \$1,000
- Firm value will be either \$750 or \$1,750 with equal probability



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## Payoffs in the absence of costs of financial distress

**Unhedged firm value** is either \$750 or \$1,750

$$\begin{aligned} E[V_{\text{BONDS}}] &= (\frac{1}{2})(\$750) + (\frac{1}{2})(\$1,000) = \$875 \\ + E[V_{\text{STOCK}}] &= (\frac{1}{2})(\$0) + (\frac{1}{2})(\$750) = \$375 \\ E[V_{\text{FIRM}}] &= (\frac{1}{2})(\$750) + (\frac{1}{2})(\$1,750) = \$1,250 \end{aligned}$$

**Hedged firm value** is \$1,250 for certain

$$\begin{aligned} E[V_{\text{BONDS}}] &= \$1,000 \\ + E[V_{\text{STOCK}}] &= \$250 \\ E[V_{\text{FIRM}}] &= \$1,250 \end{aligned}$$

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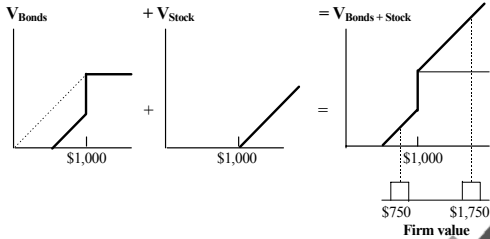
## Without costs of financial distress...

- **A zero-sum game**
  - In the absence of a market imperfection such as the costs of financial distress, hedging does not create value for the firm
- **Risk shifting**
  - When there is debt outstanding, hedging transfers wealth from shareholders to bondholders
- **The benefits of a hedging policy**
  - Instituting a hedging plan prior to borrowing can benefit shareholders by reducing borrowing costs

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### The equity call option with direct bankruptcy costs

Suppose the firm must pay \$500 in bankruptcy



### Payoffs with direct bankruptcy costs

#### Unhedged

$$E[V_{\text{BONDS}}] = (1/2)(\$250) + (1/2)(\$1,000) = \$625$$

$$+ E[V_{\text{STOCK}}] = (1/2)(\$0) + (1/2)(\$750) = \$375$$

$$E[V_{\text{FIRM}}] = (1/2)(\$250) + (1/2)(\$1,750) = \$1,000$$

#### Hedged

$$E[V_{\text{BONDS}}] = \$1,000$$

$$+ E[V_{\text{STOCK}}] = \$250$$

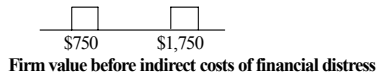
$$E[V_{\text{FIRM}}] = \$1,250$$

### Hedging with direct bankruptcy costs

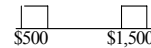
- Hedging can preserve firm value when there are direct bankruptcy costs
- Equity wins if the gain from hedging is larger than the wealth shift to debt

### Direct and indirect costs

- \$500 direct costs if bankruptcy occurs
  - Changes debtholders payout if bankruptcy occurs
- \$250 indirect costs incurred prior to bankruptcy
  - Changes firm value distribution prior to bankruptcy

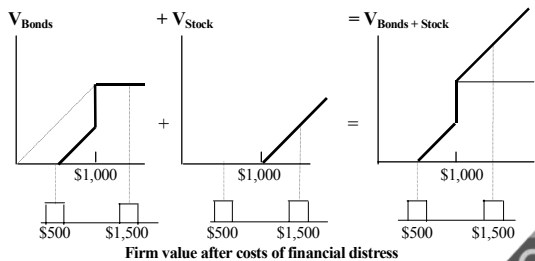


Firm value before indirect costs of financial distress



Firm value after indirect costs of financial distress

### The equity call option with direct and indirect costs of financial distress



### Payoffs with direct and indirect costs of financial distress

#### Unhedged

$$E[V_{\text{BONDS}}] = (1/2)(\$0) + (1/2)(\$1,000) = \$500$$

$$+ E[V_{\text{STOCK}}] = (1/2)(\$0) + (1/2)(\$500) = \$250$$

$$E[V_{\text{FIRM}}] = (1/2)(\$0) + (1/2)(\$1,500) = \$750$$

#### Hedged

$$E[V_{\text{BONDS}}] = \$1,000$$

$$+ E[V_{\text{STOCK}}] = \$250$$

$$E[V_{\text{FIRM}}] = \$1,250$$

### Costs of financial distress and the consequences of hedging

- **Hedging can increase expected cash flows** by reducing the costs of financial distress
- **Hedging can reduce debt's required return** and hence the firm's overall cost of capital
- **Equity may or may not benefit** from risk hedging depending on whether the increase in firm value is more or less than the value transfer to debt from the reduction in risk

### Agency costs and the consequences of hedging

- **Agency costs** are the costs of ensuring that managers act in the interests of other stakeholders
- Hedging can increase the value of the firm to shareholders by aligning managements' incentives with shareholders' objectives and thereby **reducing agency costs**