High tech venture-capital and the industrial revolution

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High tech VC and the industrial revolution

• My background
• Some venture-capital basics
• Samuel Slater
• Francis Cabot Lowell
• Characteristics of technology business (Increasing returns and Innovation)
• Slater/Lowell as high tech entrepreneurs
• Questions and wrap-up
Venture Capital Basics

• Sources of high-risk equity capital
• Stages of investing
• Main components in a venture
Sources of high-risk equity capital

- Friends and Family
- Private individuals / angels
- Institutional venture capital funds
- Corporate strategic investors
Stages of investing – Seed to 2nd Stage

- Seed – proof of concept. Does not involve production for sale
- Startup – product development, management team, test marketing and refining of business plan
- First stage – minimal technical risk. Modest manufacturing process and shipping in commercial quantities.
- Second stage – expansion. Shipping product. Need capital for equipment purchases, inventory and receivable financing.
Stages of investing – 3\textsuperscript{rd} Stage to Exit

- Third stage – profitable but cash poor. Rapid expansion requires more working capital. Banks would supply some credit.
- Fourth stage – rapid growth toward liquidity. Debt financing may be preferable to limit equity dilution.
- Bridge stage – mezzanine investment. Exit vehicle and approximate timing known, but capital needed to sustain rapid growth.
- Liquidity stage – cash out or exit.
Main components in a venture – what an investor looks for ...

- People
- Opportunity
- External context
- Deal
Slater case – investor

• Almy and Brown - Angels
  – Common interest - cotton manufacture
  – Bring capital,
  – Financial management, and
  – a sales channel

• Seed funding onwards
Samuel Slater case – people

- Slater
  - Experience in industry / intellectual capital or knowledge carried in his head
- Almy and Brown
  - Experience, capital, sales channel
- Family labor force
  - work ethic, obligation
- Machinist under “non-disclosure agreement”
Samuel Slater case – opportunity

- Build pilot machines for cotton spinning
- Operating mill
Samuel Slater case – context

- Industrial revolution - Turning point in cotton production and spinning
- Separation of production and marketing functions – great for a start-up but also lead to poor inventory controls
- Controls on intellectual property not strong
Samuel Slater case – deal

- 50% owner and manager of business – cannot dispose of assets except to Almy and Brown
- 50% of assets, any advances to be repaid with interest
- Family basis of employment – provided housing, schooling, early benefits
Samuel Slater case – success?

• Investment success?
Francis Cabot Lowell case - investor

- Nathan Appleton and Boston Associates – syndication of angels
  - Capital, network, fairly hands-off
- Seed funding onwards, clearly staged with milestones
Francis Cabot Lowell case - people

- Lowell and Jackson
  - management experience, technical knowledge, vision/reflection on industry
- Nathan Appleton
  - capital, network, vision, sales channel
- Paul Moody
  - skilled mechanic
Francis Cabot Lowell case - opportunity

- Integrated cotton mill
Francis Cabot Lowell case – deal

• Original investment
  – $5000 from Appleton
  – $100,000 total with Lowell, Jackson and family the greater part

• Lowell and Jackson to start up run the business
Francis Cabot Lowell case – success?

• Investment success?
Characteristics of high-tech: Increasing returns in business

- Market instability
- Multiple potential outcomes
- Unpredictability
- Profits for the winner
Characteristics of high-tech: Bulk production vs. knowledge based

- Most high tech companies have both
- Bulk production is repetitive – improve quality, get down costs, control and planning
- Knowledge – mission oriented, looking next big thing
Knowledge based

- Capturing good ideas
- Keeping ideas alive
- Imagining new uses for old ideas
- Putting concepts to test
Samuel Slater case - results

- 10 years of near monopoly – first mover advantage
- Joint expansion of facilities
- Investors able to obtain intellectual capital and spin off
- Retention issues – lead to rise of competition (birth of New England textile business)
- Encouraged hand-loom weavers, but did not adopt power loom
Francis Cabot Lowell case - results

• Generated extreme wealth
• Adaptive – power loom, integrated labor saving processes (cotton to cloth in one building), printing of calico, water power source
• Community contribution probably strengthened retention
## Slater and Lowell as high-tech entrepreneurs

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<th>Slater / Brown</th>
<th>Lowell / Appleton</th>
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Question, comments and further discussion
Further Reading

• The structure and governance of venture-capital organizations by William Sahlman.
• Note on Angel Financing – Graduate School of Business Stanford University S-E-50.
• Increasing returns and the new world of business by Brian Arthur, Harvard Business Review.
• Building an innovation factory by Andrew Hargadon and Robert Sutton, Harvard Business Review.