

Entrepreneurship, Innovation & Economic Growth



David B. Audretsch

www.davidaudretsch.com

Mandate for Entrepreneurship to Promote Innovation & Economic Growth

□ The EU Lisbon Proclamation

“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

What Determines Growth?

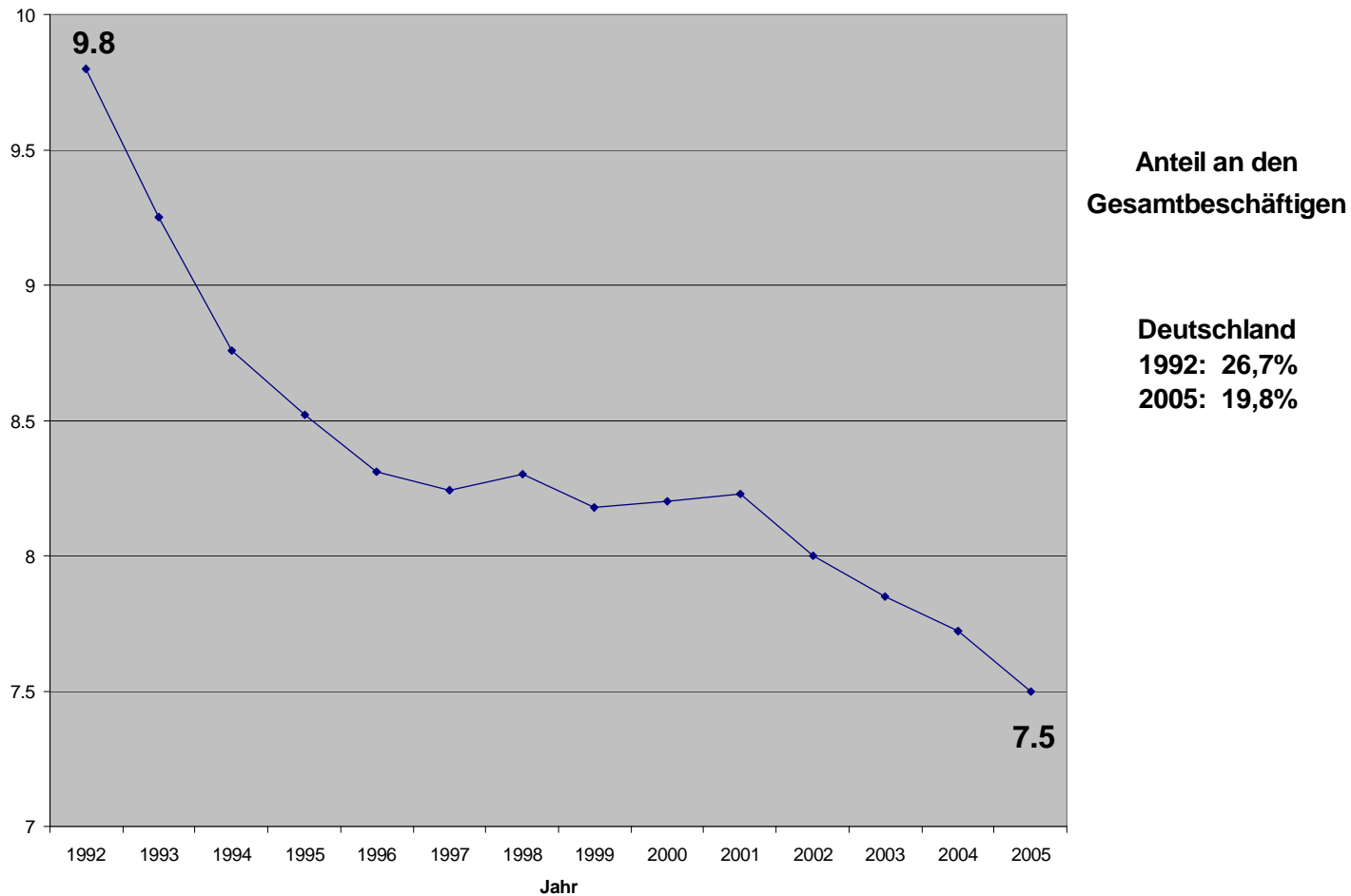
The Solow Model

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

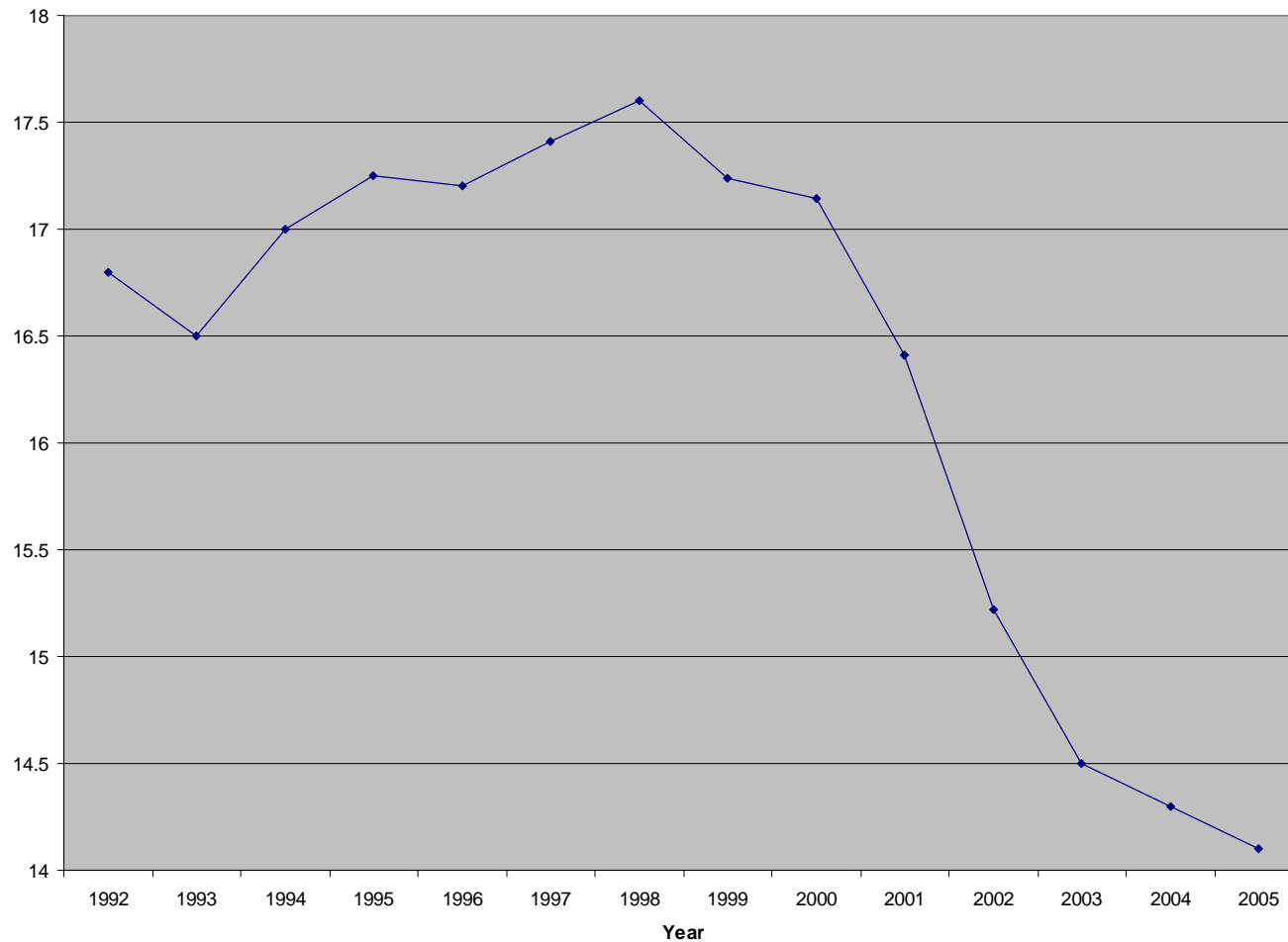
Purpose

- Link Entrepreneurship to Economic Growth
- Knowledge Spillover Theory of Entrepreneurship
- Public Policy – Interpret emergence of entrepreneurship policy as a *bona fide* economic growth policy

German Manufacturing Employment



U.S. Manufacturing Employment



The Romer Model

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



The European Paradox

“Why have European countries rich in knowledge exhibited such low growth rates?”

