



# Using investment to meet the demographic challenge - on the way to a “knowledge-based industry”

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**The proverbial Golden Years for export-oriented industry appear to be over in Germany’s case. The country is manifestly facing massive challenges. Action is already long overdue. It is not a new insight that our low birth rate is catching up with us. Migration - although it will indeed help to cushion the loss of workers - is not going to prove sufficient. What is required is a rapid expansion and modernisation of the capital stock.**

Germany is in the happy position of being able to embark on this phase with a handsome current-account surplus. The requisite investment can accordingly be financed. The public sector also has fiscal leeway to make its own important contribution in the form of infrastructure enlargement and modernisation, but needs to act quickly to put the required legal framework conditions in place.

Fledgling and smaller-sized enterprises for the most part lack direct market access. What is more, the growing importance of intangible capital goods is giving rise to a new set of special features from a financing point of view. It is still unclear in which direction the financing of intangible goods will go. What does seem certain, by contrast, is that banks will continue to perform an important function in terms of financing up-and-coming companies in a knowledge-based society. But it is possible that their role will change: from being financiers, they may well morph into networkers between established corporations, on the one hand, and a whole ecosystem composed of start-ups, fintechs and other market participants, on the other.

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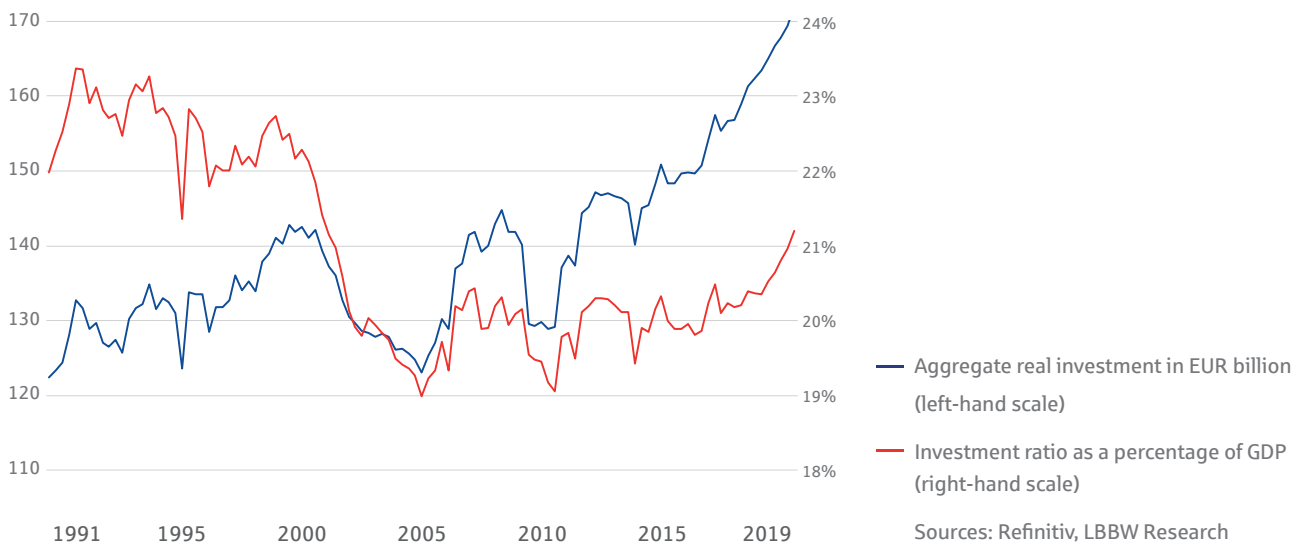
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## Germany in 2019: Population ageing at every turn

A popular thesis contends that Germany's resources, rather than being renewed, are being allowed to simply wear out. The economic successes witnessed in the more recent past - rising employment, substantial current-account surpluses and balanced government budgets - have, so the argument runs, been partly achieved at the expense of the country's infrastructure and hence of coming generations. Various benchmarks can be adduced as evidence of insufficient investment, e.g. the fact that the macroeconomic investment ratio has shifted down structurally since about 2005, only recovering again to some extent very recently (it is true, of course, that the investment ratio was somewhat overstated in the 1990s on account of the task of reconstructing eastern Germany).

