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Time Series Estimates of Intangible Investments – Sensitivity Analysis for Germany

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1 Introduction

The question on whether to treat expenditure for intangible goods as intermediate inputs into the production process or as long-term investments as well as its implications for firm-level accounting practices and national accounting systems is high on the agenda. Up to recent times, intangibles were seen as intermediate inputs and hence ignored in the accounting system. This objection was to a large extent due to the problem that investments in intangibles are hard to measure. If, however, expenditures for intangible goods are indeed investments, neglecting them generally implies two biases: We underestimate labour productivity and overestimate the contribution of multi-factor productivity (MFP), tangible capital and labour quality to labour productivity growth.

In their seminal work, Corrado et al. (2004, 2006) make a huge step forward in defining and measuring intangible assets. They distinguish the following three broad categories of intangibles: Business investment in computerized information, innovative property and economic competencies (see Table 1-1). Computerized information consists of investments for computer software and computerized databases. Innovative property reflects the scientific knowledge embedded in patents, licenses, and general know-how (not patented) on the one hand but also the innovative and artistic content in commercial copyrights, licenses, and designs on the other hand. This is captured by the following five components: expenditure for R&D in natural and social sciences, mineral exploration, copyright and licences, new product development in the financial industry and new architectural and engineering designs. Finally, economic competencies represent the value of brand names and other knowledge embedded in firm-specific human and structural resources profits (other than the software and R&D expenses) aimed at raising productivity and profits (Corrado et al. 2004). Data for some of these components, like scientific R&D or mineral exploration, are well documented, internationally harmonized and comparable to a large extent. Other categories, however, are rather crudely measured such as the expenditure for new product development in the financial industry (see Table 1-1).

Based on this approach, Corrado et al. (20006) confirm the importance of intangible goods for economic growth. They found that 12.1% of GDP was invested in intangible assets in 2003. In other countries, this share is somewhat lower, but still rather high (UK: 10.1%, Finland: 9.1%, Netherland: 8.3%, Japan 7.5%, see Marrano and Haskel, 2006, Jalava et al. 2007, van Rooijen-Horsten et al. 2008, Fukao et al. 2007). Within the same studies, it was also shown that during the period 1995-2003, intangible goods had increased labour productivity by 0.8 percentage points in the US and 0.6 percentage points in the UK.

Hao et al. (2008, 2009) used the approach by Corrado et al (2004) to estimate the effect of including intangible capital into the growth accounting framework for Germany and three other European countries (France, Italy and Spain). In an international context, however, there may arise a *trade-off* between international comparability of data sources on the one hand and a better measurement of the time series at the national level on the other hand. These

additional data sources at the national level could give some further insights to the measurement of the components at an international level. In this respect, the present report complements the work of 'The Conference Board in Europe' already provided as Deliverable 3.6 within the COINVEST project. The work by Hao et al. (2008, 2009) is based on international comparable data sources like the R&D surveys (Eurostat), EU KLEMS, STAN (OECD), World Magazine Trends, Structural Business Statistics (Eurostat), Labour Cost Survey (Eurostat), Survey of the European Management Consultancy Market (European Federation of Management Consultancies Associations) and Structure of Earning Survey (Eurostat) (see Table 1-1). Our focus is less on the international availability and comparability of data sources than on potentially better data quality at the national level. The sensitivity checks will first show on how much 'better' data sources matter with respect to the contribution of intangibles to economic growth. However, since the comparability between countries is an important feature within the COINVEST project, the second aim of this work is to propose some guidelines to improve the measurement of intangibles at the international level if possible.

At this stage, we will focus on three of the components: expenditure for advertising, market research and new product development in the financial industry. Since the first two components make up brand equity, we will look at alternative German data sources for both of them in chapter 2. In Section 3, we provide additional insights to the measurement of innovation expenditure in the banking and insurance industry. In Section 4, sensitivity checks are carried out to estimate the contribution of brand equity and innovation investment in the financial industry to total labour productivity, using alternative data sources. The last section contains some concluding remarks.

Table 1-1 Definition and Measurement of Intangible Goods

Category	Components	Data source	Measurement
Computerized information	Computer Software	EU KLEMS	Calculated by EU Klems
	Computerized databases	EU KLEMS	Gross output of NACE K724 (database activities), excluding software.
Innovative property	R&D	EUROSTAT	GERD, excluding the government and higher education sectors and the software industry.
	Mineral exploration	German national accounts.	
	Copyright and license costs	German national accounts.	
	New product development costs in the financial industry	OECD STAN	20% of financial industry's intermediate costs (STAN OECD), excluding inputs from NACE K72 (computer and related activities) and NACE 74 (other business activities including advertisement, consulting and architectural and engineering designs and other activities).
	New architectural and engineering designs	EU KLEMS	Half of the gross output of architectural, engineering and other technical activities (NACE 74.2), excluding inputs from NACE K72 and NACE K74.
Economic competences	Advertising expenditure	EU KLEMS, World Magazine Trends	Gross output of advertising industry (NACE K744) excluding half of the advertisement on newspapers. EU KLEMS provides the gross output of advertising industry, and World Magazine Trends provides the share of advertisement on newspapers.
	Market research	EUROSTAT Structural Business Statistics	Double the turnover of Market Research and Public Opinion Polling (NACE, K7413).
	Firm-specific human capital	EU KLEMS, EUROSTAT Labor Cost Survey 2004, EUROSTAT Continuing Vocational Training Survey 2005	Sum of the costs of apprentice training (Labour Cost Survey) and continuing vocational training (Continuing Vocational Training Survey). EU KLEMS provides the total labour compensation of each country.
	Purchased organizational structure	European Federation of Management Consultancies Associations: 2004 Annual Survey of the European Management Consultancy Market	The revenue of management consulting. Management consulting in the public sector is excluded. For missing years, the revenue of management consulting was estimated using the ratio of the revenue of management consulting to the output of NACE K741.
	Own account organizational structure	EU KLEMS, EUROSTAT: Structure of Earning Survey 2002	20% of managers' compensation

Source: Corrado et al. (2006), Hao, Manole and van Ark (2008), own representation.

2 Brand equity as an intangible asset

Besides computerized information such as software and databases and innovative properties like R&D, licence costs and design, Corrado et al. (2006) refer to investments into "economic

competencies" as a crucial element of a firm's intangible assets. This perspective can be traced back to the resource and capability theory of the firm (Barney, 1991; Wernerfelt, 1984). It is built around the basic premises that not everything a firm does and owns is equally important for its success. Competitive advantage and derived superior rents stem from the possession of unique resources that are valuable, specific and difficult to imitate or substitute. Frequently, success depends much more on a firm's organizational processes for combining and deploying resources (i.e., capabilities) (Peteraf, 1993). Often these specific resources and capabilities have to be developed through targeted investments in intangible assets by the firm over time as no factor markets exist (Amit and Schoemaker, 1993). Hence, there can be no explicit factor price reflecting their value.

An extension of this resource-based perspective emphasizes the fact that the possession of a specific resource may not be prerequisite for turning it into competitive advantage. This relational view stresses the advantages a firm may achieve from developing preferential ties with selected partners with unique technological or market expertise (Dyer and Hatch, 2006; Dyer and Singh, 1998). Preferential treatment by customers can be seen as one of the most important partnerships. Corrado et al. (2006) trace the asset character of this customer relationship to a firm's brand equity. It is a unique asset in the sense that the firms draw additional rents based on the brand perception of its customers (Park and Srinivasan, 1994). Brand equity can be defined as the incremental cash flow a branded product can generate compared to a similar non-branded one (Simon and Sullivan, 1993). Brand equity can be traced back to a firm's marketing mix encompassing price, place or distribution, promotion, and product ("4Ps"). Yoo et al. (2000) find that high advertising expenditures, high prices, good image of the store as well as high distribution intensity are associated with high brand equity while low prices and frequent promotions hurt it.

In addition to brand equity, economic competencies comprise firm-specific human capital and firms' organizational structure as pointed out by Corrado et al (2006). This report, however, addresses in particular the question of measuring brand equity and its contribution to economic growth.

2.1 Measuring brand equity: Starting point

Corrado et al. (2004, 2006) propose a broad conceptualization of marketing activities by including both advertising and market research. Advertising expenditure, however, is seen as the firm's primary investment into brand equity. In line with results from the management literature, they caution that only a certain fraction of all advertising and market research expenditure (60%) should be considered as an investment while the rest of it may be short-term focussed (see also Landes and Rosenberg 1994). The expression "long-term" means that the effects last presumably more than one year.

