

Innovation Surprises: Fresh Insights from New Methods

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Motivation

Innovation critical driver of

- Creation, growth, and obsolescence of markets
- Survival, growth and success of firms
- Wealth of nations

Prior Research

Relies much on

- Micro case method
- Macro country data
- Organizational or country surveys

New Paradigm of Research

- Historical (archival) market data
- Longitudinal and cross sectional
- All firms/innovations/technologies in market
- Combined with performance (stock market, sales)
- Within and across countries

Research Questions

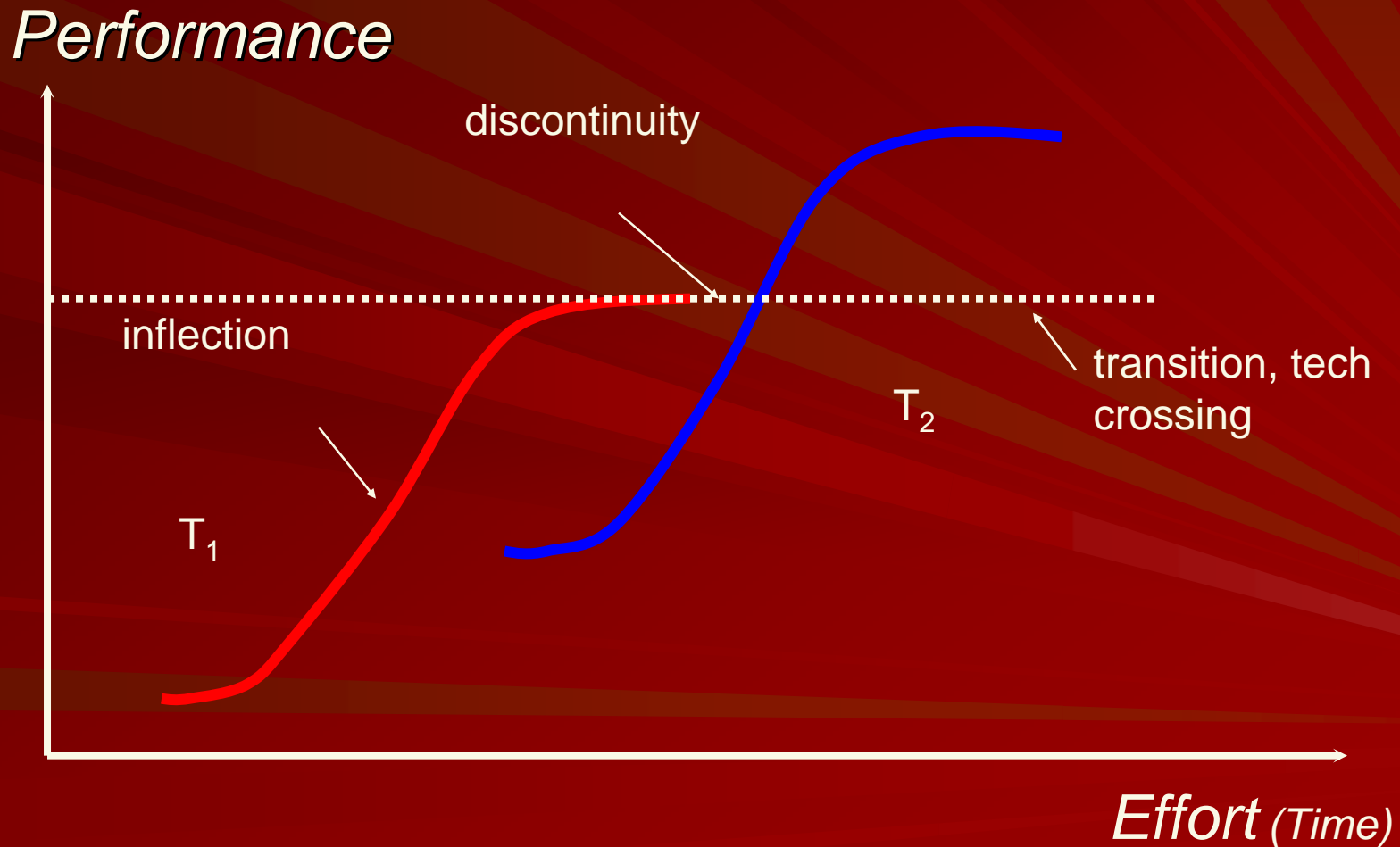
1. How do technologies evolve?
2. Who introduces disruptive innovations?
3. Does R&D in innovation payoff?
4. Should you make or buy innovations?
5. When do innovations takeoff?
6. Which countries most innovative?

