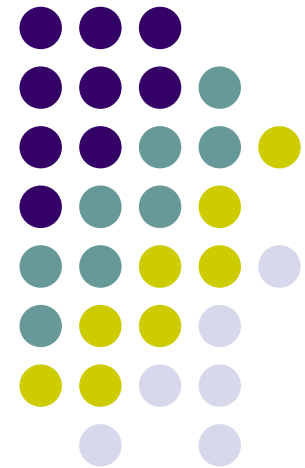
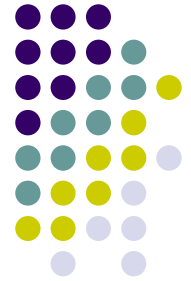


Science & Technology Based Entrepreneurship and Economic Growth

David B. Audretsch



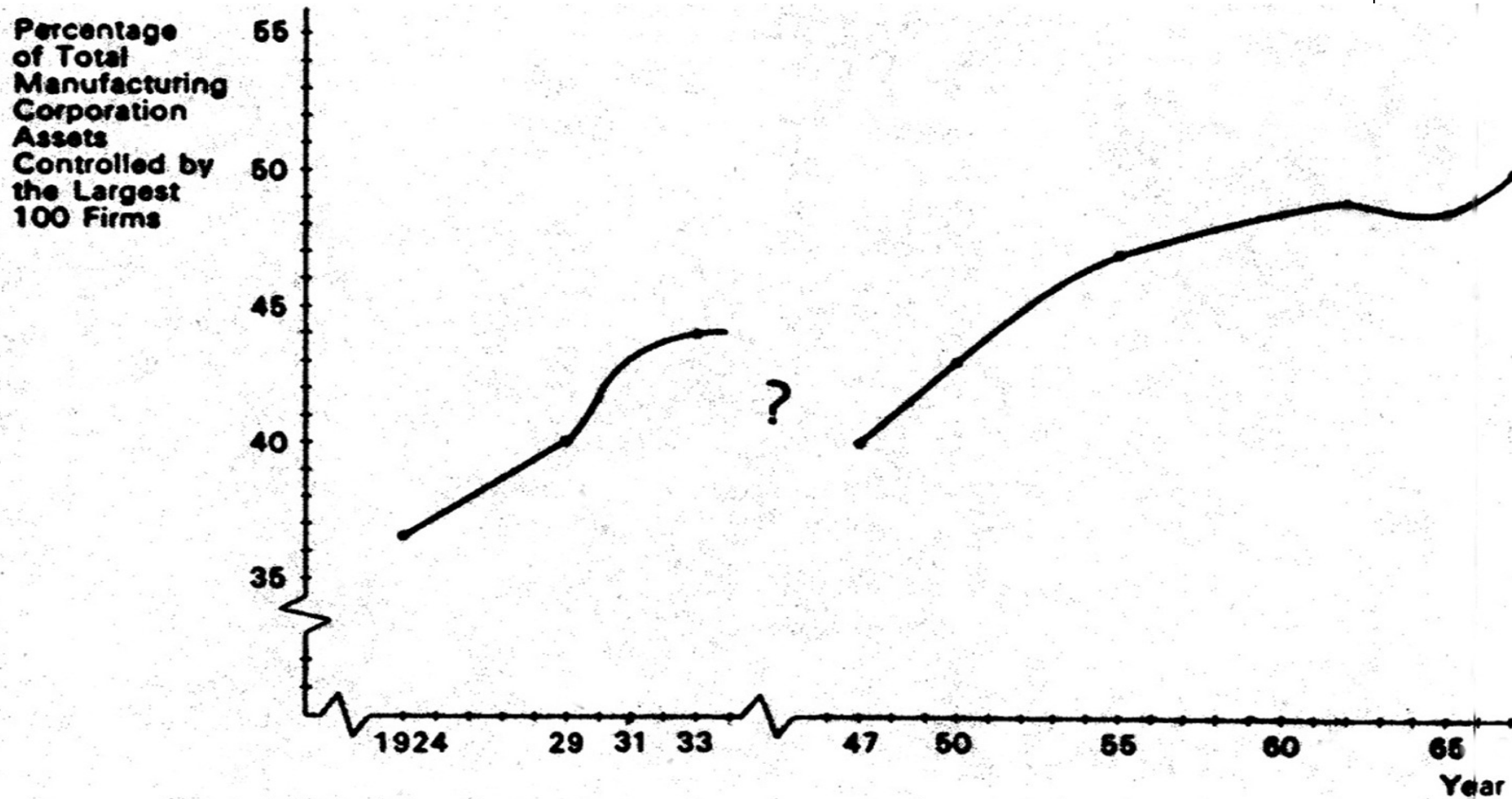
Growth in The Traditional Economy



- Model of the Production Function (Robert Solow)

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

Increased U.S. Concentration in the Managed Economy



The Public Policy Dilemma



- Efficiency vs. Democracy
- Concentration vs. Decentralization

Oliver Williamson, “Economies as an Antitrust Defense: The Welfare Tradeoffs,” 1968

Public Policy Response – Constraining Firms



- Public Ownership – Sweden & France
- Regulation – Germany & The Netherlands
- Antitrust – United States