Another aspect which is likewise important is the question of how firms have organized their marketing activities. Marketing activities can be outsourced to firms belonging to the media industry and/or can be done in-house by the firm itself. Ideally, we would like to have *total marketing expenditure*, i.e. expenditure for internal and external marketing activities. In this

case, it doesn't matter how firms have structured their marketing activities and whether there are differences in organisation across countries. In Corrado et al. (2004, 2006) advertising data are based on firm-level information stemming from Bob Coen's Insider's Report, issued by Universal-McCann. However, they did not have firm-level information on market and consumer research. Hence they estimate the total expenditure for market research by using the revenues of the market and consumer research industry and by assuming that internal own-account market research is of the same magnitude as external expenditure for market research. This implies using a factor of 2 for the revenues of the market research industry.

Hao et al. (2008) followed the general approach and in line with Corrado et al. (2004, 2006) they defined

- **expenditure in market research** as double the turnover of market research and public opinion polling (NACE, K7413), provided by the Structural Business Statistics of EUROSTAT.[1] For missing years, they estimated the turnover using the ratio of the output of K7413 to the output of K741.

In contrast to Corrado et al., however, they used data at the industry level for the advertisement expenditure as well by defining

- **expenditure in advertising** as gross output of advertising industry (NACE K744) excluding half of the advertisement on newspapers. EU KLEMS provides the gross output of advertising industry, and World Magazine Trends provides the share of advertisement on newspapers for over 70 countries on a yearly base.

This implies that only those marketing activities commissioned to outside firms from the media industry are captured. This might explain why the spending in advertising is nearly 2 times higher in the US compared to the UK or France and even 3 times higher than in Germany. In the following section 2.2 we introduce alternative data sources for marketing activities in Germany. The figures on spending and investments extracted from these data sources will be compared in section 2.3.

2.2 Robustness and sensitivity checks through alternative German data sources

In addition to data from the structural business statistics (Eurostat), we utilize three different data sources for Germany to cross-check the magnitude of this type of investment. Each data source has certain advantages and limitations which will be outlined up front.

[1] For Germany, the SBS in the service sector is based on the annual Service Statistics since year 2000. The Service Statistics is provided by the German national statistical office. The data source before 2000 is not reported, but it was presumably the turnover tax statistics.

2.2.1 Central Association of the German Advertising Industry (Zentralverband der deutschen Werbewirtschaft ZAW)

The Central Association of the German Advertising Industry ZAW is the umbrella organization for 43 associations of the industry. Its members include

- advertising agencies and clients,
- media firms,
- advertising freelancers and
- market research.

The members commission, prepare, execute, design and broker commercial advertising. The existence of a single umbrella organization for the advertising industry differentiates Germany from most other industrialized countries.

ZAW collects data from its members on a yearly basis on advertising expenditure, sources and channels. These are published as an annual yearbook called *Advertising in Germany* (*Werbung in Deutschland*).

Advantages:

- Publicly available time series data since the mid eighties.
- Broad coverage of all advertising activities and media channels.
- The data allows a distinction between net advertising expenditure (i.e. media revenues) and gross advertising expenditure. Gross advertising expenditure comprises media revenues as well as the costs for the production and design of advertising content and material.
- Separate information for daily newspapers, weekly newspapers, television, direct mail, advertising paper, popular magazines, information and directory media, trade magazines, outdoor advertising, radio, online advertising, cinema and newspaper supplements.
- The weight of different advertising channels (e.g. TV, newspapers, and direct mail) can be identified.
- The primary industries commissioning advertising (Top 25) can be identified. However, this distinction is largely product driven (e.g. beer) and not necessarily industry focused in the NACE classification sense. Retail, car sales and mail-order trade are the leading industries in most years.

Disadvantages:

- Data does not include information on market research.

- The dataset does not provide information on the size or scope of marketing activities within non-advertising firms, e.g. in-house advertising, market research or packaging.

2.2.2 Turnover tax statistics (German Federal Statistical Office)

The second data source is the German turnover tax statistics. It is a secondary statistic based on the monthly and quarterly advance turnover tax returns, meaning the turnover tax prepayments of the enterprises. The main advantage of this data set consists of its broad coverage: In Germany, it includes all enterprises whose turnover (deliveries and other performances) exceeds the threshold of 17,500 euro and whose tax amounts to more than 512 euro. Not included in the statistics are enterprises that only have to provide an annual turnover tax declaration, enterprises with a turnover lower than the threshold and enterprises that achieve almost only non-taxable turnover (e.g. medical and dental doctors in private practice without a laboratory, public authorities, insurance agents, agricultural farms). Therefore, turnover tax statistics deliver data of unexcelled completeness on the evolution of turnover in almost all economic sectors, which in such detail are not obtainable from any other statistical survey at the federal level. The only exemptions are branches like agriculture and forestry as well as the banking and insurance sector. In the agriculture and forestry sector most enterprises are exempt from turnover tax and in the banking and insurance sector a large proportion of the enterprises' turnover is not declared because it is tax free without input tax deduction (Vogel and Dittrich 2008). In contrast to that the Structural Business Statistics (SBS) used in Hao et al. (2008) is based on a sample survey.

The comprehensive coverage provides information on a detailed disaggregated level. Similarly to the SBS data, expenditure on (external) advertising can be gathered by the gross output (revenues) of the advertising industry (NACE K74.4). In contrast to the data used by Hao et al (2008), the turnover tax statistics allows to decompose the turnover of market research and public opinion polling (NACE K74.13) into its two components (market research, K74.13.2, and public opinion polling K74.13.2). This is important as expenditures on public opinion polling do not represent a building block of brand equity. Hence, expenditures on public opinion polling should not be counted as intangible capital.

On the other hand, it is a flaw of the data set that adjustments in sales that occur have to be reported to the tax authorities only in the annual turnover tax declarations filled in later and are therefore not accounted for.

To sum up:

Advantages:

- Publicly available time series data.
- Annual data since 1996 (before that on a biennial basis).

- Disaggregated data on advertising (74.4), market research (74.13.1) and opinion research (74.13.2) available.

- Census from the data of the tax authorities that covers nearly all economic sectors with high quality. It is not based on a sample survey such as the structural business statistics used in Hao et al. (2008).

Disadvantages:

- The dataset does not provide information about non-taxable transactions like in-house activities.

- Turnover is estimated on the base of advance turnover tax returns and not adjusted afterwards.

- Industry assignments are based on the product or service generating the majority of turnover. Hence, firms with minor marketing-related activities may be assigned to other industries (those with the majority of turnover) and vice versa. However, this critique is valid for the structural business statistics as well.

2.2.3 Mannheim Innovation Panel (MIP)

The "Mannheim Innovation Panel" (MIP) is the official German innovation survey. The survey is conducted *annually* by the Centre for European Economic Research (ZEW), infas-Institut für Sozialforschung and ISI Fraunhofer Institute on behalf of the German Federal Ministry of Education and Research. Every fourth year it is the German contribution to the European Community Innovation Survey (CIS), co-ordinated by Eurostat.[2] The methodology and questionnaires are internationally harmonized across the countries. The target population in Germany covers all enterprises with at least five employees. The sample is drawn using the stratified random sample technique. The survey is voluntary in Germany and each year between 5000 and 6000 enterprises in manufacturing and services respond to the survey and provide information on their innovation activities. This corresponds to a response rate of about 25%. To control for a potential response bias, a non-response analysis is carried out every year and the weighting factors are non-response adjusted. Primary respondents are general managers, heads of R&D departments and innovation management. For a more detailed description of the dataset and the survey see Peters (2008).

The 2007 survey contains a specific question on firm's **marketing expenditure** in 2006. Marketing expenditure are defined as *internal and external advertising expenditure, conceptual design of marketing strategies, market and customer demand research and establishment of new distribution channels*. Expenditure solely directed at sales and

[2] Since 2005, the CIS have to be conducted (at least) every second year.

distribution activities are explicitly excluded. Marketing expenditure for the target population of firms covered in the survey can be projected by means of weighting factors.

The main advantages and shortcomings using MIP data for calculating marketing expenditure can be summarized as follows:

Advantages:

- It provides a comprehensive coverage of all marketing expenditures, i.e. it covers marketing expenditures beyond advertising.
- Data include external (purchased) and internal (own account) corporate marketing activities such as design, packaging, customer relation management, pricing.
- It provides information on an industry level which is especially relevant for sectors that are traditionally not as active in public advertising or mass media commercials such as business to business marketing.

Disadvantages:

- Data does not allow us to split marketing expenditure into advertising expenditure and market research.
- Data is currently only available for the year 2006. The question was not part of earlier surveys. It is intended to build up a time series for market expenditures within the MIP. Data for 2007 and 2008 will be available at the end of the year 2009.
- Some industries are missing: Agriculture and forestry, construction, retail sales including car retail, hotel and restaurant industry, renting and leasing, government services (incl. public health insurance) are not included. Hence, one of the largest advertising sectors, the retail industry, is not surveyed.