- With Ashish Sood, Abhishek Borah, Peter Golder
- Available at www.gtellis.net

Study 1: Research Question

- How do technologies evolve?
- Belief: Series of successive S-curves that intersect once

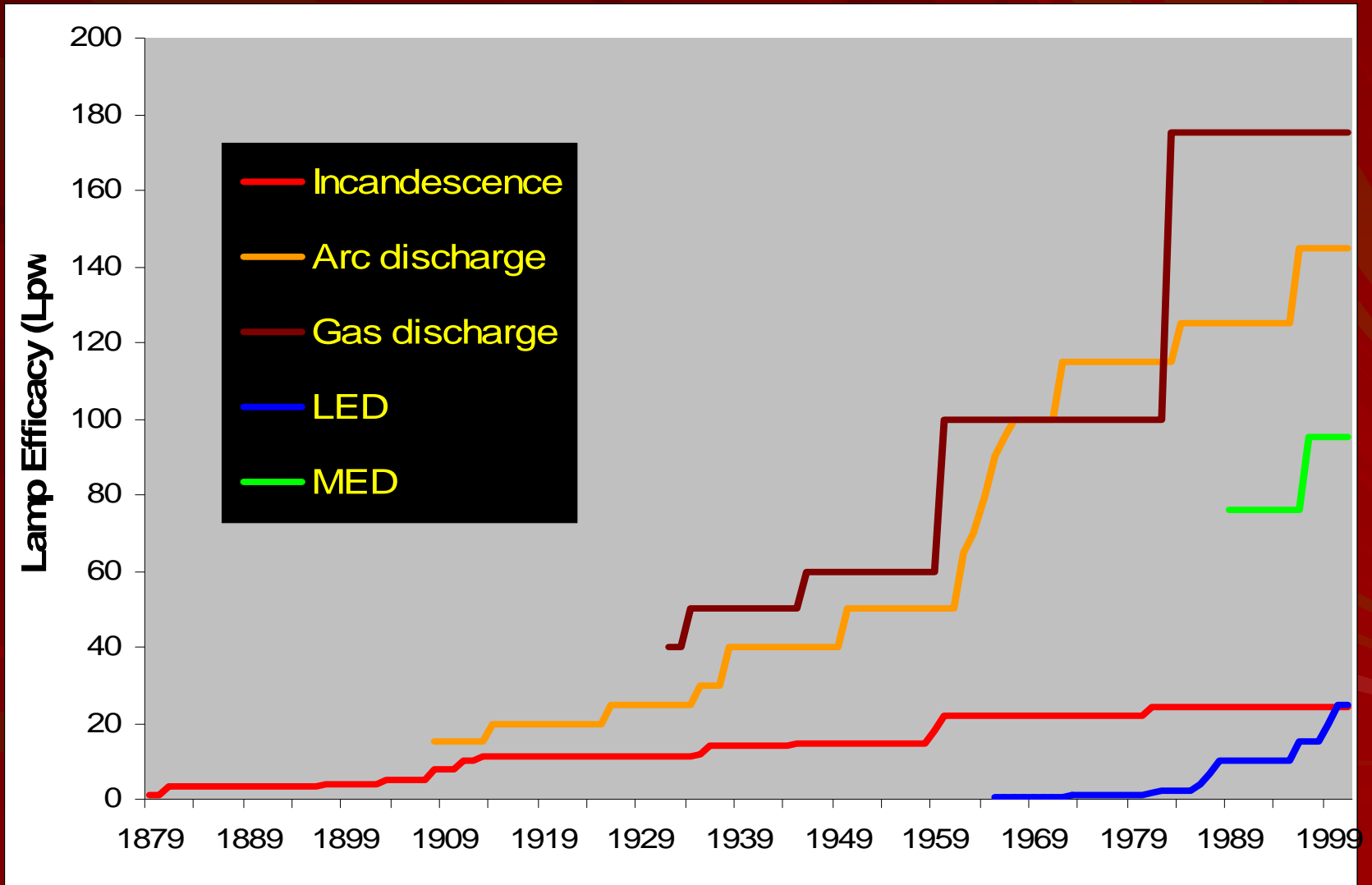
From Theory of S-Curves



