C 3 INNOVATION BEHAVIOUR IN THE GERMAN PRIVATE SECTOR

Overview

The data shown in C 3–1 through C 3–5, relative to the innovation behaviour of German industry, are based on an annual innovation survey, the Mannheim Innovation Panel (MIP)[343], that has been carried out since 1993 by the Centre for European Economic Research (ZEW). The MIP surveys legally independent companies with five or more employees, in industry and selected services sectors, relative to their innovation activities. It represents Germany's contribution to the Community Innovation Surveys (CIS) of the European Commission. A number of changes were made in the MIP 2009 survey as part of conversion to the new classification of economic sectors (WZ 2008)[344]. In addition, it became possible for the first time to use the statistical offices' company register as a basis for extrapolations. Those two factors necessitated a review of the relevant data back to the 2006 report year. The values presented in the following are based on that review, and thus they can contain discrepancies relevant to the EFI's 2010 report.

The most important source of financing for companies' innovation, far and away, consists of companies' own funds.[345]. The BACH European database[346] managed by the *Banque de France* makes it possible to determine companies' equity ratios (not including those of finance-sector companies) for various European countries. On that basis, C 3–6 presents the equity ratios of small and medium-sized industrial companies in four countries. Innovation projects can also be financed with the help of venture capital. Such capital is provided by venture-capital investors, in the form of liable equity capital or equity-capital-like financing instruments. The data presented in C 3–7 relative to venture capital investments were taken from the current yearbook of the European Private Equity & Venture Capital Association (EVCA).[347]

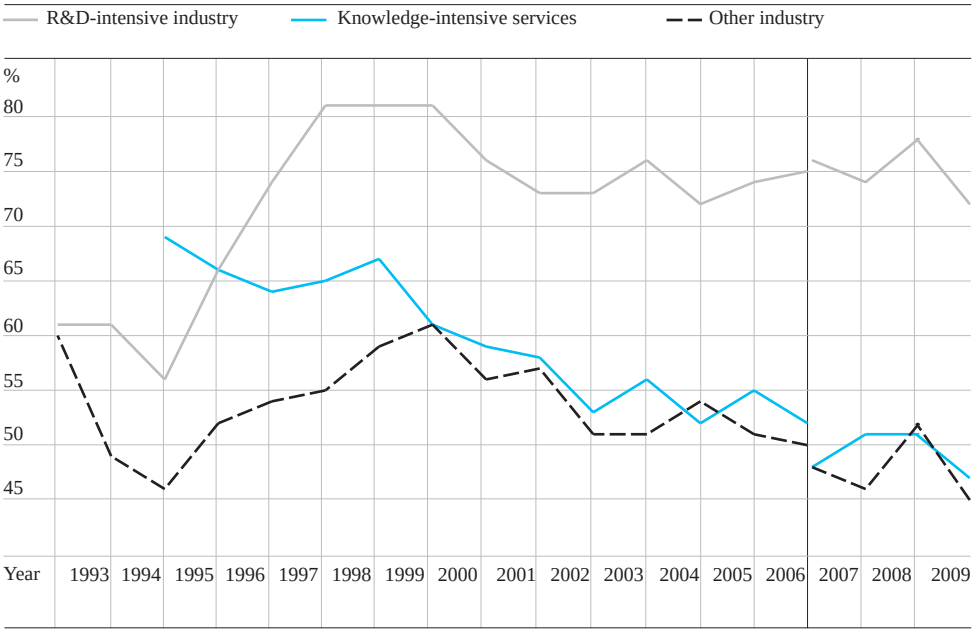
Norms and standards can promote the development and spread of innovation.[348] C 3–8 shows the extent to which various countries are involved in the work of the International Organization of Standardization (ISO). The relevant data have been taken from the Annual Reports of the ISO.[349]

Indicators studied:

