



Intangible Investment and Economic Growth across Countries - *Main Conclusions* -

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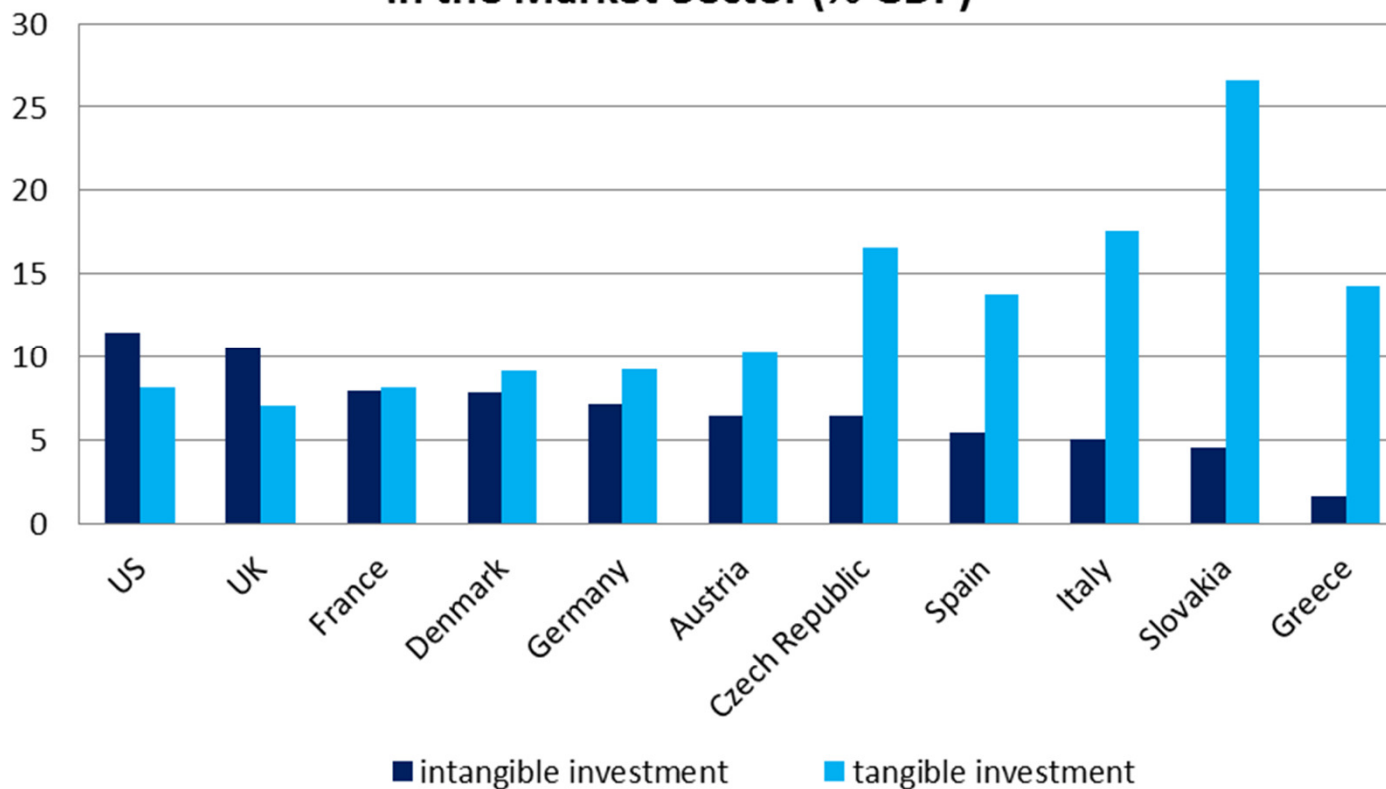
A new cottage industry?

- **The pioneers:** US(Corrado, Hulten, Sichel). UK (Morrano, Haskel, Wallis) and Japan (Fukao, Miyagawa, Mukai, Shinoda, Tonoge)
- **Earlier followers:** NL (van Rooyen, van den Bergen, Tanriseven). FI (Jalava, Aulin-Ahmavaara, Alanen). FR/DE/IT/ES (Hao, Manole, van Ark). CA (Baldwin, Gu, Lafrance, Macdonald). AUS (OECD)
- **New generation:** COINVEST, INNODRIVE, etc.