## Investment (plant and equipment, construction and other) and investment ratio in Germany



Graphic illustrations of infrastructure wear and tear in Germany are pothole-strewn roads as well as motorway bridges closed to heavy traffic, a case in point here being the A1 between Cologne and Leverkusen.

It is immediately obvious that underinvestment jeopardises growth in the long term. The less capital is available, the lower the production level and, in turn, growth rates will be. It is a fact that growth in labour productivity has already turned out to be very sluggish over the past few years. Conversely, a higher capital input could help, at least in part, to meet the demographic challenge which is taking shape. At the European Central Bank's 2019 Forum on Central Banking in Sintra, Portugal, one panel discussed the consequences of low birth rates for the euro area member countries. In this context, Prof. Börsch-Supan presented the current projections for the effect of migration, inter alia, on the demographic robustness of the pension-insurance system. The conclusion: in order to hold the ratio of pensioners to employed persons (old-age dependency ratio: over 65-year-olds to 20-64-year-olds) steady at the present level of approximately 1:3, annual net immigration of around 1.5 million (if possible, qualified) workers would be required.

Even in the event of (in practical terms, scarcely feasible) annual net immigration of 500,000 persons, the ratio between employed persons and pensioners would still deteriorate considerably in the coming years. What is more, immigration even of that magnitude would probably be politically unacceptable in Germany. Under all halfway realistic scenarios, then, the old-age dependency ratio looks set to increase to around 1:2 by 2030. Progressive population ageing is bound to lead, with mathematical certainty, to mounting burdens. To what extent this is the case will, it is true, be determined by the measures taken to counteract such a development.

Higher investment and a larger capital input, if possible combined with greater endeavours on the research-and-development front, are an imperative for today, tomorrow and beyond. In this connection, it will not suffice to simply maintain the current capital stock; the latter needs, if at all possible, to be expanded and steadily modernised. However, it would certainly be wrong to succumb to any illusions on this score. The example of Japan demonstrates that even a very modern economy cannot compensate for a decline in labour-force potential. Technology is as powerless as immigration to make up for a lack of native-born children. Even if the available technological opportunities are exploited, and even if the capital-accumulation process is accelerated, real growth in production potential is still likely to continue falling - with corresponding consequences for social-security systems and for the available scope for redistribution.

*Capital stock, not just to replace  
but to modernise*

### Taking stock of the capital stock

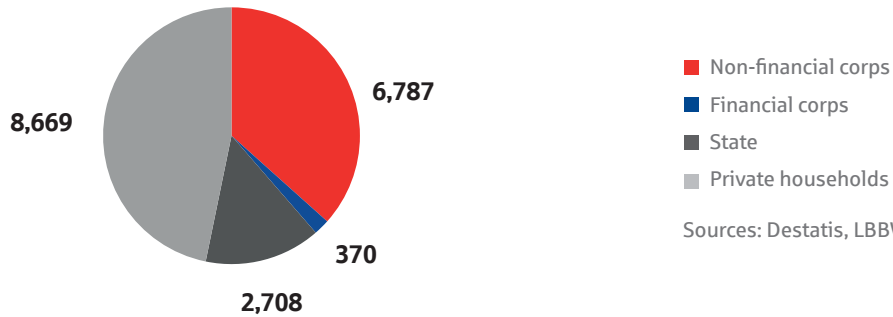
The macroeconomic capital stock can be broken down according to various criteria. It can be disaggregated into private-sector and public-sector, or into tangible fixed assets (basically plant-and-equipment and construction investment) and intellectual property (a category subsuming, amongst other items, the outcomes of research and development, software and copyrights). Basing oneself on the OECD methodology, it would also be possible to frame a broader definition of this type of “intangible capital,” or knowledge-based capital (KBC), and include assets which are not currently captured by the national accounts such as organisational capital, financial innovations, advertisements and brand values.

Likewise part of an economy’s capital are natural resources, whose value is being progressively recognised. However, it appears increasingly uncertain how such “natural portfolio capital” can be used sparingly and sustainably in an era of climate change, air pollution, the sealing of natural surfaces and soil erosion.

