

Bardt, Hubertus; Dullien, Sebastian; Hüther, Michael; Rietzler, Katja

Research Report

For a sound fiscal policy: Enabling public investment

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REPORT

IMK Report 152e, March 2020

FOR A SOUND FISCAL POLICY: ENABLING PUBLIC INVESTMENT

Hubertus Bardt, Sebastian Dullien, Michael Hüther, Katja Rietzler

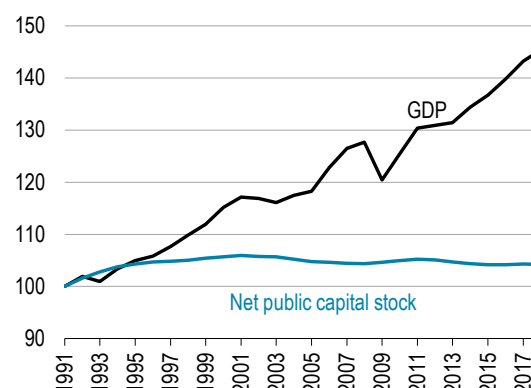
AT A GLANCE

- Public investment has been badly neglected in Germany over the past two decades, with the result that the public capital stock no longer meets the standards of a modern economy and is inadequate for the challenges that will be posed by demographic change and Germany's international decarbonisation commitments.
- In total, the areas of education, transport, communication networks and decarbonisation will require at least an additional €450 billion of public investment or public investment subsidies over the next 10 years, equivalent to approximately €45 billion a year.
- While this amount is manageable in overall economic terms, it is unrealistic to suggest that the required investment can be financed entirely through the reallocation of existing funds within the budget. Consequently, the German Constitution's debt rules should be supplemented by a Golden Rule allowing for borrowing equivalent

to the value of the net investment. The leeway offered by mechanisms such as off-budget entities should be utilised until such a rule has been implemented. A sustained reduction in local government debt will also be important in view of the key role played by the municipalities in public investment, especially in transport infrastructure.

Inadequate public capital stock in Germany

1991=100



PODCAST

Sebastian Dullien on the requirement for public investment.

<http://bit.ly/2VrhZnr>

Sources: Destatis, Ameco.

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NOTE

The report is based on a joint research project between the German Economic Institute (Institut der deutschen Wirtschaft (IW))



and the Macroeconomic Policy Institute (Institut für Makroökonomie und Konjunkturforschung (IMK)) of the Hans-Böckler-Stiftung.



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INTRODUCTION

The modernisation of Germany's capital stock poses a number of major challenges. The neglect of public investment over the last two decades means that it is now urgently necessary to upgrade the country's infrastructure and systematically clear the accumulated investment backlog. Concerted efforts will also be required in the coming years to address the consequences of an ageing population and to decarbonise the economy. Germany's infrastructure will need to be adapted to the post-fossil fuel era and to the structural economic changes made necessary by an ageing population. It is obvious that completely new approaches must be developed in order to meet these challenges and secure the nation's prosperity. There will also be huge demands on Germany's education system, which will need to deliver significantly better results going forward. The public sector has a key role to play in addressing all of these challenges. As well as utilising public investment to indirectly stimulate private investment, it can implement appropriate funding measures and regulate intelligently to create favourable conditions in areas where the private sector is responsible for major investment projects.

Unfortunately, the German public sector as a whole has failed to adequately address these challenges since the early 2000s. Although there have been some signs of a trend towards higher public investment in recent times, the increases in the investment budget have so far been too modest and the implementation of the relevant measures is progressing too slowly. In summary, Germany is increasingly jeopardising its own economic future and the prosperity of future generations.

The investment needs have now reached significant proportions – it is estimated that the total investment required over the next ten years will amount to at least €450 billion. The financing of this level of public investment will call for the removal of obstacles – especially in political decision-making processes and in the financial relationship between the different levels of government – but without putting government debt sustainability at risk. This will allow the government to fulfil its key responsibilities of investing in the public capital stock and stimulating private investment in a manner that is fiscally, economically and environmentally sustainable. This report outlines a basic approach to achieving these goals that complies with Germany's constitution and addresses both the temporal and financial dimensions. The figures cited are of course only approximate and will require administrative backing and new governance structures. However, since the aim of this report is to illustrate the basic principle, these issues are not a priority at this point.