- Innovator rate in Germany's industry and knowledge-intensive services
- Companies with continuous or occasional R&D activities in Germany's industry and knowledge-intensive-services
- Innovation intensity in Germany's industry and knowledge-intensive services
- Proportion of revenue achieved with new products in Germany's industry and knowledge-intensive-services
- Planned innovation expenditure in Germany's industry and knowledge-intensive services
- Equity ratios of small and medium-sized industrial companies
- Venture capital investments as a percentage share of gross domestic product
- Number of assigned secretariats for ISO technical committees and subcommittees

INNOVATOR RATE IN GERMANY'S INDUSTRY AND KNOWLEDGE-INTENSIVE SERVICES SECTORS

C 3–1



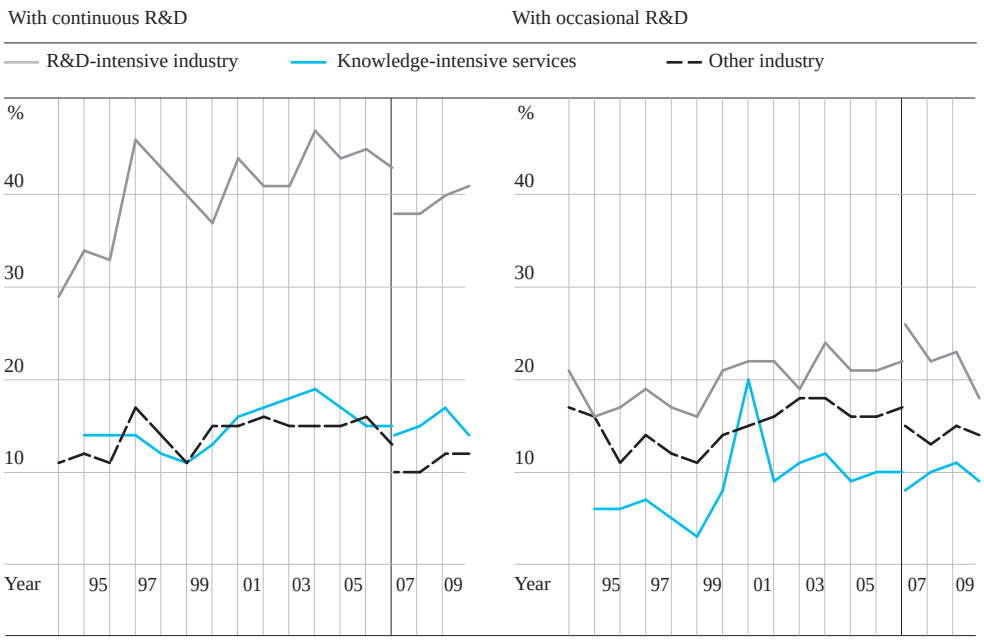
1992, 1993 and 1995 not surveyed for knowledge-intensive services. Break in the time series in 2006. Figures for 2008 and 2009 are provisional. Source: Mannheim Innovation Panel. Calculations of the ZEW.

Innovator rate: Percentage share of companies that, within a three-year period, have brought at least one new product to the market or introduced at least one new process.

Innovator rate decreased during the economic and financial crisis

In 2009, the economic and financial crisis had a clear impact on companies' involvement in innovation. In both R&D-intensive industry and other industry, and in the knowledge-intensive services sector, the innovator rate was below the previous year's level. Innovation participation fell particularly strongly in R&D-intensive industry (from 78 to 72 percent) and in other industry (from 52 to 45 percent). In those areas, the innovator rate decreased, following a sharp increase in 2008, to below the level seen in 2007. The percentage of innovating companies also decreased considerably in the area of knowledge-intensive services (from 51 to 47 percent); in 2009, it was about at the level seen in 2006. In 2009, 33 percent of all companies in R&D-intensive industry introduced innovations that were completely new to the market. That percentage was slightly higher than the corresponding figure for 2008. In other industry, the share of companies with new products on the market decreased by 2 percentage points (from 14 to 12 percent), while in knowledge-intensive services the corresponding figure decreased by five percentage points (from 15 to 10 percent). In comparison to the situation in other European countries, German companies' participation in innovation must be considered very high. Significant differences emerge between the 16 German Länder, apart from structural influences[350]. Companies in Baden-Württemberg and Hesse had the highest innovator rates, 61 and 60 percent, respectively, in 2009. The corresponding figures were below 50 percent in Saxony-Anhalt (42 percent), Mecklenburg-West Pomerania (43 percent) and Brandenburg (46 percent).

