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KfW SME Panel 2013: How German SMEs finance their innovations

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SMEs in Germany spend just under EUR 60 billion on innovations. Around EUR 16 billion of this is contributed solely by those small companies with less than five employees, which often receive very little attention. The range of innovation expenditure per innovative company varies significantly: from an average of EUR 22 thousand in companies with fewer than five employees to EUR 1.1 million in companies with 50 or more employees.

However, SMEs cannot keep up with the innovation performance of large companies because their innovation efforts are being hindered in particular by the difficulties they face to obtain external financing for their projects. The special features of innovation projects – such as a high degree of uncertainty concerning success, a small proportion of tangible assets and special project-size requirements – are obstacles to external financing, especially credit financing.

Bank loans therefore play only a minor role, making up 7% of financing for innovation expenditure. Yet there are also virtually no alternative external sources of financing available in Germany's traditionally bank-oriented finance system. So SMEs finance 79% of their innovations from internal funds. This dependency means that small companies and firms with technologically demanding projects in particular are unable to fully develop their innovative strength.

As a consequence, SMEs are investing too little in innovations. In particular, basic innovations are rarely developed. Promoting innovation is thus a long-term task for economic policy.

Innovations are the driver behind long-term economic growth.¹ New and improved products and production processes drive structural change forward and boost an economy's competitiveness on the global markets. Especially a country like Germany, which is poor in natural resources yet has a high standard of living, is only able to compete internationally if it sets itself apart from its competitors by offering customers a range of high-quality goods that deliver superior solutions to problems.

Permanently higher investments in research and development are also needed to overcome the social and economic challenges that go hand-in-hand with demographic trends, climate change and resource shortages.

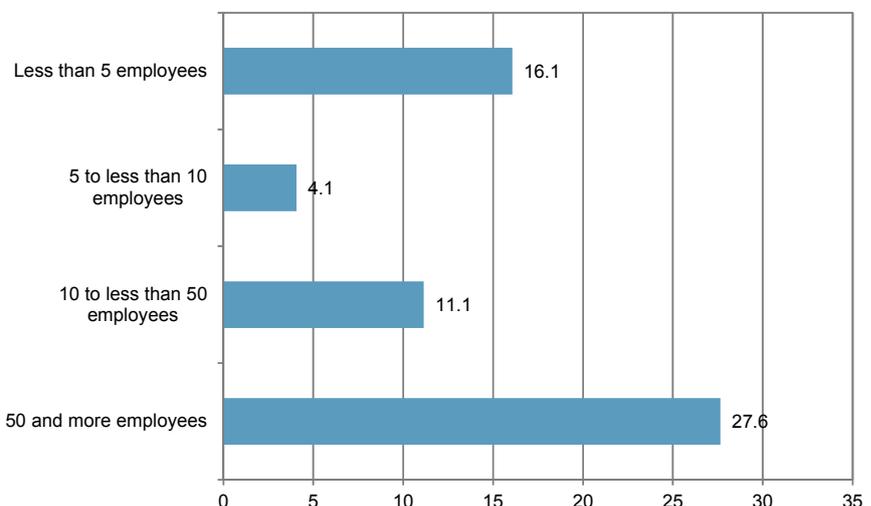
SMEs' innovation activities make a considerable contribution to the innovation performance of the German corporate

sector. In 2012, companies with an annual turnover of up to EUR 500 million invested EUR 59.6 billion in innovations², so the German SME sector is responsible for just under two fifths of the innovation expenditure of German companies.³ But compared with their share of employees (67%) or corporate investments (53%),⁴ SMEs' share of innovation expenditure is disproportionately low. Also, SMEs have not been able to keep pace with the increase in innovation expenditure by large companies over the last few years.⁵

Small companies are making a big contribution

With a total of EUR 27.6 billion, large SMEs with 50 or more employees make up the lion's share of innovation expenditure (see Figure 1). But small companies with fewer than five employees, which often receive very little attention, also account for a substantial proportion of SME innovation expenditure, reaching EUR 16.1 billion. This sizeable contribution made by small companies has less to do with each innovating company's innovation expenditure than it does with the large number of small companies. On average, a small innovating company

Figure 1: Aggregated innovation expenditure in 2012 by firm size (EUR in billions)



Note: Extrapolated with the number of employees. Not including other industries.

