
Development Economics

Lecture 11: Models of coordination failures

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Today

1. The “Big Push”
2. Kremer’s O-ring

The “Big Push”

- A model which creates multiple equilibria
 - One is “good” with high production and wages
 - One is “bad” with low production
- Externality: One firm producing and paying its workers creates market for other firms
- Big question: when does it make sense for the first firm to industrialize?
 - Sometimes only makes sense to industrialize if everyone does—coordination required
 - Then there must be a “Big Push” to industrialize

Other possible “big push” cases

- Intertemporal effects

- Investment now reduces wages, decreases demand, but increases it later. May not be worth making investment unless demand will be sufficient in future, and other firms invest

- Urbanization

- Industrial goods may only be useful (or conveniently used by) urban dwellers. So if start out rural, not worth industrializing unless enough people move to urban areas, but don't move to urban areas unless enough firms industrialize

Other possible “big push” cases

■ Infrastructure

- Airports, ports, railroads have large fixed costs. Only worth creating if enough firms will use them to pay for costs. But only worth industrializing if railroad or port will be there to ship your product.

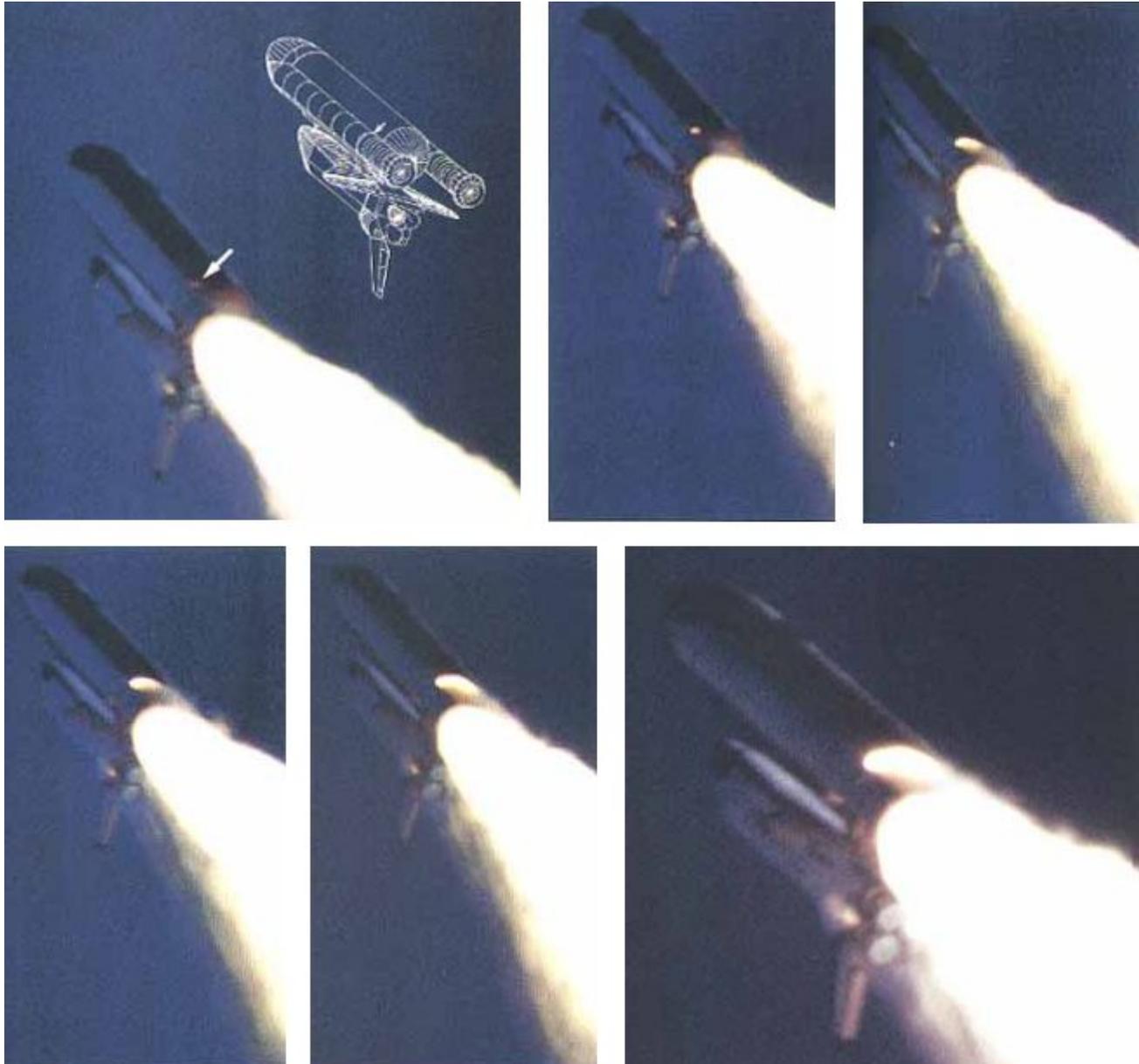
■ Training

- Trained workers may be lured away by other firms. So no firms train workers. If all firms trained workers, workers are not lured away.

Multiple equilibria and Poverty traps

- Whenever there are multiple equilibria it is possible for there to be a poverty trap
- *Poverty trap*: when economy is “trapped” in bad situation, and cannot escape without a large change.
- Poverty traps may explain divergence
 - Some countries can grow
 - Others are trapped, and will not grow unless make a big push to change

1986 Challenger disaster: a faulty O-ring



Source: <http://www.aerospaceweb.org/question/investigations/q0122.shtml>

Kremer's O-ring model

- The problem with the Challenger highlights that many systems (especially complex ones) are only as good as their weakest link.
