

# Focus on Economics

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## Have the old still got what it takes? Differences in the innovative output of young and old entrepreneurs

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There has been a shift in the age distribution of the self-employed in Germany in favour of older entrepreneurs. Given current demographic developments, this process is set to continue over the coming years.

Is this trend impacting on levels of innovation? Not in terms of products, but with regard to processes. Companies managed by older entrepreneurs launch innovations considerably less frequently – in fact, the probability of new innovations being generated falls by almost 16% if the entrepreneur in question is older than 60 compared with the under-35 age group. This does not mean, however, that older entrepreneurs generally distance themselves from innovative activity. Rather, the sales prospects associated with product innovations continue to be embraced. However, process innovations – such as the renewal of plant and equipment or production installations – are more frequently neglected due to the comparatively long amortisation periods involved.

The ageing of the entrepreneurial population can therefore be expected to have a negative impact on the way in which SMEs' productivity levels develop in particular, whilst being less relevant to product ranges and how up-to-date these are. This makes the companies more vulnerable to economic cycles and slows down wage increases.

Germany's population is set to become older over the next decades and, immigration aside, is falling significantly. The

decline is at its most marked in the section of the population who are of working age, resulting in a clear deterioration in the ratio of working age people to older members of society. Consequently, growth potential is falling, in the absence of any countermeasures.<sup>1</sup>

One means of countering this trend is to expedite technical progress through greater innovation efforts.<sup>2</sup> Yet entrepreneurs and their innovative employees are also getting older. This can have repercussions for the innovation-based activities of the companies themselves. The development of new technologies and their implementation within companies – as well as depending on the material resources made available – also hinges on the skills and incentives of the individuals concerned. Obviously, these factors change with age. Therefore, the impact of ageing employees on innovative performance has already been in-

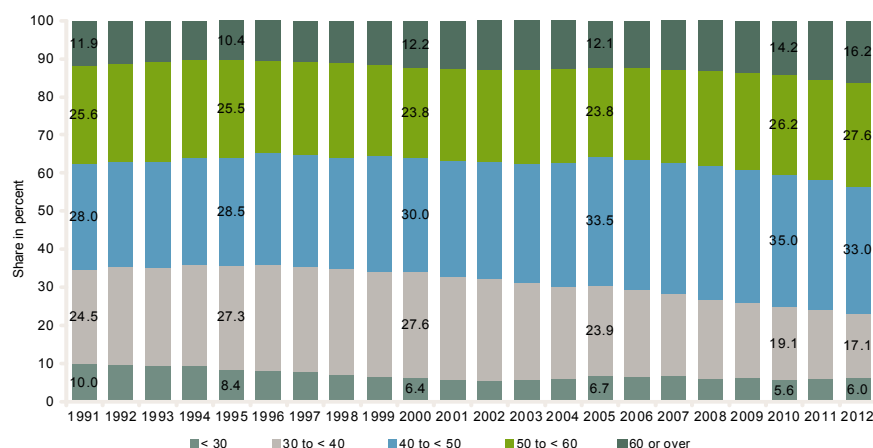
vestigated many times. Here, for the first time, the focus is on the entrepreneur.

### The ageing of Germany's entrepreneurship

The age distribution of Germany's self-employed has shifted since the mid-1990s in favour of the older age classes (see Figure 1): whilst 36.9% of the self-employed were younger than 40 in 1995, this percentage had fallen to just 23.1% by 2012. In particular, the proportion of self-employed people aged 50 or older has increased considerably since 2005, up from 35.9 to 43.8% (2012). This change can be attributed to an increase in the age of those setting up new business (in some market segments), various boom years for the creation of new companies (e. g. following German unification or at the turn of the millennium) and not least demographic developments.<sup>3</sup> This results in a smaller potential pool from which to recruit entrepreneurs, and therefore in a lack of young up-and-coming entrepreneurial talent.