Source: KfW SME panel 2013

spent EUR 22 thousand on implementing innovation projects in 2012. In contrast, the corresponding value spent by large SMEs (with 50 or more employees), amounting to around EUR 1.1 million, accounts for around 50 times that (see Figure 2).

Innovation expenditure among SMEs from the manufacturing industry is particularly high. The front-runners are companies in R&D-intensive manufacturing with EUR 550 thousand per innovating company, followed by SMEs in non-R&D-intensive branches of the manufacturing sector, whose innovation expenditure amounts to EUR 434 thousand. Trailing far behind in third place are companies from knowledge-intensive services (spending EUR 223 thousand on average).

Obstacles to financing hamper SMEs

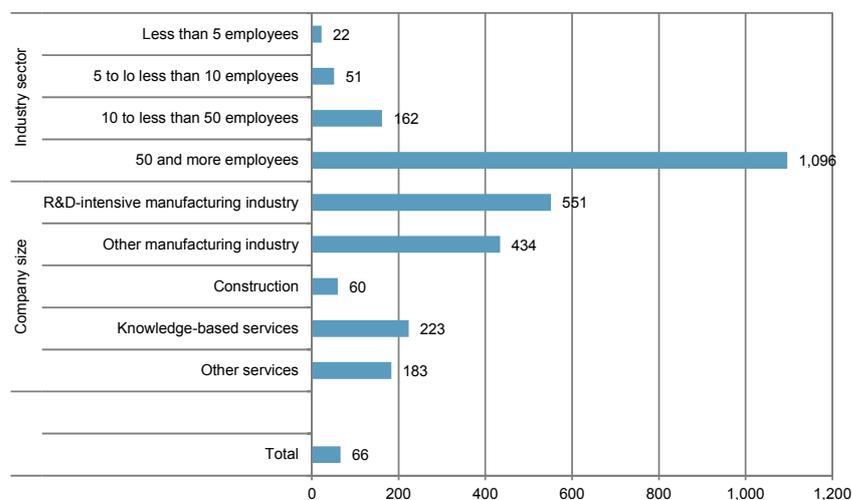
Nevertheless, a variety of obstacles hamper the innovative strength of SMEs. When surveyed, companies name high innovation costs and financing difficulties as the main obstacles to innovation.⁶ Sometimes these can be attributed to the fact that companies often have multiple innovation ideas and must therefore allocate scarce resources to the projects that promise to generate the most returns.

Uncertainty concerning success deters external financiers ...

However, the financing problems mentioned are also an expression of market failure in the financing of innovations. Innovation projects have special features that make external financing difficult, including uncertainty concerning technical feasibility and commercial success (market acceptance, competitors' response), which external financiers in particular are rarely able to assess – or if so, then only by going to extreme lengths to do so. Uneven distribution of information ("information asymmetry") between the company and the potential financier leads to said financier requesting an excessive return (including an "uncertainty premium") for providing the funds or to a refusal to provide financing for innovation projects.⁷

This applies especially for credit financing. Although a lender is exposed to the

Figure 2: Average innovation expenditure in 2012 (EUR thousands)



Note: Only companies with innovation expenditure. Extrapolated with the number of employees. Size classes analysis not including other industries. Industry analysis not including companies with less than 5 (FTE) employees.

Source: KfW SME Panel 2013

high degree of uncertainty concerning success, it does not benefit from the high returns if the project is successful, as the interest rate is fixed regardless of whether or not the project succeeds. This makes it difficult to offset individual losses with successful commitments and limits the average risk that can be incurred in a loan portfolio.

... as does a lack of collateral ...

This reluctance of financiers is reinforced by the fact that innovation projects involve a high share of current expenses such as personnel costs (e. g. for performing R&D activities, for product design and service concepts and for other preparations for production and distribution of innovations) and material. Accordingly, innovation-related spending on plant and equipment and intangible assets (e. g. patents and licences) made up only 34 % of innovation expenditure in 2012.⁸ Also, the small share of investments made in tangible assets, which can be used as collateral, is an obstacle to credit financing.

... and unfavourable project volumes

With respect to developing innovations, small and medium-sized enterprises are also at a disadvantage because of their size:

- The fixed cost nature of innovation

projects places a particularly heavy burden on small companies as a result of their low turnover. As a result, they also often lack the option of diversifying risk by pursuing several innovation projects. The failure of a project therefore often jeopardises a company's very existence, making small enterprises a particularly high-risk exposure in the minds of external financiers, especially if they are financing innovations.