Taking stock of an economy’s capital stock is a difficult business because there is no annual inventory-taking in the case of capital. For the most part, the official statistics make do with extrapolating from existing time series. Reporting can be on a gross basis (at replacement cost) or on a net basis (at replacement cost minus accumulated depreciation since acquisition). The most recent “stock-taking” was performed by the Federal Statistical Office (Destatis) for 2017. On a gross basis, the replacement value of fixed assets available for production in the national economy came to EUR 18,534 billion. Tangible assets account for approximately EUR 17,505 billion. Of this sum, EUR 14,941 billion is accounted for by buildings, EUR 8,329 billion of which involve buildings belonging to private households and non-profit organisations. Non-financial corporations possess tangible assets of EUR 5,975 billion, with the lion’s share here too being claimed by buildings (EUR 3,912 billion); equipment accounts for 2,058 billion. The value of intellectual property owned by non-financial corporations is reported at EUR 812 billion. To put the point differently: the capital stock consists predominantly of privately-owned buildings. The portion which is vital in our context comprises the tangible assets owned by companies (non-financial corporations) and by the public sector (in this case, above all infrastructure)..

### *Counting the distinct categories*

**Capital stock (tangible assets) in EUR billion,**  
gross basis, at replacement cost, cut-off date: year-end 2017

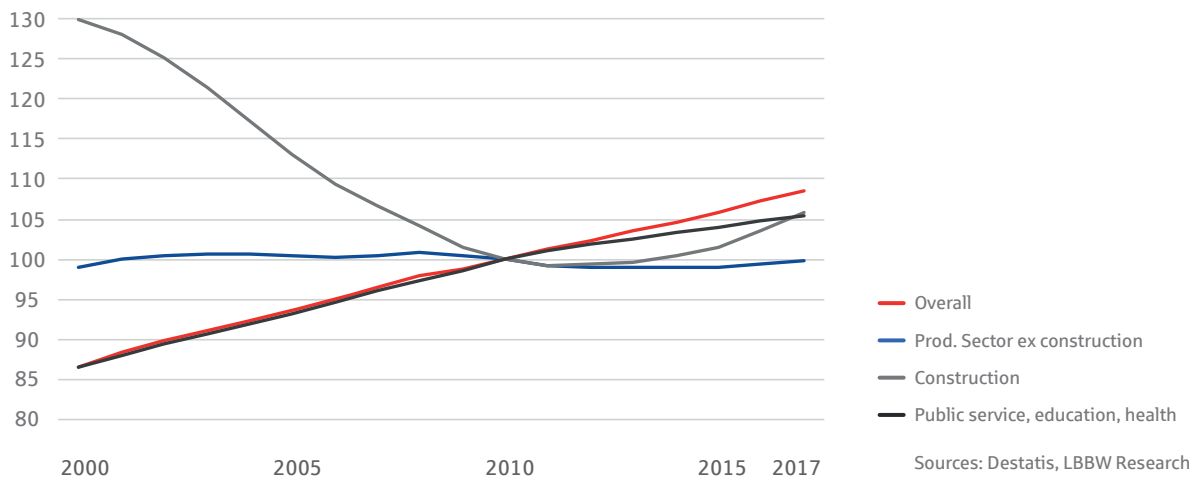


Sources: Destatis, LBBW Research

For longitudinal-comparison purposes, inflation-adjusted time series are available, albeit only as index values, meaning that no cross-checking between the various sub-categories of fixed assets is possible. In real terms, it emerges that the stock of fixed assets has indeed increased, but with significant differences between sectors. For example, the construction industry reduced its stock of fixed assets for a long period starting in 2000, only hesitantly expanding it again during the real-estate boom following the financial crisis. In the producing sector, a sideways movement marked by certain cyclically-related fluctuations is to be observed - a trajectory which may well come as a surprise in view of the economy's multi-year record ride.