C 3–2 COMPANIES WITH CONTINUOUS OR OCCASIONAL R&D ACTIVITIES, IN INDUSTRY AND IN KNOWLEDGE-INTENSIVE SERVICES



Values not included for 1995 and for 1997 in the services sector. Break in the time series in 2006.
Source: Mannheim Innovation Panel. Calculations of the ZEW.

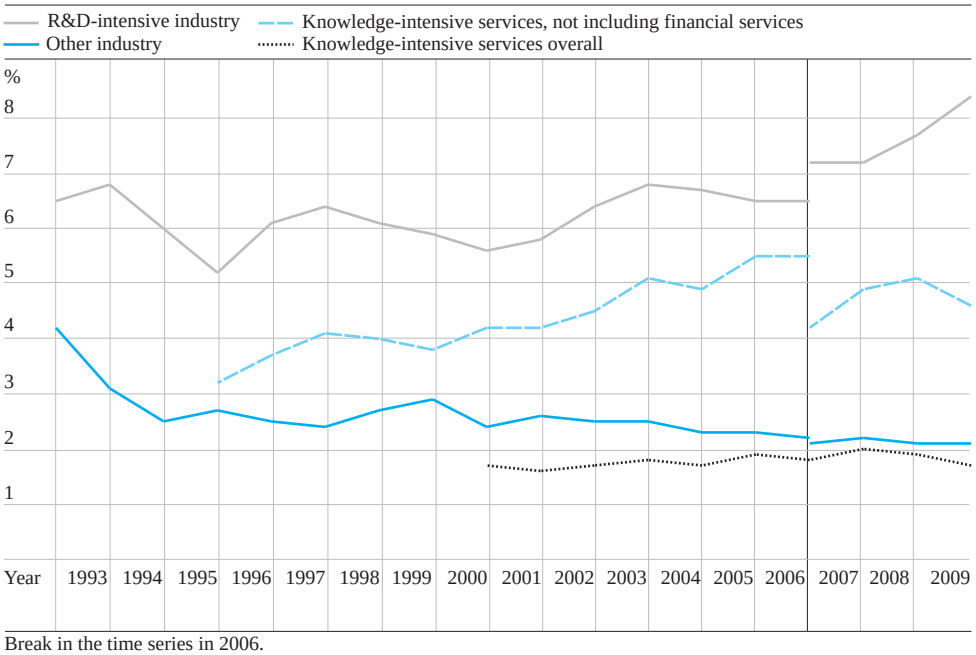
Share of companies with continuous or occasional R&D activities: Innovation-active companies that, over the previous three-year period, pursued R&D either continuously or occasionally.

R&D participation highest in R&D services and the chemical and pharmaceutical industries

Companies that wish to introduce new products that differ from existing products must normally carry out their own research and development. Consequently, R&D participation of companies is an indicator of the degree to which companies orient their innovation strategies to bringing original innovations to the market, rather than simply adopting innovative ideas of other companies. In 2009, some 59 percent of all companies in R&D-intensive industry carried out research and development. The relevant shares were particularly high in the chemical and pharmaceutical industries. In that sectoral group, the overall share decreased by 4 percentage points with regard to 2008, however. While the share of companies with continuous R&D slightly increased (from 40 to 41 percent), the share of companies with only occasional research activities decreased by 5 percentage points (from 23 to 18 percent). In other industry, the percentage share for companies with continuous R&D (12 percent) was lower than that for companies with occasional R&D (14 percent). Those figures were hardly changed from the corresponding figures for the previous year. In knowledge-intensive services, on the other hand, R&D participation decreased markedly during the same period. The percentage share for companies with continuous R&D decreased by 3 percentage points (from 17 to 14 percent), and the share for companies with occasional R&D decreased by 2 percentage points (from 11 to 9 percent). Overall, some 22 percent of all companies in this sectoral group carry out continuous or occasional R&D.

