

Knowledge in Theories of Adaptation and Innovation

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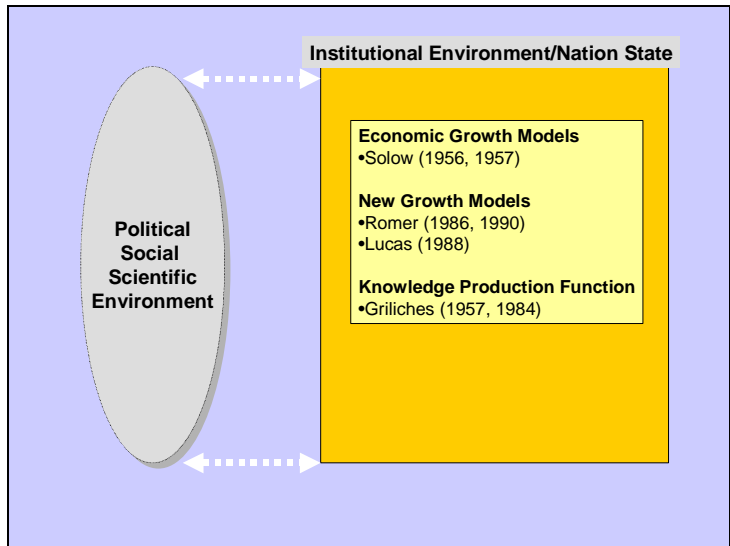
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Knowledge is a very seductive concept.

It is a central explanatory variable in many social science theories, including macro economic growth models, theories of firm adaptation and problem-solving theories,

but it predicts little.

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Economic Growth Models

- Cobb Douglas Production Function – Solow (1956,1957)
 - Changes in measured inputs did not account for full changes in measured output
 - Residual captures some growth in output
 - Residual represents *technical change*

New Growth Models

- Endogenous Growth Models – Romer (1986, 1990)
 - Aggregate stock of human capital has increasing marginal productivity
 - Residual represents scientific advances and spillover effects

Knowledge Production Function

- Empirical Knowledge Production estimation – Griliches (1957, 1984, 1992)
 - Knowledge measured by R&D investment and patents, aggregate and firm level
 - Residual reduced by accounting for spillover effects, but organizational knowledge still unexplained

Industrial Organization Economics

- Industry Structure-Conduct-Performance explains firm performance – Mason (1949); Bain (1959); Porter (1980)
- Empirical studies highlight firm heterogeneity – Schmalansee (1988)

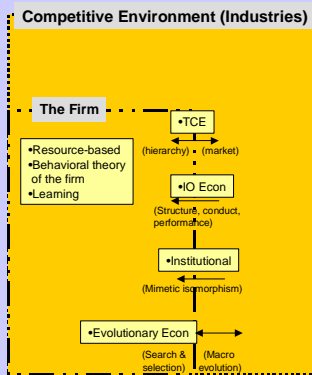
The Firm

- Resource-based
- Behavioral theory of the firm
- Learning

Explaining Firm Heterogeneity

- Resource-based view - Penrose (1959); Rumelt (1984); Wernerfelt (1984); Barney (1986)
 - Firms as bundles of inimitable tangible and intangible resources and tacit know-how
- Behavioral theory of the firm – March and Simon (1958); Cyert and March (1963)
 - Firm-specific routines
 - Slack necessary condition for knowledge production
- Learning theories - Argyris and Schon (1978); Levitt and March (1988); March (1991); Brown and Duguid (1991)
 - Creation of new knowledge

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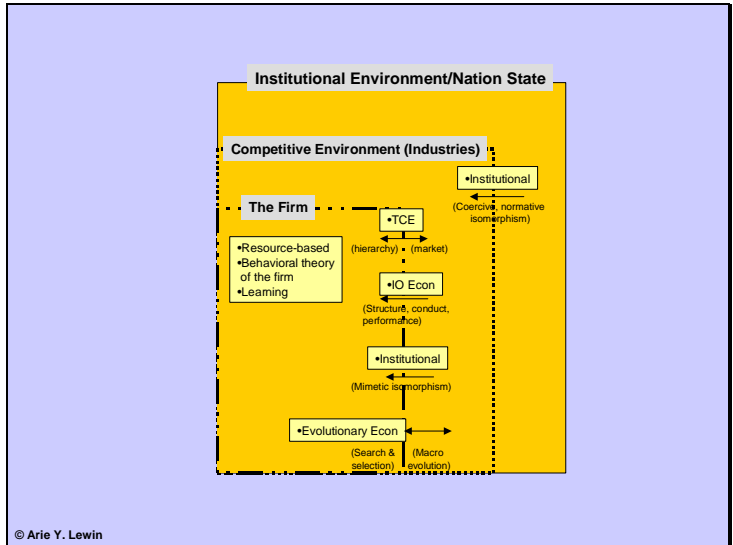
Meso-level Theories

- Transaction Costs Economics – Coase (1937); Williamson (1975; 1985)
 - Organizational knowledge for selecting between markets and hierarchies
- New Institutional Theories – DiMaggio and Powell (1983)
 - Dynamics of knowledge homogeneity: mimetic normative and coercive isomorphism
- Resource dependence – Pfeffer and Salancik (1978)
 - Uncertainty avoidance on critical new knowledge