2.3 Comparison and synthesis

We will contrast the information from all three available data sources in three steps. Hao et al. (2008) will serve as the benchmark in all cases. First, we focus on advertising expenditure using information from ZAW and German turnover tax statistics. Secondly, we will examine expenditure on market research based on turnover statistics. Finally, we focus on total marketing expenditure by using projected values derived from the MIP innovation survey.

2.3.1 Advertising

First, Table 2-1 shows figures for advertising expenditure from structural business statistics, turnover tax statistics and ZAW. As already mentioned, ZAW provides data on net and gross advertising expenditure. Net advertising expenditure represents net revenues of the media and

can be interpreted as the distribution costs of advertising. Gross advertising expenditure additionally comprises production costs of advertising. ZAW also provides data on advertising expenditure in newspapers.

Table 2-1 Advertising expenditure in Germany by alternative data sources, 1991-2008 (mn EUR)

Advertising expenditure					
Year	***Turnover tax statistics: Advertising (K74.4)***	***SBS – Eurostat: Advertising (K74.4)***	***ZAW: Gross advertising expenditure***	***ZAW: Advertising net revenues of the media***	***ZAW: Advertising net revenues of newspapers***
1991	n.a.	n.a.	22190	14495	4753
1992	n.a.	n.a.	24031	15983	5126
1993	n.a.	n.a.	25360	16320	5059*
1994	19261	n.a.	25974	17348	5300
1995	n.a.	n.a.	27405	18580	5481
1996	20369	20863	28070	19066	5460
1997	21532	21439	28939	19780	5557
1998	21735	21588	30170	20790	5868
1999	25309	25309	31440	21820	6142*
2000	27646	15235	33210	23380	6560
2001	25895	17568	31460	21720	5640
2002	22995	18747	29620	20140	4940
2003	22839	15545	28910	19280	4450
2004	23347	16431	29220	19580	4500
2005	24025	17102	29600	19833	4480
2006	25797	18308	30230	20350	4530
2007	27214	n.y.	30780	20812	4570
2008	n.y.	n.y.	30670	20357	4373

Notes: n.a.: figure not available; n.y.: figure not yet available. *) Own estimates.
Source: SBS Eurostat, German turnover tax statistics, ZAW (1991-2008), own calculations.

Based on the advertising spending figures in Table 2.1, we calculate investment figures as suggested by Corrado et al. (2004, 2006) and Hao et al. (2008). We follow their directions to make sure that at this point different results are not caused by a deviation in the methodology. As mentioned above, they have proposed that "only about 60 percent of total advertising expenditures were for ads that had long-lasting effects" where advertising expenditures were defined as gross output of advertising industry (NACE K74.4) excluding half of the advertisement on newspapers.[3] ZAW data on advertisement on newspaper is used for adjusting the advertising expenditure of all other data sources. On top of that a correction

[3] Half of the advertisement on newspapers is subtracted as it is an estimate of classified advertisement which does not contribute to brand equity, see Hao et al. (2008).

factor of 60% is applied. Table 2-2 provides investment figures for our benchmark Hao et al. (HMO) as well as those calculated using the turnover tax statistics, SBS and ZAW data. The figures in columns 2 to 6 represent purchased investments in advertisement. None of the available data sources provide information on own-account *advertising* expenditure or investments. However, as we will explore in more detail in section 2.3.3, we can estimate the relation between total and external *marketing* expenditure based on MIP data. Own-account marketing outlays make up roughly 15% of external marketing expenditure. Assuming that this premium is the same for all components, i.e. advertising expenditure as well market research, we can get an estimate of total investments in advertisement. More precisely, total investments in advertisement are estimated as 60% of total advertising expenditure which are calculated as gross advertising expenditure (ZAW) plus a 15% premium for internal advertising expenditure. Column 7 additionally presents our estimate of total, i.e. purchased and own-account, investments in advertisement.

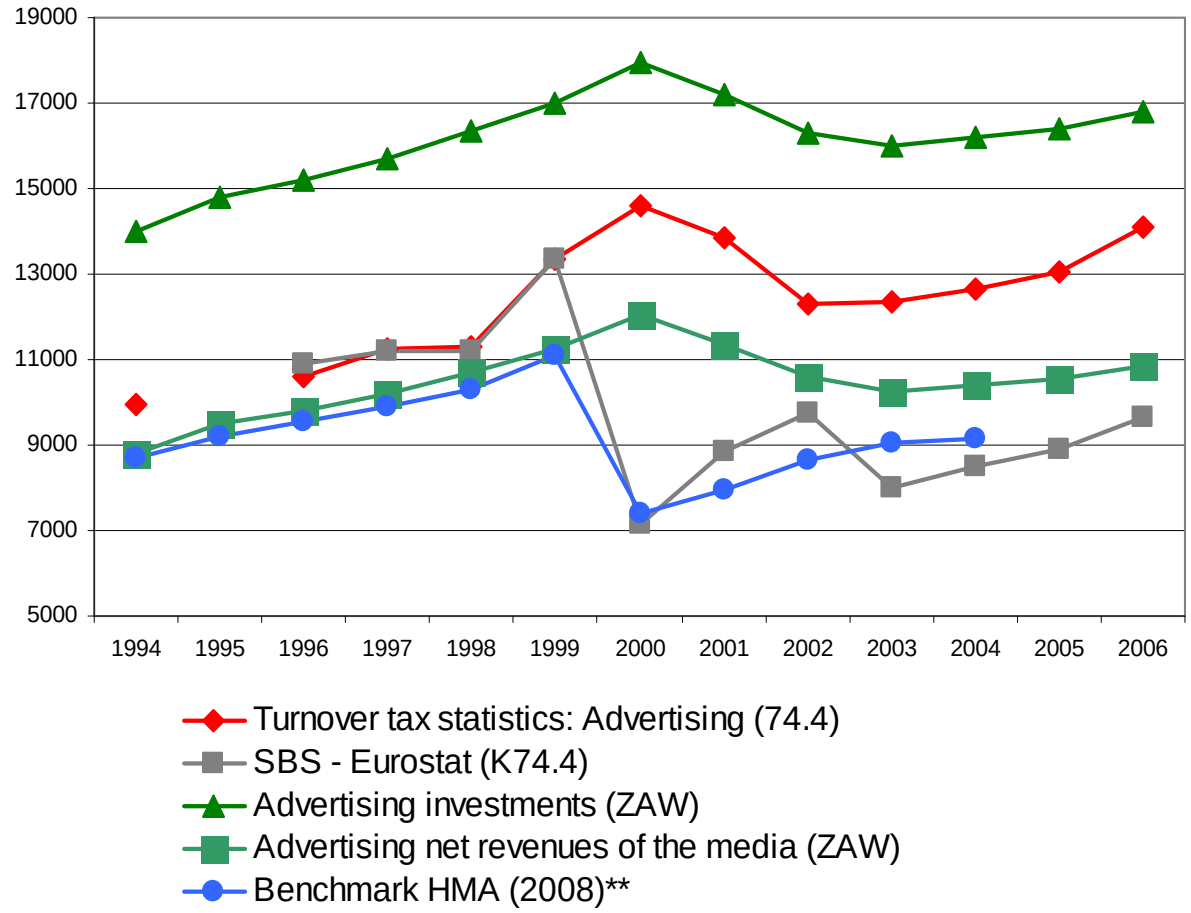
Table 2-2: Advertising investments in Germany by alternative data sources, 1991-2008 (mn EUR)

	Advertising investments					
Year	***Benchmark: HMA (2008)*****	***Turnover tax statistics: Advertising (K74.4)***	***SBS – Eurostat: Advertising (K74.4)***	***ZAW: Gross advertising investment***	***ZAW: Net advertising investment***	***Internal & external Advertising investments****
1991	7087	n.a.	n.a.	11888	7271	15311
1992	7919	n.a.	n.a.	12881	8052	16581
1993	8642	n.a.	n.a.	13698	8274	17498
1994	8721	9967	n.a.	13994	8819	17922
1995	9196	n.a.	n.a.	14799	9504	18910
1996	9542	10584	10880	15204	9802	19368
1997	9922	11252	11196	15696	10201	19968
1998	10301	11280	11192	16342	10714	20817
1999	11094	13342	13342	17021	11249	21694
2000	7414	14620	7173	17958	12060	22915
2001	7934	13845	8849	17184	11340	21707
2002	8660	12315	9766	16290	10602	20438
2003	9051	12369	7992	16011	10233	19948
2004	9161	12658	8508	16182	10398	20162
2005	n.a.	13071	8917	16416	10556	20424
2006	n.a.	14119	9626	16779	10851	20859
2007	n.a.	14957	n.y.	17097	11116	21238
2008	n.a.	n.y.	n.y.	17090	10902	21162

Notes: n.a. : figure not available; n.y.: figure not yet available.
*) ZAW gross advertising investments plus 15% premium for internal advertising investments, see section 2.3.3.
**) "Time series of intangible investment in Germany from Hao, Manole and van Ark (2008), sponsored by EU KLEMS. Not to be redistributed without the permission of the offerers."
Source: Hao et al. (2008), SBS Eurostat, German turnover tax statistics, ZAW (1991-2008), own calculations.

