A Tale of Two Projects: An Analysis of Why Projects Fail

Presentation to the International Business Club
Darden Business School

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Pop Quiz:
What Do These Entities Have in Common?

- Iridium ($6B)
- EuroTunnel ($15B)
- ICO ($5B)
- Dabhol Power ($3B)
- Bulong Mine ($0.3B)
- Equate ($2B)

- Globalstar ($4B)
- EuroDisney ($3B)
- Dulles Greenway ($0.4B)
- Murrin Murrin ($0.6B)
- Global Crossing ($4B)
- Canary Wharf ($6B)

- “Big Dig” ($12B)
- Millennium Dome ($1B)
Agenda

• What is project finance?
  – Provide a quick overview of project finance

• Why projects fail?
  – Compare and contrast two projects
  – Describe risk factors
  – Caveat: financial structure not execution process (negotiations)
Define Project Finance

Project finance involves the use of non-recourse debt by a corporate entity (the sponsor or sponsors) to finance investment in a legally-independent industrial asset, usually with a limited life.
Project vs. Corporate Finance

**Project-Financed Investment**

Corporation

(“Sponsor”)

<table>
<thead>
<tr>
<th>Asset A</th>
<th>Debt S</th>
<th>Equity P</th>
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</thead>
<tbody>
<tr>
<td>Asset B</td>
<td>Debt P</td>
<td>Equity P</td>
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Project Company

<table>
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<tr>
<th>Asset A</th>
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**Corporate-Financed Investment**

Corporation

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Typical Project Structure

- **Gas Input** under a supply contract
- **Technol. License**
- **Equipment Contract** (turbines)
- **Construction Contract** (EPC Contract)
- **Operating & Maint. Contract**
- **Labor**
- **Non-recourse Debt**
  - Inter-creditor Agreement
- **Power Output** under a purchase contract
- **Project Company (Power Plant)**
- **Host Government**:
  - legal system, permits, regulation, property rights, etc.
- **Sponsor A**
- **Sponsor B**
- **Sponsor C**
- **Equity Shareholder Agreement**
- **Board of Directors**
- **70%**
- **30%**
- **Multi-lateral, Bi-lateral, and Export Credit Agencies**
- **Bank Syndicate**
Global Project-Financed Investment
1994 - 2001

Total Investment (US$B)

- Bank Loans
- Bonds
- ECA/MLA/BLA
- Equity (est.)
Project Finance vs. Other Types of Financing in the US in 2001

Total Amount in 2001 ($billions)

- Venture Capital Investments: $36
- IPO Proceeds: $38
- Project Finance: $68
- Leases: $242
- Municipal Bonds: $257
- Asset Backed Securities: $354
- Corporate Bonds: $434

"Structured Finance"
A Tale of Two Projects

• **Project #1 (1998)**
  – $6B telecom system based in the US
  – Backed by top companies, banks, and advisors

• **Project #2 (1997):**
  – $1.4B aluminum smelter in Mozambique
    • Mozambique GDP = ~$1.7B
    • 17-year civil war recently ended, infrastructure gone
  – Backed by IFC, bilateral agencies, metals & mining companies
Project #1: Iridium, LLC

- $6B global satellite telecommunications system (voice, data, and paging)
  - 66 LEO satellites
  - Target D/TC = 60%
- Service launched Nov. 1998
- Bankrupt in August 1999
  - $25m = salvage value at the bankruptcy auction
- Re-launched in March 2001
Project #2: MOZAL

- $1.4B aluminum smelter in Mozambique
- Financing closed April 1999
  - D/TC = 50% (61% w/sub debt)
- Completed Sept. 2001
  - $120m under budget
  - 6 months ahead of schedule
- Mozal II ($1B) announced 6/01
Research Question: What Explains the Divergent Outcomes?

• Extensive field research
  – Analyzed more than 200 projects
  – Wrote case studies on 18 projects
    • Mozambique, Vietnam, Kuwait, etc.
    • Power, mining, telecom, etc.
    • Most investments >$1 billion
  – Interviews with >150 practitioners
• Synthesis phase of this research
  – Case-based evidence, but N > 1
Research Question: What Explains the Divergent Outcomes?

**Hypothesis:** Projects fail when sponsors violate basic principles of financial management.

1) Leverage should be inversely related to asset risk.
2) Cost position is critical, especially in commodity businesses.
3) Real options are valuable (flexibility).
4) Incentives matter.
Revenue = Price * Quantity
minus Operating Costs
= Operating Profit
minus Debt Service
= Net Income (Dividends)

1) Successful completion?
2) Operating performance?
3) Loan Default
4) Returns to Capital?
   • Debt Returns
   • Equity Returns
Failure Defined as Loan Default

• Basel II (new capital accord) due 2006
  – Project loans are riskier than corporate loans
  – Project loans should have higher capital charges
• Recent study revealed that PF loans
  – have lower default rates: 7% vs. 9%
  – have higher recovery rates: 75% vs. 50%
• Project loans NOT riskier than corp. loans
• Nevertheless, there are systematic factors that lead to default
Principle #1: Leverage should be inversely related to asset risk

- Asset (revenue) risk comes in two forms:
  - **Completion risk**
    - Mozal: proven and stable technology
    - Iridium: new, unproven technology
  - **Market or Operating risk**
    - Mozal: wholesale demand, contracted, done in $US
    - Iridium: retail demand with currency risk
- Mistake: Improper capital structure
  - Use of debt (not equity) or too much debt
  - Conflict: D/TC pre- vs. post-completion
Principle #1: Leverage should be inversely related to asset risk

\[ \text{PV} = \frac{(\text{Asset Value} - \text{Investment Cost})}{\text{Investment Cost}} \]