As the age structure of labour force potential shifts upwards – beyond the exit of the baby boomer generation from the workforce in the 2040s<sup>4</sup> – it is very likely that this trend towards older entrepreneurs will hold up over the coming years.

Figure 1: Age distribution of the self-employed 1991 to 2012



Source: Federal Bureau of Statistics Mikrozensus, own calculations

### Entrepreneurs: Driving innovation activities in the SME sector

Particularly in the SME sector, it is entrepreneurs who have a central role to play in innovation processes. Most innovation projects launched in small and medium-sized companies are down to the person of the company owner (see Figure 2).<sup>5</sup> Leaving aside their role in coming up with new ideas, it is the owners themselves who determine how their companies are organised and their corporate and innovation strategies. Their aims and values, in terms of entrepreneurial spirit and innovative nature, as well as their skills and expertise with regard to formal training, experience, receptiveness to new ideas and creativity, can be expected to shape a company's innovation activities.<sup>6</sup>

### The significance of age for a company's innovation potential

What is the impact of age on the potential to generate innovations? In terms of an individual's intellectual skills, the specialist literature makes a distinction between fluid and crystallised intelligence.<sup>7</sup> Fluid intelligence is important for solving new problems that are occurring for the first time. In contrast, crystallised intelligence encompasses all of the skills that are learnt over a lifetime and / or determined by an individual's environment. These include, for example, experience-based skills and language skills.

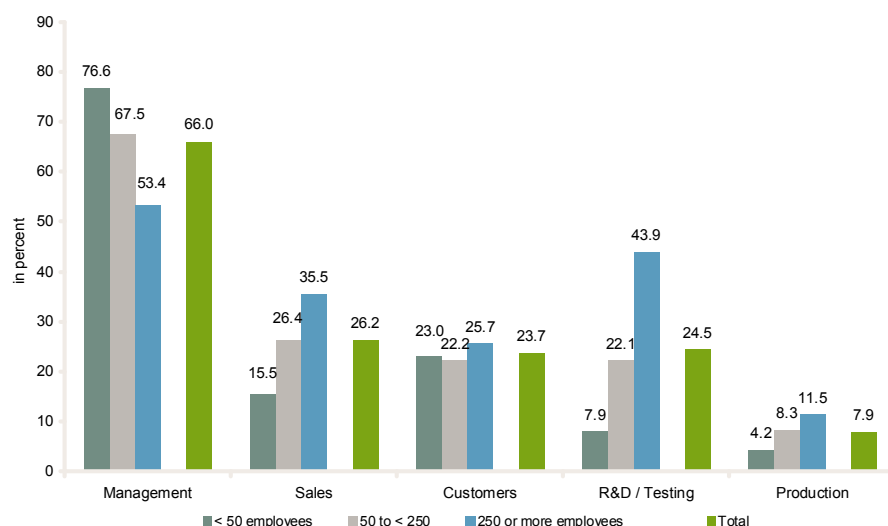
Both types of intelligence develop differently over time. Whilst fluid intelligence successively declines from the age of 30, the crystallised components remain at least stable well into old age. Under certain circumstances, this form of intelligence may actually increase as we get older.

### Waning creativity and receptiveness in old age ...

In terms of a company's innovation potential this means the following: the decline in fluid intelligence that sets in as we age impedes our ability to come up with innovations. The reasons for this include a deterioration in our perceptive faculties, in the speed at which information is processed and in our ability to think in abstract terms, all of which reduce general intellectual capacity.

**Figure 2: Importance of the entrepreneur for innovation activity in the SME sector**

Share of projects supported through the ERP innovation programme according to where initiated



Note: Only the most frequently given responses are shown, respondents were permitted to give more than one answer

Source: KfW Funding Database

### ... but growing experience

However, a company's innovation potential also rests on skills that can be classed as crystallised intelligence, since the innovation process is not just about problem-solving. Rather, filtering processes are also required in that the feasibility of processes needs to be reviewed and a suitable course of action identified. Particularly in decision-making situations – as are typically faced by entrepreneurs – innovation experience, in other words knowledge of past innovation processes and problems, is key to the successful implementation of innovation projects.