Romano Prodi
European Union

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, 1978

Romer Model Limitations

- *Empirical Paradox* – Why have countries rich in knowledge (high R&D & Patents) yielded such low growth rates?
- *Theoretical* – Assumes knowledge automatically spills over for commercialization

How is Knowledge Different?

- Non-excludable & non-exhaustive
- Hyper uncertainty, asymmetries & transactions cost
- *The Knowledge Filter* impedes investments in knowledge from spilling over and being commercialized

Endogenous Entrepreneurship

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

Knowledge Spillover

Theory of Entrepreneurship

- Entrepreneurship will be greater in the presence of higher investments in new knowledge, *ceteris paribus*. Entrepreneurial activity is an endogenous response to higher investments in new knowledge, reflecting greater entrepreneurial opportunities generated by knowledge investments.

Why Unique and Insightful?

□ Prevailing Innovation Theories

- firm exogenous, investment in knowledge to endogenously innovate

□ Knowledge Spillover Theory of Entrepreneurship

- knowledge exogenous and embodied in workers, new firm endogenously created in effort to appropriate value of knowledge endowment

Localization Hypothesis

- Knowledge spillover entrepreneurship will tend to be spatially located within close geographic proximity to the source of knowledge actually producing that knowledge. Thus, in order to access spillovers, new firm startups will tend to locate close to knowledge sources.