PUBLIC INVESTMENT TO SECURE GERMANY'S FUTURE

Investment is key to the development of the capital stock and is thus an important determinant of potential output (Bardt et al. 2017). This means that, ultimately, it determines the country's future GDP. Current and future investment also influences the extent to which the predicted demographic trends will compromise Germany's potential output and slow potential growth in the future (Ollivaud et al. 2016). According to a study by the Institut der deutschen Wirtschaft (2017), the retirement of the baby boomers born in the 1960s could lead to a halving of the macroeconomic growth rate over the coming decades, from its current level of between 1.5% and 1.75% to just 0.75% by the early 2030s. However, this demographically induced slowdown caused by the falling growth rate and eventual absolute decline of the labour force from the next decade on can be counteracted through increased investment. This highlights the importance of physical capital formation to Germany's future prosperity.

Although private investment accounts for almost 90% of all investment in the economy, public investment still plays a very particular role. In addition to the provision of public goods, public investment also underpins factors that complement private investment. The capacity and productivity effects of the available infrastructure capital have a key influence on long-term growth (Bardt et al. 2014). The level of accumulated infrastructure capital stock influences an economy's potential output. Infrastructure also constitutes an intermediate input for private sector production – (certain) goods can only be produced if the relevant infrastructure is available. This applies to transport networks and the energy supply, for example.¹ In this context, a complementary relationship is said to exist between infrastructure and the other factors of production. The quality and amount of infrastructure capital determines the overall extent to which other factors of production – particularly private capital – are utilised in an economy.

In addition to this quantity effect, infrastructure capital may also be expected to produce efficiency effects, especially in network-type infrastructures. According to this interpretation, the efficiency of companies' production processes depends on the available infrastructure. The better the infrastructure, the greater the productivity of the other factors of production. Among other things, this is due

¹ In Germany the energy suppliers are part of the private sector and are classified as non-financial corporations. Investments into the energy supply infrastructure are thus not counted as public investments. Nevertheless the government plays a particular role here and the public investment strategy is rather broad, i.e. including allocations, subsidies and regulation.

to the fact that better infrastructure allows for a more intensive spatial and sectoral division of labour as well as for greater exploitation of agglomeration effects, especially in the transport and information sectors (see Bertenrath et al. 2006, p. 20 ff.). Furthermore, better infrastructure can facilitate cost savings, reducing transport and storage costs by saving time, for example. These savings can boost companies' competitiveness and deliver production and productivity gains through price and quantity effects. Finally, better infrastructure can also have positive effects on private investment and employment.

Empirical studies of the economic effects of infrastructure offer insights into both the short-term economic stimuli and the long-term growth effects. Comprehensive overviews of the relevant studies are provided by Busch/Klöß 1995, van Suntum et al. 2008, Bom/Ligthart 2008 and ifo 2013. The 2008 meta-study by Bom and Ligthart addresses the growth effects of infrastructure capital, analysing 76 separate studies published up to the end of 2006. This meta-analysis found that the output elasticity of public capital amounts to 0.08%. In other words, a 1% increase in infrastructure capital will cause long-term economic output (real GDP) to grow by 0.08%. This is somewhat lower than the figure arrived at by van Suntum et al. (2008, p. 77), who conclude that a 1% increase in public infrastructure capital will result in a long-term increase in Germany's real GDP of at least 0.1%. Based on the current approximate figures for Germany, this means that an increase in public infrastructure investment of around €10 billion would generate a long-term increase in GDP of approximately €2.5 billion. More recent studies such as Lowe et al. 2019 and Gechert 2015 confirm the positive growth effects of the public capital stock, finding its marginal productivity to be consistently higher than that of the private capital stock.