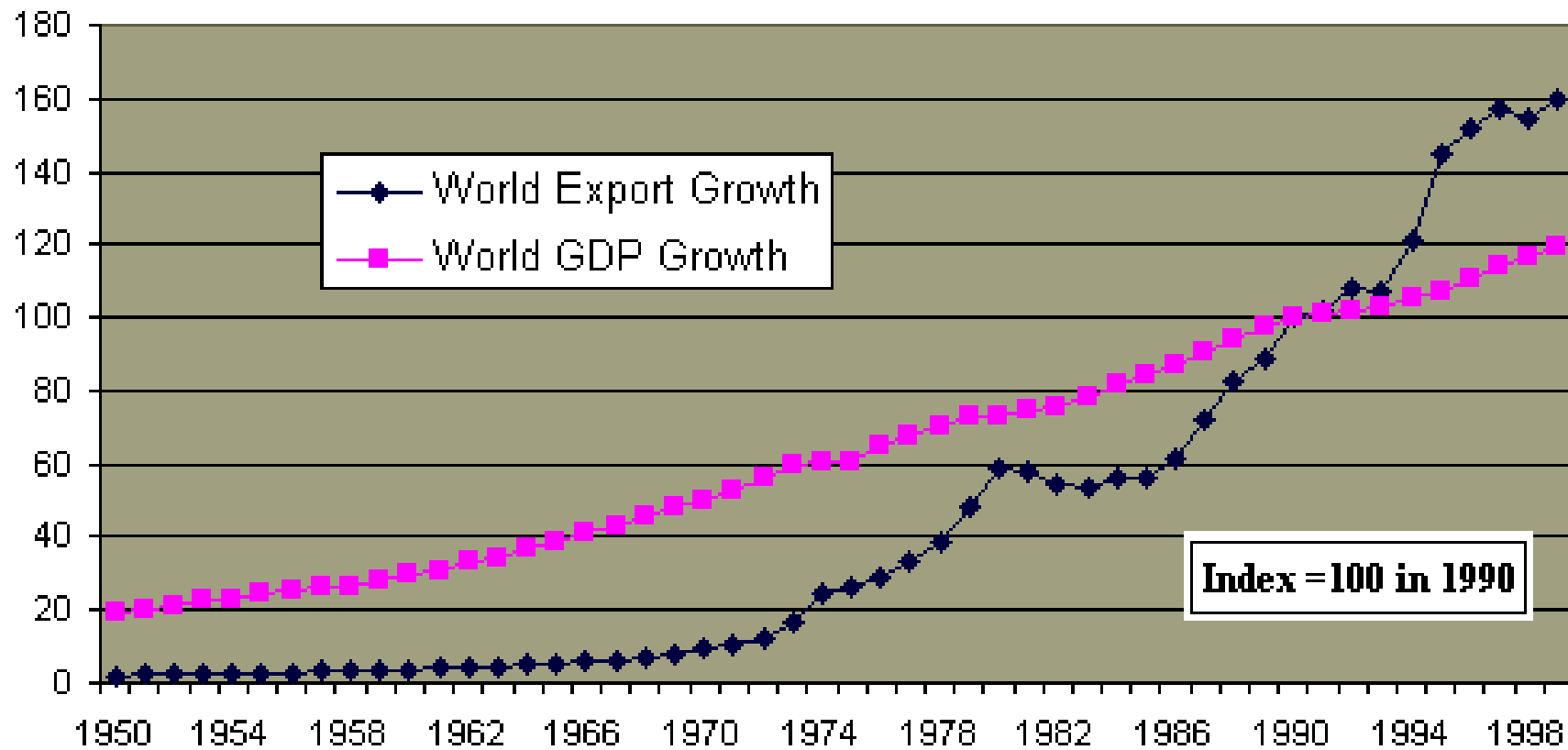
- Entrepreneurship Promotion – Social Goal at an Economic Cost
(The U.S. Small Business Administration)