*Big differences between sectors*

**Germany: Gross fixed capital stock in selected economic sectors,**  
year-end readings, chain index (2010 = 100)



Sources: Destatis, LBBW Research

### **The capital stock is in urgent need of modernisation**

Fixed assets are subject to the ageing process - direct wear and tear during production contributes to this physically, but so too, on an economic level, do technological progress and regulatory amendments. One metric capturing a capital stock's "degree of modernisation" is the ratio of net fixed assets to gross fixed assets. If this coefficient declines, the inference is that depreciation of existing assets has increased relative to new fixed investment (the net capital stock shrinks in relative terms). The higher the coefficient, by contrast, the more "modern" the capital stock will be because depreciation then only accounts for a comparatively small share of gross investment. According to calculations from the German Economic Institute (IW), the "degree of modernisation" of Germany's fixed assets has never been as low as it is today. The ratio of net fixed assets to gross fixed assets has decreased almost continuously since 1991 - from 0.6 thirty years ago to 0.54 in 2015, the final year of the study in question. This tallies with the trend in the investment ratio and with Destatis' extrapolation of the trend in real tangible assets. A modernisation wave in the industrial sector would therefore appear to be particularly badly needed.

Germany is also looking in poor shape by international standards in the sphere of knowledge-based capital. In the services sector, around 80% of the Federal Republic's aggregate capital stock has been generated in the last three investment years; by contrast, the equivalent ratio for the USA, France and the United Kingdom is 90-100%, and the average is indeed above 100% in the case of smaller euro zone member states.

*Germany with backlog especially at knowledge capital*

### **Germany's "energy turnaround" as a hazardous incident**

Germany's "energy turnaround" is a chapter in itself. The energy sector is a key sector in every modern state, whether predominantly geared towards industry or services. Let us therefore take a look back at the recent past regarding German energy policy. After a number of twists and turns, it is well known that the Federal Government decided in the aftermath of the nuclear accident at Japan's Daiichi plant at Fukushima in March 2011 to phase out the peaceful use of nuclear energy. All German nuclear power stations are to be shut down by the end of 2022. At the present juncture, nuclear energy contributes about 6% of primary energy generation and approximately 13% of electricity generation. The gap left by the so-called "nuclear phase-out" will have to be closed by other energy sources, where hard coal and lignite command the highest shares (some 29% of electricity generation in 2018). According to information from Germany's Federal Environment Agency, renewable energy sources

are responsible for around 14% of primary energy and 47% of electricity generation. However, especially power generation on the basis of wind and solar plants shows an unsteady trend: detrimental weather conditions can make it necessary to draw on reserves either from existing storage facilities or else from additional power-plant capacities (coal and gas). Maintaining reserves in this way is expensive and undesirable on account of the resulting release of CO<sub>2</sub> into the atmosphere along with the associated knock-on effects for the climate (“greenhouse effect”). The “energy turnaround“ also envisages that all coal-fired power stations are to be closed down by 2038. There is, furthermore, a need for greater supraregional networking between production and consumption regions because of the more pronounced asymmetry here in the case of renewable energies.

The Association of German Chambers of Commerce and Industry (DIHK) recently pointed out that every fourth company was reporting power failures. The DIHK also predicts that the additional wind and solar energy plants needed to provide the capacities targeted for 2030 are probably not going to be put in place. Even assuming unchanged power consumption, the DIHK argues, 5 new plants would have to be installed every day, rather than 1 every 2 days like at the moment, for this objective to be achieved. For the goals to be attained by 2030, plant buildout would have to be speeded up to 10 times the current level. The DIHK also warns that power consumption is likely to increase further in future. Nature conservation (great numbers of birds, bats and insects apparently end their lives in the rotor blades of wind turbines), a lack of acceptance for wind turbines and solar fields, minimum-distance rules as well as regulations concerning civil and military flight safety are all standing in the way of quicker plant expansion.

*Conversion is stagnating*

It is quite plain that the interests of the energy sector and of home and property owners, the concerns of nature conservation, and the requirements entailed by flight-safety considerations are all competing for the scarce resource called space. What is more, a functioning power supply, an intact residential environment, a species-rich environment and public safety are all goods of paramount importance. Special priority rules for investment are therefore hardly a possibility here. It would at most make sense to increase staffing levels in the executive and judiciary branches, at planning authorities and in the justice-administration field so that procedures are at least not slowed down by a lack of personnel.

### Knowledge and the world of tomorrow

Knowledge is capital - that is, at least, the prevailing equation in any increasingly technology-driven and innovation-driven economy. Empirical studies make it clear that investment in knowledge-based capital has been bulking markedly larger in modern economies over the past few years. If one takes a look at the USA and Europe as a whole, it would appear that investment in intangible assets has already outstripped fixed-asset investment for several years.

