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COINVEST:

Intangible Capital and Growth—an International Comparison

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Motivation

1. Intangible spending amounts to a large percentage of GDP.
   - US: 13.1% of GDP or 1223 million dollars (CHS, 2005) annual average 1998-2000
   - UK: 10.9% of GDP or 127 million pounds (MH, 2006) in 2004

2. Intangible assets contributed to the growth of labor productivity (annual growth rates, 1995-2003).
   - US: 0.84 percentage points (CHS, 2006)
   - UK: 0.59 percentage points (MHW, 2007)

3. What about Germany, France, Italy and Spain?
   - Germany, France, Italy and Spain account for 61% of GDP of EU 15 in 2004.
   - Germany, France, Italy and Spain have different economic structures from the US and the UK.

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Literature Review

1. Countries invest substantially in intangible assets.
   - Finland: 9.1% of GDP in 2005 (Jalava, Aulin-Ahmavaara and Alanen, 2007).
   - The Netherlands: 8.3% of GDP from 2001 to 2004
     (van Rooijen-Horsten, van den Bergen and Tanriseven, 2008).
   - Japan: 7.5% of GDP from 1995 to 2002
     (Fukao, Hamagata, Miyagawa and Tonogi, 2007)

2. Intangible assets contribute to growth.
   Finland (JAA, 2007)
   0.64 percentage points annually (1995-2000)
   0.87 percentage points annual (2000-2005)

3. Other research
   (Timmer and van Ark, 2005, Inklaar, Timmer and van Ark, 2008, Eicher and Strobel, 2008, and Pianta and Vaona, 2006)

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What is This Paper about?

1. Measure intangible investment in Germany, France, Italy and Spain.

2. Measure the contribution of intangible assets to the growth of labor productivity in Germany, France, Italy and Spain.

1. Compare our estimates with the estimates of the US and the UK.

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Method of Measuring Intangibles

1. We follow the method of CHS (2005).

2. Three categories of intangible assets.
   (1) Computerized information
   (2) Innovative property
   (3) Economic competencies

3. Spending v.s. Investment
   Benefits lasts for more than 1 year—investment.

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Data Sources of Measuring Intangibles

1. National Accounts (EU KLEMS and EUROSTAT).
   Software, databases, development costs in financial industry, new architectural and engineering designs and advertising expenditure.

2. Surveys provided by EUROSTAT.
   R&D, market research, training, own-account organizational structure.

3. Surveys provided by trade associations.
   Copyright and license costs and management consulting.

4. Corporate financial statements.

Table 1: Spending on Intangible Assets in the Market Sector (% GDP)

Type of Expenditure	Germany 2004	France 2004	Italy 2004	Spain 2004	UK 2004	US 1998-2000
1. Computerized information	**0.75**	**0.86**	**0.69**	**0.77**	**1.70**	**1.65**
a) Software	0.73	0.82	0.69	0.75		
b) Databases	0.02	0.04	0.01	0.03		
2. Innovative property	**3.47**	**3.12**	**2.26**	**2.51**	**3.23**	**4.57**
a) R&D	1.69	1.32	0.52	0.55	1.09	2.06
b) Mineral exploration	0.00	0.02	0.04	0.04	0.04	0.19
c) Copyright and license costs	0.20	0.32	0.10	0.19	0.21	0.81
d) Dev costs in financial industry	0.70	0.58	0.79	0.35	0.69	0.79
e) New arch and eng designs	0.87	0.88	0.80	1.38	1.2	0.73
3. Economic competencies	**3.27**	**5.22**	**2.67**	**2.19**	**5.95**	**6.91**
a) Brand equity	0.84	1.51	1.19	0.58	1.59	2.53
Advertising expenditure	0.69	1.24	0.91	0.33	1.2	2.33
Market research	0.15	0.27	0.28	0.25	0.39	0.2
b) Firm-specific human capital	1.34	1.51	1.00	0.83	2.45	1.25
Continuing vocational training	0.67	1.25	0.69	0.73		
Apprentice training	0.67	0.26	0.31	0.11		
c) Organizational structure	1.09	2.21	0.48	0.78	1.92	3.13
Purchased	0.50	0.31	0.11	0.25	0.6	0.87
Own account	0.59	1.90	0.37	0.53	1.31	2.26
Total Spending	**7.48**	**9.20**	**5.61**	**5.47**	**10.88**	**13.13**