Globalization



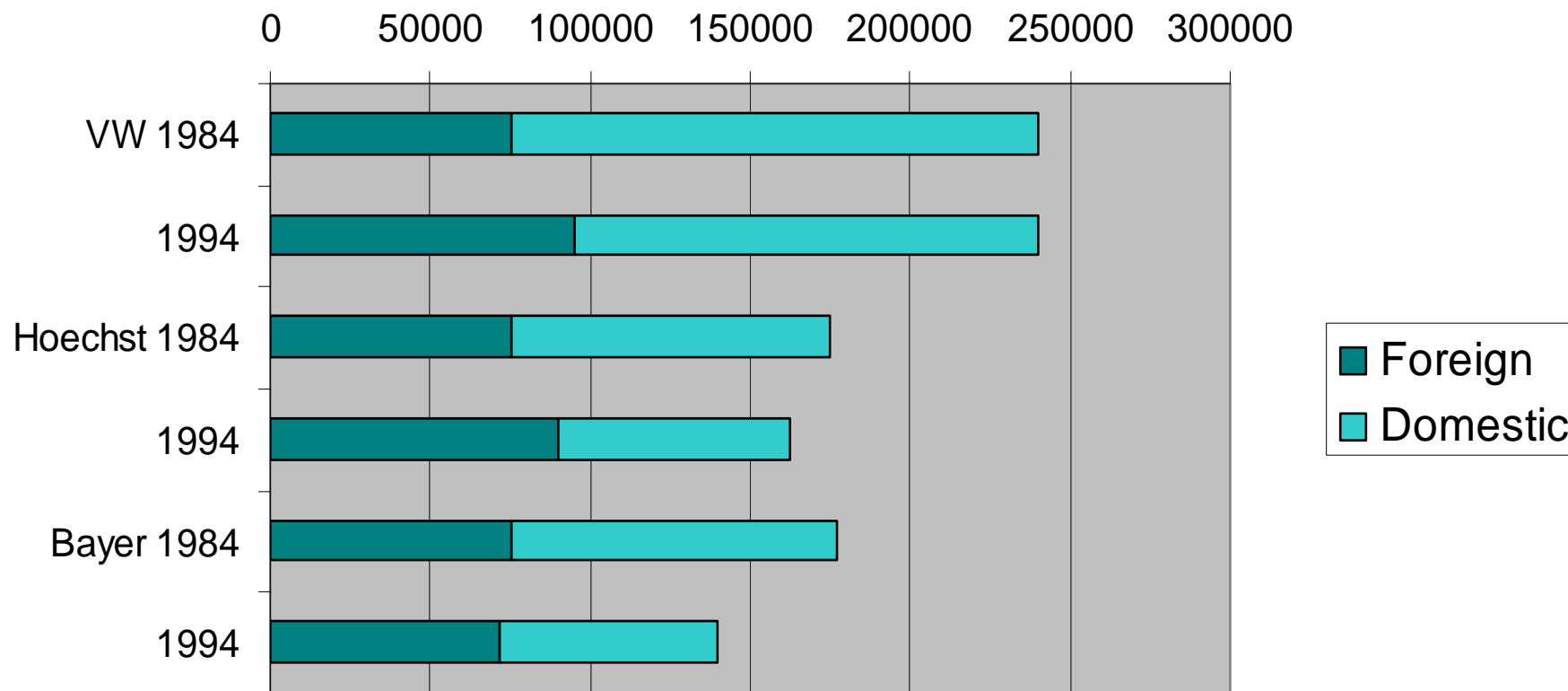
Growth of World Exports and GDP 1950-1999