The US and UK spend more on intangible than on tangible capital

Intangible and Tangible Investment in the Market Sector (% GDP)

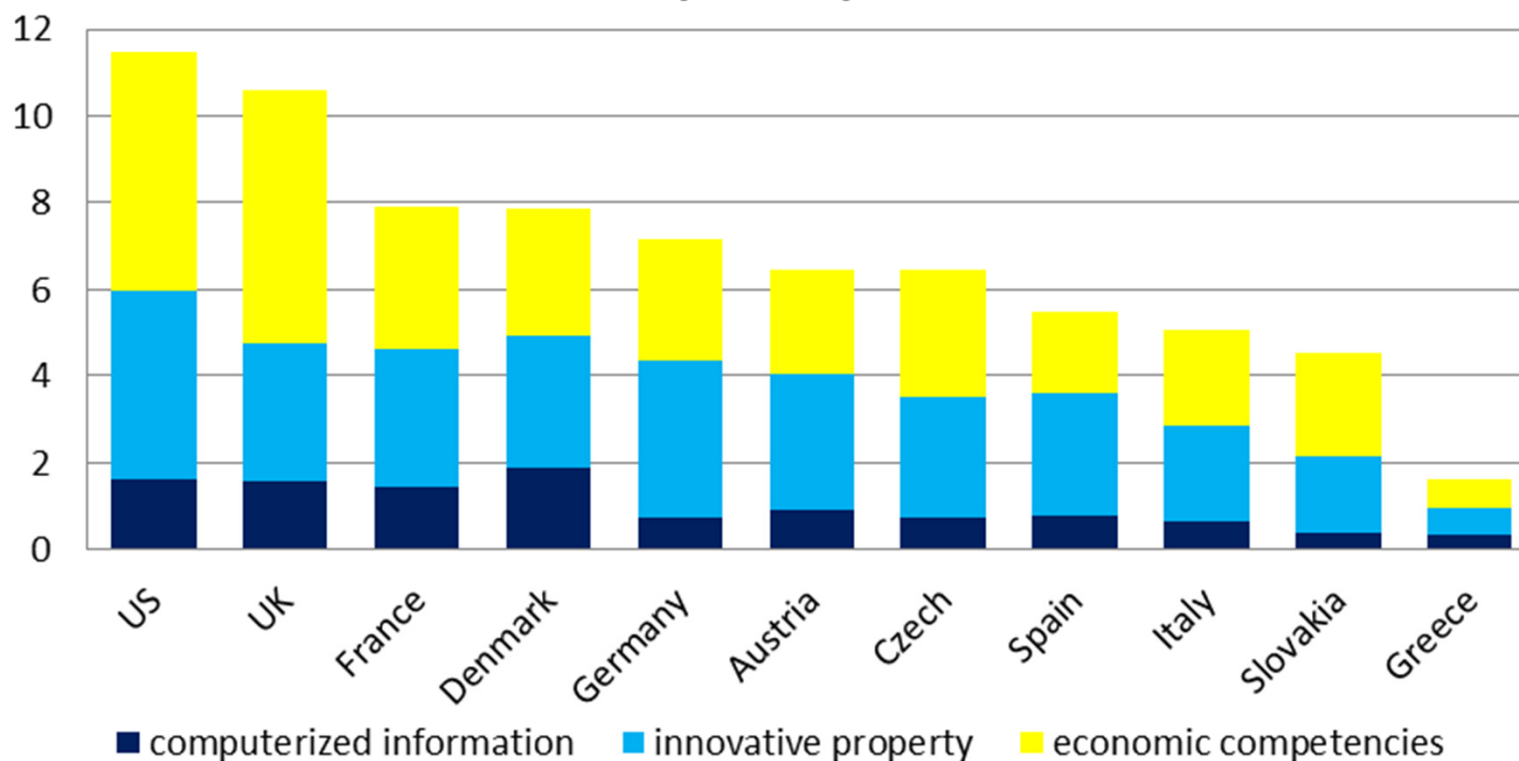


Source: COINVEST, TCB, CHS (2009) for the US and Marrano *et al.* (2009) for the UK.