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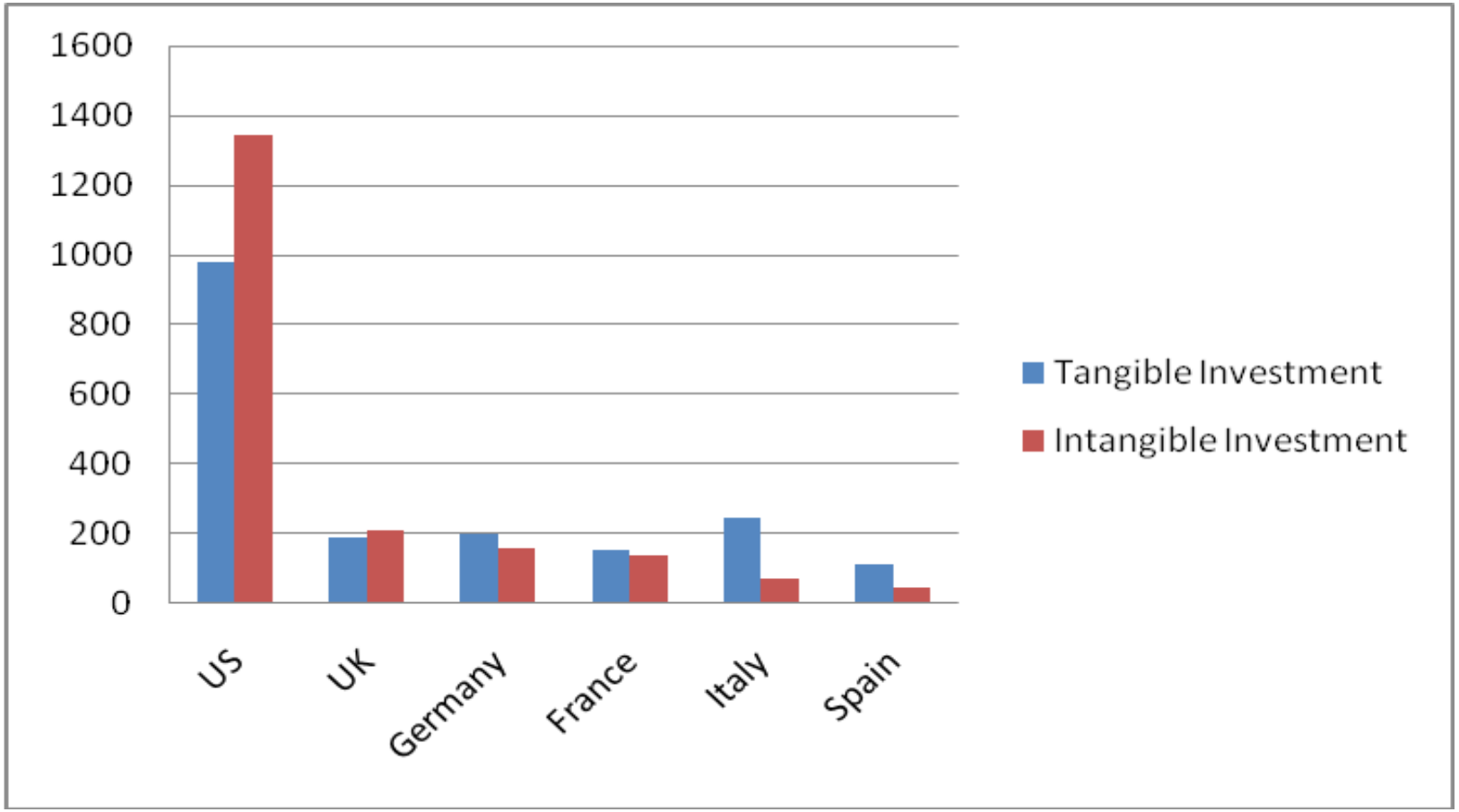
Figure 1: Intangible and Tangible Investment in 2004 ($billion, current prices)



Source: CHS (2005), MH (2006) and our estimates.
Note: Values of the US are the annual averages of 2000-2003.

