Entrepreneurship & Economic Development: KID 2014 Summer School on “Knowledge Dynamics, Industrial Evolution, Economic Development”

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What is Entrepreneurship Research?

- Organizational Context
  --Small Firm (SME)
  --New Firm(Startup)
  --(Nascent) Individual
  --Business Owner
- Behavior
  --Opportunity Recognition/Creation
  --Opportunity Exploitation
- Performance
  --Innovation
  --Growth (Gazelles)

Organizational Context

- Small Firm (SME)
- New Firm(Startup)
- (Nascent) Individual
- Business Owner

Behavior

- Opportunity Recognition
- Opportunity Creation
- Opportunity Evaluation
- Opportunity Exploitation

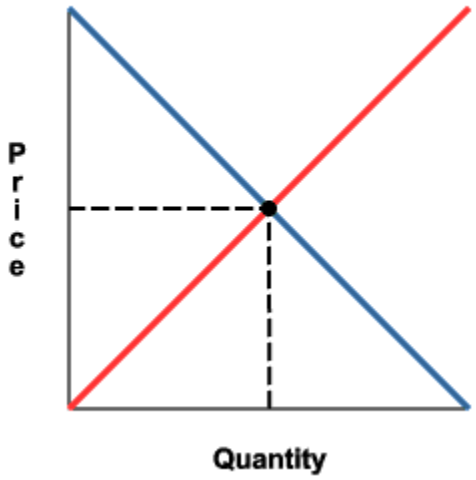
Performance

- Innovation
- Growth (Gazelles)
- Social Goals (Social Entrepreneurship)

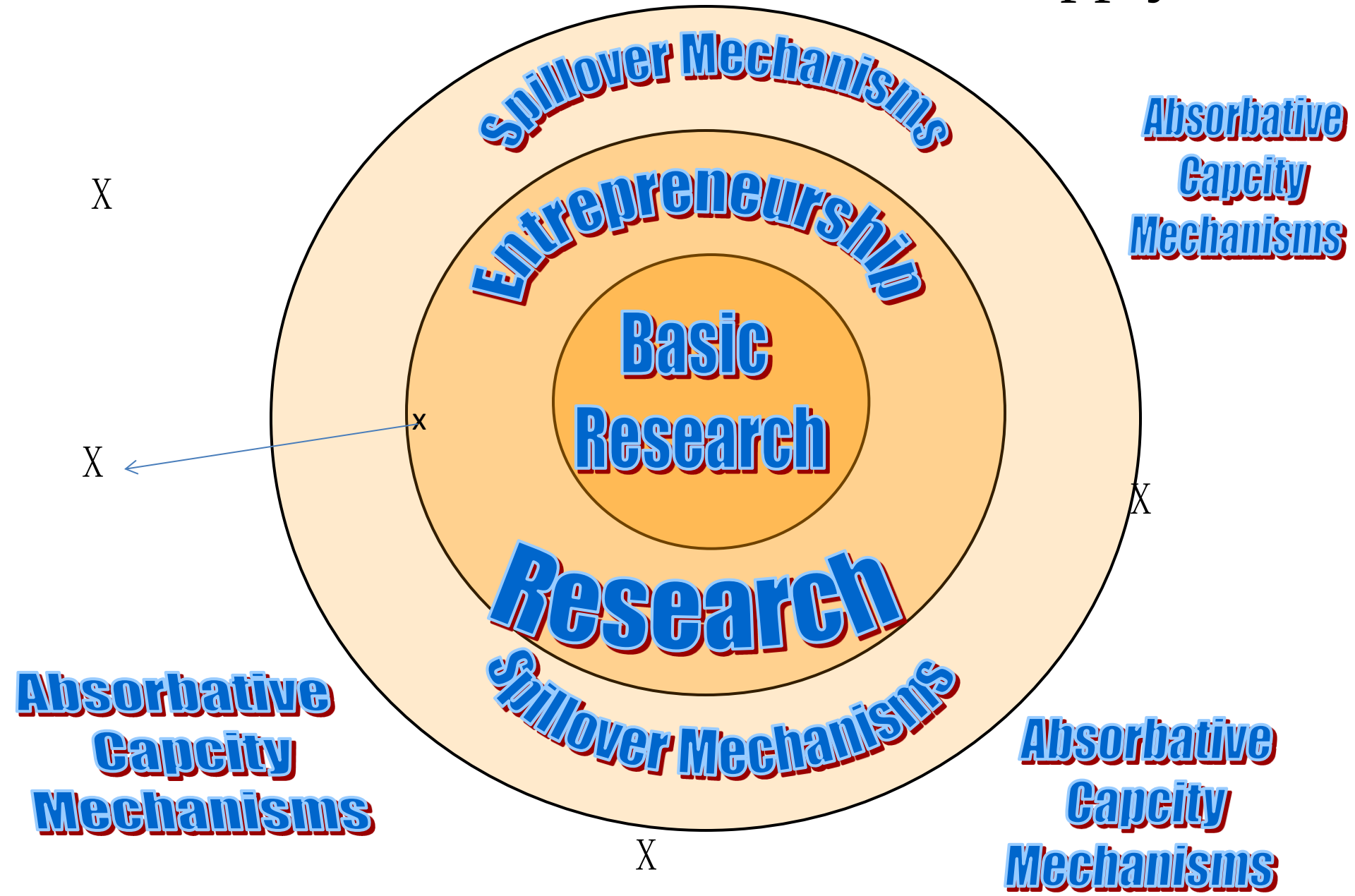
An Overview of Entrepreneurship Literature