Investments in intangible capital are large relative to total GDP

Intangible Investment in the Market Sector (% GDP)

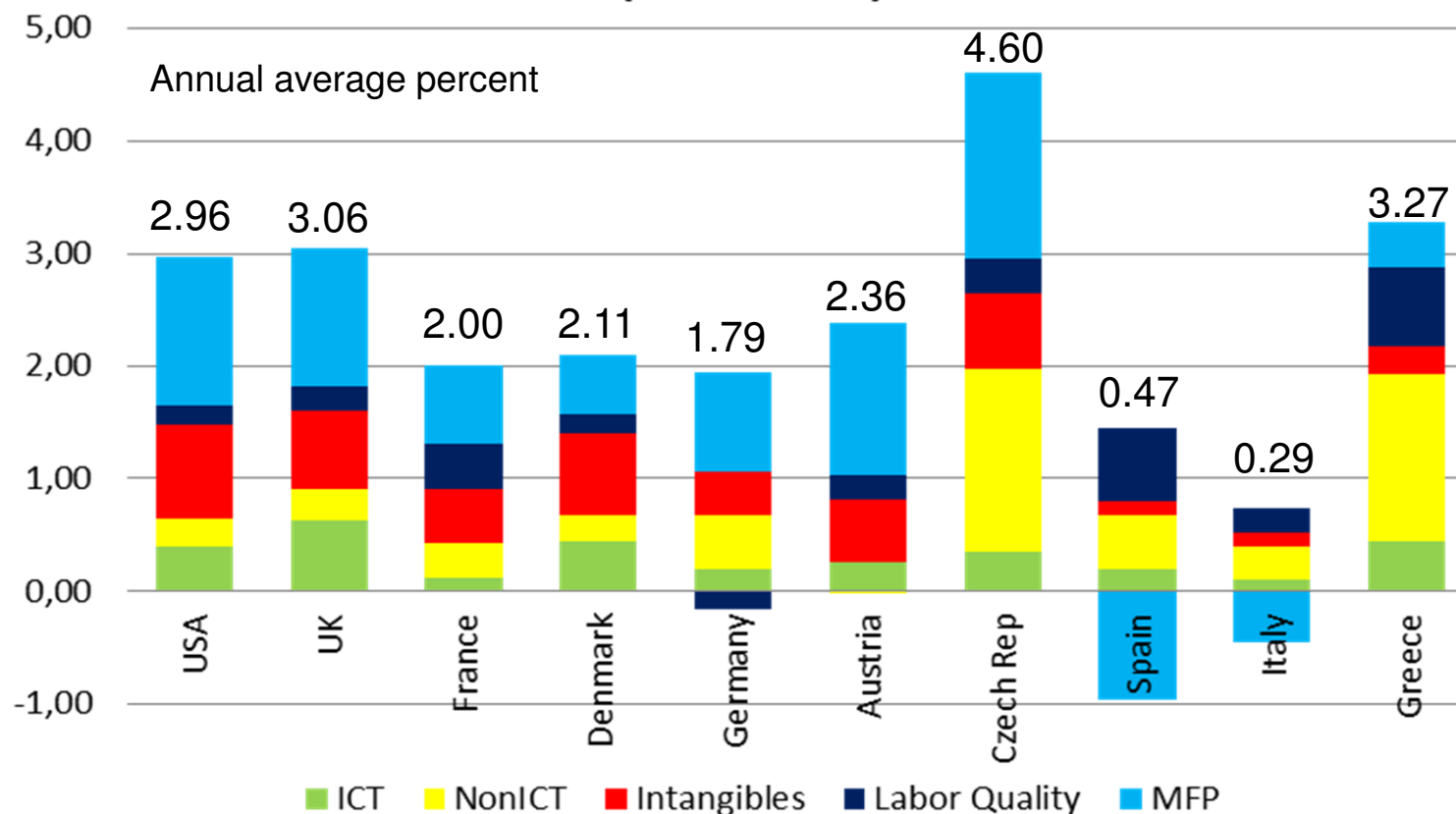


Source: COINVEST, TCB, CHS (2009) for the US and Marrano *et al.* (2009) for the UK.