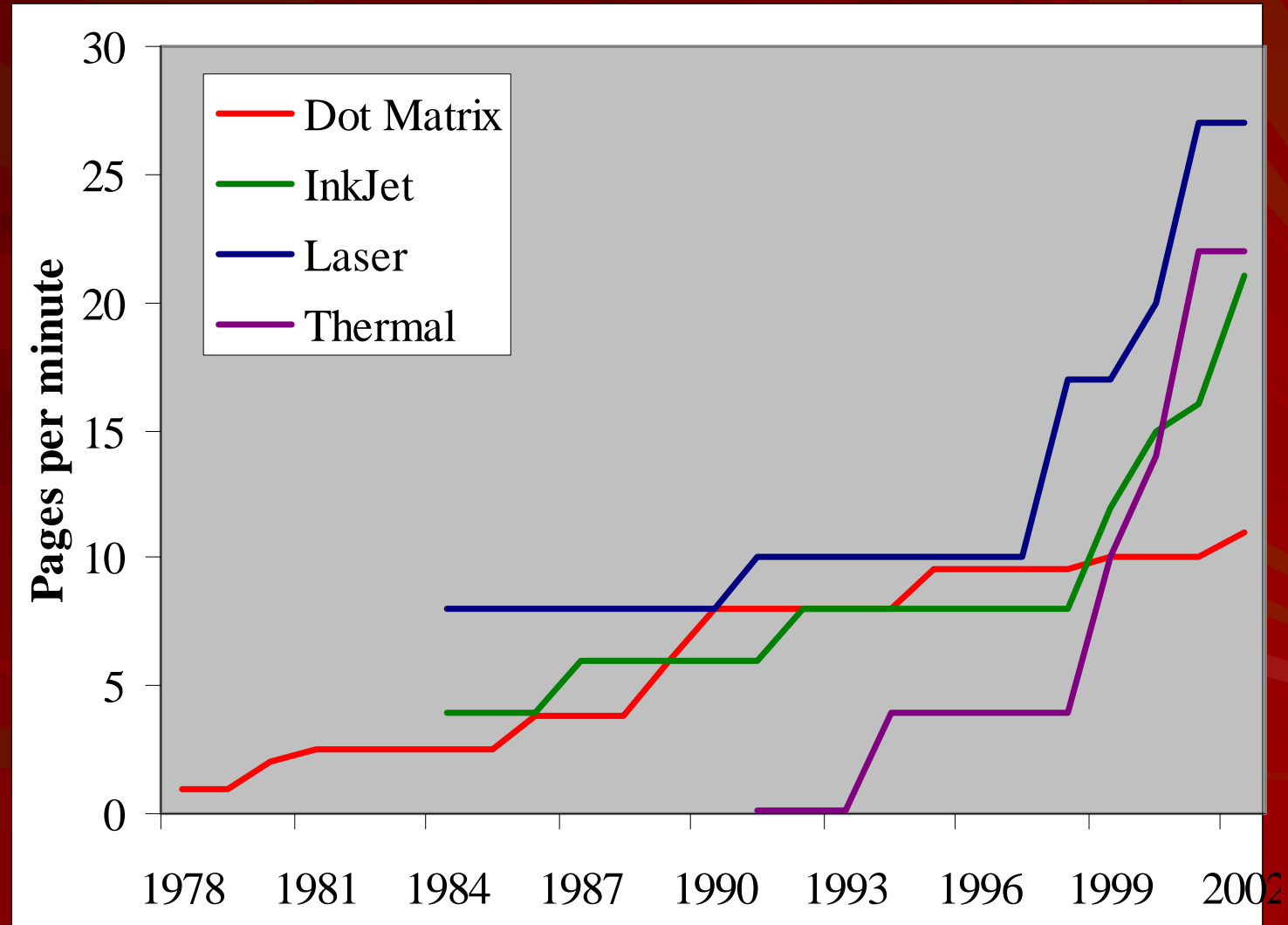
Study 1: Method

- Selected 7 markets (lighting, analgesics, printers, data transfer, memory, monitors, auto engines)
- Collected entry & performance of all technologies in each market over extended time periods

