Managing Financial Risk

Prof. Ian Giddy
New York University

Corporate Finance

CORPORATE FINANCE DECISIONS

INVESTMENT
- PORTFOLIO
- CAPITAL
- M&A

FINANCING
- DEBT
- EQUITY

RISK MGT
- MEASUREMENT
- TOOLS
What Hedging Instruments?

What Protection Needed?

- Volatility & Direction
  - OTC options, Caps and Floors

- Direction
  - Forwards, Futures, Swaps

- Complex risks Or arbitrage
  - Exotics, Hybrids, structured notes
A Typical Derivative

- We agree today to pay a certain price for a commodity in the future

What's the difference?
The "cost of carry"

Commodities: Spot and Forward

How can Coke's cannrers cap their can costs?

ALUMINUM PRICE
per tonne

$1584.5

$1607.0

SPOT 3 MONTHS 6 MONTHS
Commodity Prices

Simple model of a commodity futures price based on the cost of carry:

\[ F_t = S_0 \left( 1 + R_t + C_t \right)^t \]

- \( F_t \) = Futures price for delivery \( t \) years from today
- \( S_0 \) = Spot price today
- \( R_t \) = Interest rate for \( t \) years
- \( C_t \) = Non-interest costs of carry

Fear and Backwardation

For some, a barrel of oil in the hand is worth two in the bush. This "premium for possession" factor is called convenience yield:

\[ F_t = S_0 \left( 1 + R_t + C_t - CY \right)^t \]

where \( CY \) = Convenience yield, in percent per annum
A Typical Forward Exchange Contract

- We agree today to pay a certain price for a currency in the future

Foreign Exchange Quotations

Spot, Forward points
Policies and Exchange Rate Regimes

- Exchange rate systems--fixed vs floating
- Managed floating
- EMU-type currency blocs
- De facto blocs--the dollar

Hong Kong Dollar

Source: pacific.commerce.ubc.ca/xr
### Domestic Policies, Domestic Prices and Interest Rates, and Exchange Rates

#### Country A
- **Domestic Economic Policies**
- **Inflation Rate**
- **Interest Rate**
- **Forward Rate**

#### Country B
- **Domestic Economic Policies**
- **Inflation Rate**
- **Interest Rate**
- **Forward Rate**

### MacParity

<table>
<thead>
<tr>
<th>MacParity Source: economist.com</th>
</tr>
</thead>
</table>

#### The hamburger standard

<table>
<thead>
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</thead>
</table>

<table>
<thead>
<tr>
<th>Country</th>
<th>Big Mac price in dollars</th>
<th>Inflation implied by PPP of dollar</th>
<th>Actual $ exchange rate</th>
<th>Undervalued/overvalued against the dollar, %</th>
</tr>
</thead>
<tbody>
<tr>
<td>United States</td>
<td>$2.54</td>
<td>2.45</td>
<td>2.00</td>
<td>1.00</td>
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<tr>
<td>Argentina</td>
<td>Peso 2.50</td>
<td>1.50</td>
<td>0.96</td>
<td>1.02</td>
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<td>Australia</td>
<td>Aus$ 1.00</td>
<td>1.52</td>
<td>1.18</td>
<td>1.98</td>
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<td>Brazil</td>
<td>Real 5.00</td>
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<td>1.43</td>
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<td>Britain</td>
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<td>1.29</td>
<td>1.63</td>
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<tr>
<td>Canada</td>
<td>Canadian Dollars 0.00</td>
<td>2.05</td>
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<td>1.63</td>
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<tr>
<td>China</td>
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<td>1.29</td>
<td>1.63</td>
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<tr>
<td>Czech Rep</td>
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<td>1.29</td>
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<td>1.63</td>
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<tr>
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<td>1.63</td>
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<tr>
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<td>Franc 1.00</td>
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<td>1.63</td>
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<td>1.63</td>
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<td>India</td>
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<td>1.63</td>
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<td>1.63</td>
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<tr>
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<td>1.63</td>
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<td>1.63</td>
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<td>1.63</td>
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<td>1.63</td>
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<tr>
<td>South Korea</td>
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<td>1.29</td>
<td>1.63</td>
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<tr>
<td>Sweden</td>
<td>Kronor 1.00</td>
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<td>1.63</td>
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<tr>
<td>Switzerland</td>
<td>Francs 1.00</td>
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<td>1.29</td>
<td>1.63</td>
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<tr>
<td>Thailand</td>
<td>Baht 1.00</td>
<td>2.05</td>
<td>1.29</td>
<td>1.63</td>
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</table>
Heineken and the Euro