Contribution of intangibles to LP growth ranges from about 10 to 40 percent

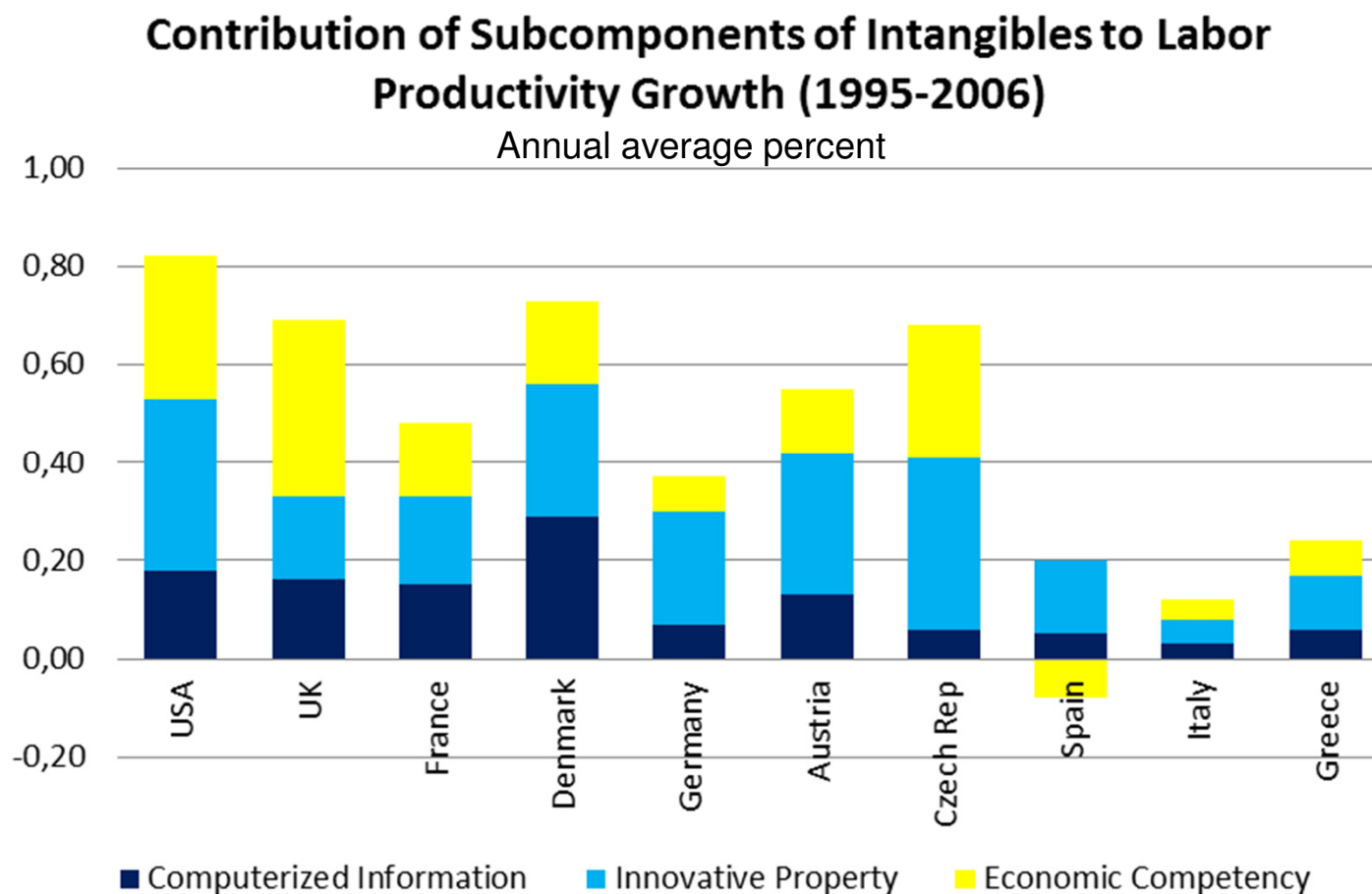
Contribution of Inputs to Labor Productivity Growth (1995-2006)



Source: COINVEST, TCB, CHS (2009) for the US and Marrano *et al.* (2009) for the UK.