Figure 2-1 highlights the trends in advertising investments for the period 1994-2006. We identify three time periods of interest. Between 1995 and 1999 Hao et al. (2008), SBS, turnover sales tax and ZAW net advertising expenditure are largely in unison. After 2002 the convergence between ZAW net advertising expenditure and Hao et al. (2008) information reemerges with turnover sales tax showing a similar trend at a higher level.

Figure 2-1: Advertising investments in Germany by alternative data sources, 1991-2008 (mn EUR)



Source: Hao et al. (2008), German turnover tax statistics, ZAW (1991-2008), own calculations.

The most interesting time period is between 1999 and 2002. There is a significant divergence of Hao et al. (2008) and SBS data from the other data sources. Both time series show a sharp decline in the investments in advertising whereas we can detect even an upward trend in the other two data sets. Our investigation leads us to suppose that the move to the German service statistics within the SBS in 2000, as mentioned above, is responsible for that structural break in the HMO and SBO data. The synchronized upwards move of turnover tax statistics and ZAW trends suggest that German advertising expenditure during this time period are underestimated by Hao et al. (2008) and the SBS.

The time series in Table 2-2 further show that the difference between gross and net ZAW advertising investment is largely stable over time. In general, the investments for the production and design of advertising content and material amount to around 30% of the net investments.

2.3.2 Market research

Table 2-3 provides data for spending on purchased market research. Data sets used are SBS and turnover tax statistics. The latter allows us to subtract expenditure related to opinion research from the overall revenue in the market research industry (K74.13) which is necessary since these outlays do not increase brand equity.

Table 2-3: Market research expenditure in Germany by alternative data sources, 1994-2007 (mn EUR)

Market research expenditures				
Year	***SBS - Eurostat (K74.13)***	***Turnover tax statistics: Market and opinion research (K74.13)***	***Turnover tax statistics: Market research (K74.13.1)***	***Turnover tax statistics: Opinion research (K74.13.2)***
1994	n.a.	3052	2994	58
1995	n.a.	n.a.	n.a.	n.a.
1996	2812	2745	2604	141
1997	2360	2370	2216	154
1998	2220	2235	2030	205
1999	2352	2352	2120	232
2000	1350	2183	1885	297
2001	1856	2215	1920	294
2002	2069	2282	2001	281
2003	1707	2446	2105	341
2004	1624	3107	2652	455
2005	1828	2637	2261	376
2006	2158	2716	2311	405
2007	n.y.	2833	2413	420

Notes: n.a. : figure not available; n.y.: figure not yet available.
Source: SBS Eurostat, German turnover tax statistics.

Hao et al. (2008) further assumes that own-account market research equals purchased market research and that market research has a long-term focus implying that all outlays should be counted as investment. Hence, total investment in market research is calculated by doubling the expenditure figure. In columns 3 to 5 we likewise use a correction factor of 2 for our alternative data sources. Like in case of advertising, none of the available data sources allows us to verify the assumption on the relation between own-account and purchased market

research in Germany and future research on the topic is necessary. However, as already explored in section 2.3.1, we can estimate the relation between total and external marketing expenditure. Assuming that the 15% premium for internal marketing expenditure is the same for all single components, we get an alternative estimate of total market research investments in column 6.

Table 2-4: Market research investments in Germany by alternative data sources, 1994-2007 (mn EUR)

	Market research investments (calculated data)				
Year	***Starting point HMA (2008)****	***SBS - Eurostat (74.13)***	***Turnover tax statistics: Market and opinion research (74.13)***	***Turnover tax statistics: Market research (74.13.1)***	***Turnover tax statistics: Market research (74.13.1) plus 15% MIP premium***
1994	5280	n.a.	6105	5989	3444
1995	5178	n.a.	n.a.	n.a.	n.a.
1996	5624	5624	5491	5208	2995
1997	4720	4720	4741	4433	2549
1998	4440	4440	4470	4060	2335
1999	4704	4704	4704	4239	2438
2000	2700	2700	4365	3770	2168
2001	3711	3711	4429	3841	2209
2002	4138	4138	4564	4002	2302
2003	3414	3414	4892	4210	2421
2004	3249	3249	6214	5304	3050
2005	n.a.	3657	5274	4521	2600
2006	n.a.	4315	5432	4622	2658
2007	n.a.	n.y.	5666	4826	2775

Notes: n.a.: figure not available; n.y.: figure not yet available.
*) "Time series of intangible investment in Germany from Hao, Manole and van Ark (2008), sponsored by EU KLEMS. Not to be redistributed without the permission of the offerers."
**) ZAW gross advertising investments plus 15% premium for internal advertising investments, see section 2.3.3 below.

Source: Hao et al. (2008), SBS Eurostat, German turnover tax statistics, own calculations.

Table 2-4 and Figure 2-2 compare the investments on market research (NACE 74.13) provided by Hao et al. (2008) based on EU Klems, structural business statistics and German turnover tax statistics. Several conclusions can be drawn from this comparison.

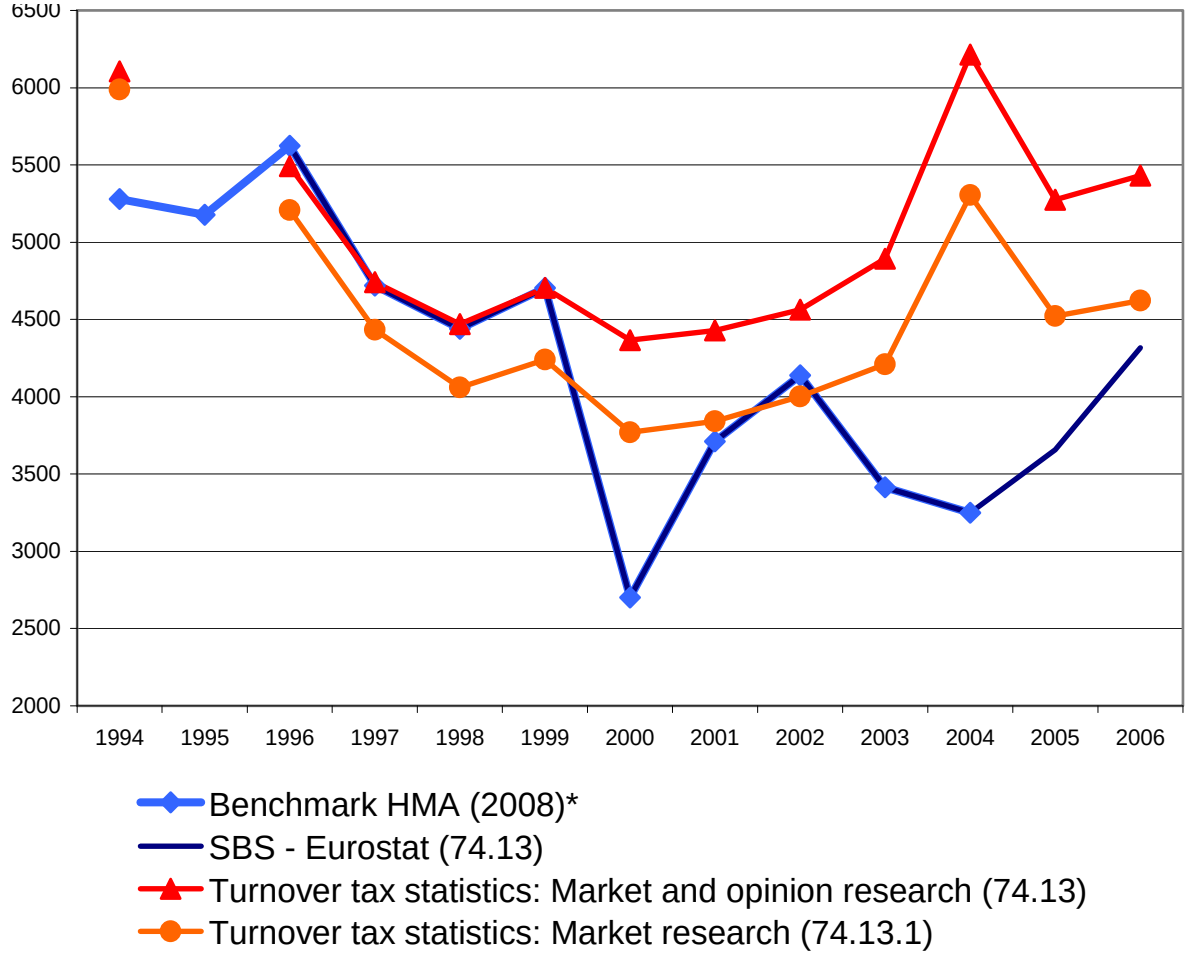
- First, the data in EU Klems used by Hao et al. (2008) are the same as the SBS data.