- Acs, Zoltan J. and David B. Audretsch, 2010, The *Handbook of Entrepreneurship Research* (New York: Springer)
- Parker, Simon, 2009, *The Economics of Entrepreneurship* (Cambridge: Cambridge University Press).

What Creates Value in (Economic) Research



What Generates Demand & Supply



The Historical Perspective

- Entrepreneurship as a Marginal or Invisible Field
- Small Business Research
- *Mittelstandsforschung* in Germany
- KMU Forschung

The Historical Perspective

Baumol, William J., 2004, *The Free-Market Innovation Machine: Analyzing the Growth Miracle of Capitalism* (Princeton: Princeton University Press).

Scherer, F.M., 1992, "Schumpeter and Plausible Capitalism," *Journal of Economic Literature*, 30(3), 1416-1433.

McCraw, Thomas K., 2007, *Prophet of Innovation: Joseph Schumpeter and Creative Destruction* (Cambridge, Mass.: Belknap Press).

Solow, R. (1956). A Contribution to Theory of Economic Growth. *Quarterly Journal of Economics, 70,* 65-94.

The Demise of Entrepreneurship

"Since capitalist enterprise, by its very achievements, tends to automize progress, we conclude that it tends to make itself superfluous – to break to pieces under the pressure of its own success. The perfectly bureaucratic giant industrial unit not only ousts the small- or medium-sized firm and 'expropriates' its owners, but in the end it also ousts the entrepreneur and expropriates the bourgeoisie as a class which in the process sands to lose not only in its income but also, what is infinitely more important, its function."

Joseph Schumpter, 1942, *Capitalism and Democracy*

Policy Mandate for Entrepreneurship to Promote Innovation & Economic Growth

"Our lacunae in the field of entrepreneurship needs to be taken seriously because there is mounting evidence that the key to economic growth and productivity improvements lies in the entrepreneurial capacity of an economy"

EU President, Romano Prodi

2002

Innovation at the Firm Level

Baumol, William J., 2004, *The Free-Market Innovation Machine: Analyzing the Growth Miracle of Capitalism* (Princeton: Princeton University Press).

Cohen, W. and Klepper, S. (1992b). The Anatomy of Industry R&D Intensity Distributions. *American Economic Review, 82,* 773-99.