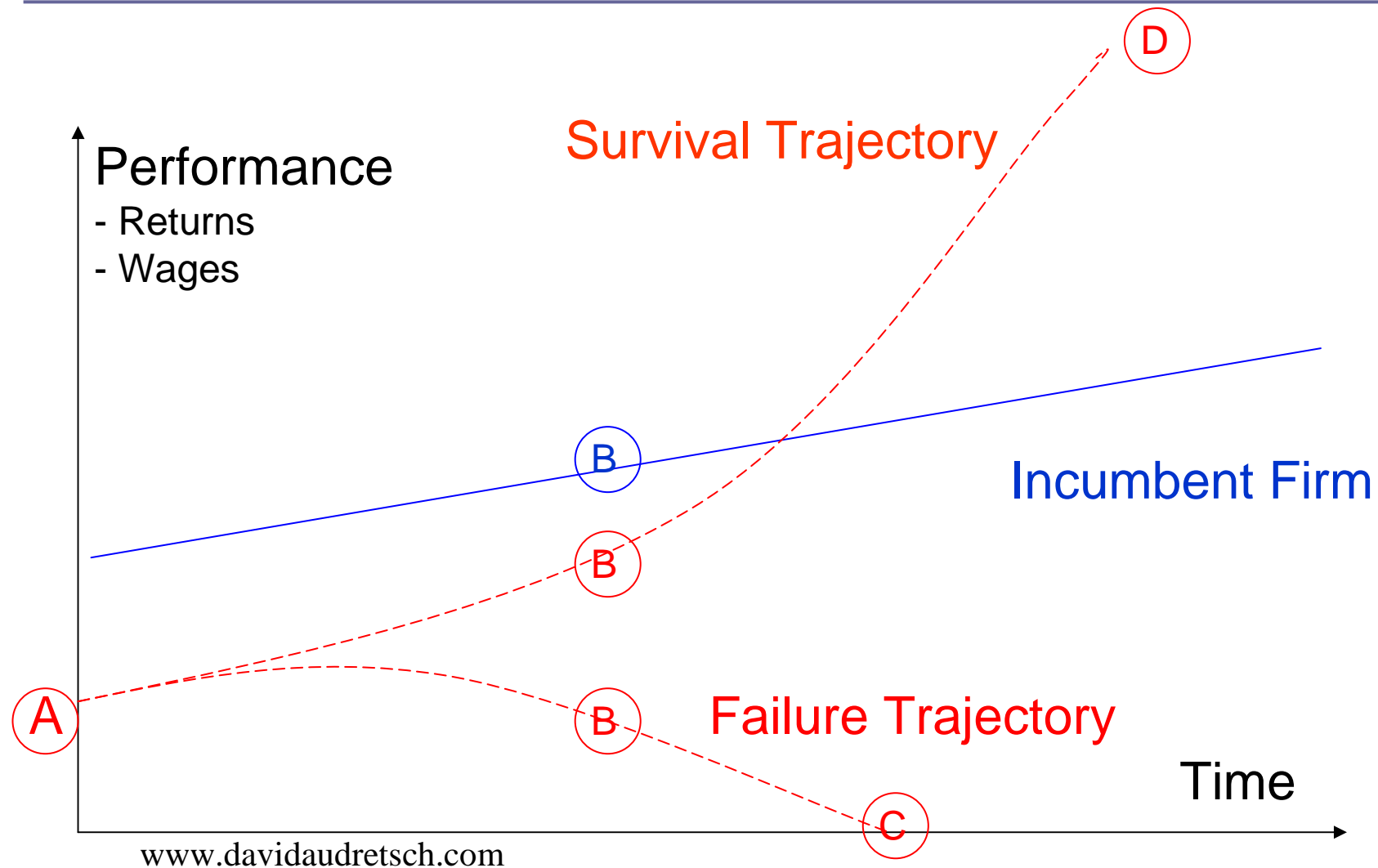
Economic Growth Hypothesis

- $Q_i = h(t)f (C_i, L_i, K_i, E_i)$
 - *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 Dynamics: Stylized Facts

- 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

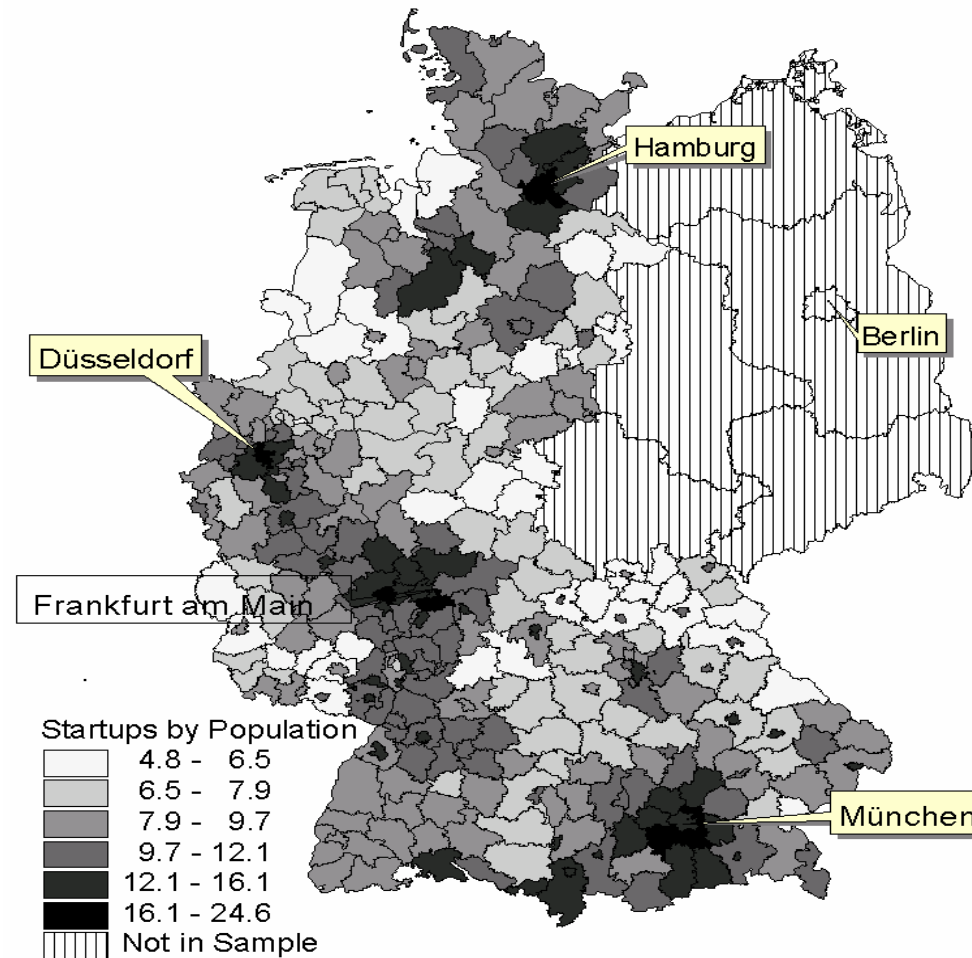
Entrepreneurship & Growth



Entrepreneurship Capital's Role

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

Entrepreneurship in German Regions



Estimation of Regional Labor Productivity

Table 4: Results of Estimation of the Model of Labor Productivity in German Regions