Source: World Trade Organization





Employment in Large German Firms



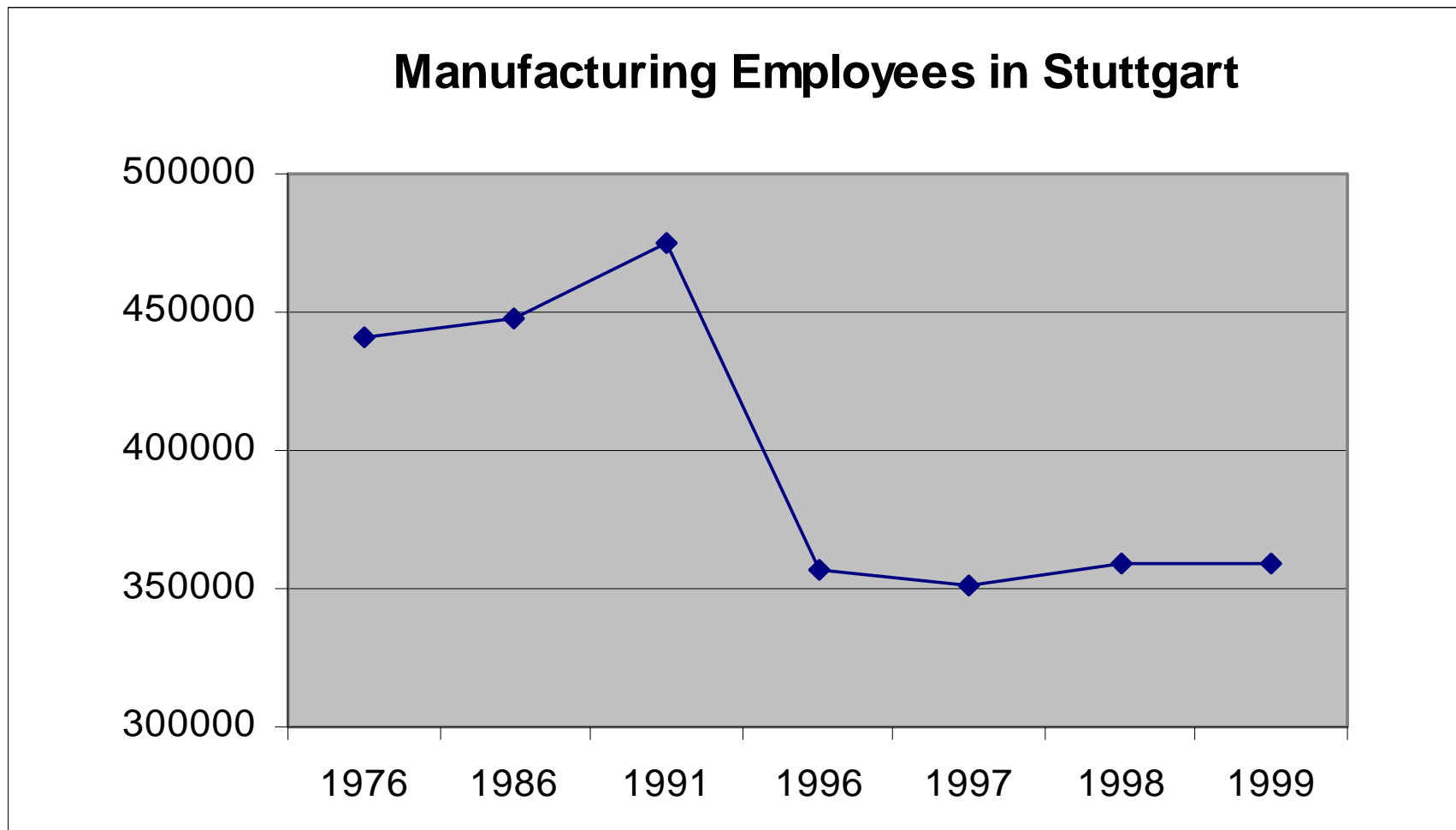
German Industries



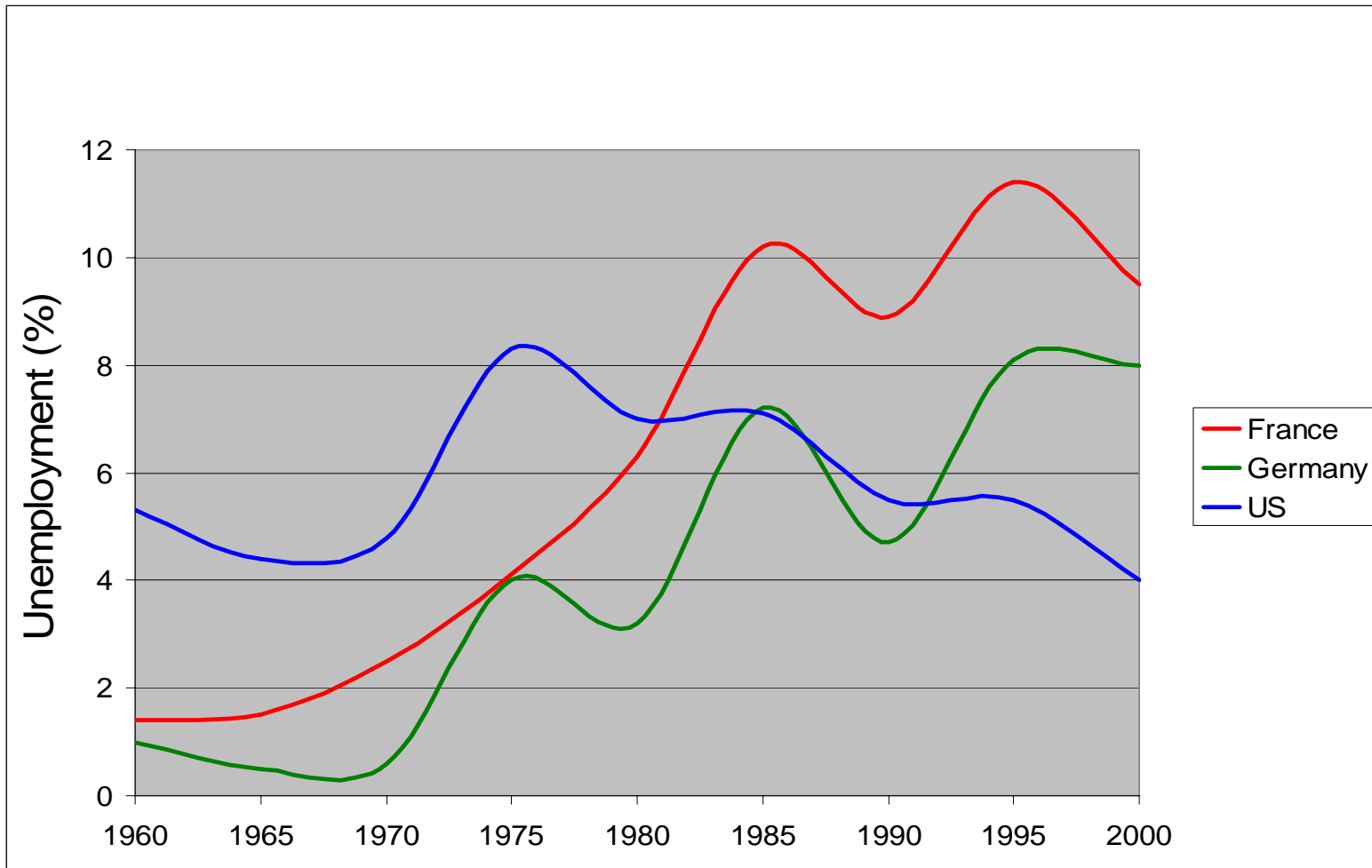
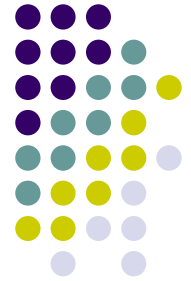
Change in Employment in Germany and Foreign Subsidiaries (1991-1995)

	Mfg.	Chemical	Electrical Eng	Autos	Mechanical Eng	Textiles
Foreign	+189,000	+14,000	-17,000	+30,000	+16,000	-6,000
Domestic	-1,307,000	-80,000	-198,000	-161,000	-217,000	-68,000