Griliches, Z. (1979). Issues in Assessing the Contribution of Research and Development to Productivity Growth. *Bell Journal of Economics, 10*, 92-116.

Griliches, Z. (1990). Patent Statistics as Economic Indicators: A Survey. *Journal of Economic Literature*, *28*, 1661-1707.

The Model of the Knowledge Production Function

- I$= f(K)$
- $I = \alpha RD^{\beta} \cdot HK^{\eta} \cdot \epsilon$

Where I is innovative output and

K is Knowledge, and RD is R&D, HK is human capital

Testing the Schumpeterian Hypothesis

- Firm Innovative Output is Positively Related to Firm Size
- Empirical Evidence $\beta \geq 0$
- Measurement Issues
- Innovation -- Inputs (R&D), Intermediate Outputs (Patents), Outputs

The Schumpeterian Paradox

- Empirical Evidence for Innovative Output Measures find $\beta \leq 0$

Acs, Z. and Audretsch, D. (1988). Innovation in Large and Small Firms: An Empirical Analysis. *American Economic Review*, *78*, 678-690.

Acs, Z. and Audretsch, D. (1990). *Innovation and Small Firms*. Cambridge: MIT Press.

Griliches, Z. (1990). Patent Statistics as Economic Indicators: A Survey. *Journal of Economic Literature*, *28*, 1661-1707.

Scherer, F.M., 1992, "Schumpeter and Plausible Capitalism," *Journal of Economic Literature*, 30(3), 1416-1433.

Resolving the Schumpeter Paradox: Knowledge Spillovers

- $E_i = f(K_j)$

Where E is the startup of a new firm i and j refers to an incumbent organization.

- The knowledge production function reconsidered – the knowledge is exogenous and the creation of a new firm is endogenous

How is Knowledge Different?

- Non-excludable & non-exhaustive (Arrow, 1962)

- Hyper uncertainty, asymmetries & transactions cost (Arrow, 1962)

The Knowledge Filter

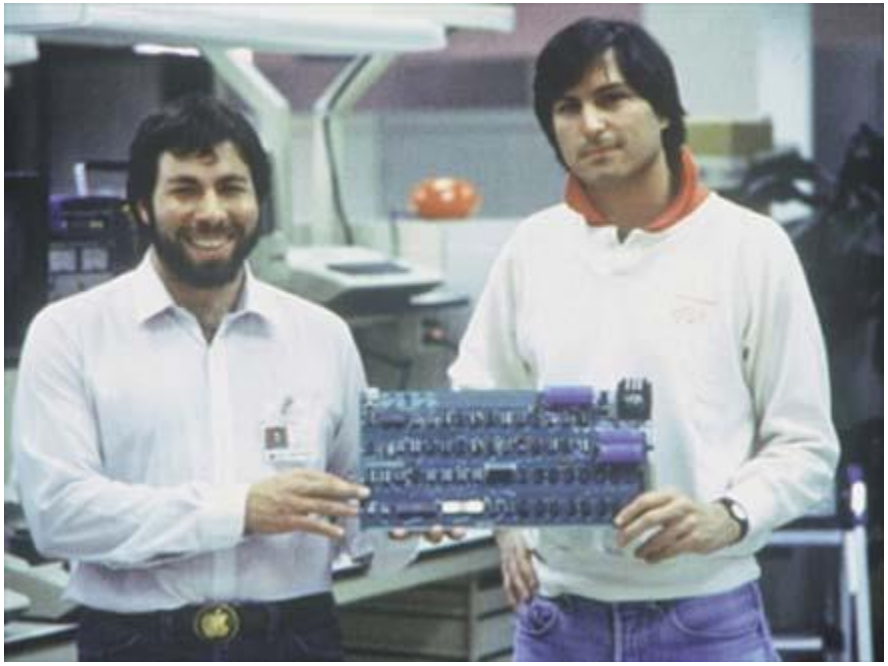
"*A wealth of scientific talent at American colleges and universities – talent responsible for the development of numerous innovative scientific breakthroughs each year – is going to waste as a result of bureaucratic red tape and illogical government regulations…What sense does it make to spend billions of dollars each year on government-supported research and then prevent new developments from benefiting the American people because of dumb bureaucratic red tape*?"