	(1)	(2)	(3)	(4)	(5)
<i>Constant</i>	1.888***	-2.175***	-1.645***	-1.730***	-1.299***
	(-19.235)	(-16.683)	(-5.566)	(-6.060)	(-6.060)
<i>Capital Intensity</i>	0.332***	0.283***	0.283***	0.296***	0.293***
	(6.814)	(5.535)	(5.551)	(5.747)	(5.807)
<i>Knowledge</i>		0.035***	0.030***	0.030***	0.021**
		(3.673)	(3.028)	(3.005)	(2.032)
<i>Entrepreneurship</i>			0.107**		
			(1.993)		
<i>High-Tech Entrepreneurship</i>				0.044*	
				(1.747)	
<i>ICT Entrepreneurship</i>					0.102***
					(3.203)
R^2	0.125	0.169	0.179	0.177	0.195

Estimating Entrepreneurship and Economic Performance

	<i>Dependent Variable: Regional Output</i>			
<i>Constant</i>	1.0003*** (3.00)	0.5316* (1.73)	0.645* (1.94)	1.0061*** (2.79)
<i>Capital</i>	0.2001 (7.07)	0.2022*** (7.69)	0.2069*** (7.76)	0.1923*** (6.52)
<i>Labor</i>	0.7045*** (18.54)	0.6854*** (20.53)	0.6835*** (20.06)	0.7075*** (17.94)
<i>Knowledge</i>	0.0244** (2.29)	0.0200* (1.73)	0.0246** (2.13)	0.0334*** (3.27)
<i>General Entrepreneurship</i>	0.5230*** (6.84)			
<i>High Tech Entrepreneurship</i>		.2496*** (6.38)		
<i>ICT Entrepreneurship</i>			.2767*** (5.85)	
<i>Low Tech Entrepreneurship</i>				.5078*** (6.33)
<i>R2</i>	.9336	.9453	.9402	.9326