- At the same time, the volumes small companies request are comparatively low from a financier's perspective. For the financier this means an unfavourable ratio between transaction costs and return, often making the commitment not worthwhile, or if so then only when the required return is increased considerably.⁹

Innovation financing: internal funds dominate ...

Accordingly, a significant distinction is made in SMEs between financing innovations and financing investments (see Figure 3). Internal funds are by far the most important source of financing for innovations (such as ongoing cash flow, reserves or cash reserves). Indeed, 79 % of innovation expenditure is financed in this way. To be sure, internal sources make up the lion's share of investment spending too. However, at 49 %, the internal sources in investment financing

are far less dominant than in innovation financing.¹⁰

... while little use is made of bank loans

There are also major differences with regard to the use of bank loans. Bank loans are used to finance only 7% of innovation expenditure, compared with 31% of investment expenditure. Promotional funds (such as subsidised loans, subsidised equity capital, subsidies and grants) make up 10% for innovations and 15% for investments. The remaining 3% (innovations) or 5% (investments) is distributed across other sources of financing, such as mezzanine capital and third-party interests.¹¹

Low volumes make external financing difficult for small companies

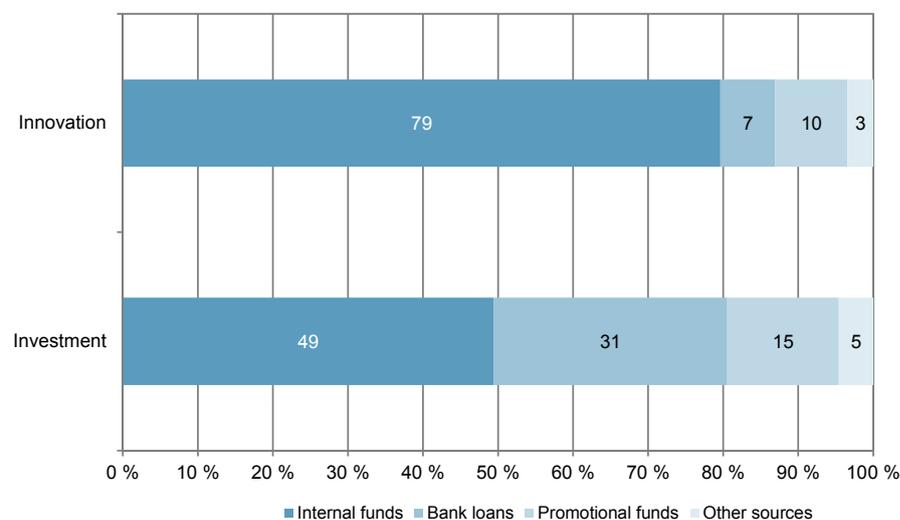
Small and large SMEs in particular finance their innovations using their own funds (see Figure 4). In the case of companies with fewer than five employees, one reason for this could be that they often have worse access to external financing¹² – given the comparatively small volumes from a financier’s perspective, as explained above (see Figure 2), or the lack of potential for diversification in connection with greater difficulties in providing sufficient collateral. With increasing firm size, their access to credit improves. Accordingly, the share of bank loans in innovation expenditure initially increases up to companies with between 10 and 49 employees.

Large companies' pronounced internal financing capability

In contrast, at 87%, the largest share of internal sources is at large SMEs (50 or more employees). This is due to the strong internal financing capability of these companies, which means they can do without external funds. This is especially true because the relative financial burden caused by innovations eases with increasing firm size. Indeed, 69% of innovators with 100 or more employees spend less than 5% of their annual turnover on innovation activities. However, the corresponding share for companies with fewer than 10 employees is 28%.¹³