Largest differences are due to economic competencies



Source: COINVEST, TCB, CHS (2009) for the US and Marrano *et al.* (2009) for the UK.



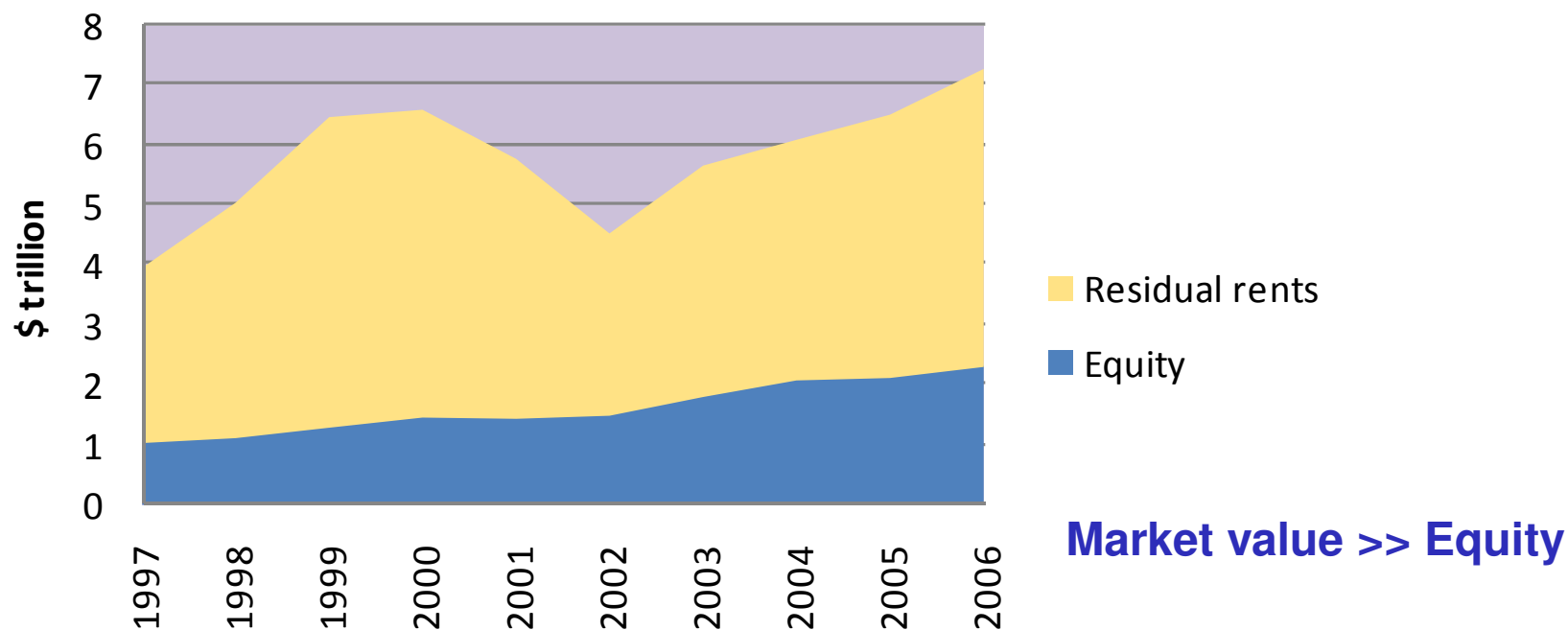
Correlation between Intangibles and other Variables

- Wealthier countries invest greater proportions in intangible assets
- Higher intangible investments (% GDP) is associated with greater labor productivity
- Mature financial market is associated with heavy investment in intangible assets
- Government policy is associated with intangible investment
- Openness is negatively correlated with intangible investment



So where is the intangible capital within the firm?