INNOVATION INTENSITY IN GERMANY'S INDUSTRY AND KNOWLEDGE-INTENSIVE SERVICES

C 3–3



Break in the time series in 2006.
Source: Mannheim Innovation Panel. Calculations of the ZEW.

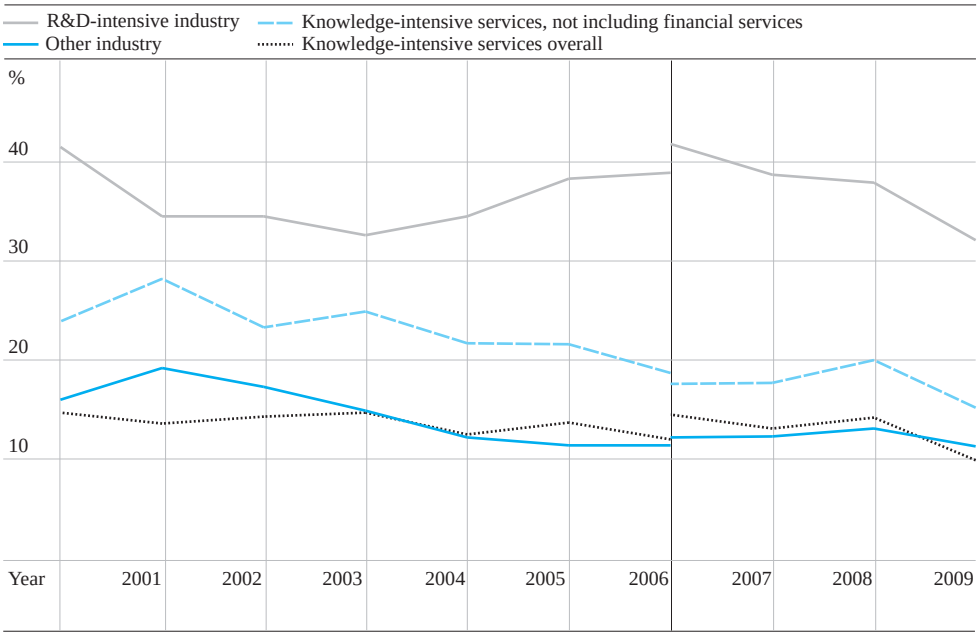
Innovation intensity: Companies' innovation expenditures in relation to total revenue.

During the crisis, innovation expenditures did not fall as sharply as revenue did

In 2009, companies in R&D-intensive industry, other industry and knowledge-intensive services spent a total of EUR 101 billion on internal and external R&D, patents and licenses, innovation-related machinery and equipment, product design, market introduction of new products and other innovation-related goods and services. The corresponding figure for the previous year was EUR 114 billion. The main reason for the sharp decrease of 12 percent is that investment-related innovation expenditures fell strongly.

In 2009, revenue in the three sectoral groups under consideration fell even more strongly than did innovation expenditures. As a result, innovation intensity increased from 3.8 to 3.9 percent during the crisis year. That intensity increased particularly sharply in R&D-intensive industry, where it reached the highest level, 8.4 percent, seen during the period under study (1992–2009). Within that sectoral group, the pharmaceutical industry, and the areas of electronics, measurement technology and optics had the highest innovation intensities (14.4 and 12.0 percent, respectively). In the other industry, innovation intensity remained where it had been in the previous year, at 2.1 percent. In knowledge-intensive services, it decreased, during the same period, from 1.9 to 1.7 percent. Within that sectoral group, innovation intensity in R&D services was especially high, at 36.7 percent.