Figure 3: Comparison of innovation and investment financing

Percentage share of sources of financing in the relevant spending category

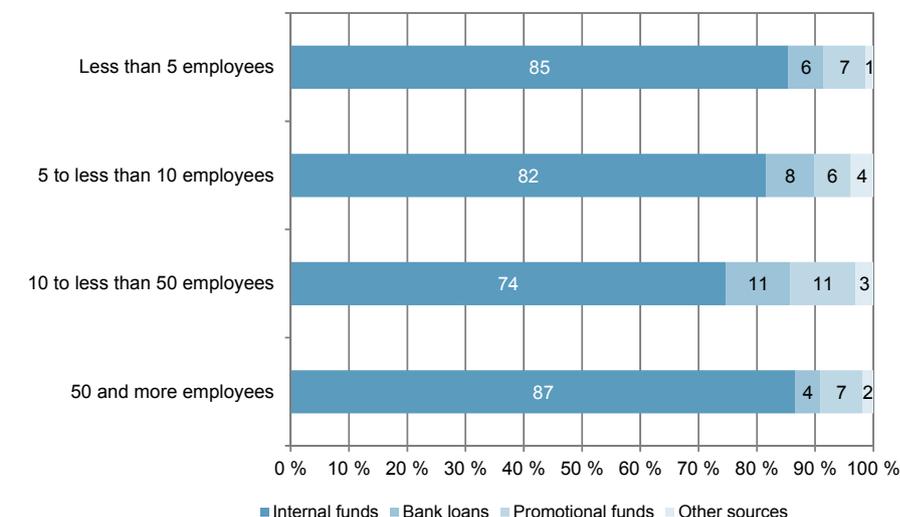


Note: Investment: Only companies with no innovation expenditure. Extrapolated with the number of employees.

Source: KfW SME panel 2013

Figure 4: Innovation financing by firm size

Percentage share of innovation expenditure



Note: Extrapolated with the number of employees.

Source: KfW SME panel 2013

High innovation expenditure requires access to external sources

Internal company funds are typically limited. So, companies can only finance extensive innovation projects if they manage to acquire external funds. This is reflected in the fact that the share of bank loans is more than four times as high, that of promotional funds three times as high, if a company invests 9% or more of its turnover in innovation projects when compared with a company

with an innovation intensity of less than 2% (see Figure 5).

Bank loans have a limited ability to bear risks

In particular, a company's R&D intensity reflects the technology content of innovation activities and can be considered as an indicator of an external financier's uncertainty concerning the project's success. A high R&D intensity is also synonymous with a low amount of in-

vestment-related innovation expenditure and thus with correspondingly fewer new tangible assets for collateral.

Accordingly, the share of bank loans used to finance innovation expenditure decreases as R&D intensity rises (i. e. more spent on R&D in relation to annual turnover). Whereas innovating SMEs without their own internal R&D finance 13% of their innovation expenditure with the help of bank loans, this proportion drops to only 3% in companies with a high R&D intensity (7% or more) (see Figure 6).

SMEs initially have to compensate for the decline in bank loans as R&D intensity increases by making greater use of internal funds. The share of promotional funds only increases to 9% in the case of companies with a high R&D intensity (7% or more). As a result, promotional funds primarily benefit companies that undertake extensive R&D.

High use of promotional funds when developing market novelties

There are virtually no differences between financing new products and financing new production processes (see Figure 7). But this masks different financing patterns for product imitations and (product) market novelties. Product imitations are financed more by internal funds – with moderate use of bank loans and low utilisation promotional funds. Given the lower development costs, a financing mix such as this is probably more feasible for imitations than when developing market novelties.

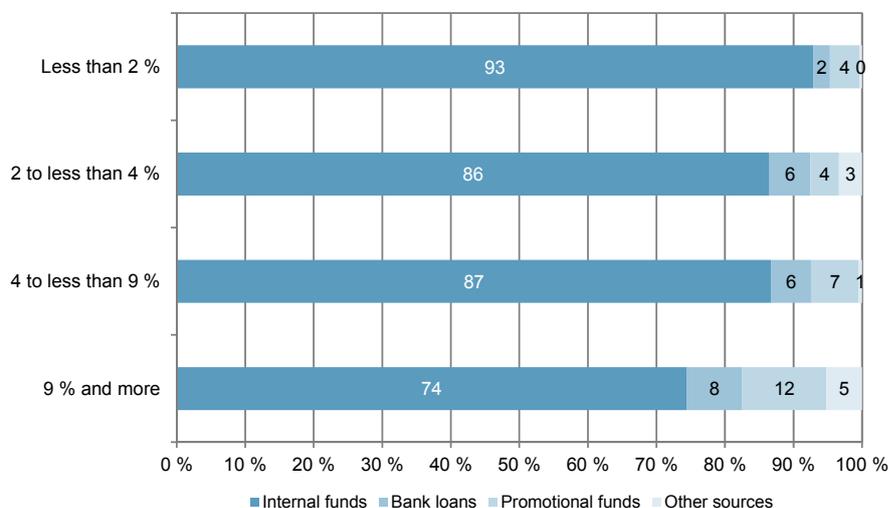
Market novelties, in contrast, represent a greater risk than imitations as far as technical feasibility and market success are concerned. The 3% share of bank loans (half as much) used to finance market novelties compared with imitations might therefore reflect the limited ability of bank loans to bear risks. At 15%, promotional funds play a key role, especially with respect to innovations with a high novelty factor.