- Secondly, they are furthermore fully in line with the turnover tax statistics until 1999. After that the trend which shows up in the HMA data is largely asynchronous with the turnover tax numbers and figures are even below the more specific NACE K74.13.1 data excluding opinion research.

- Third, unlike the advertising investment we can not corroborate a clear upward trend in investments for market research. This might be related to national elections.

- Fourth, the share of market research to the sum of market and opinion research has been continuously decreased in the nineties. It went down from 98% in 1994 to 86% in 2000 and has remained rather stable from that point in time onwards.

Figure 2-2: Market research investments in Germany by alternative data sources, 1994-2007 (mn EUR)



Source: Hao et al. (2008), German turnover tax statistics, ZAW (1991-2008), own calculations.

2.3.3 Total marketing expenditures

As already emphasized, firms may not commission all advertising activities to outside media firms but some of them may be carried out in-house as well. Furthermore, advertising expenditure can only be considered one building block of a firm's brand equity. It also includes management capabilities for designing products, setting prices and managing distribution channels (e.g. Yoo et al., 2000). Many of these activities can be assumed to be conducted in-house as well, especially high value and strategically crucial ones. They would therefore not show up as the turnover in dedicated marketing and market research industries. The most important part of internal marketing expenditure is probably related to labour costs for marketing stuff and own market research.

We project total marketing expenditure based on the Mannheim Innovation Panel (MIP) for the year 2006. This projection put firms marketing expenditures at EUR 34.8 bn. However, as mentioned earlier, some industries are not covered by the MIP survey. For the particular purpose of this study, the absence of retailing appears to be the most pressing shortcoming. According to ZAW firms in retail services are the number one investor into advertising in Germany. They estimate their external gross advertising expenditure at EUR 2.5 bn. Hence, we add this number to the projected value for Germany as a conservative, low end approximation of marketing expenditure in retailing. This brings our estimation of total marketing expenditures in Germany to EUR 37.3 bn. in 2006. This number should however be interpreted carefully as it relies only on one cross-section.

With these caveats in mind, our approximation of total marketing expenditure in Germany can be compared to the other data sources. Since the marketing expenditure gathered within the MIP should ideally comprise (internal and external) advertising and market research, we compare our figure to the sum of advertising expenditure and market research.

- Comparing purchased marketing expenditure – defined as the sum of gross advertising expenditure provided by ZAW in 2006 (EUR 30.2 bn) and market research expenditure provided by the German tax statistics (EUR 2.3 bn) – with total marketing expenditure (EUR 37.3 bn), we find that total marketing expenditure are roughly 15% higher than external marketing expenditure in Germany. A *premium of about 15%* implies that a non-negligible part of the marketing activities are carried out in-house. Total marketing expenditure is roughly 24% higher when compared to gross advertising expenditure only.

- Using the sum of turnover in the advertising industry (EUR 25.8 bn in NACE 74.4) and market research industry, both provided by the German tax statistics, would imply an even higher premium of 33% to measure up the total marketing expenditure based on MIP projections.

- The corresponding premia would be 65% and 81% if we use sales from market research industry as well as ZAW net advertising expenditure and SBS, respectively.

- The share of internal market research is much smaller than assumed by CHS (2004, 2006). However, we have to admit that the data set does not allow us to determine the share of internal to total expenditure for advertising and market research, separately. Hence, it might be that this share is higher for market research than for advertising.

- It remains an open question whether 40% of the internal marketing expenditure can also be considered short-term oriented (compare Corrado et al., 2006).

In a nutshell, with regards to external advertising expenditure, we are convinced that gross advertising expenditure collected by ZAW can be considered as the most comprehensive measure of investment into advertising in Germany. If comparable ZAW statistics are not available in other countries, our findings for Germany suggest that a premium of 30% on top of the turnover in the advertising industry (NACE 74.4) may be a suitable solution for bridging the gap between net and gross advertising expenditures.[4] Since we have no information on the time duration of the advertising effects in our data we would follow Corrado et al. (2006) and use 60% of the gross advertising expenditure as advertising investment.

Before exploring the effect of these alternative measures for brand equity on economic growth, we will present an alternative data source for the development costs in the financial industry as well.

3 Development costs in the financial industry as intangible asset

In addition to (scientific) R&D, Corrado et al. (2006) emphasized the importance of non-scientific R&D to capture resources devoted by businesses to innovation. One important aspect of this 'innovative property' is the investment in new product development by financial services and insurance firms.

3.1 Measuring development costs in the financial industry: Starting point

Nakamura (2001) proxied new product development costs in the financial services industry as a proportion of the non-interest expenses of banks and non-depository institutions. He assumed 50% without giving a sound economic explanation. Corrado et al. (2006) broadened the coverage to include other financial institutions (security and commodity brokers and other financial investments and related activities). Since there is no broad survey data in the US on the resources banks and insurance companies devote to new product development, they proposed to use as proxy a share of 20% of all intermediate purchases reported in the BEA`s

[4] We rely on data from the turnover tax statistics. This figure would be suitable if the SBS data in other countries are more closely to the turnover tax statistics.

data on gross output and value added by industry. A share of 20% seems to be a rather ad hoc assumption and further research on this topic is needed.

Hao et al. (2008) followed this line and defined investments for the development of new products in the financial industry in Germany as 20% of financial industry's intermediate costs which are provided by the OECD STAN database. The financial industry is captured by NACE K65-67. To avoid double counting, they exclude inputs from industries NACE K72 (computer and related activities) and NACE 74 (other business activities including advertisement, consulting and architectural and engineering designs and other activities).

3.2 Robustness and sensitivity checks through alternative German data sources

In contrast to the US there exist survey data on innovation expenditure in the financial industry in all European countries and in many other OECD countries as well. The banking and insurance sector is one of the core industries in services which have to be covered by the Community Innovation Surveys in Europe. Historically, the data on innovation expenditure goes back to 1996 and are available every fourth year. Since 2004 they have been provided every second year. As already explored in section 2, the German contribution to the CIS is the Mannheim Innovation Panel (MIP) and in contrast to other European countries, it is carried out annually. As an alternative to the proxies used in the literature we therefore provide a more precise estimate of development costs in the financial industry based on MIP data. Each year, around 230-300 enterprises from the financial industry respond to the survey. All figures are extrapolated to the total population of enterprises using appropriate weighting factors.

The MIP follows the recommendations on innovation indicators given in the Oslo manual (OECD and Eurostat 2005). The Oslo manual defines an *innovation* as a technologically new or significantly improved product which an enterprise has introduced to the market or a new or significantly improved process implemented within the enterprise. An *innovator* is an enterprise which has at least one innovation introduced within a 3-year reference period. The *innovation expenditures* include all expenses in a given year (including labour costs and investments) for the following activities concerning the development and introduction of product and process innovations:

- in-house research and experimental development (intramural R&D expenditure),
- awarding of R&D-contracts to third parties (extramural R&D expenditure),
- acquisition of advanced machinery, facilities, software and external knowledge (e.g. patents, licenses, trademarks) to realize innovation projects,
- product design, construction, design of services and other preparations for the production/sale and distribution of innovations,
- internal or external training specifically for innovation projects and
- launch of product innovations onto the market (e.g. marketing campaigns directly linked to new products).

The questionnaire also provides some examples of innovations for each industry. Regarding the financial industry, the following examples for product innovations were given in 2005 (examples have changed over time):

- Telephone-/direct-banking around the clock
- Adoption of individualized costumer care in the securities business
- Issuing of policies at the point of sale
- Certified retirement-provision products
- Ecological/ethical investments (earmarked for specific purposes)
- Development of new financial derivatives.

The advantage of using innovation expenditure provided by MIP/CIS over the proxies used so far is obvious: We don't have to apply a fix share of intermediate costs but we are able to use direct survey data. Survey data would only be a problem if the respondents systematically under- or overestimate their true innovation activities and hence innovation expenditure. However, we do not have any hint on that in our data.