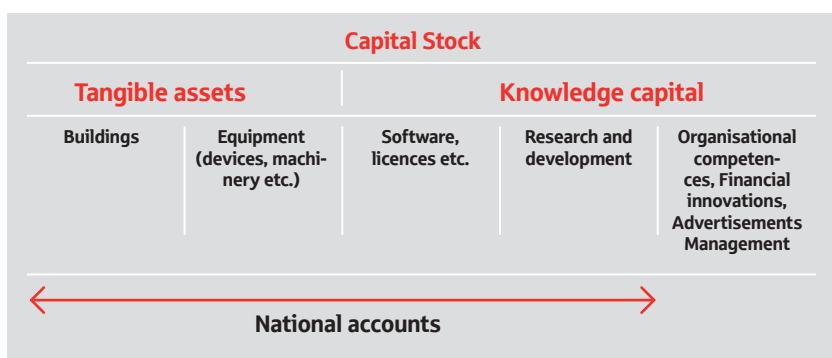
A recently published study by the German economic-research institute DIW Berlin<sup>1</sup> points out that Germany is only in mid-table in the international knowledge-capital league. What is more, the knowledge capital stock of German companies seems to be relatively obsolescent. In our view, the Federal Republic's lower level of modernity vis-à-vis its competitors and the fact that the size of its knowledge capital stock is only mediocre on an international comparison do not match its claim to be one of the world's leading technological nations, and indeed endanger the future competitiveness of Germany as an economic location. German enterprises accordingly need to invest more in knowledge capital so as not to fall behind, both quantitatively and qualitatively, in the international KBC stakes. The characteristics which distinguish intangible assets offer major incentives to act in this way: the non-rivalry property of such assets, along with synergy effects, means that investment in knowledge capital - especially in conjunction with complementary investment in fixed assets - is conducive to boosting production efficiency. Economic policy ought therefore to support companies in their quest to ratchet up investment in all the elements of knowledge capital which are relevant for them.

Furthermore, there are indications that the increasing weight of intangible assets may, at least in part, explain persistently low interest rates and low GDP growth rates. As was pointed out at the beginning of this study, the fact that investment activity has been restrained since the financial crisis can, at least partly, be explained by the fact that investment in intangible capital is not taken account of - or not taken sufficient account of - in the national accounts.

### Externalities when investing in knowledge capital

<sup>1</sup> Heike Belitz and Martin Gornig: "German economy needs to invest more in knowledge capital," DIW Weekly Report 31/2019

### Composition of corporate capital assets



Source: "International Comparison of Sectoral Knowledge Capital," Bertelsmann Stiftung, July 2019