Study 1 Results: Lighting



Study 1 Results: Desktop Printers



Study 1: Conclusions

- Evolution follows step function not S-curve
- Sharp jumps in performance follow long flat performance
- Multiple crossings in performance
- Old technologies do not die easily, but compete on multiple dimensions to multiple segments simultaneously
- SAW Model can predict evolution

Study 2: Research Question

- Who introduces “disruptive technologies”
- Belief: new entrants

Study 2: Method

- Collected technological evolution as in prior study
- Added incumbent and entrant strategies and performance

Study 2: Results

- Incumbents introduce at least as much “potentially disruptive innovations” as entrants
- Incumbents cause more disruptions than entrants
- Hazard model can predict disruptions fairly well

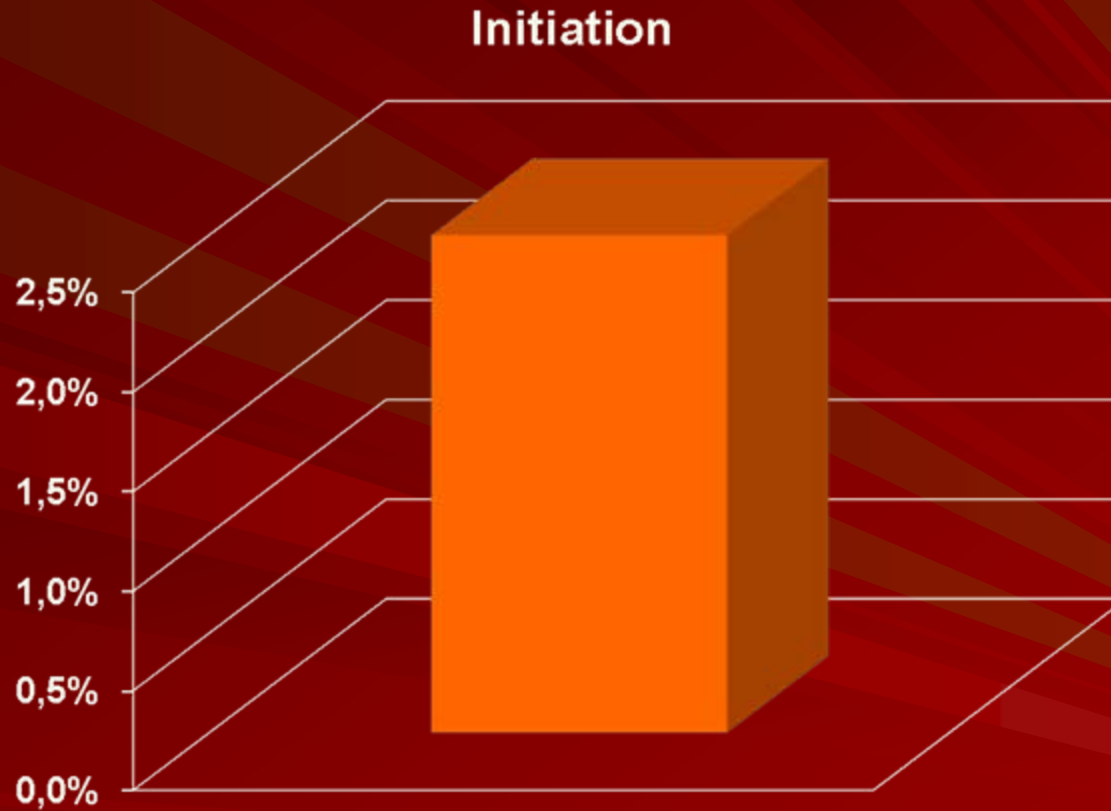
Study 3: Research Question

- Does R&D on innovation pay off?
- Belief: Stock market short sighted, discourages investment in long term, uncertain innovations