C 3–4 PROPORTION OF REVENUE ACHIEVED WITH NEW PRODUCTS IN GERMANY'S INDUSTRY AND KNOWLEDGE-INTENSIVE SERVICES



Break in the time series in 2006.
Source: Mannheim Innovation Panel. Calculations of the ZEW.

Proportion of revenue achieved with new products: Revenue with new or significantly improved products introduced by innovating companies in the past three years, for the first time, in relation to total revenue.

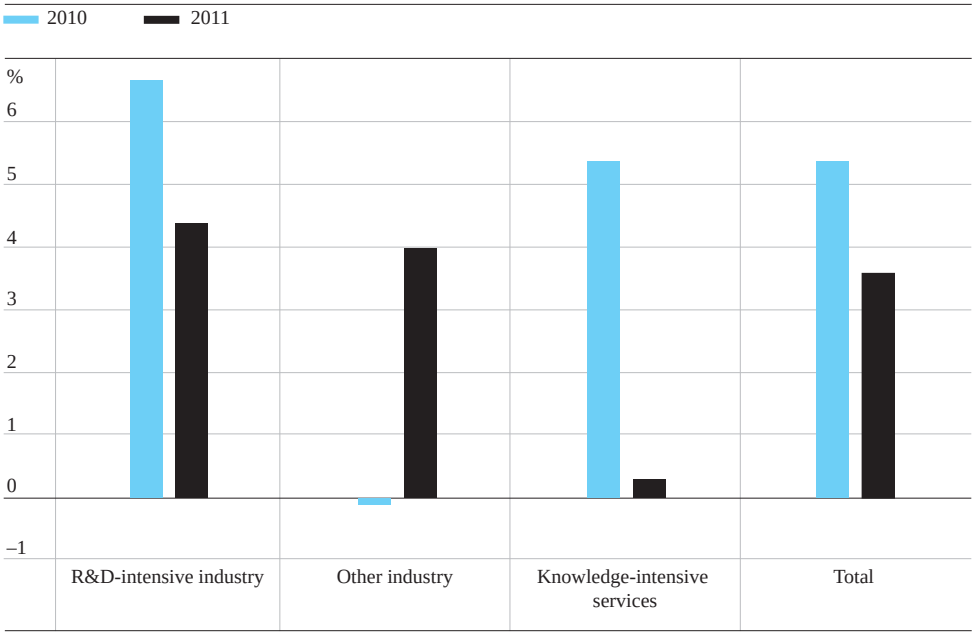
Marked decrease in revenue with derivative innovations

Revenue shares with new products, including both new products on the market and derivative innovations, decreased in 2009 in all three sectoral groups considered. In R&D-intensive industry, it decreased by 6 percentage points with respect to the previous year (from 38 to 32 percent). The highest relevant shares in this sectoral group were seen in the automotive industry (48 percent) and in the areas of electronics, measurement technology and optics (39 percent). In other industry, only 11 percent of revenue was earned with new products in 2009; the corresponding figure for the previous year was 13 percent. In knowledge-intensive services, the share decreased, during the same period, from 14 to 10 percent. When financial services are excluded from that category, the decrease was from 20 to 15 percent. The sectors in this sectoral group that generate the largest revenue shares with new products are R&D services and IT / telecommunications.

The smaller new-product revenue shares overall are the result of markedly decreased revenue with derivative innovations. During the crisis, many companies may well have opted not to introduce new products of that type. What is more, customer demand for standard products, oriented to keeping costs down, may have grown. On the other hand, the revenue share earned with new products on the market increased slightly in 2009. While relevant absolute revenue decreased in that category as well, the general drop in revenue was larger.

PLANNED INNOVATION EXPENDITURE IN GERMANY'S INDUSTRY AND KNOWLEDGE-INTENSIVE SERVICES

C 3–5



Values based on companies' planning data from spring and summer of 2010.
Source: Mannheim Innovation Panel. Calculations of the ZEW.