Stuttgart Region



Rise in European Unemployment

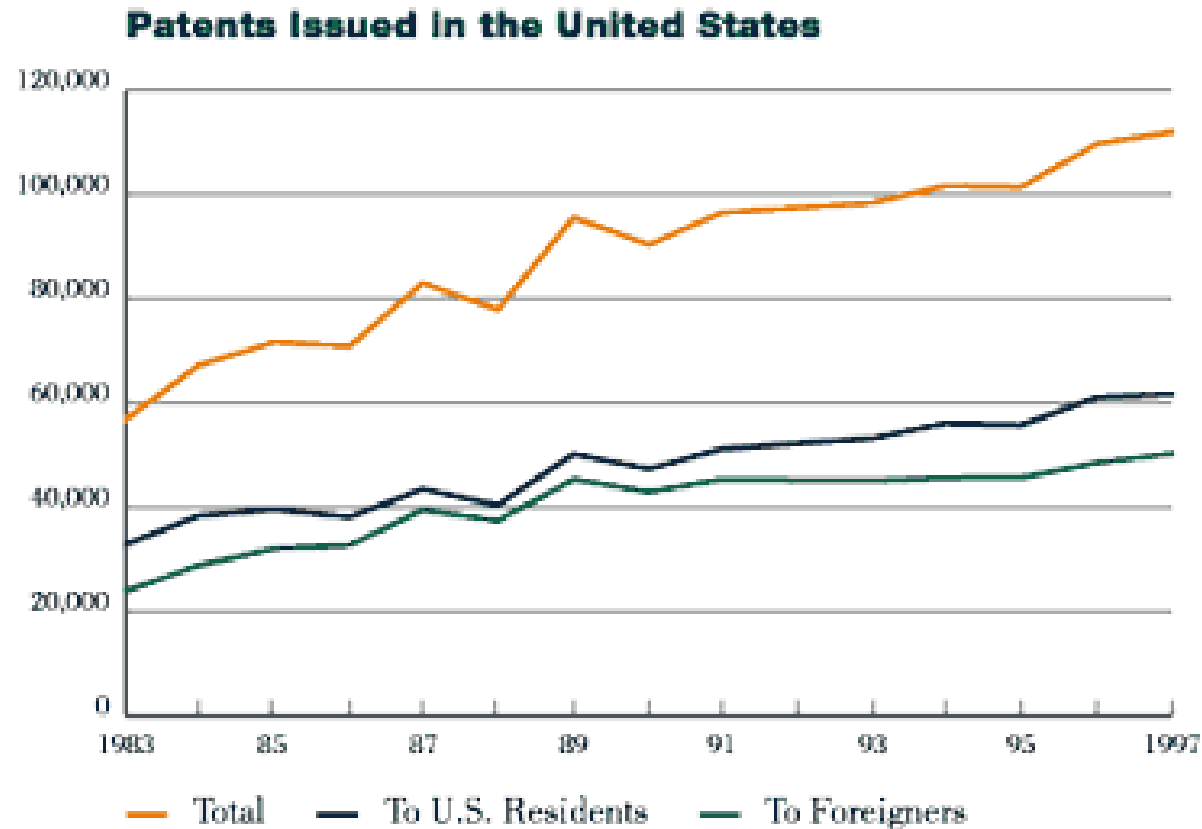


Impact of Globalization



- De-linking Competitiveness of Firms from Competitiveness of *Standort*

Knowledge as Source of Competitiveness





The New Economy

- Endogenous Growth Model
(Paul Romer)

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

Implications of Knowledge-Based Economy



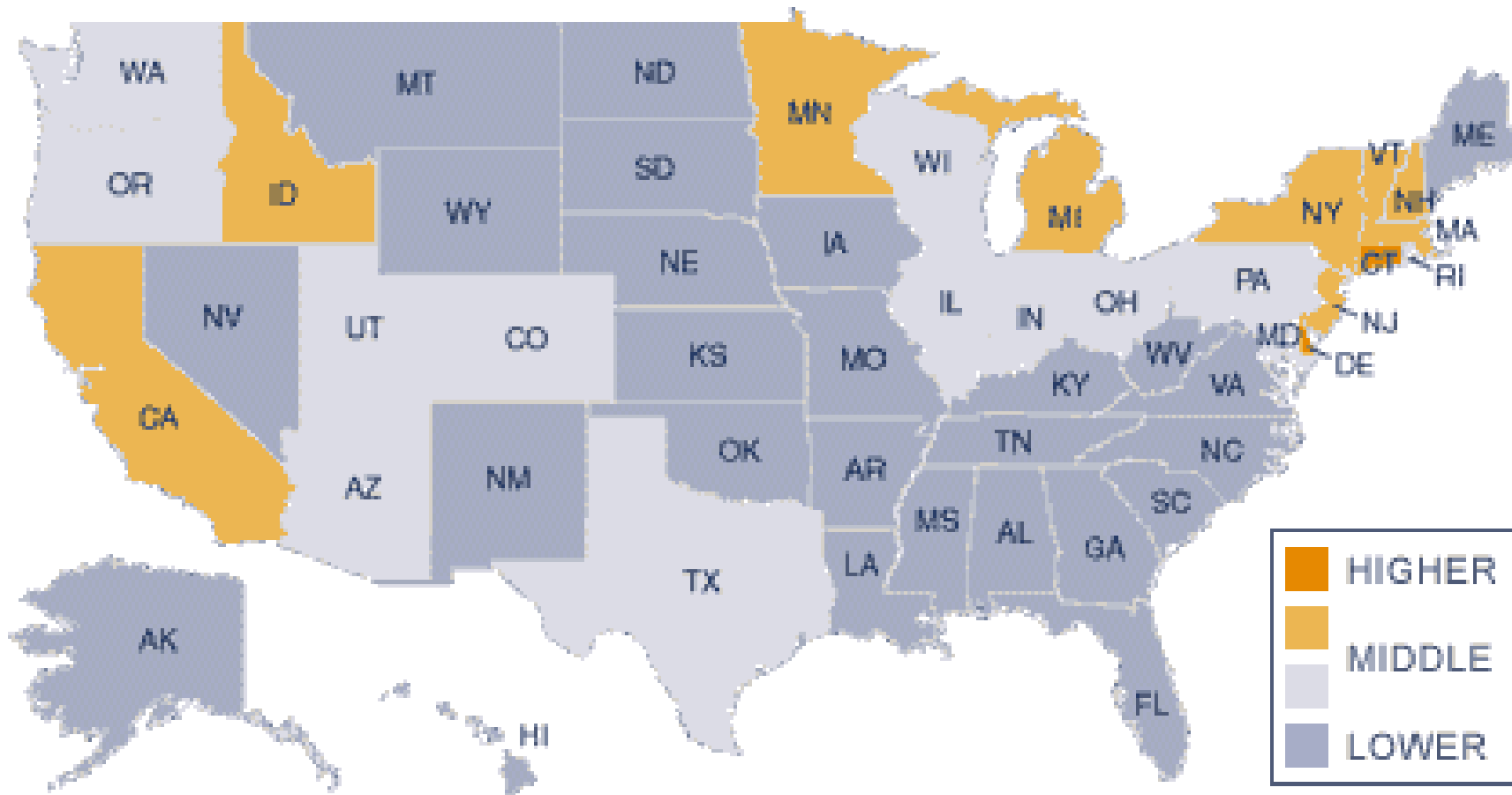
- Localization of Knowledge
- Commercialization of Knowledge -- The Knowledge Filter & Entrepreneurship as a Spillover Conduit