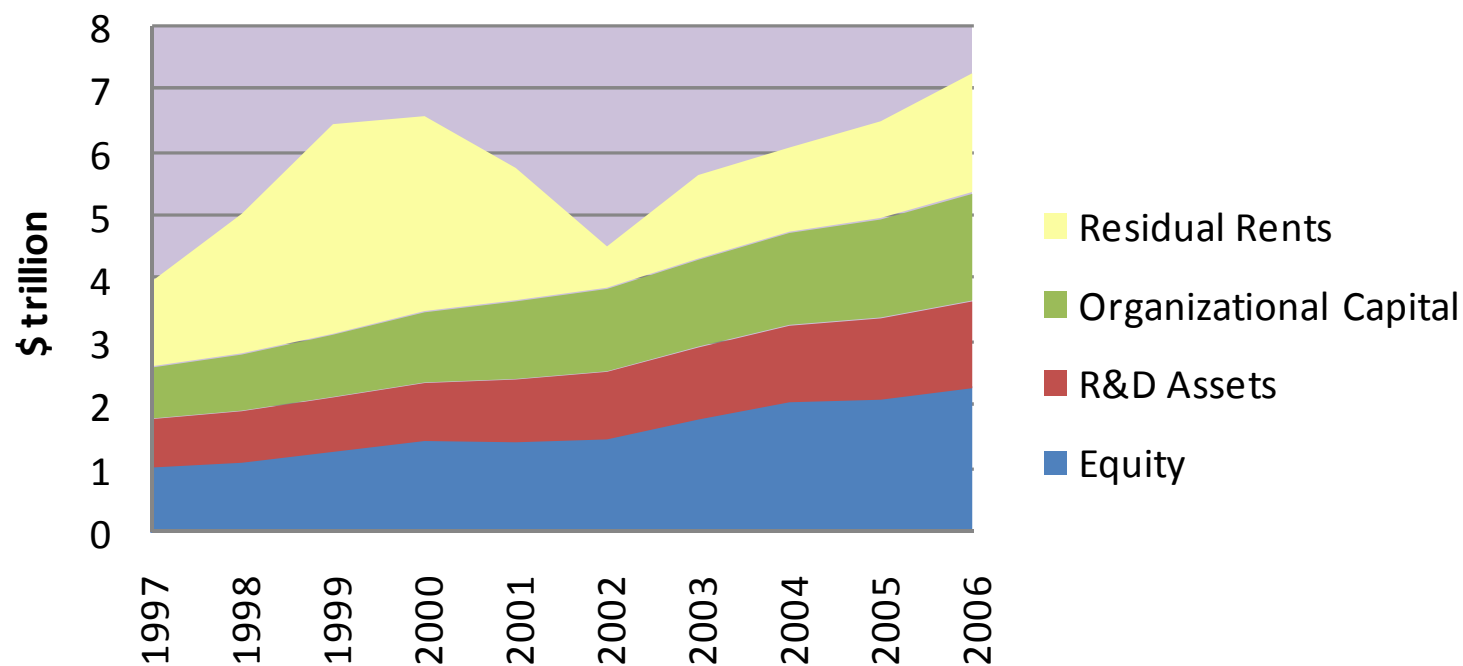
Decomposition of Stock Market Value 617 R&D-intensive Companies