Study 3: Method

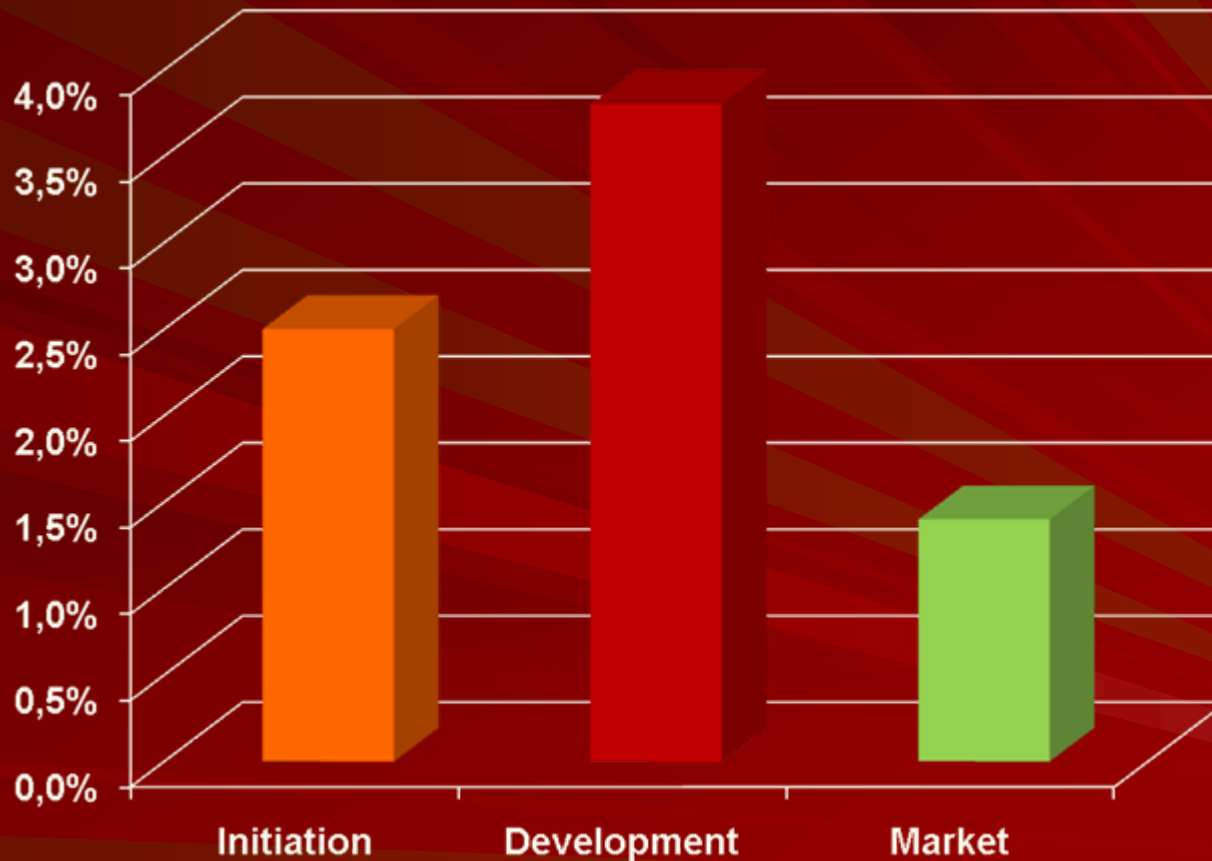
- Prior data as in study 1 and 2
- Plus collected all announcements of every stage and event in every technology (project) of every market and firm: Over 5431 announcements
- Plus stock market returns for each of above events