Probability

Debt Profile (Project Finance)

Equity Profile (VC/PE)

PV[(Asset Value - Investment Cost) / Investment Cost]
Concurrent Analyst Revenue Forecasts for Iridium (YE 1998)

Revenue ($ Billions)

- Lehman Brothers (12/30/98)
- Merrill Lynch (1/22/99)
- Salomon Smith Barney (2/1/99)
- Credit Suisse First Boston (12/18/98)
- CIBC Oppenheimer (12/7/98)
**Principle #2**: Cost position is critical, especially in commodity businesses

- Cost position affects survival in downturns
  - Mozal: bottom 5% of industry cost curve
    - Stable technology
  - Iridium:
    - Global coverage → high-cost producer
    - Evolving technology (Moore’s Law)
    - *Are telecom services a commodity?*
- Mistake: High cost position hinders ability to sell product and repay debt
  - Low-cost producer (bottom 25%) over long run
**Principle #2**: Cost position is critical, especially in commodity businesses.

![Graph showing cumulative capacity](image)

- Mozal

<table>
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<th>US$/ton (1995 US$)</th>
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<tr>
<td>$1,000</td>
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<tr>
<td>$2,600</td>
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**Principle #3: Real Options Are Valuable**

- Flexibility (expand, contract, abandon, etc.) is valuable and should be incorporated
  - Mozal: built in two phases (Mozal I and II)
    - Value of staged commitment (e.g. venture capital)
  - Iridium: built all at once
    - Result: high-cost producer, need more capital upfront
- **Mistake:** Failure to capitalize on “real options”
  - Conflict: Most projects have little flexibility
    - Nature of projects (contracts, fixed capital)
**Principle #4: Incentives Matter**

- Sustainability = f(incentives, fairness)
  - Mozal:
    - Private sponsors, strong financially, LT perspective
    - GOM shares in some benefits
  - Iridium:
    - Private sponsors, *most* strong financially
    - Motorola investment vs. system development fees
- Mistake: Improper incentive structure reduces revenue and increases costs
Managing Sovereign/Political Risk: The Paradox of Infrastructure Investment

• Finance theory: High Risk ➔ High Return
• But in infrastructure… High Return ➔ High Risk
  – Unfair deals are not stable
  – Examples: Enron Dabhol (India) and Calpine (US)
    • Enron projected return: IRR = ~ 28%
    • Permissible return under Indian law: IRR = 16%
• Solution: Lower risk, DO NOT increase the return
  – Structural approach to risk management
• Traditional approaches to risk management can exacerbate the problem
  – Financial a (high hurdle/discount rates)
## Risk-Factor Checklist

<table>
<thead>
<tr>
<th>Risk Factor</th>
<th>US Independent Power Project</th>
<th>Mozal Aluminum Smelter</th>
<th>Iridium Satellite Telecommunications</th>
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<tbody>
<tr>
<td>Asset Risk</td>
<td></td>
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</tr>
<tr>
<td>1) Established technology</td>
<td>Yes</td>
<td>Yes</td>
<td>No</td>
</tr>
<tr>
<td>2) Stable technology</td>
<td>Yes</td>
<td>Yes</td>
<td>No</td>
</tr>
<tr>
<td>3) Low-cost producer (bottom 25%)</td>
<td>Yes</td>
<td>Yes</td>
<td>No</td>
</tr>
<tr>
<td>4) Staged construction/operations</td>
<td>N/A</td>
<td>Yes</td>
<td>No</td>
</tr>
<tr>
<td>Market Risk</td>
<td></td>
<td></td>
<td></td>
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<tr>
<td>5) Wholesale demand (offtake)</td>
<td>Yes</td>
<td>Yes</td>
<td>No</td>
</tr>
<tr>
<td>6) No currency risk (no mismatch)</td>
<td>Yes</td>
<td>Yes</td>
<td>No</td>
</tr>
<tr>
<td>Ownership Risk</td>
<td></td>
<td></td>
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<tr>
<td>7) Strong sponsors (high-rated)</td>
<td>Yes</td>
<td>Yes</td>
<td>Yes/No</td>
</tr>
<tr>
<td>8) Private-sector sponsors</td>
<td>Yes</td>
<td>Yes</td>
<td>Yes</td>
</tr>
<tr>
<td>9) Proper long-term incentives</td>
<td>Yes</td>
<td>Yes</td>
<td>No</td>
</tr>
<tr>
<td>Political/Sovereign Risk</td>
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<td></td>
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<tr>
<td>10) Fair to all parties</td>
<td>Yes</td>
<td>Yes (?)</td>
<td>Yes</td>
</tr>
</tbody>
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Conclusions

• Many projects fail for unforeseeable or “unavoidable” reasons
• Yet, many projects fail for “avoidable” reasons
  – Failure to heed basic principles of financial management
Conclusions: New Research Questions

• *Are certain projects inherently unfinanceable?*
  – e.g., large, high-tech projects like Iridium

• *Why does the private sector finance big, bad (- NPV) projects like Iridium?*
  – Exuberance? private sector financed many small, bad companies recently…
  – Social benefits? Private sector cannot monetize all social benefits