U.S. Senator Birch Bayh, 1980


SAP

Xeorx PARC’s Discarded Inventions

Apple Computer Founders



Knowledge Spillover Theory of Entrepreneurship

Entrepreneurship - Innovation - Growth

Behavior- Organization- Performance

Where Do Entrepreneurial Opportunities Come From?

- **Knowledge Spillover Theory of Entrepreneurship**: Knowledge embedded in economic agents is *exogenous*, and in an effort to appropriate the returns from that knowledge, the spillover of knowledge involves *endogenously* creating a new firm

Endogenous Entrepreneurship

- Appropriation Problem – Firm vs. Knowledge Agent
- New firms are endogenous response to knowledge not completely & exhaustively commercailized
- Knowledge exogenous and embedded in economic agents who endogenously start new firms to appropriate knowledge endowments

Knowledge Spillover Entrepreurship

- Acs, Zoltan J. and David B. Audretsch, 2010, "Knowledge Spillover Entrepreneurship," in Z.J. Acs and D.B. Audretsch (eds.), *Handbook of Entrepreneurship Research* (New York: Springer).
- Ghio, Niccolo, Massimiliano Guerini, Erik E. Lehmann & Critina Rossi-Lamastsra, "The Emergence of the knowledge Spillover Theory of Entrepreneurship," *Small Business Economics* 2014.

Two Dimensions of Knowledge Spillovers

- **Geography** – Clusters within Close Spatial Proximity to Knowledge Source

  (Adam B. Jaffe, Manuel Trajtenberg, and Rebecca Henderson, 1993, "Geographic Localization of Knowledge Spillovers as Evidenced by Patent Citations," *Quarterly Journal of Economics*; Annalee Saxenian, 1994, *Regional Advantage*; Harvard University Press.)
- **Organizational** – Role of Entrepreneurial New Firms as Conduit of Knowledge Spillovers
  (R. Agarwal et al., "The Process of Creative Construction: Knowledge Spillovers, Entrepreneurship and Economic Growth,"," *Strategic Entrepreneurship Journal*, 2008.

The Geography of Innovation

Grossman, G. and Helpman, E. (1991). *Innovation and Growth in the Global Economy*. Cambridge: MIT Press.

Jaffe, A. (1989). The Real Effects of Academic Research. *American Economic Review, 79,* 957-970.

Jaffe, A., Trajtenberg, M. and Henderson, R. (1993). Geographic Localization of Knowledge Spillovers as Evidenced by Patent Citations. *Quarterly Journal of Economics, 63,* 577-598.

Audretsch, D. and Stephan, P. (1996). Company-Scientist Locational Links: The Case of Biotechnology. *American Economic Review, 86,* 641-652.

Audretsch, D. and Feldman, M. (1996). R&D Spillovers and the Geography of Innovation and Production. *American Economic Review, 86,* 630-640.

Feldman, M. and Audretsch, D. (1999). Innovations in Cities: Science-Based Diversity, Specialization and Localized Monopoly. *European Economic Review, 43,* 409-429.

The Cluster Context

- Cluster: “The location of complementary and interacting firms, individuals and institutions within close geographic proximity”
- Michael Porter, “firms in downstream industries (that is channels or customers); producers of complementary products; specialized infrastructure providers; government and universities, think tanks, vocational training providers); and standards/setting agencies”

  (M.E. Porter, “On Competition,” Harvard Business School Publishing, 1999, p. 199.)