- How was the Dutch company Heineken affected by the fall in the Euro in 1999-2000?
- Look at
  - The Euro
  - The company’s sales
  - The company’s production
Heineken and the Euro

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Look at
- The Euro
- The company’s sales
- The company’s production

<table>
<thead>
<tr>
<th>Location</th>
<th>Fixed Assets</th>
<th>Sales</th>
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<tbody>
<tr>
<td>The Netherlands</td>
<td>2,341</td>
<td>15% 1,063 15%</td>
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<tr>
<td>Rest of Europe</td>
<td>8,874</td>
<td>57% 4,027 57%</td>
</tr>
<tr>
<td>Western H</td>
<td>1,972</td>
<td>13% 895 13%</td>
</tr>
<tr>
<td>Africa</td>
<td>685</td>
<td>4% 311 4%</td>
</tr>
<tr>
<td>Asia Pacific</td>
<td>1,613</td>
<td>10% 732 10%</td>
</tr>
<tr>
<td></td>
<td>1548500%</td>
<td>100% 7,028 100%</td>
</tr>
</tbody>
</table>

Data: 1999 figures, millions of Euro
Source: http://www.heinekencorp.nl

Heineken and the Euro

How was the Dutch company Heineken affected by the fall in the Euro in 1999-2000?

Look at
- The Euro
- The company’s sales
- The company’s production

Exchange provides no volume data.
The Exposure Triangle

Transactions Exposure

Translation Exposure

Economic Exposure

The Hedging Choices

“Natural” Hedge?

Or

Derivatives?

Debt?
Domestic and Eurocurrency Rates

<table>
<thead>
<tr>
<th>Country</th>
<th>Overnight</th>
<th>Day</th>
<th>Change week</th>
<th>Month</th>
<th>One month</th>
<th>Three months</th>
<th>Six months</th>
<th>One year</th>
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</thead>
<tbody>
<tr>
<td>US$ Libor*</td>
<td>1.78875</td>
<td>-0.027</td>
<td>-0.111</td>
<td>0.004</td>
<td>1.9</td>
<td>2.03</td>
<td>2.34</td>
<td>3.0275</td>
</tr>
<tr>
<td>Euro Libor*</td>
<td>3.23375</td>
<td>0.223</td>
<td>-0.032</td>
<td>0.093</td>
<td>3.35</td>
<td>3.4</td>
<td>3.53875</td>
<td>3.90025</td>
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<tr>
<td>Swiss Fr Libor*</td>
<td>4.66938</td>
<td>0.597</td>
<td>0.577</td>
<td>-0.025</td>
<td>4.1325</td>
<td>4.18813</td>
<td>4.39625</td>
<td>4.80063</td>
</tr>
<tr>
<td>Yen Libor*</td>
<td>0.05</td>
<td>-</td>
<td>-</td>
<td>-</td>
<td>0.1075</td>
<td>0.105</td>
<td>0.10563</td>
<td>0.11188</td>
</tr>
<tr>
<td>US$ CDs</td>
<td>-</td>
<td>-</td>
<td>-</td>
<td>-</td>
<td>1.86</td>
<td>1.96</td>
<td>2.28</td>
<td>2.24</td>
</tr>
<tr>
<td>Euro CDs</td>
<td>3.325</td>
<td>0.335</td>
<td>0.085</td>
<td>0.025</td>
<td>3.36</td>
<td>3.425</td>
<td>3.585</td>
<td>3.935</td>
</tr>
</tbody>
</table>

Source: ft.com

ft.com
- Markets Home
- Bonds
- Data Links – Money Rates

What Hedging Instruments?