Moreover, innovation processes are critically influenced by the communication skills of everyone involved. This is particularly true of innovation processes that involve different business divisions within the company.

### A diminishing planning horizon impedes innovation ...

In terms of the incentive to be innovative, the issue of amortisation periods has a key role to play. Technological and organisational change in the company tend to detract from the existing (long-established) knowledge of the entrepreneur, whilst it becomes more difficult to acquire new knowledge the older we get.

Given that the available time for new knowledge to pay off falls as the company owner grows older, there is less and less incentive for that owner to "invest" in innovation.

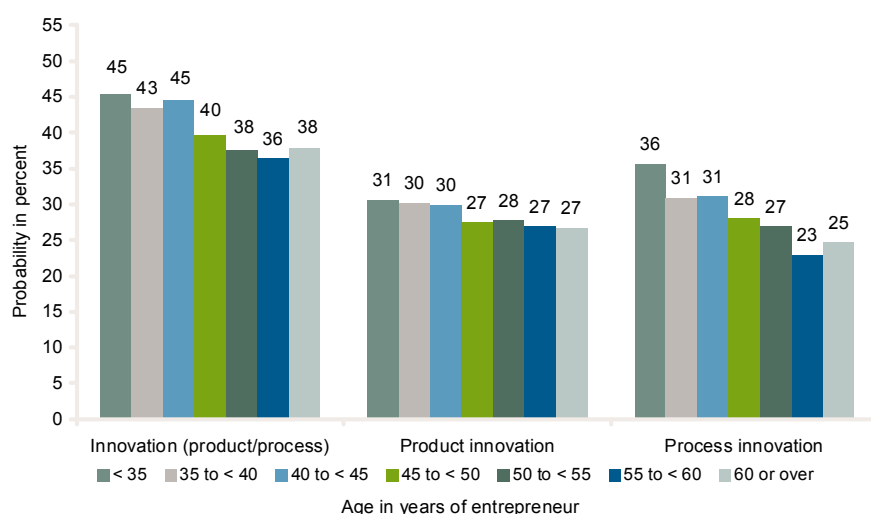
The problem with falling amortisation periods not only applies to investment in human capital but also to investment decision-making in general. Research into company succession has shown that older company owners reduce their investment activity if a handover is imminent. This is because such an owner cannot be sure that whoever takes over the business will value the investment to the same extent and be willing to increase what is paid for the company accordingly.<sup>8</sup> With regard to long-term projects in particular, it is increasingly unlikely that the investment will pay off, with the result that this type of project becomes less frequent as the entrepreneur grows older.

Thus the age of an entrepreneur can either have a conducive effect on innovation or impede it altogether. The question of which effect dominates can ultimately only be determined by means of an empirical study.

### ... and drives innovative output down

Multivariate analysis based on the KfW SME Panel<sup>9</sup> shows that innovation – re-

**Figure 3: Probability to introduce innovations within the company according to age of entrepreneur**



Note: Standard calculation for a typical SME

Source: KfW SME Panel, own calculation

companies' own development of market novelties.

The falls in process innovation are, in contrast, likely to be attributable to the fact that investments in new plant and equipment and in production installations are more frequently neglected given their comparatively long amortisation period and the shorter planning horizon considered by entrepreneurs as they get older.

**Conclusion**

In common with the development in the working population as a whole, the age distribution of the self-employed has shifted in favour of older entrepreneurs over recent years. With demographic developments further restricting the potential workforce from which business owners can recruit, it can be assumed that this process will at least continue over the coming years, if not actually intensify.