Stylized Facts for Geographic Clusters

- ***Emergence of Knowledge-Based Clusters***
  (AnnaLee Saxenien, *Regional Advantage*, Harvard University Press, 1994)
- ***Innovative Activity Clusters within Close Geographic Proximity Around Knowledge Sources***
  (D. Audretsch & M. Feldman, "R&D Spillovers and the Geography of Innovation and Production," *American Economic Review*, 1996, 630-640)

Stylized Facts for Geographic Clusters - 2

- ***Knowledge-Based Clusters Exhibit*** *Higher Rates of Economic Growth*
  (Ed Glaeser et al., "Growth of Cities," *Journal of Political Economy,* 1992)
- ***Cluster Growth is Promoted by Diversity Rather than Specialization of Knowledge Resources***
  (M. Feldmann & D. Audretsch, "Innovation in Cities," *European Economic Review*, 1999.

Stylized Facts for Geographic Clusters - 3

- ***New-Venture Growth Greater in Cluster Context than in Non-Cluster Context*** (B. Gilbert et al., "Clusters, Knowledge Spillovers and New Venture Performance: An Empirical Examination," *Journal of Business Venturing*, 2007; D. Audretsch & E. Lehmann, "Does the Knowledge Spillover Theory of Entrepreneurship hold for regions?", *Research Policy*, 2005, 1191-1202.

Stylized Facts for Geographic Clusters - 4

- ***New Venture Creation Greater in Cluster Context*** (D. Audretsch et al., 2005, "University Spillovers and New Firm Location," with Erik E. Lehmann and Susanne Warning, *Research Policy.)*
- ***Locational Sources Provide Capabilities & Knowledge to New Ventures in Cluster Context Creating High Performing Firms*** (S. Klepper, 2007, "Disagreements, Spinoffs, and the Evolution of Detroit as the Capital of the U.S. Automobile Industry," *Management Science,* 616–631 and R. Agarwal et al., 2004. "Knowledge Transfer through Inheritance: Spin-Out Generation, Development and Performance. *Academy of Management Journal,* 501-522.)

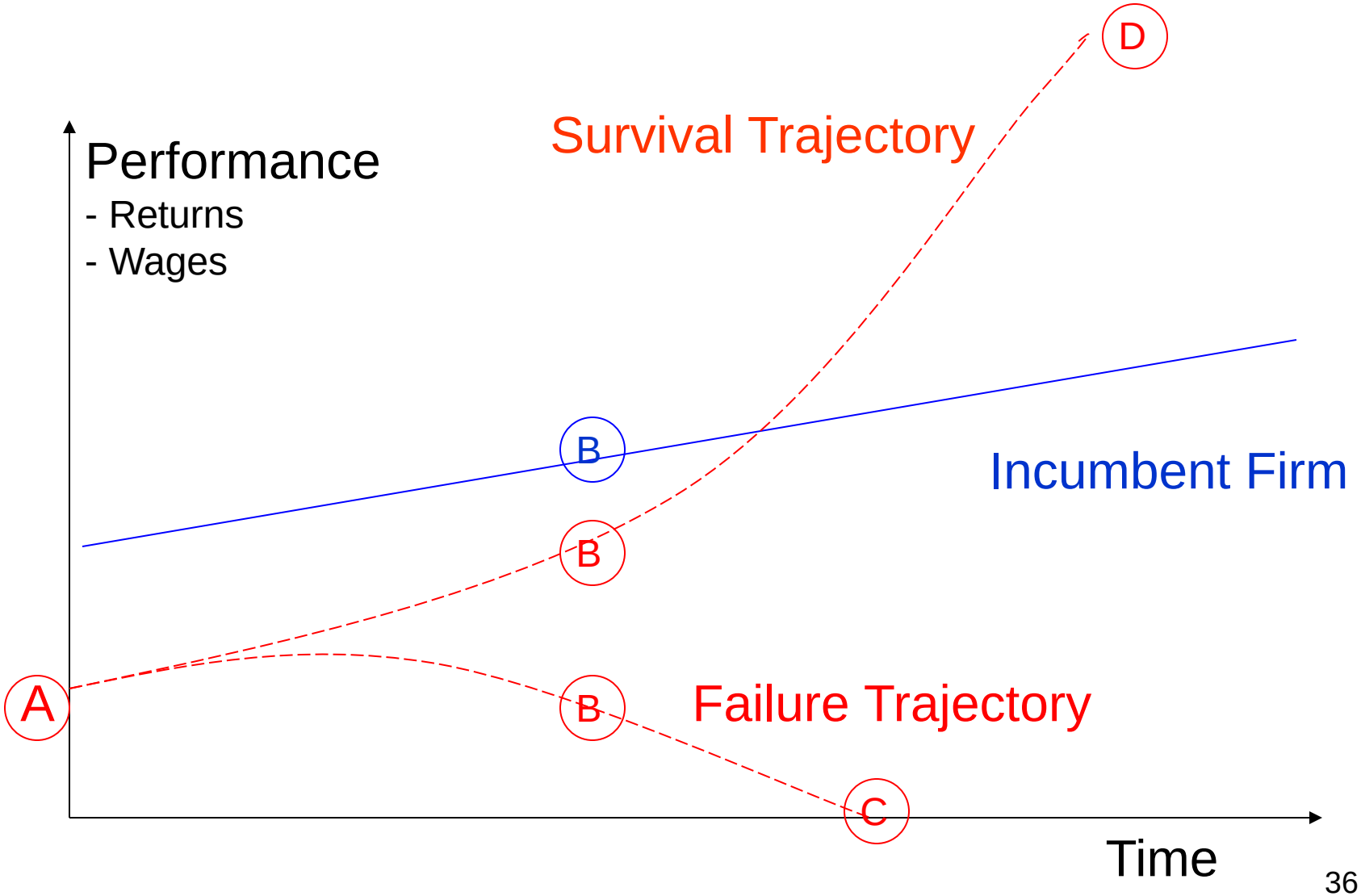
Stylized Facts of Entrepreneurship Dynamics