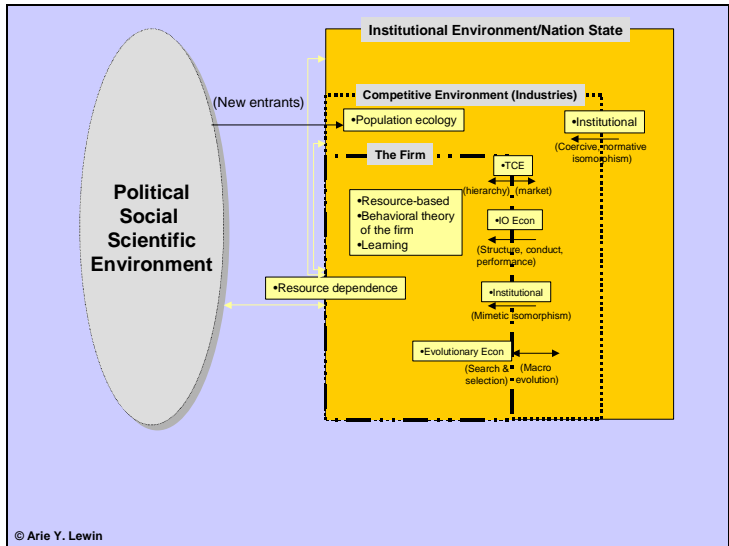
Meso-level Theories

- Evolutionary Economics – Nelson and Winter (1974; 1977; 1982)
 - Knowledge basis of routines
 - Routines for knowledge creation (internal and external Variation-Selection-Retention)
- Collectively these theories inform on interactive processes of knowledge creation and utilization at multi-level of analysis

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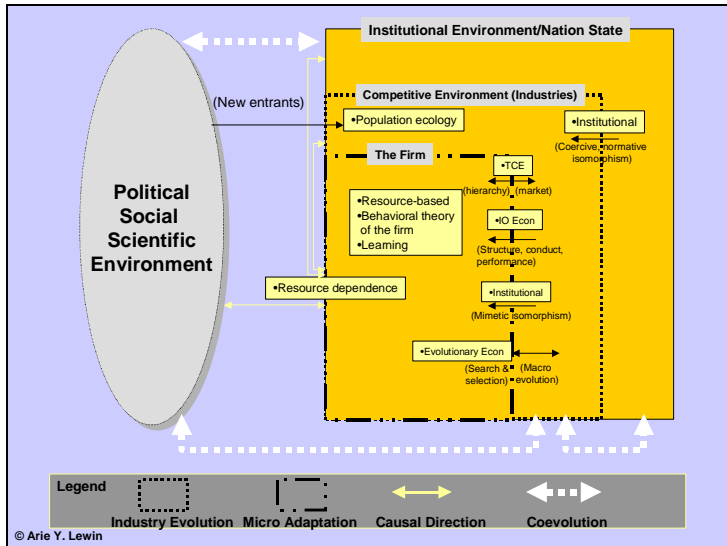
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Exogenous Discontinuities

- Scientific and technological discontinuities (Schumpeter, 1934; Perez, 1983)
 - Acquisition of new knowledge constrained by structural inertia, technological path-dependence and firm absorptive capacity
 - New entrants introduce new organizational forms (population ecology, Hannan and Freeman, 1977, 1984)

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Empirical Challenge: Ceteris Paribus, How Much does Knowledge Explain Performance?

- Econometric estimations of the knowledge production function: strong inferential support
- Case studies on firm capabilities: vast majority of findings explicate sources of structural inertia
- Simulation studies: source of important theoretical insights
- Personal accounts

**Empirical Challenge: Ceteris Paribus,
How Much does Knowledge
Explain Performance?**

However, few studies have empirically linked knowledge to exceptional performance or investigated how knowledge-based advantage is sustained

(McEvily and Chakravarthy, 2002)

Applying Evolutionary Economics to Resolve the Challenge

- **Why Evolutionary Economics?**
 - Bridges theoretical silos
 - Builds on and extends foundations concepts of Behavioral Theory of the firm (March and Simon, 1958; Cyert and March, 1963)
 - Encompasses and extends
 - Resource Based View
 - Resource Dependence Theory
 - Institutional Theory
 - Information-processing Theories

Why Evolutionary Economics?

- Firm modeled as a hierarchy of practiced routines
- Knowledge bases of routines ranges from codified to tacit
- Execution does not require understanding of knowledge base
- Capabilities consist of bundles of routines
- Capabilities and routines change via internal and external VSR processes

Performance Implications of Evolutionary Economics

- Regardless of industry, exceptional performance derives from superior hierarchies of routines
- The configurations of routines and capabilities are context specific.
For example,
 - Absorptive capacity capabilities for assimilating internal and external new knowledge consist of more elaborated bundles of routines in high tech than in low tech industries

Design of Empirical Studies

- Comparative longitudinal studies
 - High tech vs Low tech industries
 - **Low tech**: performance differences due to organizational capabilities
 - **High tech**: performance difference due to technological knowledge creation and utilization, and organization capabilities
- Compare selection rates over time
 - High performance low selection rates < Low performance selection rates
- Control for relevant firm specific characteristics
 - E.g., size, age, brand strength, etc.
- Capture routines quantitatively and qualitatively
 - HP routines > LP routines

Some final thoughts...