Relationship between financial key figures and innovation financing

The options that a company has with respect to financing innovations – whether internally or through bank

Figure 5: Innovation financing by intensity of innovation expenditure

Percentage share of innovation expenditure

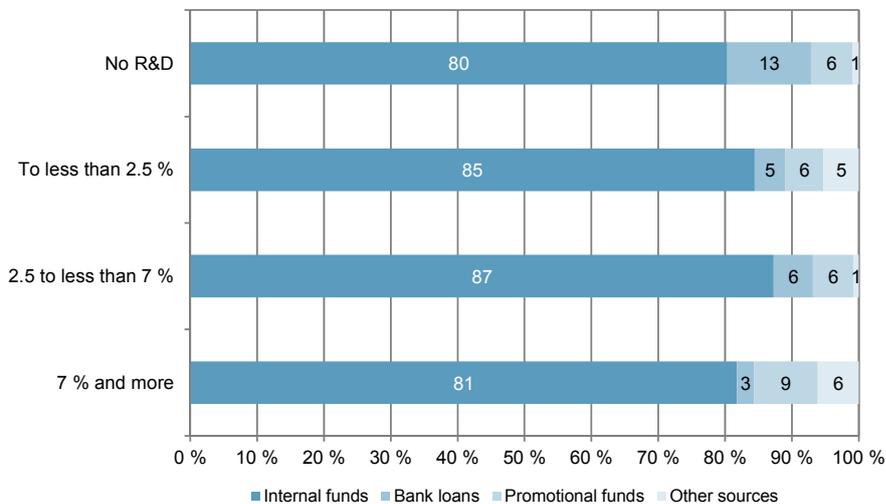


Note: Innovation intensity: Innovation expenditure as a percentage of annual turnover. Extrapolated with the number of employees.

Source: KfW SME panel 2013

Figure 6: Innovation financing by R&D intensity

Percentage share of innovation expenditure



Note: R&D intensity: R&D expenditure as a percentage of annual turnover. Extrapolated with the number of employees.

Source: KfW SME panel 2013

loans – essentially depend on its financial situation. Positive financial key figures translate into a strong internal financing capability. At the same time, the financial situation also determines access to bank loans, given how important it is in assessing the company's credit rating.

For instance, a high equity ratio is an indicator that a company has a good

credit rating and correspondingly good access to loans. At the same time, a high equity ratio also indicates a strong internal financing capability, for instance, because the company was able to retain profits due to positive business performance over the last few years. It is therefore initially unclear which aspect outweighs the other when deciding on financing matters.

As the return on sales rises, the proportion of internal financing in innovation expenditure increases and the proportion of bank loans falls (see Figure 8). With regard to the return on sales, the current availability of internal funds is therefore more important for the financing decision than how they affect the company's credit rating. A company's preference to finance innovations from internal funds may therefore be due to the fact that external investors demand an "uncertainty premium".

However, as the equity ratio rises, the share of internal funds in innovation financing initially decreases, while the share of bank loans increases. This relationship is only reversed in the case of companies with a high equity ratio (40% and more). Bank loans barely play a role at 3%, while the share of internal funds increases to the highest value at 88% (see Figure 9).

To explain this trend: as the equity ratio increases, access to credit improves and initially loans are used more to finance innovations. From a certain equity ratio, however, the company's stronger internal financing capability outweighs all other factors here as well, meaning that it can do without credit financing more often.