- What Protection Needed?
  - Volatility & Direction
    - OTC options, Caps and Floors
  - Direction
    - Forwards, Futures, Swaps
  - Complex risks Or arbitrage
    - Exotics, Hybrids, structured notes

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Financial Risk Management 24

Financial Risk Management 25
Questions about options:
- When should companies use them?
- Which options?
- How much do they cost?
- Are they worth paying for?
**Hockey Sticks**

<table>
<thead>
<tr>
<th>CALL</th>
<th>PUT</th>
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<tbody>
<tr>
<td>BUY</td>
<td></td>
</tr>
<tr>
<td>SELL</td>
<td></td>
</tr>
</tbody>
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**View on Direction, Volatility or Both?**

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Managing Financial Risk: Case Study

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Case Study: Photronics

PHOTOMASKS

US DOLLARS

PHOTONICS
**Case Study: Photronics**

Photronics is the world’s leading and fastest growing manufacturer of photomasks. Photomasks are high precision quartz plates that contain microscopic images of electronic circuits. A key element and enabling technology in the manufacture of semiconductors, photomasks are used to transfer circuit patterns onto semiconductor wafers during the fabrication of integrated circuits. They are produced in accordance with circuit designs provided by customers at strategically located manufacturing facilities in North America, Europe and Asia.

**Photronics’ International Business**

"The globalization of the semiconductor industry has created significant growth opportunities beyond Photronics’ core market in North America. Customers operating manufacturing facilities in Asia and Europe, as well as North America, are streamlining their equipment and materials procurement processes, relying on fewer and more capable suppliers.

"Photronics has made excellent progress in expanding its presence around the world both by acquisitions and by the construction of new facilities. During the year, new facilities were quickly brought to full production in Manchester, England, and Austin, Texas, while additional technological capability was installed in Singapore. These advanced capabilities have elevated our strategic supplier status with many significant customers who are now benefiting from our balanced approach to international expansion and technology investments.

"In Asia, our Singapore facility is benefiting from our customers’ utilization of foundries, reflecting the increasing trend of semiconductor manufacturers moving toward a fabless business model. We believe that the number of companies utilizing foundries will increase as they focus on their core strengths—designing semiconductors and product marketing. Such a business model transfers the risk associated with investing capital in production assets, giving the now “fabless” semiconductor company additional flexibility during down cycles, like the one affecting the semiconductor industry today."
Case Study: Photronics

- The company and its currency exposure
- Income, cash flow and translation effects
- The economic risks
What hedging policy?
Translation Policy

The Company’s subsidiaries in Europe and Singapore maintain their accounts in their respective local currencies. Assets and liabilities of such subsidiaries are translated to U.S. dollars at year-end exchange rates. Income and expenses are translated at average rates of exchange prevailing during the year. Foreign currency translation adjustments are accumulated in a separate component of shareholders’ equity. The effects of changes in exchange rates on foreign currency transactions are included in income.

Economic Exposure

- Economic exposure is how the firm’s revenues and costs will respond to exchange rate changes.
  - Example: Even though Intel invoices German customers in marks, its future revenues may be unaffected by fluctuations in the mark if the currency of determination of prices in the semiconductor business is the dollar or even the yen.

- The currency of determination is the currency in which most of the competition prices similar products.
Translation vs Economic Exposure

Accounting exposure
- Exposure = "Exposed" assets - "exposed" liabilities

Economic exposure
- Exposure = How will an unanticipated exchange rate change affect the cash flows of the firm?
  - Domestic sales
  - Exports
  - Domestic costs
  - Import costs

Photronics: Economic Exposure

- A/R
- INVENTORY
- PLANT

PHOTO-MASKS

SOLD IN UK INVOICED IN GBP

SOLD IN WORLDWIDE MARKET

DETERMINED BY COMPETITION

GBP?

USD?

JPY?
What Should Photronics Do?

- Hedge, or suffer translation gains & losses?
- How can its exposure be gauged?
- What does FAS 133 imply for a company like this?
- What tools should be used?

What Kind of Debt?
Some Considerations

- Fixed/floating:
  - How certain are the cash flows? Are operating profits linked to interest rates or inflation?
- Currency:
  - Consider currency of the assets: currency of denomination vs. currency of location vs. currency of determination.
- Maturity or availability:
  - Are the assets short term or long term? Should the firm assume ease of refinancing, or buy an option on access to financing?
A Hedging Roadmap

Motivations for Hedge

Driven by company views
Volatility: options, Direction: forwards, debt
Market risk remains

Driven by company needs
Company has economic exposure
Forwards, swaps or debt
No need for hedging

Company has natural hedge

Contact Info

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