Localization of Knowledge



- Knowledge vs. Information
- The Paradox of Globalization
- The Economic Value of Geographic Proximity
- Emergence of Local Knowledge Clusters & Agglomerations – Silicon Valley, Route 128, Munich,

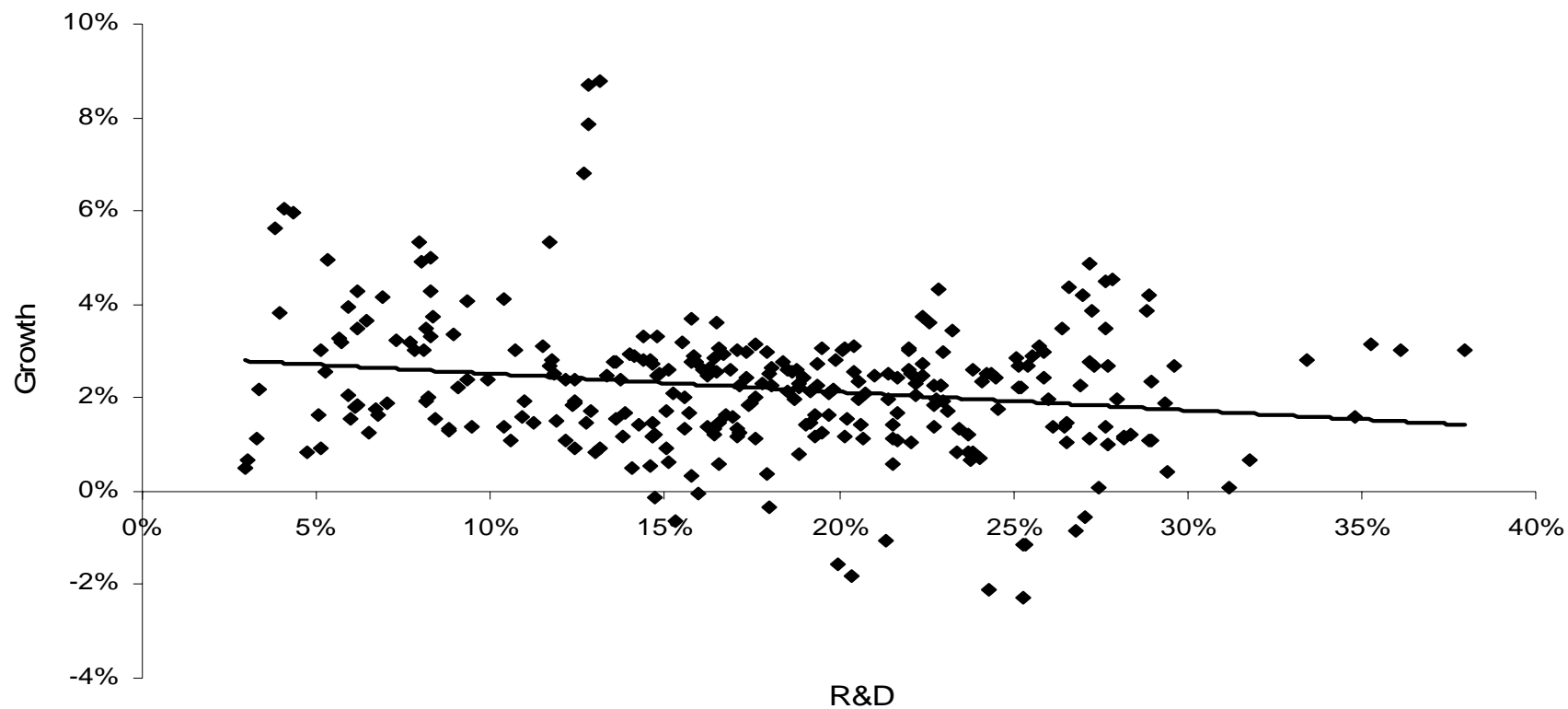
Regional Clusters & Agglomerations -- Patents