Intangible capital can explain a lot of the market to book value gap

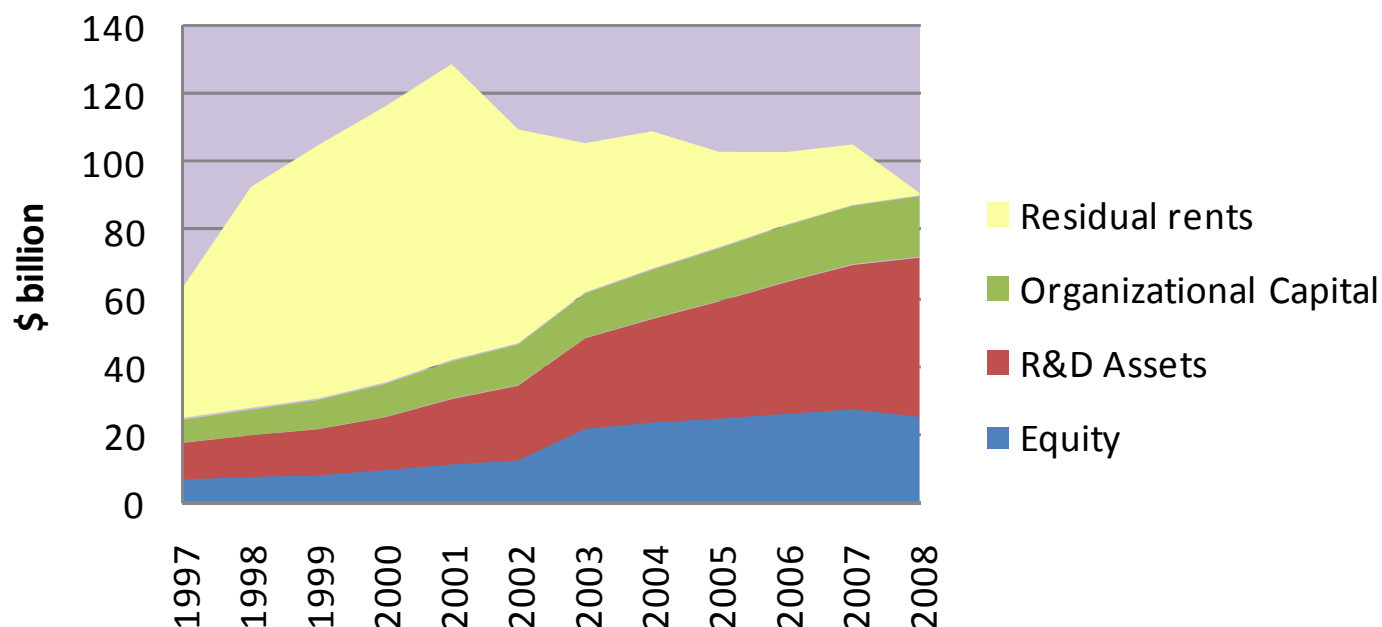
Decomposition of Stock Market Value 617 R&D-intensive Companies





... and recently even all of the market value in pharma

Decomposition of Stock Market Value Six Pharmaceutical Companies



Note: The six companies are Abbott Laboratories, the Bristol-Myers Squibb Company, Eli Lilly and Company, Johnson and Johnson, Pfizer Inc., and Wyeth.



Market to Book Value Puzzle

The Puzzle

Accounting Principle: $\text{Equity} = \text{Assets} - \text{Liabilities}$

Theoretically: $\text{Equity} = \text{Market Value}$

Actually: $\text{Equity} \ll \text{Market value}$

- Absence of most intangible assets from financial statements
- Expenditure on intangibles produced within a firm often treated as a current expense. not as an investment in firm's future.
⇒ No output or value created.
- No market transactions to measure the value of R&D and brand created within the company
- Difference between stock-market value of a firm and the book value of its equity treated as "goodwill" and (more or less) loosely associated with intangibles.



Methodology

Market-to-book gap is **too large** to be attributed solely to the mismeasurement of conventional equity / vicissitudes of the stock market

- Estimate the in-house investment in R&D and organizational capital
- Include “own” intangibles on corporate financial statements
- Construct balance sheets and income statements for German/Swiss firms with and without intangibles for 10 years
- Compare traditional financial statements with “new view” balance sheets and income statements
- Focus on two statistics related to intangibles
 - Rate of investment in own intangibles (R&D and organizational capital)
 - Percentage of market value explained