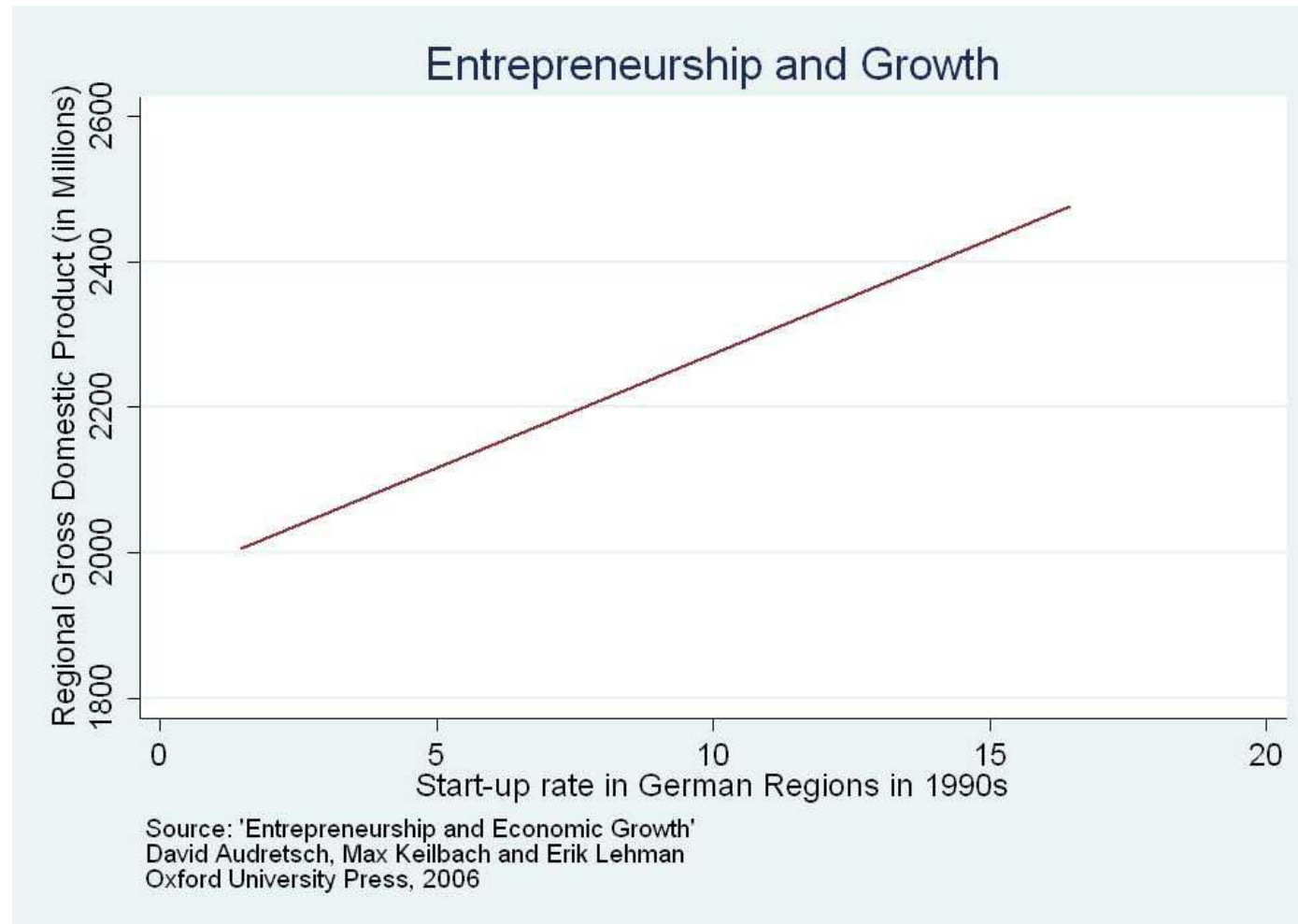
Knowledge Spillover Theory Testing

3SLS Estimation

Dependent Variable: *Entrepreneurship*

	<i>General</i>	<i>High Tech</i>	<i>ICT</i>	<i>Low Tech</i>
<i>Constant</i>	-5.9748*** (-22.86)	-9.7557*** (-25.28)	-8.6529*** (-24.13)	-6.1225*** (-22.32)
<i>Growth</i>	0.2765* (1.81)	0.7999*** (3.51)	0.6481*** (3.05)	0.2061 (1.27)
<i>Investment</i>	-0.0034*** (-4.28)	-0.0049*** (-4.24)	-0.0047*** (-4.33)	-0.0031*** (-3.78)
<i>Unemployment</i>	0.0010 (0.18)	-0.0320*** (-4.04)	-0.0277*** (-3.72)	0.0064 (1.15)
<i>Agglomeration</i>	0.00003 (1.05)	0.0002*** (3.98)	0.0001*** (3.38)	0.00001 (0.40)
<i>Standard Attractiveness</i>	0.0648 (0.65)	-0.0617 (-0.42)	0.1759 (1.27)	0.0597 (0.57)
<i>Social Diversity</i>	0.0495 (0.35)	1.0475*** (4.90)	0.4013** (2.03)	-0.0508 (-0.34)
<i>Policy</i>	-0.00003 (-0.83)	-0.00004 (-0.83)	-0.0001** (-2.52)	-0.00002 (-0.62)
<i>Taxes</i>	0.0007*** (4.30)	0.0008*** (3.78)	0.0008*** (4.05)	0.0007*** (4.02)
<i>Knowledge</i>	0.3293 (1.59)	1.0435*** (3.45)	0.7908*** (2.77)	0.1581 (0.73)
<i>Human Capital Diversity</i>	0.1264 (0.44)	0.5968 (1.40)	-0.4222 (-1.06)	0.0997 (0.33)
<i>Industry Diversity</i>	0.7544*** (4.98)	0.7385*** (3.36)	0.8147*** (3.94)	0.8016*** (5.02)
<i>R</i> ²	0.3024	0.5248	0.4253	0.2423

Entrepreneurship and Growth



Schumpeter Was Wrong

- Entrepreneurship *as Creative Construction*
- The EU -- Lisbon Proclamation 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

Conclusions

- Knowledge Spillover Theory of Entrepreneurship
- Entrepreneurship as Missing Link for Innovation & Economic Growth – Penetrates Knowledge Filter
- Entrepreneurship Policy to Promote Innovation