The European Paradox



Correlation between Growth and R&D



Source: Acs, Audretsch, Braunerhjelm and Carlsson, 2005

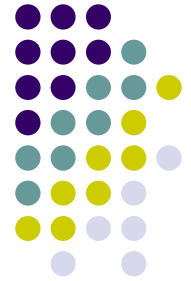
Why Is Knowledge Different?



- Hyper-Uncertainty
- Asymmetries
- High Transactions Costs

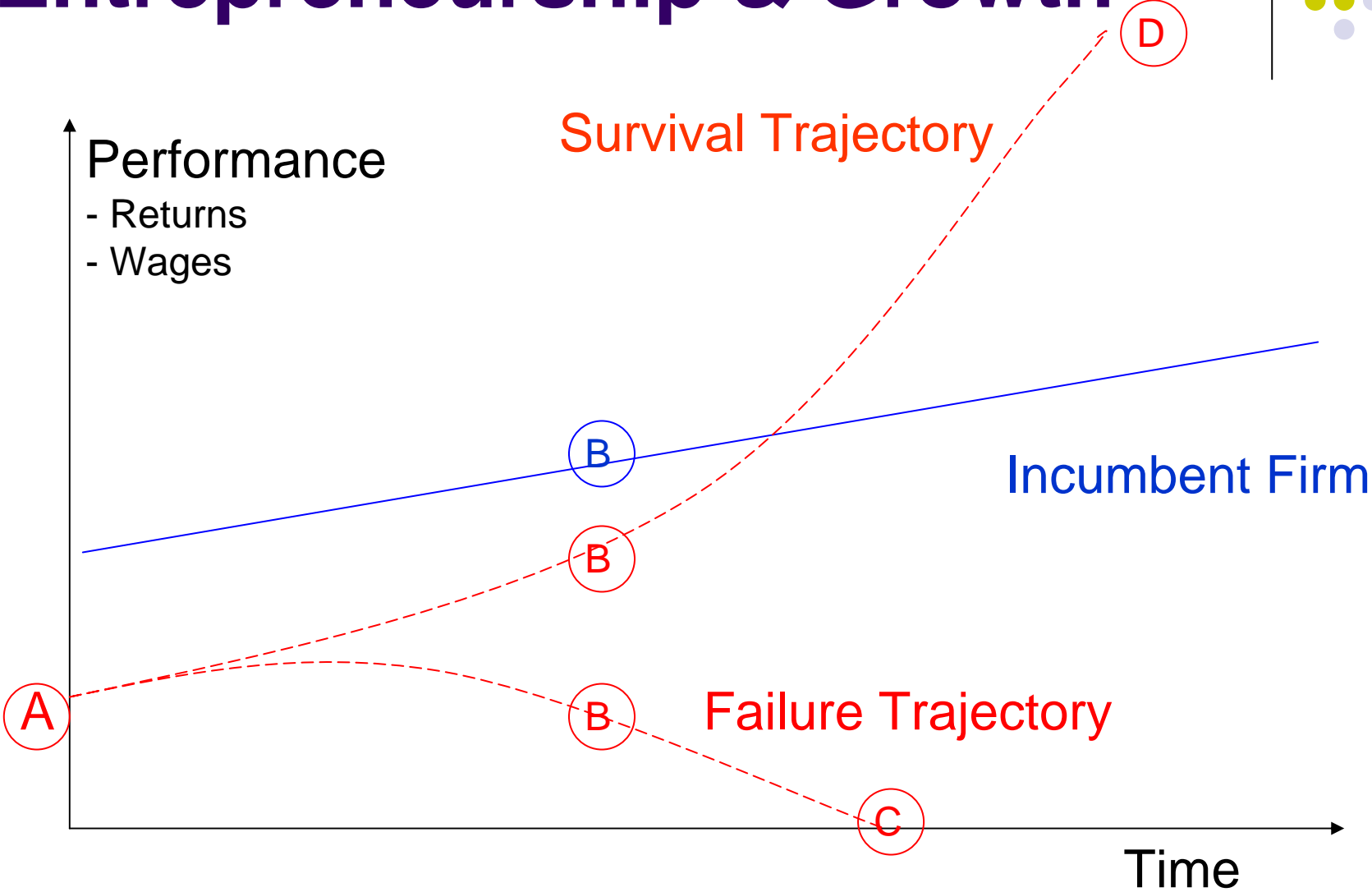
- Spillovers not Automatic
- Results in Divergences in Valuation of Ideas

Emergence of the Entrepreneurial Economy



- Entrepreneurship as Conduit of Knowledge Spillovers & Commercialization
- The Missing Link in Economic Growth