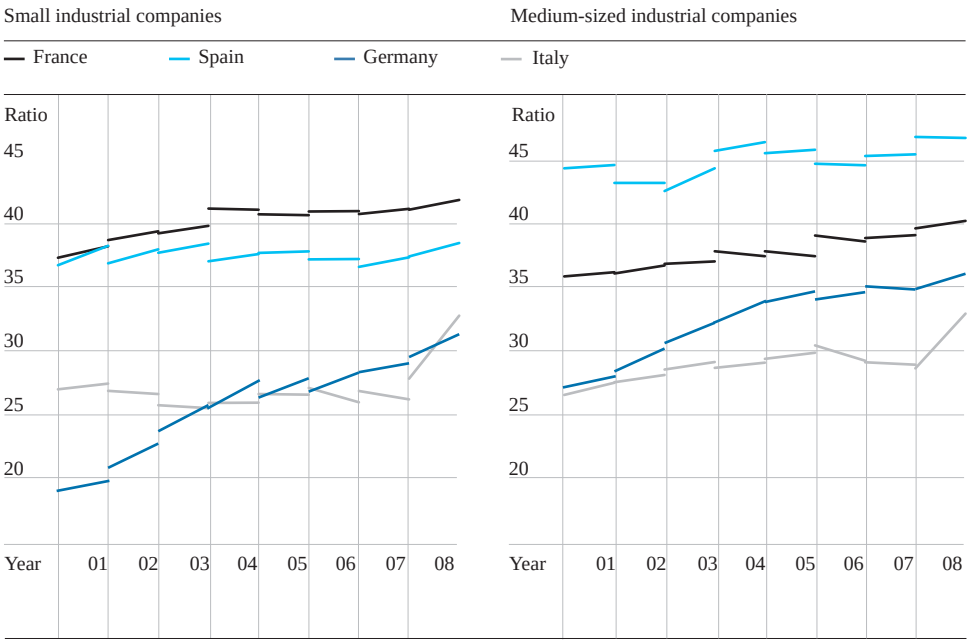
Planned innovation expenditures: Data, obtained from companies' planning figures, regarding changes in innovation-related expenditures, with regard to the previous year.

Innovation expenditures in 2010 not yet back up to their 2008 level

No data has become available to date showing how innovation expenditures have developed following the end of the economic and financial crisis. The latest innovation indicators cover only the period up to 2009. For 2010 and 2011, relevant company planning data are available from spring and summer of 2010.[351] In all likelihood, innovation expenditures increased again in 2010. The planning figures show that companies in R&D-intensive industry, other industry and knowledge-intensive services increased their innovation budgets by a total of 5.4 percent, to EUR 106.5 billion. The increase does not yet compensate for the strong decrease seen in 2009, and thus expenditures can be expected to still be considerably below innovation expenditures of 2008 (EUR 114 billion). For 2011, the pertinent companies are planning to increase their innovation budgets by an additional 3.6 percent. Even if that increase occurs, innovation expenditures would still be nearly 4 percent below the value for 2008.

For R&D-intensive industry, the planning figures for 2010 and 2011 indicate that above-average growth in innovation budgets can be expected, with the result that that sectoral group's innovation expenditures in 2011 will be back up to their 2008 level. Companies in other industry areas are not planning to increase their innovation budgets until 2011. In the area of knowledge-intensive services, planning called for innovation budgets to rise in 2010. No further increase is planned for 2011, however.

C 3–6 EQUITY RATIOS OF SMALL AND MEDIUM-SIZED ENTERPRISES[352]



Source: BACH-ESD. *Banque de France*. Own depiction.

Equity ratio: A company's equity in relation to its balance-sheet total.