- Although with less disastrous consequences, same is true for most industrial/services products
 - They require many steps, and a good product at the end requires all of the steps to be completed successfully or at least reasonably well
- Kremer O-ring model highlights how the quality of different inputs relates to the output

Kremer's O-ring model

- Basic idea:
 - Each product or activity needs several inputs
 - The probability that the activity will fail is the *multiple* of the probability of each input failing
- Specialization: cannot just substitute more of one thing to get output, need all things
 - A good surgeon requires:
 - Good assistants, Gloves, Scalpels, Lights, Good post-operative care
 - Without the *complementary* inputs, a good surgeon will not do good surgeries
 - Although likely better surgeries than a bad surgeon under same circumstances

Kremer's O-ring model

- Production has 2 tasks
- Each task completed with skill q
- Probability of producing the produce (or quality of the product) = $q_1 q_2$
- Assume
 - Firms are risk neutral
 - Labor competitive
 - Workers always work

Kremer's O-ring model

- With competitive markets, workers are paid their marginal (revenue) product

$$F(q_1, q_2) = q_1 q_2 \quad \text{MPL of } q_1 = dF/dq_1 = q_2$$

- The wage of 1 depends on skill of 2
- Conclusion: everyone wants to work with skilled workers!

Kremer's O-ring model

- Will skilled workers end up together in market equilibrium?
- Suppose two skilled workers (q_H q_H) and two unskilled workers (q_L q_L)
 - Different combinations:
 - q_L q_H , q_H q_L
 - q_L q_L , q_H q_H
 - If price=1, wage (MRPL) =
 - q_L for q_H , q_H for q_L
 - q_L for q_L , q_H for q_H
 - Since q_L q_H < q_H q_H , if start with q_L q_H , q_H q_L , one of the firms hires away one of the skilled workers

Kremer's O-ring model

- Only equilibrium is for one firm to employ both skilled workers
- Production: $q_L q_H + q_H q_L \rightarrow q_L q_L + q_H q_H$
 - Can show that $q_H^2 + q_L^2 > 2 q_L q_H$
 - So “assortative” equilibrium is *efficient*
- If everyone starts q_L , does it make sense to pay some cost to go from q_L to q_H ?
 - Individually it never makes sense upgrade (get paid the same q_L MRPL wage)
 - No incentive to become q_H , *coordination failure*