In addition to the narrower focus on growth, public investment is also needed in order to accomplish social goals. For instance, climate protection and climate change adaptation will entail significant expenditure over the coming decades. Of course, in many cases investment only creates the conditions needed to accomplish a particular goal such as higher productivity, more growth or a reduction in CO₂ emissions – coherent action and utilisation strategies are also required in order to actually deliver the desired outcome. For example, while the Digital Pact creates the necessary conditions by providing schools with modern digital equipment, the hoped-for effects cannot be achieved without the right teaching strategies.

TRENDS IN PUBLIC INVESTMENT SPENDING

In recent decades, the overall trend has been towards a significant reduction in public spending on capital goods. Once the reunification boom of the early 1990s had come to an end, gross fixed capital formation of the government sector declined steadily in relation to economic output, falling below 2% for the first time in 2004. Starting from a lower base, net investment experienced a similar trend over the same period, falling below zero for the first time in 2004 (Figure 1). While outsourcing of public tasks away from main budgets was undoubtedly a factor, the investment figures for municipal enterprises, funds and institutions that are not classified as part of the government sector and the decline in the private investment rate indicate that overall expenditure on infrastructure capital and public service provision was indeed lower than in previous phases.

This overall trend in the public sector conceals some stark contrasts in the trends for the different levels of government and for individual investment areas. The trend was particularly weak for public construction projects at the municipal level, where the gross capital stock has declined in real terms in recent years despite an increase in overall gross investment (Figure 2). Investment in this area had already begun to stagnate as long ago as the early 2000s. On the other hand, there was a strong increase in investment in equipment and other fixed assets, primarily for research and development (Grömling et al., 2019). This occurred mainly at the federal government and Länder levels. However, it should be noted that 37.5% of gross federal government investment is in the defence sector and cannot therefore be regarded as directly stimulating growth.

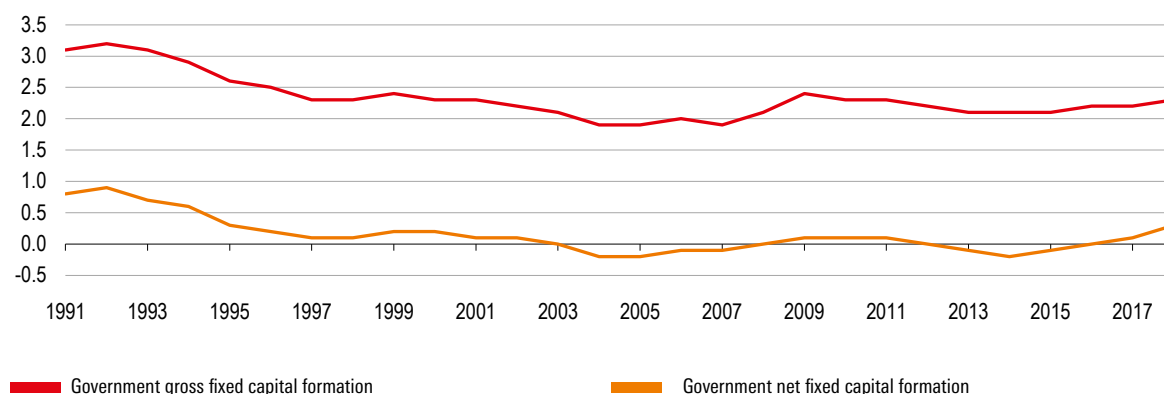
The weak public investment trend is also reflected in the figures for public investment as a percentage of gross fixed capital formation across the economy as a whole. Having fallen to just 11.3% (2018), public gross fixed capital formation now plays a relatively minor role. Up until the 1980s it accounted for a significantly higher share, partly exceeding 18% (Deutsche Bundesbank 1999).

