Basic Story

- Hedging strategy starts with the firm’s investment program and the value produced there.
- What is the contingency that we are worried about? A shortage of internal cash flow.
- Why? Causes a cut back in positive NPV capital investments, undermining shareholder value.
  - Premise: external capital is not a complete substitute for internal capital.
    There are “frictions” in the debt and equity markets.
- Hedging should be targeted to assuring the internal cash flow necessary to fund the investment program.

- Froot, Scharfstein & Stein, Journal of Finance & HBR.
Example: Omega Drug

- R&D yields value – calculate the optimal R&D level

<table>
<thead>
<tr>
<th>R&amp;D level</th>
<th>Discounted cash flows</th>
<th>Net present value</th>
</tr>
</thead>
<tbody>
<tr>
<td>100</td>
<td>160</td>
<td>60</td>
</tr>
<tr>
<td>200</td>
<td>290</td>
<td>90</td>
</tr>
<tr>
<td>300</td>
<td>360</td>
<td>60</td>
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*In millions of dollars

Example: Omega Drug (cont.)

- firm faces exchange rate risk and therefore volatile internal cash flows
- this translates into cutbacks in valuable R&D expenditures

<table>
<thead>
<tr>
<th>The Dollar</th>
<th>Internal funds*</th>
<th>R&amp;D without hedging*</th>
</tr>
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<tbody>
<tr>
<td>Appreciation</td>
<td>100</td>
<td>100</td>
</tr>
<tr>
<td>Stable</td>
<td>200</td>
<td>200</td>
</tr>
<tr>
<td>Depreciation</td>
<td>300</td>
<td>200</td>
</tr>
</tbody>
</table>

*In millions of dollars

Example: Omega Drug (cont.)

- hedging smooths the internal cash flow
- and this assures funding for R&D
- which generates shareholder value

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Image by MIT OpenCourseWare.

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the hedge is NPV 0

Image by MIT OpenCourseWare.
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The Effect of Hedging on Omega Drug's R&D Investment and Value

<table>
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<tr>
<th>The Dollar</th>
<th>Internal funds*</th>
<th>R&amp;D without hedging*</th>
<th>Hedge proceeds*</th>
<th>Additional R&amp;D from hedging*</th>
<th>Value from hedging*</th>
</tr>
</thead>
<tbody>
<tr>
<td>Appreciation</td>
<td>100</td>
<td>100</td>
<td>+100</td>
<td>100</td>
<td>+130</td>
</tr>
<tr>
<td>Stable</td>
<td>200</td>
<td>200</td>
<td>0</td>
<td>0</td>
<td>0</td>
</tr>
<tr>
<td>Depreciation</td>
<td>300</td>
<td>200</td>
<td>-100</td>
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<td>-100</td>
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*In millions of dollars

the value of hedging is produced by the R&D

When NOT to Hedge

- Complicate the basic story…
- Need for cash may ALSO be “risky”, i.e., contingent on the same variables
- Omega Oil example
  - low oil price means low cash flow, but also means low profitability of capital investments
  - the demand for funds rises and falls with the oil price
- Use a much smaller hedge, sufficient to assure the lower funds needed when the price is low
Omega Drug: Hedging with Fixed R&D Investment

Supply of internal funds (cash flow from operations)

Hedging

Demand for funds (desired R&D investment)

Appreciating Dollar
Stable Dollar
Depreciating Dollar


Omega Oil: Hedging with Oil-Price-Sensitive Investment

Supply of internal funds (cash flow from operations)

Hedging

Demand for funds (desired investment)

Lower Oil Price
Current Oil Price
Higher Oil Price

Omega Oil: Hedging with Oil-Price-Sensitive Investment

The optimal sized hedge in this case leaves the firm with plenty of risk.

Perfect hedging in this case is overhedging... it would create a SHORTFALL when the price is high.

Guidelines

- Companies in the same industry should not necessarily adopt the same hedging strategy...
- It depends on (1) how variable are their respective supplies of funds, and on (2) how variable are their respective demands for funds
- Epsilon Oil has higher cost fields and so, in the face of a falling price, shuts operations sooner...therefore has a greater need to have locked in the cash for new investments
- Or Epsilon’s prospects are in higher cost regions, and so cancels investments sooner …and therefore has less need

Merton: Risk Balance Sheet
Premise: Equity Capital is Costly

- dividends are taxed while interest payments are not
- agency costs are higher
  - between who? …who is the agent, who the principal?
- thought experiment: loading up the firm with cash raised by equity
  - investing in riskless Treasuries
  - market price of equity would be below the book value!
- outside the frictionless MM world

Equity is All-Purpose Risk Capital

- amount of traditional debt is limited by total risk, by the lower bounds
  - limited amount of quantifiable risk
  - role of security
  - lack of interest in future prospects
  - concern with worst case scenarios
- equity must be raised to cover the risk
  - no matter the sort of risk
Role of Comparative Advantage

- asset side risks come bundled
- only some of the risks are related to the firm's comparative advantage
- return from risks related to comparative advantage is diluted by risks not related to comparative advantage

Banks & Interest Rate Risk

- comparative advantage in origination, client evaluation, relationships
- interest rate risk comes bundles
- result is a constraint on scale
Interest Rate Swaps Market

- decouples interest rate risk and client risk
- banks can sell off the interest rate risk
- can afford to grow to a larger scale using the same equity capital

Questions

- to whom do they sell the interest rate risk?
- next comes credit risk
- what about Ameritrade and equity swaps?
The End