As the probability of innovations being created falls, with a difference of almost 16% between the youngest and oldest age groups being considered here, the influence of a company owner's age on the innovative performance of his or her operation is considerable. Above all, process innovations become less frequent as company owners age, whilst there are no proven negative effects on the development of product innovations. Thus the increasing ageing of entrepreneurs can be expected to have a particularly negative impact on the productivity of SMEs. The early entry of a potential successor in the capacity of a partner would help to counter this problem. Then, young and old could work together as a team in order to secure the company's long-term competitiveness and survival. ■

ardless of any distinction between product and process innovation – becomes increasingly rare the older the entrepreneur.<sup>10</sup> There is a probability of around 45% that a company headed by an owner who is younger than 35 will be involved in at least one innovation (see Figure 3).<sup>11</sup> This probability falls to 38% for companies whose owners are aged 60 or older (-15.6%) but otherwise display the same characteristics.<sup>12</sup> With levels of between 40 and 36%, innovation probabilities fall from the age of 45 upwards in particular.<sup>13</sup>

**Differences between product and process innovations**

The age of the company owner does however have different effects on the generation of different types of innovation! At levels of between 31 and 27%, there is only a minor overall decline in product innovations that does not reach statistical significance.<sup>14</sup> Even when dif-

ferentiating according to market innovations and imitations, it is not possible to determine any (statistically) significant reduction in the realisation of product innovations as owners grow older.

In contrast, with regard to process innovations there is a clear (and statistically significant) reduction in innovation probability as company owners get older, from 36% (under-35s) to 25% for entrepreneurs 60 and older (-30.6%).<sup>15</sup>

Therefore, a general withdrawal of older entrepreneurs from innovation activity cannot be established. There are also no indications that the desire or indeed ability to generate innovations and to implement these within the company wane with increasing age. Rather, the findings show that entrepreneurs embrace new sales opportunities based on innovations regardless of their age. This applies both to adopting new product ideas and to

<sup>1</sup> See Borger, K., Lüdemann, E., Zeuner, J. and V. Zimmermann (2013): Deutsches Wirtschaftswachstum in der Demografiefalle: Wo ist der Ausweg? [Germany's growth in the demography trap: Where is the way out?] KfW Economic Research. Papers and Proceedings on Economic, in print.

<sup>2</sup> See Council of Expert Advisors on an assessment of macroeconomic development (2011), Challenges of demographic change. Expert report commissioned by the German Federal Government.

<sup>3</sup> See Metzger, G., Heger, D., Höwer, D. and G. Licht (2010): High-Tech-Gründungen in Deutschland. Zum Mythos des jungen High-Tech-Gründers. [High-tech start-ups in Germany. The myth of the young high-tech entrepreneur] ZEW and Microsoft (Editor) and also Hagen, T. and K. Ullrich (2012): Demografischer Wandel in Deutschland: Auch Gründen ist eine Frage des Alters. [Demographic change in Germany: Start-ups are also a question of age] KfW Economic Research. Focus on Economics No. 7, October 2012.

<sup>4</sup> See Fuchs, J., Söhnlein, D. and B. Weber (2013): Projektion des Arbeitskräfteangebots bis 2050. Rückgang und Alterung sind nicht mehr aufzuhalten. [Projected supply of workers up to 2050. Population decline and ageing can no longer be stopped] IAB brief report 16/2011.

<sup>5</sup> The relatively high proportion of project ideas, at around 25%, emanating from a development or R&D department can be attributed to the fact that the majority of companies promoted within the ERP innovation programme engage in R&D on an ongoing or occasional basis. See Zimmermann, V (2009): ERP-Innovationsprogramm. Innovationsaktivitäten der geförderten Unternehmen [ERP innovation programme. Innovation activities of supported companies]. KfW-Research. Akzente No. 14, December 2009.

<sup>6</sup> See the literature overview in Andries, P. and D. Czarnitzki (2012): Small Firm Innovation Performance and Employee Involvement. ZEW Discussion Paper No.12-013.