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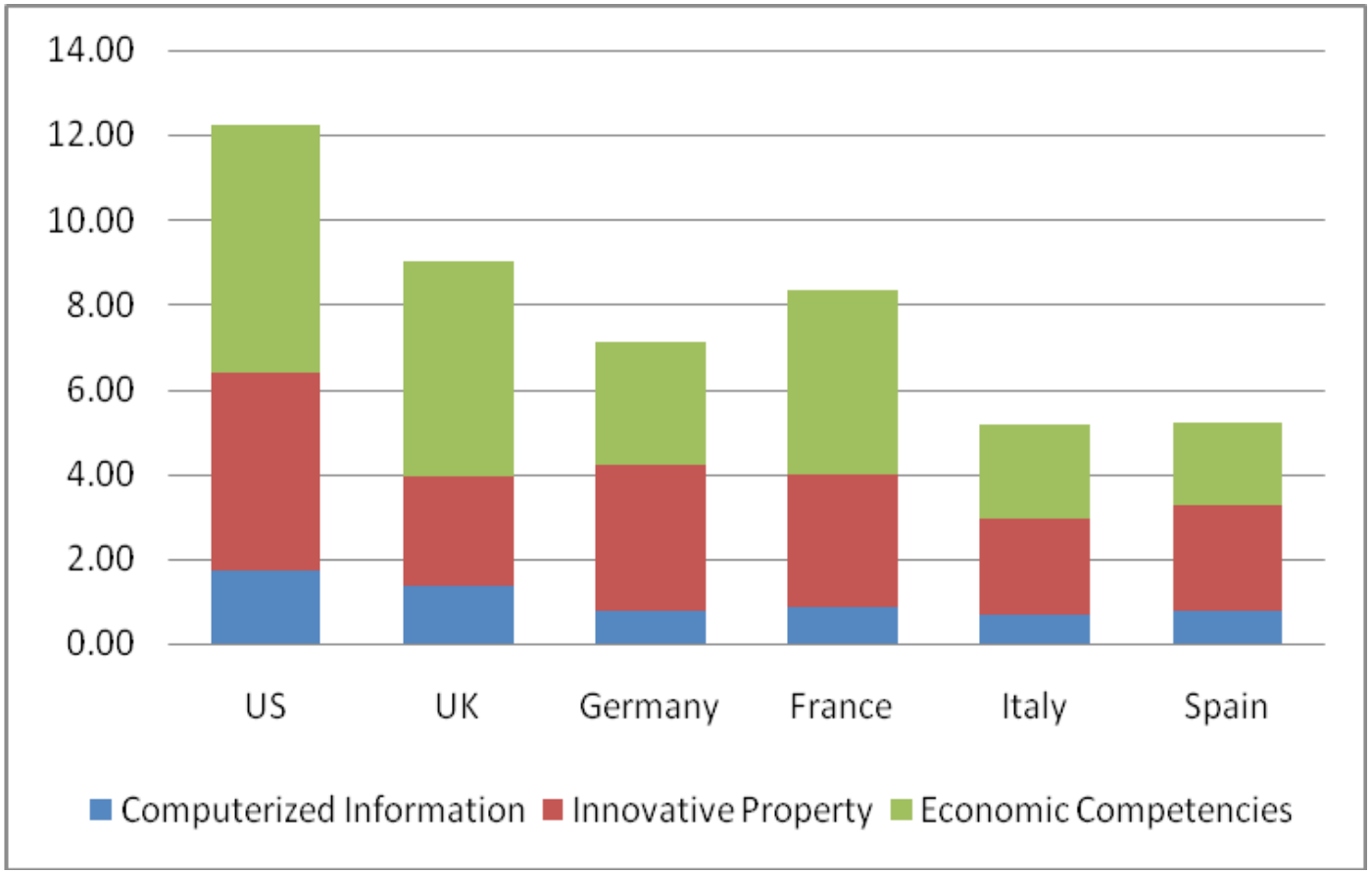
Figure 2: Intangible Investment in the Market Sector (% GDP, 2004)



Source: CHS (2005), MH (2006) and our estimates.
Note: Values of the US are the annual averages of 2000-2003.