There is one conceptual difference compared to the approach by Corrado et al. (2004, 2006) worth to note. Whereas Corrado et al. focussed on expenses for new product development only, innovation expenditure is related to new products and processes. It is not possible to split innovation expenditure into these two components. On the one hand both types of innovation activities should generally be taken into account. On the other hand this involves the risk of double counting. Process innovations are often associated with the acquisition of new machines which are counted as tangible capital at the same time. This problem may arise with the development of new products as well (e.g. the acquisition of faster and better computers necessary to test software for new products) but seems to be of less importance. Every fourth year the MIP delivers information not only on the total amount of innovation expenditure, but also on the structure. This allows us to avoid double counting by subtracting the expenditure which is related to the acquisition of new machines for product and process innovations from total innovation expenditure. We call this figure the *corrected innovation expenditure*. In years in which this detailed information is not asked, we interpolate the share of innovation expenditure which is related to the acquisition of new machines and apply the estimated share on the given total innovation expenditure.

Finally, one has to keep in mind that R&D expenditure is part of the innovation expenditure and should be already included in the R&D numbers applied by Hao et al. (2008). As a measure of scientific R&D they define GERD excluding the government and higher education sectors and the software industry. This is equivalent to BERD minus the software industry. Per definition R&D in the financial sector is therefore included. However, services and particular banks have not been surveyed in the German R&D surveys before the year 2000. Since then they have been included, though, banks and insurances are still underestimated in

the R&D figures. This can be easily verified by the fact that R&D expenditure of total sectors G,H,J,L-N amount to 282 mn Euro in 2005[5] whereas the R&D expenditure in the financial industry self-reported in the MIP come to 1,8 bn Euro. Therefore, we assume that double counting is present in the data but is of minor importance in the period considered.

3.3 Comparison and synthesis

In this section we contrast the information from the alternative available data sources. Table 3-1 shows total and corrected innovation expenditure in the financial industry derived from the MIP. For comparison, the time series for new product developments used by Hao et al. (2008) is also reported as it serves as benchmark again. Figure 3-1 illustrates the trends.

Table 3-1: New product development costs in the German financial industry, 1995-2007 alternative data sources (mn EUR)

	New product development costs in the financial industry				
Year	***Benchmark HMA (2008)****	***Total innovation expenditure (MIP)***	***in % of HMA***	***Corrected total innovation expenditure*****	***in % of HMA***
1995	8239	5145	62	3910	47
1996	8833	4771	54	3626	41
1997	9563	5417	57	4185	44
1998	10502	7438	71	5838	56
1999	11568	8239	71	6569	57
2000	13446	6834	51	5534	41
2001	14082	6391	45	4880	35
2002	14413	7092	49	5087	35
2003	14855	7054	47	4733	32
2004	15544	6423	41	4012	26
2005	n.a.	7300	n.a.	n.y.	n.y.
2006	n.a.	8060	n.a.	n.y.	n.y.
2007	n.a.	6483	n.a.	n.y.	n.y.

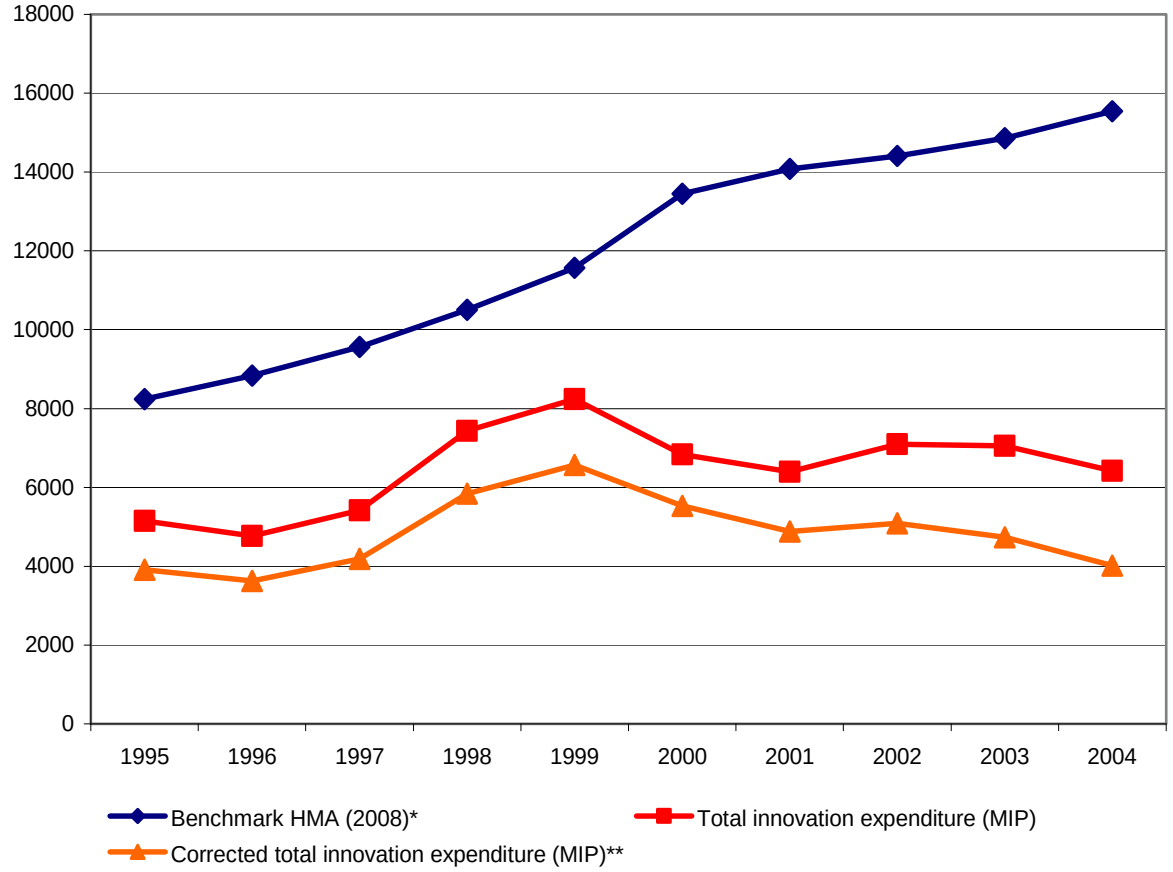
Notes: n.a.: figure not available; n.y.: figure not yet available.
*) "Time series of intangible investment in France and Germany from Hao, Manole and van Ark (2008), sponsored by EU KLEMS. Not to be redistributed without the permission of the offerers."
**) Expenses relating to the acquisition of tangible goods (machineries, equipment) concerning the development and introduction of innovations have been subtracted from total innovation expenditure. Information about the share of tangible innovation expenditure is available for the years 1996, 2000 and 2004. The share has been interpolated for the other years.
Source: Hao et al. (2008), own calculations.

The numbers used by Hao et al. (2008) which are based on a fixed proportion (20%) of intermediate costs differs substantially from the innovation expenditure derived from the MIP data. First of all, they are much higher compared to the self-reported survey figures. One

[5] This figure includes banks and insurances. No separate information for the financial industry is available.

difference between the two numbers arises due to the fact that firms with less than 5 employees are not covered by MIP. However, as innovation expenses are usually mainly determined by the large companies, this cannot explain the large gap. Furthermore, the difference between the proxy based on intermediate costs and total innovation expenditure is not stable over time. It varies between 40 and 70% over the time period. The same is valid for the corrected innovation expenditure. They amount to 25% - 55% of the benchmark data. Whereas the time series of Hao et al. (2008) nearly follows a linear time trend, both total and corrected MIP innovation expenditure indicators seems to be stationary time series in that period. It turns out that their fluctuations are affected by the overall economic development. The MIP time series show a peak in the year 1999 which is plausible because it was a boom phase characterised by tremendous 'online-banking-activities' and preparations for the introduction of the new EURO currency.[6] Overall, the survey data provides evidence that the investments in intangible capital in the financial industry vary substantially over time.

Figure 3-1: New product development costs in the German financial industry, 1995-2004 (mn EUR)



Notes: See Table 3-1.
Source: Hao et al. (2008), own calculations.

[6] Many firms mentioned online banking as the most important innovation in the 1999 survey.