<sup>7</sup> See in detail Schneider, L. (2010): Alterung und Arbeitsmarkt: Eine Untersuchung zum Einfluss des Alters von Beschäftigten auf Produktivität, Innovation und Mobilität. [Ageing and the labour market: An investigation of the influence of workers' age on productivity, innovation and mobility].

<sup>8</sup> This can apply for example if the person taking over the company is looking to take the commercial activity in a new direction. In literature, the phenomenon of a reduction in investment activity in the run-up to a take-over is referred to as the "shadow of succession". See for example the literature overview in Haunschild, L.; Tchouvakhina, M. and A. Werner (2010): Unternehmensnachfolge im Mittelstand: Investitionsverhalten, Finanzierung und Unternehmensentwicklung [Corporate successions in the SME sector: Investment behaviour, finance and corporate development]. KfW Economic Research Standpunkt No. 5, July 2010 and also Diwisch, S. D.; Voithofer, P. and C. R. Weiss (2010): The 'Shadow of Succession' in Family Firms. Discussion Papers SFB International Tax Coordination, Discussion Paper No. 10, WU Vienna University of Economics and Business, Vienna.

<sup>9</sup> The KfW SME Panel is a representative annual company survey with responses from between 10,000 and 15,000 company owners with annual sales of up to EUR 500 million. In particular, the survey also covers companies with fewer than five employees, which according to calculations based on the KfW SME Panel account for more than four fifths of Germany's small and medium-sized enterprises and are generally not included in comparable data sets. See Schwartz, M. (2012): KfW SME Panel 2012: Strong performance – Increasing risks.

<sup>10</sup> Separate probit regression was carried out for the generation of innovations (regardless of any distinction between product and process innovation), product innovations, process innovations, imitating product innovations and (product) market novelties. All explanatory variables are incorporated into the investigation in lags. Due to the high demands for continuity of participants given the 3-year period during which innovation activity is surveyed, a panel procedure is not used and, instead, the method described in Huber, P. J. (1967). The behaviour of maximum likelihood estimates under non-standard conditions. Proceedings of the Fifth Berkeley Symposium on Mathematical Statistics and Probability 1: 221–233 is applied to calculate standard errors. The control variables used in the estimation are size of workforce (in FTE), the age of the company (both in logs), the regional limits of the sales market (50km region, Germany, world), employment of graduates, legal form, membership of a group and sales expectations at the industry level (3-digit level of NACE classification). As well as the age of the company owner, the owner's gender and an academic dummy are also entered. In order to control for the structure of the data collection, the region in which the company is based (eastern or western Germany), support status (supported or not) and the survey wave are also taken into account. Depending on the specification of the regressions, just under 9,000 observations from around 4,700 companies from the four most recent survey waves of the KfW SME Panel can be incorporated into the analysis. The evaluations therefore relate to information on innovation activities during the period from 2006 to 2011.

<sup>11</sup> Based on a three-year period.

<sup>12</sup> These model calculations are based on a 17-year-old company with 15 employees (FTE including owner). These figures correspond to the medians in the sample. The reference company employs graduates and is active across Germany. In terms of sales expectations, the median from the sample is applied. The company is not part of a group, is a limited liability company in terms of its legal status, is located in western Germany, has not been supported by KfW in the past and took part in the 2009 wave of the survey. The company owner is male and holds a university degree.

<sup>13</sup> The slight increase in probability between the age categories "55 to 60 years" and "60 years and over" proves not to be significant. An additional Wald test to check the equality of the underlying regression coefficients does not reject the corresponding null hypothesis.

<sup>14</sup> The t value of the underlying regression coefficient for the "60-year-olds and older" dummy, at -1.22, is a long way off the significance level generally applied.

<sup>15</sup> In line with the results for the general creation of innovations (regardless of the distinction between product and process innovations), the reductions in innovation activity among owners from the age of 45 upwards also prove to be statistically significant in the case of process innovations.