Conclusion

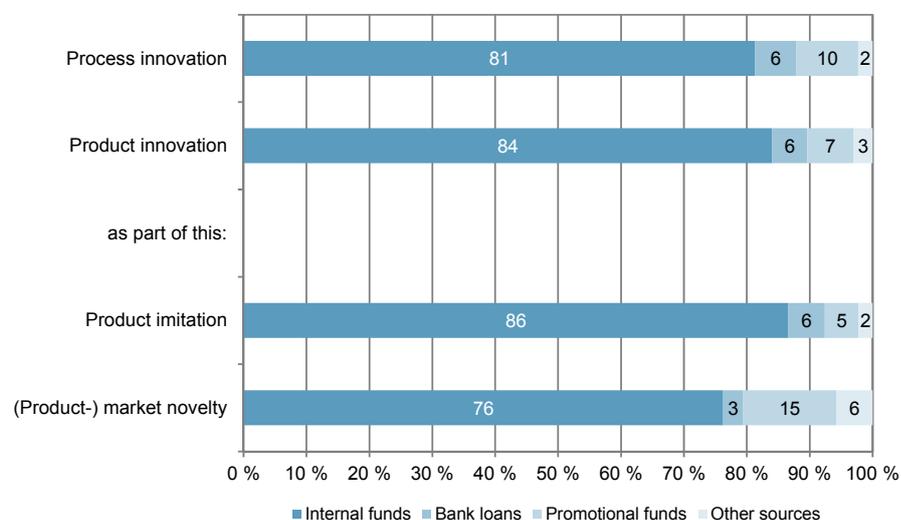
Compared with investments, SMEs only finance a small amount of their innovations using external sources. This is consistent with theoretical considerations whereby special features of innovation projects – such as a high degree of uncertainty concerning success, a small proportion of tangible assets and project-size requirements – are primarily obstacles to external financing using bank loans. Small and highly innovative companies are affected by this in particular.

Also, there are virtually no alternative external sources of financing – such as equity capital – available (at conditions acceptable to companies) in this segment in Germany's traditionally bank-oriented finance system. This makes a company's innovation activities highly dependent on the availability of internal sources. This entails a multitude of drawbacks:

- Internal funds are limited, so compa-

Figure 7: Innovation financing by type of innovation activity

Percentage share of innovation expenditure

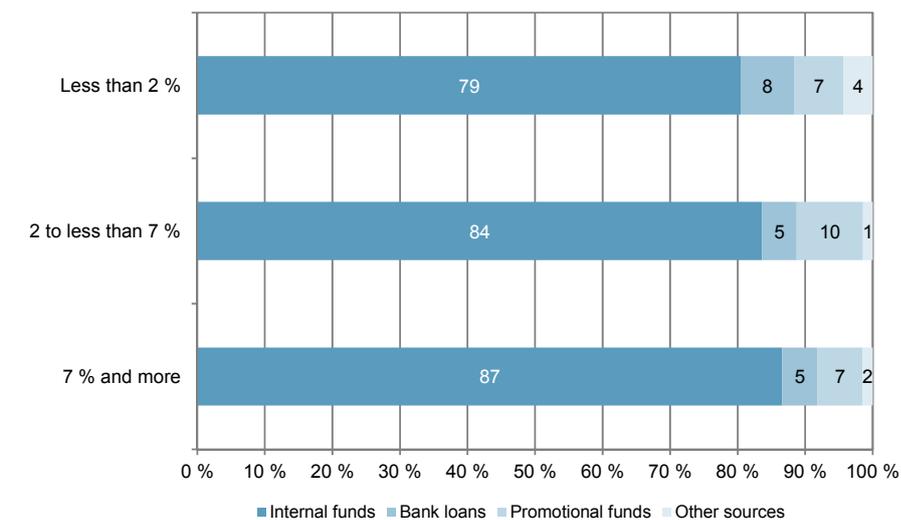


Note: Extrapolated with the number of employees.

Source: KfW SME panel 2013

Figure 8: Innovation financing by returns on sales

Percentage share of innovation expenditure



Note: Extrapolated with the number of employees.

Source: KfW SME panel 2013

nies invest too little in innovations. Too few innovation projects are started, while implemented projects are carried out on a smaller scale than is desirable from a macroeconomic perspective.