Results 3: Returns to Initiation

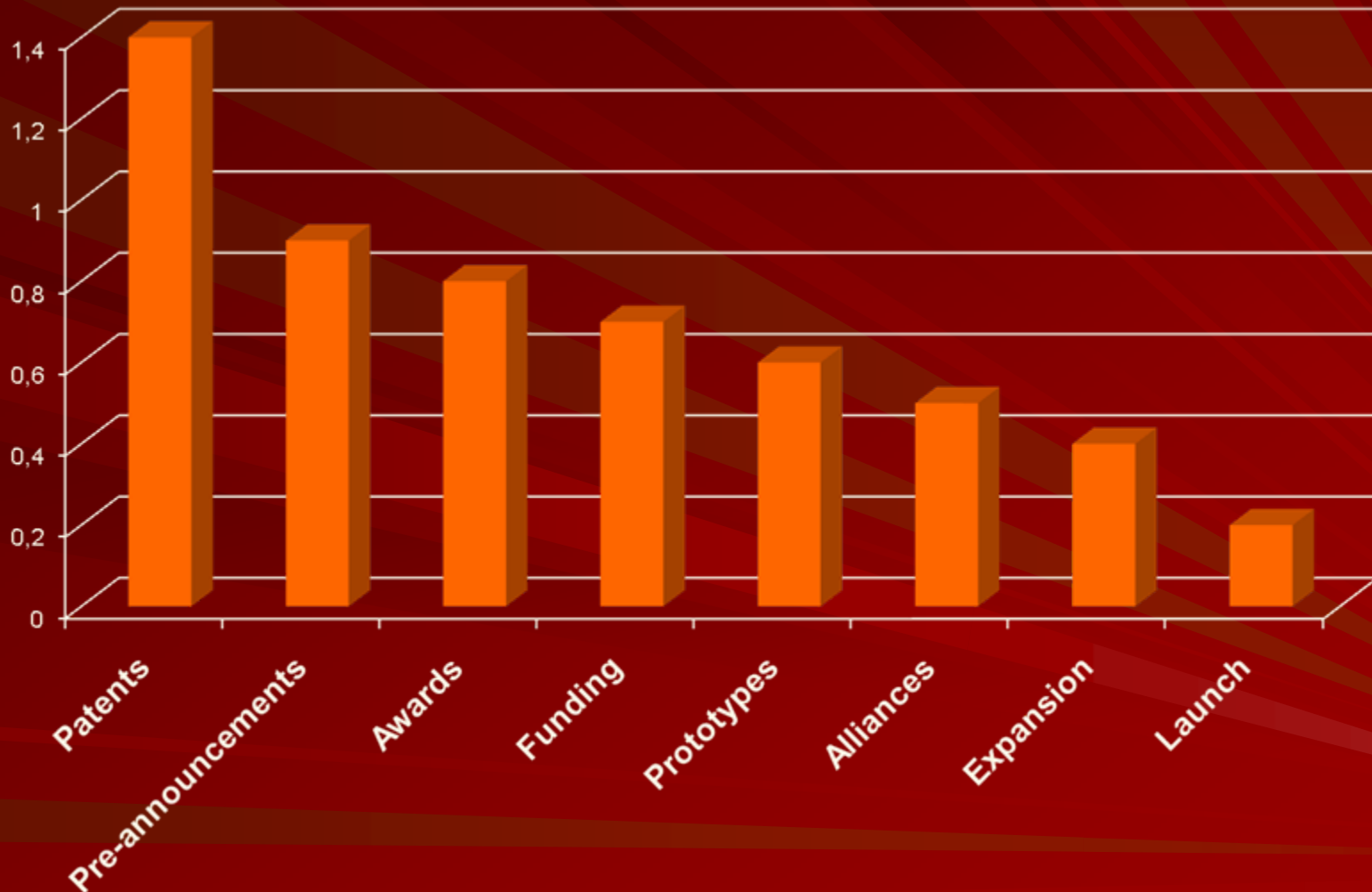


Average of 4.7 years before launch

Study 3: Returns by Phases



Study 3: Returns by Event



Average time from start of project to commercialization: 4.7 years

Good and Healthy Returns to Innovation

Study 3: Conclusions

- Markets strongly responsive to all stages of development of innovation
- Strongest returns to start and development years before launch
- Returns to launch lowest of all events
- Returns exceed investments