Increasing equity ratios in German companies

Equity ratios of small and medium-sized industrial companies in Germany have been growing since the beginning of the millennium. Companies have been increasing their equity ratios in preparation for, and in response to, the equity-ratio regulations (*Basel II*) that banks have had to apply throughout the EU since 2007.[353]

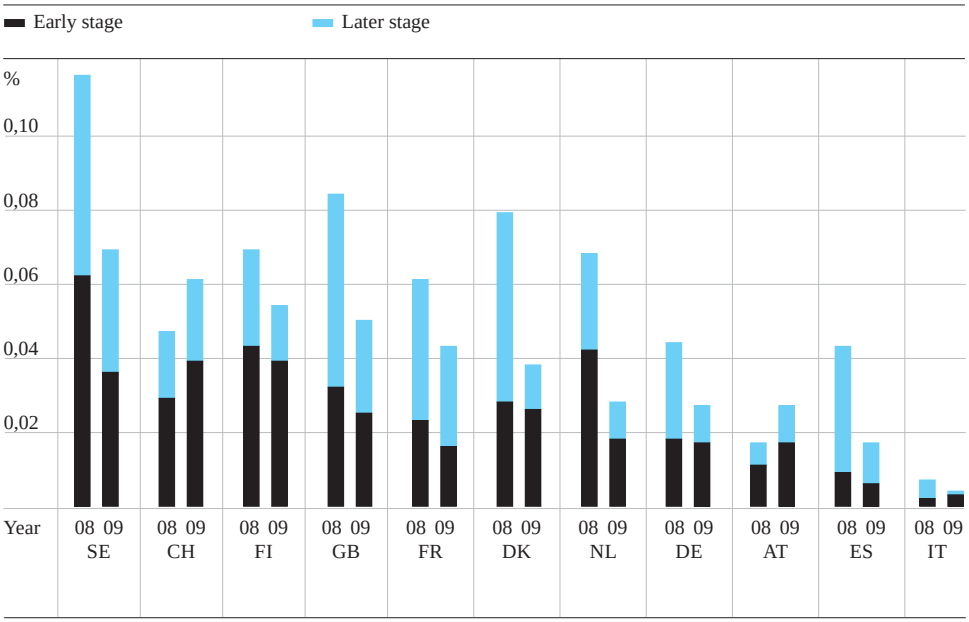
In Germany, small industrial companies tend to have considerably lower equity ratios than medium-sized companies. Small companies thus find it more difficult to finance innovation processes.

An international comparison shows that German and Italian companies – especially small companies – have lower equity ratios than French and Spanish companies. This can be explained as follows:[354]

- In Germany and in Italy, creditors enjoy better protection than they do in France and Spain and are thus less averse to taking risks. That, in turn, makes it easier for companies in Germany and Italy to find creditors. And that leads to lower equity ratios for such companies.
- In Germany, companies tend to have close and long-lasting relationships with their principal banks. As a result, principal banks tend to be well-informed about their customer companies, and that enables them to offer lower interest and easier access to loans.
- Differences in tax models can also explain some of the differences in equity ratios.

VENTURE-CAPITAL INVESTMENTS AS A PERCENTAGE OF GDP (INVESTMENTS DETERMINED ON THE BASIS OF COMPANIES' LOCATIONS)

C 3–7



The early stage comprises the phases "seed" and "start-up".
Source: EVCA (2010). Eurostat. Own calculations.