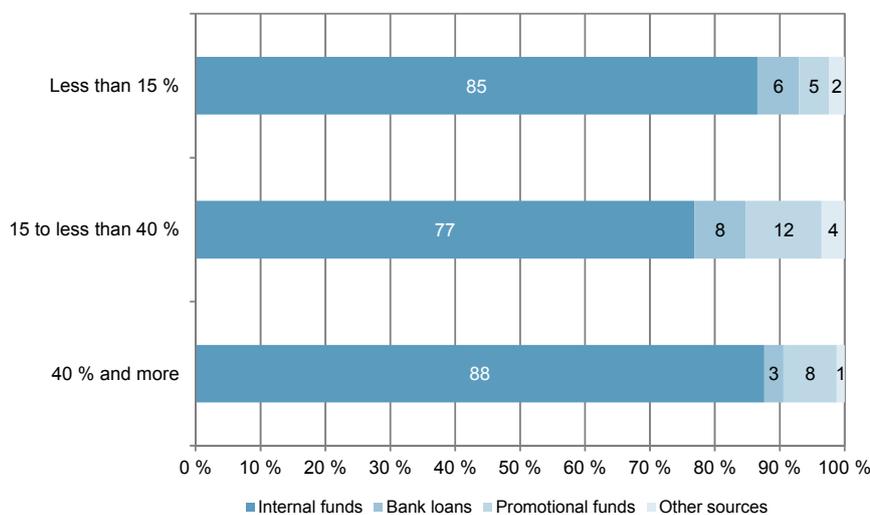
- Innovation patterns must be strongly adapted to the company's current financial situation. Consequently, fewer long-term innovation projects are implemented, while projects that can be realised in the short term are a far more common occurrence. Basic innovations, which are

especially important for Germany's competitiveness in the international arena, are thus developed less frequently. In 2012, the ratio of companies that only made product imitations compared with those that developed market novelties was 4.4 to 1.¹⁴

- If innovation activities have to be scaled back in economically difficult times due to falling profits, the company runs the risk of losing key company-specific know-how due to the loss of

Figure 9: Innovation financing by equity ratio

Percentage share of innovation expenditure



Note: Extrapolated with the number of employees.

Source: KfW SME panel 2013

thus a long-term task for economic policy.

A key task for innovation policy is to help companies that play a leading role in the innovation process and are therefore particularly affected by financing difficulties. The higher use of promotional funds in companies with substantial innovation efforts takes account of the particularly pronounced obstacles to financing that these companies face and of their significance in the innovation system.

Most SMEs pursue strategies geared towards incremental improvements and customer-specific solutions.¹⁶ The innovation efforts of these companies cause innovations to spread in the economy. In particular, they ensure that German SMEs can fulfil their role in the value chain and guarantee that the German economy as a whole is competitive. They, too, are hampered in their innovation activities by obstacles to financing. In addition to promoting "excellence", innovation efforts therefore need to be supported across the entire length and breadth of the SME segment. ■

staff. This then makes it all the more difficult to resume innovation activities once a crisis has been overcome. Already today innovative SMEs in particular attribute their staffing problems to the specific additional qualifications they require.¹⁵ External recruitment will become ever more difficult over the next

few years due to demographic trends – even if companies accept a lack of company-specific know-how.

The problems associated with financing innovations externally indicate that significant potential lies idle due to market imperfections. Promoting innovation is

¹ Cf. Borger, K.; Lüdemann, E.; Zeuner, J. and V. Zimmermann (2013): *Deutschlands Wachstum in der Demografiefalle: Wo ist der Ausgang?* [German growth in the demographic trap: Where is the way out?] KfW Economic Research. Papers and Proceedings, November 2013.

² The study is based on the KfW SME Panel. The KfW SME Panel is a representative, annual survey of companies, with responses from between 10,000 and 15,000 SMEs with annual sales of up to EUR 500 million. In particular, companies with fewer than five employees are also included in the survey because, according to calculations by the KfW SME Panel, they represent more than four fifths of the SMEs in Germany and are generally not included in similar data sets. Cf. Schwartz, M. (2013): *KfW SME Panel 2013. Solider Gesamteindruck trotz Sand im Getriebe* [Solid overall impression, despite sand in the works] KfW Economic Research.

³ This figure is a rough estimation based on the value calculated with the Mannheim Innovation Panel, supplemented by the figures for the construction sector, "other economic sectors" and companies with fewer than five employees (= employed individuals plus active owners) provided by the KfW SME Panel.

⁴ Cf. Schwartz, M. (2013): *KfW SME Panel 2013. Solider Gesamteindruck trotz Sand im Getriebe* [Solid overall impression, despite sand in the works] KfW Economic Research.