Study 4: Question

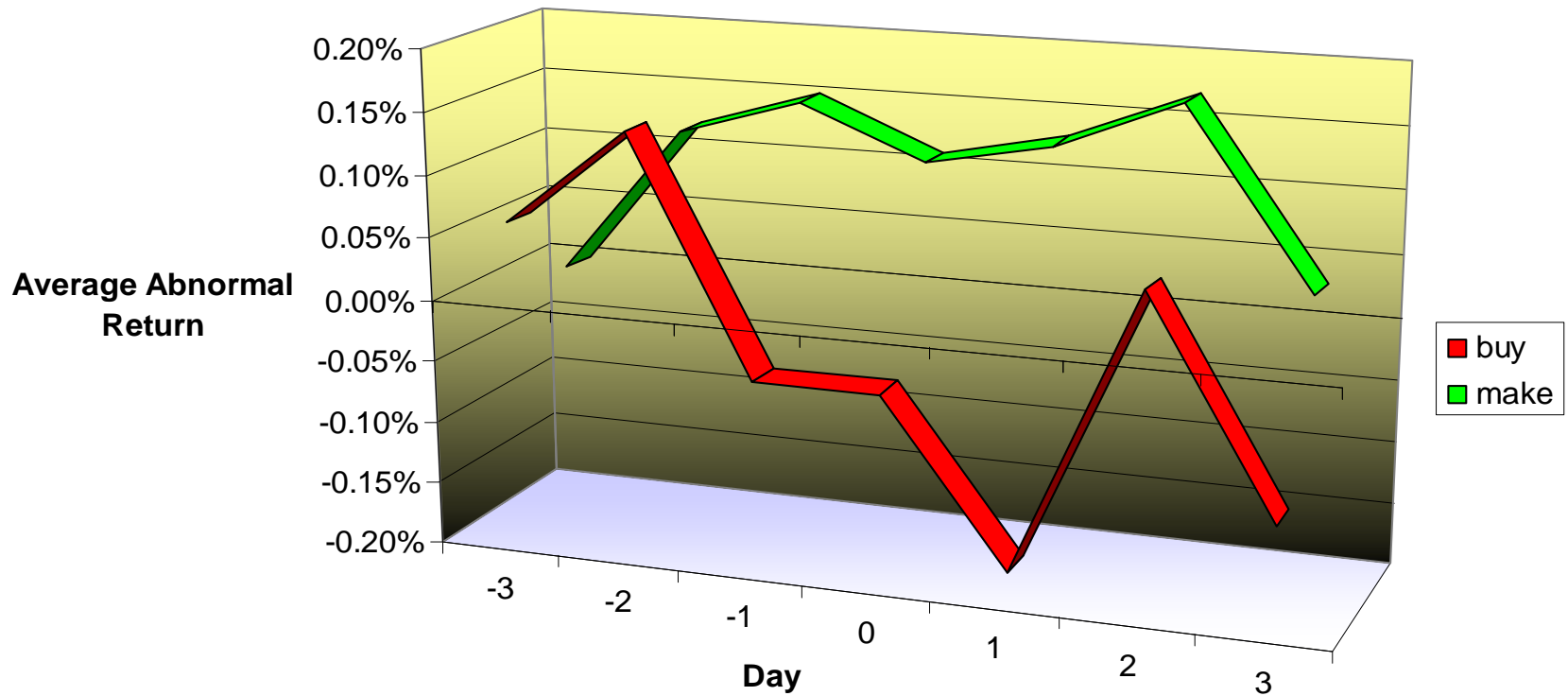
- Is it better to buy or make innovations?
- Belief: Watch & see: acquire if and when an innovation takes off

Study 4: Method

- Prior data as in studies 1 to 3
- Plus data on acquisitions events and stock market returns

Study 4: Results

Average Abnormal Return (AAR) for make and buy innovation events



Study 4: Conclusions

- Make significantly outperforms buy
- Make events lead to positive returns
- Buy events lead to negative returns
- Marketing intensity positively affects buy strategy & all returns

Study 5: Research Question

- Why and when do new innovations take off?
- Belief: due to word of mouth diffusion

Study 5 Method

- Collect data on radical innovations that started a new category
- Sales, prices, market penetration, type of category. Year of introduction
- Define takeoff
- Build hazard model of takeoff

Study 5: Results

Sales



Even

Takeoff

*No
takeoff*

Time

Study 5 Conclusions

- Takeoff distinct event in diffusion of innovation
- Innovations do not take off even when well known
- Takeoff highly dependent on price
- Time to takeoff declining with calendar time
- “Visible” categories take off faster

Study 6 Question

- Do countries differ in innovativeness?
- Belief: major economies most innovative

Study 6 Method

- Data in study 5
- Plus data across countries

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Country	Time To Takeoff	Categories
Denmark	3.7	9
Norway	4.0	7
Sweden	4.4	8
Finland	4.6	8
Belgium	5.0	9
Austria	5.1	7
Swiss	5.3	3
Ireland	5.8	4
Germany	6.3	4
Netherlands	6.5	8
Spain	7.4	8
Italy	7.9	8
UK	8.5	6
Portugal	9.3	7
France	9.4	7
Greece	9.8	6

Study 6 Results

- Time-to-takeoff is good metric of innovativeness
- Countries can be ranked on time-to-takeoff
- Economics not primary determinant of (takeoff) innovativeness

General Conclusions

Importance of

- Market data vs only case or survey
- Longitudinal vs only cross sectional
- Performance vs only input measures
- Micro x country vs only macro-country

Thank you!