4 The contribution of intangible capital on economic growth in Germany – A sensitivity analysis

In this section, we carry out growth accounting of the market sector[7] in Germany using the alternative data sources of brand equity and development costs in the financial industry and compare our results with the one provided by Hao et al. (2008). To be consistent with Hao et al. and Corrado et al., we use the same growth accounting methodology, the same price deflators and depreciation rates which are explored in more detail in Hao et al. (2008).[8] The estimation is done by using a STATA program which was written for the COINVEST project by the UK team to facilitate that all countries apply the same methodology.[9]

The results by Hao et al. (2008) serve as benchmark case (case 0). Based on the alternative time series on intangible capital presented in section 2 and 3, we cross-check the impact on labour productivity growth performing the following sensitivity analyses:

Table 4-1: Sensitivity Analysis

Case	Advertising	Market research	Development costs in financial industry
0	EU Klems	EU Klems (NACE 74.13)	20% of intermediate costs
1	Turnover tax statistics (NACE K74.4)	Double of revenues in turnover tax statistic (NACE 74.13.1*)	20% of intermediate costs
2	SBS – Eurostat (NACE K74.4)	Double of revenues in turnover tax statistic (NACE 74.13.1*)	20% of intermediate costs
3	Gross advertising investments (ZAW)	Double of revenues in turnover tax statistic (NACE 74.13.1*)	20% of intermediate costs
4	Net advertising investments (ZAW)	Double of revenues in turnover tax statistic (NACE 74.13.1*)	20% of intermediate costs
5	Internal & external Advertising investments (ZAW gross advertising + 15% MIP-Premium)	Revenues in turnover tax statistic (NACE 74.13.1*) + 15% MIP premium	20% of intermediate costs
6	EU Klems	EU Klems (NACE 74.13)	Corrected total innovation expenditure (MIP)
7	Internal & external Advertising investments (ZAW gross advertising + 15% MIP-Premium)	Revenues in turnover tax statistic (NACE 74.13.1*) + 15% MIP premium	Corrected total innovation expenditure (MIP)

Notes:
*) That is without research for opinion polls.
Source: Own representation.

[7] Market sector comprises the whole economy excluding public administration, education, health and real estate activities.

[8] See also Coinvest Deliverable 3.6.

[9] We thank Jonathan Haskel and Anarosa Pesole for sharing the STATA program.

The sensitivity analysis is performed by comparing the impact of each alternative data source separately. Cases 1 to 5 describe alternative data sources for investments in advertisement and market research. In case 6 we use the alternative estimation of development costs in financial industry. The final case 7 represents our preferred data sets for the German market economy.

We first estimate the contribution of intangible capital for the period 1995 to 2004. This is the period for which we have data at hand and can compare it to the benchmark case. The results are reported in Table 4-2. The table provides the average annual growth rate of labour productivity of the market sector in Germany and the growth contribution of ICT tangible capital, non-ICT tangible capital, intangible capital as well as labour quality. The last three rows further disentangle the contribution of intangible capital by looking at the impact of software, innovative property and economic competencies, separately.

As Without accounting for intangible capital, average annual labour productivity growth amounted to 1.7% in the period 1995-2004 (Hao et al. 2008). However, as already set out labour productivity is usually under-estimated if we ignore intangible capital. The inclusion of intangible capital leads first of all to an increase in labour productivity growth. The rise in productivity growth varies between 1.89% (case 2) and 1.82% in our preferred data set (case 7). Overall, the variation in labour productivity growth is rather small in the different sensitivity analyses. The average annual labour productivity growth of 1.85% in the benchmark case lies between these two values.

Intangible capital stimulated labour productivity growth by roughly 0.53 percentage points. It turns out, that the contribution of intangible capital is more or less the same in the benchmark case and in our preferred data set. Digging deeper, however, we see that the contribution of innovative property has decreased from 0.35 in the benchmark case to 0.31 percentage points in case 7. This decrease was just compensated by an increased importance of economic competencies. That is, the contribution of economic competency mounted from 0.1 to 0.13 percentage points. All in all, the point that the impact of intangibles is a quantitatively large fraction of GDP growth bears scrutiny.

Table 4-2: Decomposition of Labour Productivity Growth in Germany, 1995-2004

Time Period: 1995-2004	***Case***							
	0	***1***	***2***	***3***	***4***	***5***	***6***	***7***
Labour productivity growth	1.855	1.886	1.886	1.872	1.875	1.868	1.805	1.817
ICT tangible capital deepening (ex. software)	0.300	0.300	0.300	0.298	0.300	0.297	0.302	0.299
Non-ICT tangible capital deepening	0.519	0.518	0.518	0.515	0.518	0.513	0.522	0.517
Intangible capital deepening	0.534	0.590	0.590	0.566	0.563	0.567	0.500	0.534
Labour quality	0.093	0.092	0.092	0.092	0.093	0.092	0.094	0.093
TFP	0.410	0.386	0.386	0.400	0.401	0.399	0.387	0.376
Software	0.091	0.091	0.091	0.091	0.091	0.090	0.092	0.091
Innovative property	0.347	0.346	0.346	0.344	0.346	0.343	0.311	0.308
Economic competency	0.097	0.153	0.153	0.131	0.126	0.134	0.097	0.134

Notes:
1995-2004 means that the first growth rate is calculated between 1995 and 1996.
Source: Own calculation.

In a second step, we split the sample and consider the period 1995-2000 and 2000-2004 since Hao et al. reported a decreasing impact of intangibles on economic growth for the second period. Table 4-3 provides the growth accounting for the two periods. It turns out that labour productivity growth was much higher in the first period than in the second period. Depending on the data set we used, we estimated an average annual labour productivity growth of 2.1% (case 6) to 2.3% (case 2) for the first period and 1.3% (case 7) and 1.45% (case 2) for the second period.

Table 4-3: Decomposition of Labour Productivity Growth in Germany, 1995-2000 and 2000-2004

	Case							
Time Period: 1995-2000	***0***	***1***	***2***	***3***	***4***	***5***	***6***	***7***
Labour productivity growth	2.188	2.289	2.348	2.263	2.263	2.287	2.141	2.240
ICT tangible capital deepening (ex. software)	0.347	0.347	0.369	0.346	0.348	0.345	0.349	0.347
Non-ICT tangible capital deepening	0.551	0.552	0.479	0.548	0.551	0.546	0.556	0.551
Intangible capital deepening	0.559	0.668	0.583	0.626	0.620	0.649	0.551	0.642
Labour quality	-0.039	-0.039	-0.067	-0.039	-0.039	-0.038	-0.039	-0.039
TFP	0.770	0.760	0.828	0.782	0.783	0.785	0.724	0.739
Software	0.096	0.095	0.097	0.095	0.096	0.095	0.096	0.095
Innovative property	0.375	0.375	0.352	0.373	0.375	0.371	0.365	0.362
Economic competency	0.089	0.198	0.135	0.158	0.150	0.183	0.089	0.184
Time Period: 2000-2004	***0***	***1***	***2***	***3***	***4***	***5***	***6***	***7***
Labour productivity growth	1.440	1.383	1.449	1.382	1.391	1.344	1.385	1.290
ICT tangible capital deepening (ex. software)	0.241	0.240	0.241	0.239	0.240	0.238	0.242	0.240
Non-ICT tangible capital deepening	0.478	0.476	0.478	0.474	0.477	0.472	0.481	0.474
Intangible capital deepening	0.504	0.493	0.504	0.490	0.493	0.464	0.437	0.398
Labour quality	0.257	0.256	0.257	0.256	0.257	0.255	0.259	0.257
TFP	-0.041	-0.082	-0.031	-0.077	-0.076	-0.085	-0.035	-0.079
Software	0.086	0.085	0.086	0.085	0.086	0.085	0.086	0.085
Innovative property	0.312	0.310	0.311	0.309	0.311	0.308	0.244	0.241
Economic competency	0.107	0.097	0.107	0.096	0.096	0.071	0.107	0.072

Notes: 1995-2000 means that the first growth rate is calculated between 1995 and 1996 and the last one between 1999 and 2000.
Source: Own calculation.

Using alternative data sources, we confirm the finding of a decreasing contribution of intangible capital to labour productivity growth. In our preferred data the contribution declined from 0.64 to 0.40 percentage points. This fall is much more pronounced than in benchmark case in which the contribution decreased from 0.56 to 0.50 percentage points. A reduced contribution can be detected for all three categories of intangible capital. Whereas the

decline in the contribution of software is rather moderate from 0.095 to 0.089, the fall is much more pronounced in the impact of innovative property on labour productivity growth (from 0.36 to 0.24). The most striking result is the sharp drop in the contribution of economic competencies which has cut by more than one half (from 0.18 to 0.07 percentage points). Interestingly, the benchmark case even showed an upwards trend in the contribution of this component (0.09 to 0.11 percentage points).

However, since the SBS data exhibits an artificial structural break in the year 2000, a division of the sample in year 2000 may lead to biased results. In a third step, we therefore split the sample into the periods 1995-1999 and 2001-2004. The results can be gathered from Table 4-4. We corroborate the downward trend for all components of intangible capital in our preferred time series and now also find this pattern for the SBS data used in the benchmark study. Like before, the decline in intangible capital deepening is more pronounced in our preferred time series (from 0.63 to 0.34 compared to 0.60 to 0.45 in case 0) mainly caused by the different measurement of economic competencies.