⁵ Cf. Rammer, C. et al. (2014): *Innovationsverhalten der deutschen Wirtschaft. Indikatorenbericht zur Innovationserhebung 2013* [Innovation patterns in German business. Indicator Report for the Innovation Survey 2013]. With respect to the SME innovation activity trend, cf. Zimmermann, V. (2014): *KfW SME Panel 2013: Innovationen. Steht der Mittelstand endlich in den Startlöchern?* [Innovations. Are German SMEs finally in the starting blocks?] KfW Economic Research. Focus No. 42, 30 January 2014.

⁶ Cf. e.g. Zimmermann, V. (2012): *Innovationshemmnisse im Mittelstand* [Barriers to innovation in SMEs]. KfW Economic Research. Focus on Economics No. 6, September 2012 or Arend, J. and V. Zimmermann (2009): *Innovationshemmnisse bei kleinen und mittleren Unternehmen* [Innovation obstacles in small and medium-sized enterprises]. KfW Economic Research. SME and structural policy 43: 57–95.

⁷ Aside from this, it is often impossible to sufficiently protect innovation results against use by third parties. Competitors can often use the knowledge acquired to develop their own ideas or to imitate the innovation at low cost ("knowledge spillovers"). Consequently, the returns are split between the initial innovator and the imitator, while the initial innovator has to bear most of the costs. Spillovers therefore create an unfavourable cost-benefit ratio for the initial innovator, such that the innovation costs may appear too high from a microeconomic perspective and the company shies away from developing innovations. Formal intellectual property rights may well limit potential use by third parties, yet they do not offer comprehensive protection. Not all innovations, for example, are patentable. Loss of staff is also a key channel for spillovers. As an innovation activity can build on another company's existing product or manufacturing process, the publication of patents even contributes to the disclosure and dissemination of existing technical knowledge. For SME protection strategies, cf. Zimmermann and Thomä (2012): *Innovationsschutz im Mittelstand: Strategien und deren Bestimmungsfaktoren* [Protecting innovations in SMEs: Strategies and their determinants], KfW Economic Research. Points of View No. 16, March 2012.

⁸ Vgl. Rammer, C. et al. (2014): *Innovationsverhalten der deutschen Wirtschaft. Indikatorenbericht zur Innovationserhebung 2013* [Innovation patterns in German business. Indicator Report of the Innovation Survey 2013]. Innovation spending also covers external R&D and training projects connected with innovations and their market launch.

⁹ Equity capital financing in particular thus often requires comparatively high financing volumes and strong prospects for growth, which are somewhat rare in innovative medium-sized companies.

¹⁰ As there are overlaps between investments and innovations, only companies that had not spent anything on innovations were considered for the investment comparison.

¹¹ Including the "Other" sources of finance category. These sources of financing are not taken into consideration in the further analysis given the low number of cases.

¹² Cf. Zimmermann, V. (2013): Company survey 2013. *Trotz schwacher Konjunktur Unternehmensfinanzierung stabil* [Corporate financing stable despite weak economic conditions]. KfW special publication or Schwartz, M. (2013): KfW SME Panel 2013. *Solider Gesamteindruck trotz Sand im Getriebe* [Solid overall impression, despite sand in the works] KfW Economic Research.

¹³ Cf. Zimmermann, V. (2014): KfW SME Panel 2013: Innovationen. *Steht der Mittelstand endlich in den Startlöchern?* [Innovations. Are SMEs finally in the starting blocks?] KfW Economic Research. Fokus No. 42, 30 January 2014.

¹⁴ Cf. Zimmermann, V. (2014): KfW SME Panel 2013: *Innovationen. Steht der Mittelstand endlich in den Startlöchern?* [Innovations. Are German SMEs finally in the starting blocks?] KfW Economic Research. Fokus No. 42, 30 January 2014.

¹⁵ Cf. Reize, F. (2011): *Fachkräftemangel im Mittelstand: generelles oder partielles Problem?* [Shortages of skilled workers in SMEs: A general or partial problem?] KfW Economic Research. Standards No. 41, May 2011.

¹⁶ Cf. Zimmermann, V. (2012): *To be the Leader of the Pack? Innovationsstrategien im Mittelstand* [To be the Leader of the Pack? Innovation strategies in the German SME sector]. KfW Economic Research. Fokus No. 11, 28 November 2012.