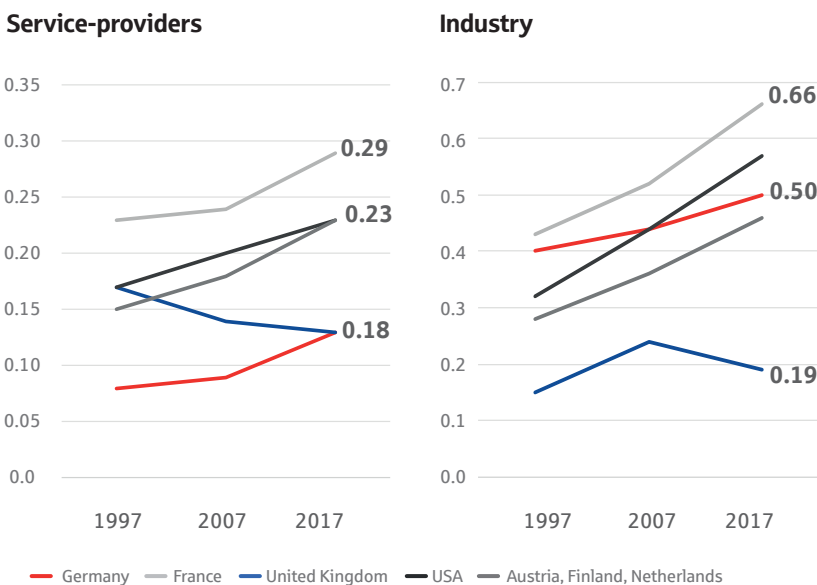


KBC encompasses a broad spectrum of extremely heterogeneous assets. The OECD classifies the following elements as components of knowledge-based capital: software and databases, research and development (R&D) in the private sector as well as in the social sciences and humanities, exploratory drilling, brand equity, copyrights, licences, financial innovations, designs, marketing und advertisements, firm-specific further training, human capital and organisational know-how. As illustrated in Chart 4 above, the national accounts do not currently capture all components of knowledge capital. They do not, for instance, have a place for organisational capital, financial innovations or advertisements. By contrast, the national accounts do already factor in investment in R&D, software and databases, copyrights and exploratory drilling. These elements are also designated as investment in intellectual property.

*Distinct sub-categories of KBC*

From a macroeconomic perspective, the generation of positive spill-over effects is also of great interest. If such positive spill-overs are generated, investment in knowledge capital at one single company can work to the advantage of the economy as a whole. In view of this, it is incumbent on politicians to create favourable framework conditions for investment in KBC. Such preconditions include the provision of a modern digital infrastructure, with corresponding expansion of glass-fibre and mobile-telephony networks. They could also include additional investment incentives for companies, for example improved depreciation options for investment in knowledge-based capital. At the moment, at any rate, German enterprises are some way behind the leading pack by international standards on this score.

**German enterprises are lagging behind**  
**Capital coefficients for knowledge capital, 1997 to 2017**



Notes: One reason for the low weighting of KBC in the United Kingdom is the focus of UK industry on “extended workbenches” rather than knowledge-based production; this development could also reflect the concentration in the services sector in Great Britain on financial services. As yet, investment in financial innovations is not captured by the national accounts. On account of their similar size and economic structure, the DIW subsumes Austria, Finland and the Netherlands into a single country group, which it then examines as a single entity.

Source: “International Comparison of Sectoral Knowledge Capital,” Bertelsmann Stiftung, July 2019, on the basis of calculations by the economic-research institute DIW Berlin. Depiction: LBBW Research.

Financing of knowledge capital is likely to run on traditional lines for some time to come in the case of companies without direct access to the capital market, i.e. above all fledgling and smaller-scale enterprises. The German Private Equity and Venture Capital Association (BVK) reports that private-equity financing (for a total of 1,222 companies) worked out at approximately EUR 9.6 billion across Germany as a whole in 2018, which corresponds to a share of 11.9% in overall European private-equity capital. If the investment volume is put in relation to national GDP, Germany is languishing below the European average. Relative to its economic strength, the Federal Republic is therefore definitely not one of the frontrunners in the private-equity market.

Whether in the case of knowledge capital or of the “old economy,” the preferred source of financing in the eyes of Germany’s small- and medium-sized enterprises (“Mittelstand”) is self-financing. In 2017, roughly half (51%) of Mittelstand funding was financed from own resources, corresponding to a figure of EUR 108 billion in absolute terms. Scope for self-financing is, of course, limited to a crucial extent by a company’s underlying profitability. From a corporate point of view, depreciation allowances play a significant role in this regard. What are urgently needed - and the ball is unequivocally in the court of tax policymakers here - are improved depreciation tax breaks for digital and knowledge-based investment.

Financial requirements exceeding the scope of self-financing activities have to be covered by means of external sources of finance. In this context, the most important source of outside capital continues to be bank loans: in 2017, roughly 480,000 SMEs came knocking at the doors of banks or savings banks in order to conduct negotiations about investment loans. Unlike in the case of tangible assets, however, it is a characteristic of intangible goods that they are difficult to fix valuations on, and may possibly be transferable. They are therefore not suited in some cases as collateral for conventional loan-based financing. It is true that brands, patents, data and similar intangibles can be made suitable as loan collateral; however, valuation and valorisation run into other difficulties in the case of intangibles than in the case of conventional assets. As a result, the bank of the future may well (on top of its other tasks) be a networker spanning the divide between established corporations, on the one side, and a whole ecosystem of start-ups, fintechs, investors and other market participants, on the other.

*Finding the suitable financing*

## Disclaimer

The present position paper of the Chief Economists does not necessarily correspond to the attitude of the DekaBank or the attitude of the respective Landesbanken and Savings Banks or the DSGV.

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