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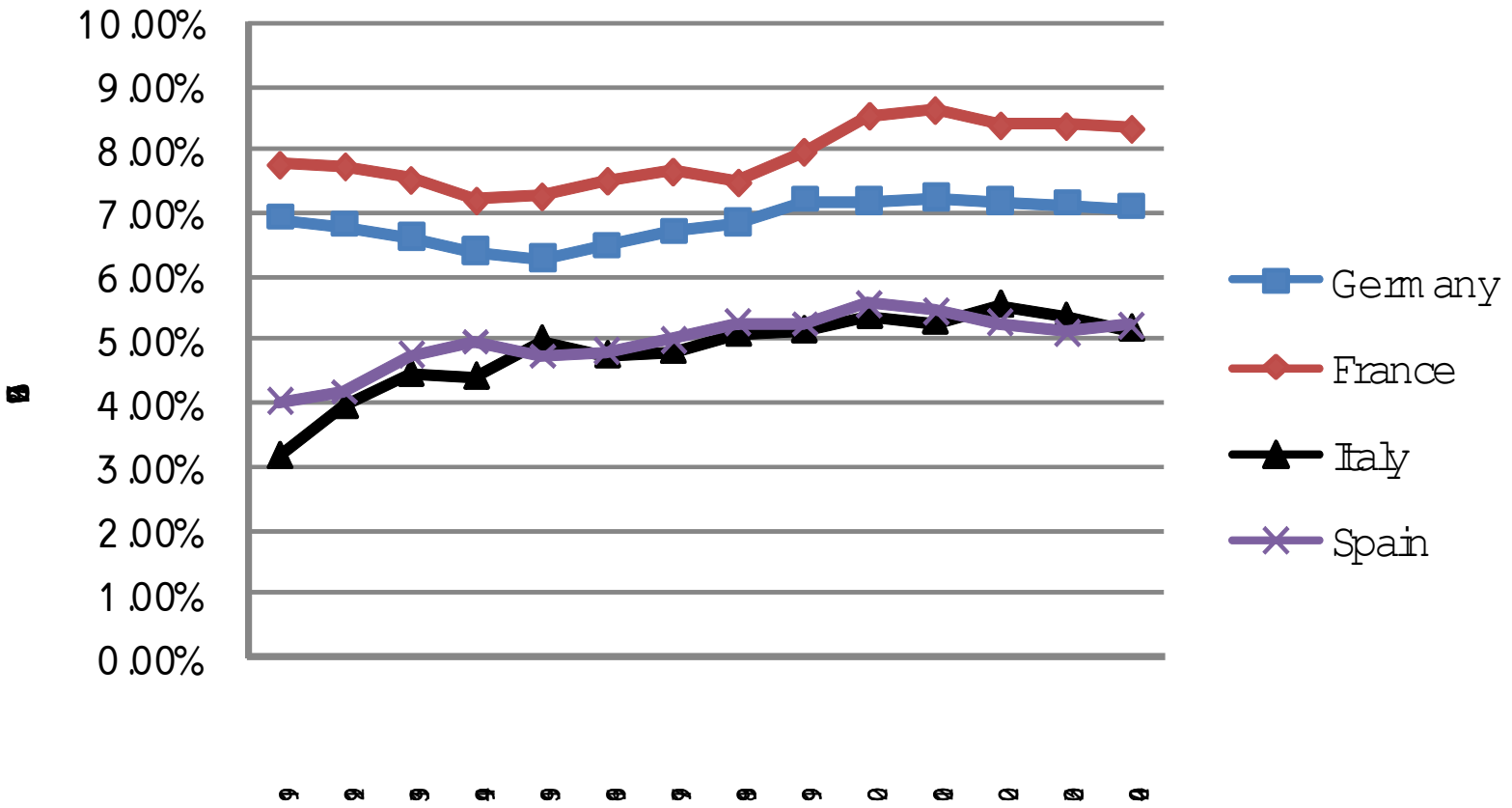
Figure 3: Intangible Investment



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Methodology of Growth Accounting

$$\Delta \ln A = \Delta \ln(Y/L) - \sum_i \alpha_i \Delta \ln(K_i/L) - \sum_j \beta_j \Delta \ln(R_j/L) - \gamma \Delta \ln(L^{QA}),$$

where $\sum_i \alpha_i + \sum_j \beta_j + \gamma = 1.$

Y is the value-added of the market sector.
A is total-factor productivity.
K is tangible capital stock.
R is intangible capital stock.
L is labor input.
L^{QA} is labor quality.