Table 4-4: Decomposition of Labour Productivity Growth in Germany, 1995-1999 and 2001-2004

Time Period: 1995-1999	***0***	***1***	***2***	***3***	***4***	***5***	***6***	***7***
Labour productivity growth	1.918	1.921	2.137	1.897	1.897	1.918	1.912	1.912
ICT tangible capital deepening (ex. software)	0.326	0.326	0.347	0.324	0.326	0.323	0.328	0.325
Non-ICT tangible capital deepening	0.573	0.574	0.484	0.570	0.573	0.567	0.578	0.573
Intangible capital deepening	0.600	0.648	0.651	0.606	0.601	0.627	0.604	0.630
Labour quality	0.049	0.049	0.041	0.049	0.049	0.049	0.049	0.049
TFP	0.370	0.325	0.334	0.349	0.348	0.352	0.353	0.335
Software	0.093	0.093	0.094	0.093	0.093	0.092	0.094	0.093
Innovative property	0.371	0.371	0.339	0.369	0.371	0.367	0.373	0.369
Economic competency	0.136	0.184	0.218	0.145	0.137	0.167	0.137	0.168
Time Period: 2001-2004	***0***	***1***	***2***	***3***	***4***	***5***	***6***	***7***
Labour productivity growth	1.227	1.210	1.235	1.211	1.218	1.177	1.181	1.131
ICT tangible capital deepening (ex. software)	0.192	0.191	0.191	0.190	0.191	0.189	0.193	0.191
Non-ICT tangible capital deepening	0.460	0.458	0.460	0.456	0.459	0.454	0.463	0.457
Intangible capital deepening	0.453	0.430	0.451	0.432	0.435	0.401	0.387	0.336
Labour quality	0.310	0.309	0.310	0.308	0.310	0.308	0.312	0.310
TFP	-0.188	-0.177	-0.177	-0.175	-0.176	-0.175	-0.174	-0.162
Software	0.075	0.075	0.075	0.075	0.075	0.074	0.076	0.075
Innovative property	0.288	0.287	0.288	0.286	0.288	0.285	0.222	0.220
Economic competency	0.089	0.068	0.087	0.071	0.072	0.042	0.090	0.042

Notes: 1995-1999 means that the first growth rate is calculated between 1995 and 1996 and the last one between 1998 and 1999. 2001-2004 means that the first growth rate is calculated between 2001 and 2002 and the last one between 2003 and 2004.
Source: Own calculation.

5 Conclusion

The main aim of this report was to investigate whether alternative data sources for brand equity and development costs in the financial industry are available at the national level in Germany. The comparison of the different data sources with the benchmark study by Hao et al. (2008) showed that an improvement of data quality is feasible. Unfortunately, the alternative choice of data sources limits the comparability to other European countries.

Regarding the measurement of brand equity, the German SBS data contain an artificial structural break in year 2000. This break is due to the introduction of the service statistics in Germany and its application for the SBS data. In contrast, data provided by the ZAW and turnover tax statistics are more similar and stable across time. The alternative data sources allow us to exclude opinion research from market research expenditure since it does not feed into brand equity building. Using the additional data sources, we are furthermore able to cover more components of intangible assets, in particular the cost of producing advertisements and internal (own-account) marketing expenditure. To account for own-account advertising expenditure and market research, we estimated a premium of 15% on purchased advertising expenditure and market research. Though the number is based on a cross-sectional estimate so far, it could serve as guidance for other European countries.

In a nutshell, for measuring brand equity in Germany we propose the following:

- Advertising: Gross advertising investments (including cost of producing advertisements) provided ZAW plus a 15% premium for in-house advertising activities.
- Market research: Turnover of the market research industry (without opinion research) provided by the turnover tax statistic plus a 15% premium for internal market research activities.

The figures of new product development costs in the financial industry provided by Hao et al. (2008) are based on a fixed proportion (20%) of intermediate costs. It turns out that they differ substantially from the innovation expenditure derived from the MIP data. That is, they are much higher compared to the self-reported survey figures. Furthermore, the survey data provides evidence that the investments in intangible capital in the financial industry vary substantially over time which seems to reasonable but which is not captured by the proxy used by Hao et al. In our view, further research on this topic is needed.

Using these preferred time series, Table 5-1 reports the investment in advertising, market research and new product development for the period 1991-2008 as well as the proportion in terms of GDP. Investments for market research are rather stable over time and make up roughly 0.11-0.13% of GDP in Germany. The share of advertising is much higher, but it shows a continuous downward trend over the period 1991-2008 (from 1% to 0.85%). The investments for new product and process development in the financial industry show a peak in the New Economy period at the end of nineties and beginning of the new century. Since then it has fallen to a level before the New Economy boom.

Table 5-1: Preferred time series (investment, in mn EUR and as % of GDP)

Year	*Internal & external advertising investments plus 15% premium*		*Turnover tax statistics: Market research (K74.13.1) plus 15% premium*		*MIP: Innovation expenditure in the financial industry*	
	mn EUR	*% of GDP*	mn EUR	*% of GDP*	mn EUR	*% of GDP*
1991	15311	1,00	n.a.	n.a.	n.a.	n.a.
1992	16581	1,01	n.a.	n.a.	n.a.	n.a.
1993	17498	1,03	n.a.	n.a.	n.a.	n.a.
1994	17922	1,01	3443	0,19	n.a.	n.a.
1995	18910	1,02	3219*	0,21	3910	0,21
1996	19368	1,03	2995	0,16	3626	0,19
1997	19968	1,04	2549	0,13	4185	0,22
1998	20817	1,06	2335	0,12	5838	0,30
1999	21694	1,08	2438	0,12	6569	0,33
2000	22915	1,11	2168	0,11	5534	0,27
2001	21707	1,03	2208	0,10	4880	0,23
2002	20438	0,95	2301	0,11	5087	0,24
2003	19948	0,92	2421	0,11	4733	0,22
2004	20162	0,91	3050	0,14	4012	0,18
2005	20424	0,91	2600	0,12	n.y.	n.y.
2006	20859	0,90	2657	0,11	n.y.	n.y.
2007	21238	0,88	2775	0,11	n.y.	n.y.
2008	21162	0,85	n.y.	n.y.	n.y.	n.y.

Notes: n.y.: figure not yet available. * Value for 1995 estimated as average between 1994 and 1996 value.
Source: German Federal Statistical Office, ZAW, own calculations

Taking these new times series together with the ones already provided for other components of intangible assets, we get new estimates of spending and investment on intangible assets in the market sector. Table 5-2 contrasts our estimates with the findings of Hao et al. (2008). Overall, the alternative data sources confirm the large importance of expenses and investments in intangible assets. The alternative data sources even indicate a somewhat higher spending on intangible assets. In year 2004, the proportion of spending in intangible capital comes to 7.75% of GDP compared to 7.45% reported by Hao et al. (2008). The proportion of investment in intangible investment of GDP is roughly the same in both studies. Though the overall results are quite similar for both studies, the composition of different components of intangible assets has changed. On the one hand, the proportion of investment in innovative property is lower than in the benchmark study (2.94% instead of 3.47%). On the other hand, the investments in economic competencies are estimated to be 3.4% of GDP compared to 2.9% before.

Table 5-2: Investment and spending on intangible assets in the market sector (% GDP), 2004

Asset item	*Spending (% GDP) in intangible assets 2004*		*Investment (% GDP) in intangible assets 2004*	
	Hao et al. (2008)	*ZEW (2009)*	*Hao et al. (2008)*	*ZEW (2009)*
1. Computerized information	**0.71**	**0.71**	**0.71**	**0.71**
2. Innovative property	**3.47**	**2.94**	**3.47**	**2.94**
d)Development costs in the	0.70	0.18	0.70	0.18
financial industry				
3. Economic competencies	**3.27**	**4.09**	**2.88**	**3.37**
a)Brand equity	0.84	1.66	0.56	1.19
Advertising expenditure	0.69	1.52	0.41	0.91
Market research	0.15	0.14	0.15	0.14
Total Spending	**7.45**	**7.75**	**-**	**-**
Total Investment	**-**	**-**	**7.05**	**7.02**

Source: Hao et al. (2008), own calculations.

The main findings by Hao et al. (2008) regarding the decomposition of economic growth bear scrutiny using alternative data sources. In particular, we find a high and similar contribution of intangible assets to labour productivity. However, the composition of effects has changed, i.e. we find a higher contribution of economic competencies and a lower contribution of innovative property to economic growth. We also corroborate the finding that the impact of intangible capital as decreased since 2000. The fall is even more pronounced using the alternative data sources. A lower contribution can be detected for all three categories of intangible capital, and the fall is particularly sharp for economic competencies.

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