Entrepreneurship & Growth



The Dual Roles of Knowledge & Entrepreneurship Capital



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



Emergence of Entrepreneurship Policy

- The Strategic Management of Places--
Standortpolitik
- The EU -- Lisbon Mandate of 2000
- „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” (Romano Prodi, 2002)

Entrepreneurship Policy



Managed Economy

- Constraining
- Centralized at National Level
- Public Ownership, Regulation

Entrepreneurial Economy

- Enabling
- Decentralized at Local Level
- Creation & Commercialization of Knowledge

Entrepreneurship Policies



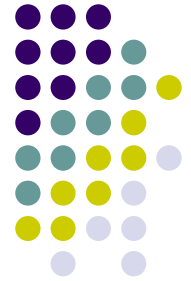
- Universities as Engines of Economic Development
- Technology Transfer & Commercialization
- Private-Public Partnerships



Examples from the U.S.

- Research Triangle, North Carolina
- The Hope Scholarship Program – Georgia
- The 21st Century Fund – Indiana
- Austin, Texas
- Madison, Wisconsin
- San Diego

The U.S. Small Business Innovation (SBIR) Program



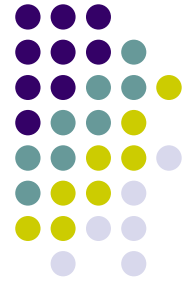
- Established by Congress in 1982 as a Response to U.S. *Competitiveness Crisis*
- Federal Agencies (Defense, NIH, NASA, Education, Energy...) allocate 2.5% of budget for innovative small business
- \$3.0 billion in 2005
- Goal – Stimulate Innovation & Entrepreneurship

SBIR Impact



- SBIR Firms Have Stronger Performance –
Examples: Microsoft, Apple, Intel
- Create Entrepreneurial Career Paths of
Scientists & Engineers
- Create Entrepreneurial Culture

The European Entrepreneurial Policy Response



Creating an Entrepreneurial Europe: The Five Stages

- Denial
- Recognition
- Envy
- Consensus
- Attainment



Phase One – Denial (1980s)

- Higher Growth, Lower Unemployment in Europe
- Skepticism towards Vulture Capitalism Model of Silicon Valley, Appropriation of Investments
- Rejection of “Shareholder Value”, “Venture Capital”, “University Commercialization”
- J.-J. Schreiber

Phase Two – Recognition (early 1990s)



- Link between High Tech Entrepreneurship & Growth
- Law of Comparative Advantage
- Assumed Low Cost of Diffusion
- European Emphasis on Diffusion Policies
- European *Mittelstand* vs Entrepreneurship

The *Mittelstand* Tradition vs. Entrepreneurship Model



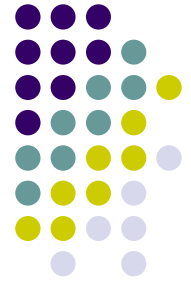
- ***Mittelstand* Tradition**

- Traditional Sectors
- Family Tradition
- Low R&D
- Low Human Capital
- Low Wages
- Stability (Low Startup & Failure Rates)
- Traditional Sources of Finance
- Low Growth

- **Entrepreneurship Model**

- New Emerging Sectors
- High R&D
- High Human Capital
- High Wages
- Turbulence (High Startup & Failure Rates)
- New Sources of Finance
- High Growth

Phase Three – Envy (mid 1990s)



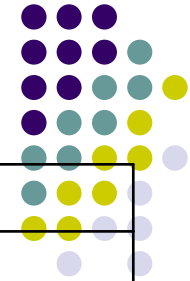
- Globalization in Europe like U.S.
- Loss of Competitiveness in Traditional Industries
- Low Growth, High Unemployment
- Recognition of Link between Entrepreneurship & Growth



Phase Four -- Consensus

- The Lisbon European Council & The Lisbon Mandate
- The Gothenbourg Council
- Global Knowledge Leader by 2020
- The Global Entrepreneurship Leader by 2020
- „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” (Romano Prodi, 2002)

New Entrepreneurship Policy



SMEs AGENDA		
Problem	Program	Country
1. Access to Loan Finance	Loan Guarantee Scheme	UK; USA; Canada; France; Netherlands
2. Access to Equity Capital	Enterprise Investment Scheme	UK
3. Access to Markets	Europartenariat	EU
4. Administrative Burdens	Units established within government to seek to minimize administrative burdens on smaller firms	Netherlands Portugal, UK
5. Science Parks	Property based developments adjacent to Universities	UK, France, Italy and Sweden
6. Managed Workspace	Property provision to assist new and very small firms	World-wide
7. Stimulating Innovation and R&D in small firms	Small Business Innovation Research Program	USA
8. Stimulating Training in small firms	Japan Small Business Corporation (JSBC)	Japan

Source: Storey, *Handbook of Entrepreneurship Research*, 2003

New Entrepreneurship Policy



GOVERNMENTS AGENDA		
1. Entrepreneurial Skills	Small Business Development Corporations (SBDCs)	USA
2. Entrepreneurial Awareness	Entrepreneurship Education	Australia, Netherlands, but leading area was Atlantic Canada
3. Special Groups	Law 44	Southern Italy

Source: Storey, *Handbook of Entrepreneurship Research*, 2003

Phase Five – Attainment?





What astonishes me in the United States is not so much the marvelous grandeur of some undertakings as the innumerable multitude of small ones.

Alexis de Toqueville, 1835