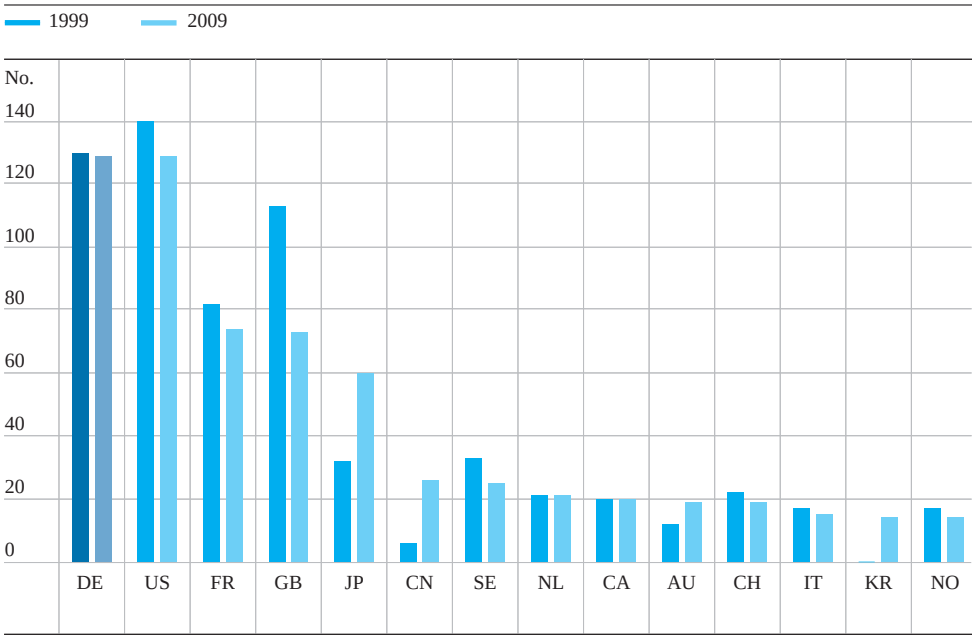
Venture capital: Time-limited equity participation in young, innovative, unlisted companies.[355]

Sharp drop in venture capital investments during the crisis

Venture capital plays a decisive role in providing young, innovative companies with the capital base they need. Tax-based incentives are particularly suited as instruments for mobilising venture capital. Such incentives are too weak in Germany, however. For that reason, the venture-capital market is underdeveloped. During the crisis, investment volumes, already rather low, dropped sharply. In the crisis year 2009, venture-capital investments in German companies reached a volume of EUR 647 million. That figure represented a drop of nearly 42 percent with respect to 2008. The venture-capital market fell especially sharply in the "later-stage" area, in which the investment volume amounted to hardly more than one-third the previous year's level.

In 2009, venture-capital investments were equivalent to 0.027 percent of Germany's gross domestic product. Among the five largest European economies, Germany thus occupies a middle position at best in this category. The countries that had the highest shares of venture-capital investments in 2009, expressed as percentages of GDP, were Sweden (0.069 percent) and Switzerland (0.061 percent). The rates for the UK and France, 0.050 and 0.043 percent, respectively, were also considerably higher than the rate for Germany. In comparison to Germany, both of those countries offer much more extensive tax incentives for such investments. The levels for Spain and Italy, 0.016 and 0.004 percent, respectively, were lower than the level for Germany.

C 3–8 NUMBER OF ASSIGNED SECRETARIATS FOR ISO TECHNICAL COMMITTEES AND SUBCOMMITTEES



Source: ISO (2000 and 2010). Own compilation.

Standardisation: Standardisation of important characteristics of products, processes and services.

Germany strongly committed to, and involved in, international standardisation

Standardisation play an important role in commercialisation of innovative technologies in cases in which different implementation options are available or the actions of different actors have to be co-ordinated. At the international level, standards are developed by the committees of the International Organization for Standardization (ISO). By participating in such committees, a country can significantly influence global technical infrastructures. Such participation significantly reduces adaptation costs for the country's companies, and thereby generates competitive advantages.[356] What is more, co-operation in international standardisation processes makes it possible to support national preferences in standards of quality, safety and environmental aspects. In 2009, the ISO had a total of 740 technical committees and subcommittees. In that same year, the German Institute for Standardization (DIN), which represents Germany in the ISO, had been assigned the secretariats of 129 technical committees and subcommittees. Among other countries, only the U.S. shows similar commitment. The number of secretariats managed by DIN has remained nearly constant since 1999. The U.S., France and the UK have all cut back their own involvement. On the other hand, Japan, China, Australia and Korea have significantly increased the number of secretariats assigned to them. The Asian region (including Oceania) has been gaining increasing influence in development of international standards.