- New Firm Survival positively related to age and size
- New Firm Growth negatively related to age and size
- Survival and Growth effects more pronounced in knowledge industries

Caves, Richard E.,1998, “Industrial Organization and New Findings on the Turnover and Mobility of Firms,” *Journal of Economic Literature*

Sutton, John, 1997, “Gibrat’s Legacy,” *Journal of Economic Literature*

Entrepreneurship & Growth



Linking Entrepreneurship to Economic Growth

- Carree Martin A. and A. Roy Thurik, 2010, “The Impact of Entrepreneurship on Economic Growth,” in *Handbook of Entrepreneurship Research* (New York: Springer).
- Braunerhjelm, Pontus, et al. 2010, “The Missing Link: Knowledge Diffusion and Entrepreneurship in Endogenous Growth,” *Small Business Economics*.
- Ghio, Niccolo, Massimiliano Guerini, Erik E. Lehmann & Critina Rossi-Lamastsra, 2014,“The Emergence of the knowledge Spillover Theory of Entrepreneurship,” *Small Business Economics* .

The Romer Model

$$Q = \alpha K^{\beta} L^{\varphi} R^{\eta}$$

Economic Growth Hypothesis

- $Q_i = h(t)f(C_i, L_i, K_i, E_i)$
  - *Given a level of knowledge investment and severity of the knowledge filter, higher levels of economic growth should result from greater entrepreneurial activity, since entrepreneurship serves as a mechanism facilitating the spillover and commercialization of knowledge.*

Entrepreneurship Capital's Role

$$Q_i = \alpha K_i^{\beta} L_i^{\varphi} R_i^{\eta} E_i^{\varepsilon}$$

Regional Differences by Growth

- **High Growth Regions**
- High knowledge investments
- Low knowledge filter
- High level of Entrepreneurship Capital

- **Low Growth Regions**
- Low Knowledge Investments
- High knowledge filter
- Low level of Entrepreneurship Capital