Construct the stock of assets using perpetual inventory method.

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Data Sources of Growth Accounting

1. *Value-added :* EU KLEMS

2. *Labor Input:* EU KLEMS.
   Compensation and hours worked by 3 skill levels.

3. *Tangible assets (Investment & Stock):* EU KLEMS.

4. *Intangible assets (Investment & Stock):* our estimation.

5. *Deflators and Depreciation rates.*
   Tangible assets: EU KLEMS.
   Intangible assets: EU KLEMS for software and databases, and CHS (2006) for all the other intangible assets.

Table 4: Depreciation Rates

Assets	Depreciation Rates
Software	0.315
Databases	0.315
R&D	0.2
Mineral exploration and evaluation	0.2
Copyright and license costs	0.2
Dev costs in financial industry	0.2
New arch and eng designs	0.2
Advertising expenditure	0.6
Market research	0.6
Firm-specific human capital	0.4
Organizational structure	0.4
Computing equipment (IT)	0.315
Communications equipment (CT)	0.115
Transport equipment	0.189
Other machinery and equipment	0.126
Non-resident structures	0.031
Other assets.	0.126

Source: EU KLEMS provides the depreciation rates of tangible assets, software and databases. CHS (2005) provides the depreciation rates of intangible assets except software and databases.

Table 5: Annual Change in Labor Productivity in the Market Sector, 1995-2003

	US	UK	Germany	France	Italy	Spain
	Excluding Intangible Capital (%)					
Labor productivity growth	2.78	2.59	1.93	2.17	-0.24	0.10
ICT tangible capital deepening (ex. software)	0.70	1.13	0.30	0.20	0.16	0.24
Non-ICT tangible capital deepening	0.28	0.51	0.84	0.58	0.33	0.34
Labor Quality	0.38	0.36	0.05	0.32	0.16	0.52
TFP	1.42	0.58	0.73	1.08	-0.89	-1.00
	Including Intangible Capital (%)					
Labor productivity growth	3.09	2.93	2.07	2.34	-0.10	0.16
ICT tangible capital deepening (ex. software)	0.60	1.02	0.27	0.17	0.15	0.22
Non-ICT tangible capital deepening	0.24	0.52	0.70	0.47	0.30	0.30
Intangible Capital deepening	0.84	0.59	0.45	0.55	0.19	0.06
Labor Quality	0.33	0.31	0.04	0.29	0.15	0.49
TFP	1.08	0.48	0.60	0.87	-0.89	-0.91
Software	0.27	0.18	0.09	0.12	0.04	0.06
Innovative Property	0.22	0.14	0.27	0.20	0.06	0.12
Economic Competency	0.35	0.26	0.09	0.23	0.09	-0.12

Sources: CHS (2006), MHW (2007) and our estimates.

Table 7: Growth Accounting with Intangible Assets 1995-2000 and 2000-2004

	1995-2000				2000-2004			
	Germany	France	Italy	Spain	Germany	France	Italy	Spain
Annual growth rate of labor productivity of the market sector	2.20	2.77	0.61	0.10	1.63	1.52	-0.96	0.43
Contribution of Inputs								
ICT tangible capital deepening (ex. software)	0.33	0.20	0.23	0.31	0.19	0.12	0.07	0.11
Non-ICT tangible capital deepening	0.65	0.32	0.29	0.09	0.62	0.56	0.41	0.66
Intangible Capital deepening	0.39	0.57	0.28	0.04	0.45	0.42	0.01	0.14
Labor Quality	-0.07	0.44	0.13	0.56	0.23	0.19	0.15	0.42
TFP	0.90	1.26	-0.32	-0.90	0.15	0.21	-1.59	-0.89
Software	0.09	0.13	0.05	0.06	0.08	0.08	0.02	0.04
Innovative Property	0.24	0.16	0.06	0.08	0.28	0.22	0.05	0.17
Economic Competency	0.06	0.27	0.17	-0.10	0.09	0.12	-0.06	-0.08

Source: EU KLEMS, CHS (2006) and our estimates of intangible investment.