Comparison of Key Statistics from the U.S. and German Firm Analysis

<i>2008</i>	<i>US-633</i>	<i>US-18</i>	<i>Ger-12</i>
R&D spending/conventional revenues	0.04	0.08	0.05
R&D+Org. spending/conventional revenues	0.17	0.28	0.15
%MV explained w/o Intan	0.30	0.29	0.47
%MV explained w Intan	0.77	0.80	1.09
ROE w/o Intan	0.33	0.15	0.12
ROE w/ Intan	0.17	0.08	0.07
Debt/EQ w/o Intan	2.15	2.50	1.96
Debt/EQ w/ Intan	0.83	0.89	0.90

Source: US-633 firms are from the updated results of Hulten and Hao (2008)



Comparison of U.S. and German IT and Pharmaceutical Companies

2008	IT ¹		PHARMA ²	
	US	Germany	US	Germany
R&D Spending / Revenues	0.07	0.06	0.17	0.12
Org Spending / Revenues	0.18	0.16	0.28	0.26
EQ/MCAP w/o Intang	0.24	0.33	0.29	0.44
EQ/MCAP w/ Intang	0.69	0.96	1.00	1.13
ROE w/o Intang	0.25	0.22	0.21	0.12
ROE w/ Intang	0.13	0.07	0.11	0.08
Debt/Equity w/o Intang	1.42	2.14	1.19	1.03
Debt/Equity w/ Intang	0.49	0.73	0.34	0.40

Notes: 1. German IT Companies: SAP and Siemens; U.S. IT Companies: Oracle. Apple. Intel. IBM. HP. Cisco and EMC. 2. German+ Pharmaceutical Companies: Bayer. Merck. Stada. Novartis; U.S. Pharmaceutical Companies: J&J. Pfizer. ABT. Bristol Myer. Eli Lilly and Wyeth.



Conclusions

Micro level

- Intangible assets explains about a quarter of LP growth in the US and larger countries of the EU
- Western Europe benefited more from intangible assets than catching-up countries did
- Catching-up countries such as Czech Republic, Greece and Slovakia benefited more from tangible assets than from intangible assets

Micro level

- Capitalization of internal R&D and organizational capital \Rightarrow large impact on income statements and balance sheets
- Addition of internally intangibles increases the percentage of market value that can be explained by equity
- Leading R&D oriented firms exhibit higher R&D investment rates than average firms



Thank you



Six Group-wise Comparisons of Companies by Industry

	GE	UTX	Siemens	J&J	Bayer	Pfizer	Novartis
R&D Inv/Adjusted Revenue	0.02	0.03	0.05	0.13	0.08	0.22	0.17
ORG Inv/Adjusted Revenue	0.10	0.04	0.04	0.11	0.09	0.11	0.09
%MV explained w/o Intan	0.41	0.26	0.42	0.23	0.41	0.44	0.43
% MV explained w Intan	0.76	0.58	1.20	0.76	1.22	1.45	1.08
ROE w/o Intan	0.15	0.29	0.21	0.30	0.11	0.14	0.14
ROE w/ Intan	0.11	0.17	0.05	0.15	0.05	0.08	0.09
Debt/EQ w/o Intan	6.02	2.55	2.45	1.00	2.21	0.93	0.55
Debt/EQ w/ Intan	3.26	1.13	0.86	0.31	0.74	0.28	0.22
	Forest	Stada	Oracle	SAP	Dow	DuPont	BASF
R&D Inv/Adjusted Revenue	0.18	0.03	0.16	0.15	0.02	0.05	0.02
ORG Inv/Adjusted Revenue	0.12	0.10	0.11	0.07	0.01	0.04	0.03
%MV explained w/o Intan	0.36	0.39	0.22	0.18	0.45	0.19	0.51
% MV explained w Intan	1.01	0.78	0.52	0.58	0.83	0.64	0.96
ROE w/o Intan	0.26	0.10	0.24	0.26	0.04	0.28	0.16
ROE w/ Intan	0.18	0.11	0.20	0.15	0.04	0.06	0.10
Debt/EQ w/o Intan	0.22	1.94	1.05	0.94	2.37	4.08	1.72
Debt/EQ w/ Intan	0.08	0.97	0.45	0.30	1.28	1.28	0.91 31