High public investment rates coincide with major infrastructure building programmes. A large proportion of the infrastructure in use today was built around 1970 in western Germany and post-1990 in the East. In other words, much of the public infrastructure is several decades old. Almost half of all motorway bridges (measured by area) were built between 1965 and 1975 (BMVI 2016, p. 2). These bridges were never designed for today's traffic volumes and would have been due a complete renovation by now, even if they had been well maintained. In practice, however, many have not been adequately maintained and now need to be replaced. Meanwhile, the average age of Ger-

Figure 1

Government investment ratios

in % of GDP



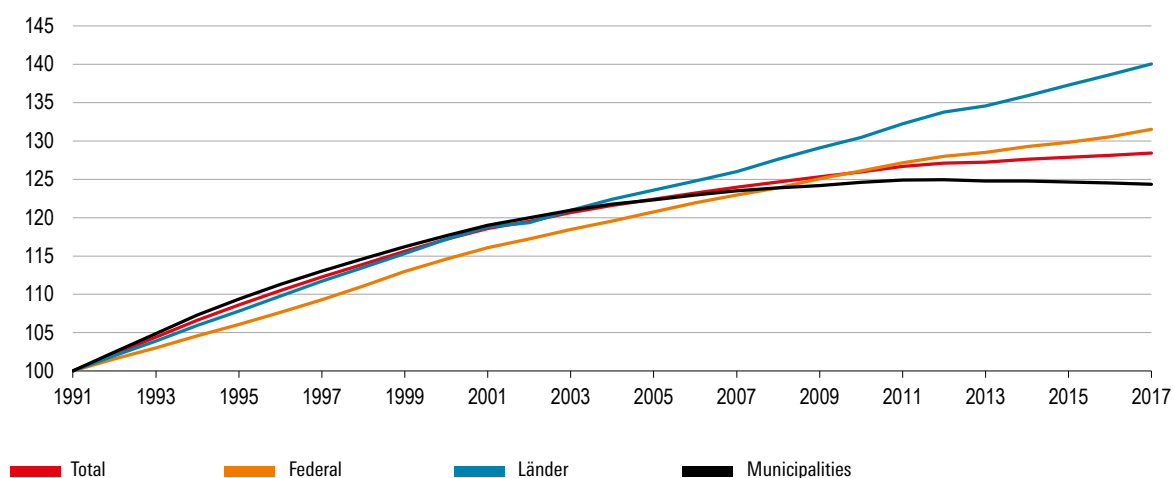
Source: Destatis (working document: investments, by May 2019).

IMK

Figure 2

Government capital stock: Buildings

(price-adjusted, 1991=100)



Source: Destatis (calculation of assets, by August 2018).

IMK

many's railway bridges is just under 60 years (ZDB 2014), with almost 10,000 having been built before the First World War. And the average age of the country's waterways is even higher.

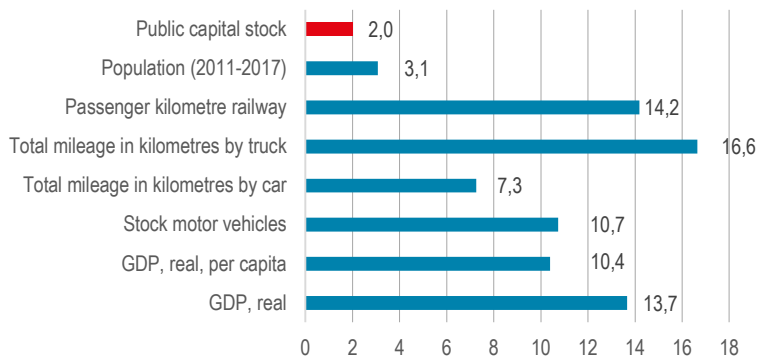
Moreover, in recent years traffic volumes have risen even faster than economic output in some sectors, among other things due to the eastern enlargement of the European Union and Germany's geographical location at the heart of the EU (Dullien/Rietzler 2019). For example, the number of miles driven by trucks on German roads increased

by more than 16% between 2010 and 2017, while GDP rose by just under 14% over the same period (Figure 3). This means that an outdated and inadequate transport infrastructure is increasingly having to cope with growing traffic volumes.

These findings are consistent with the results of the company surveys conducted by the Institut der deutschen Wirtschaft (IW). More than two thirds of companies surveyed by the IW in spring 2018 said that their business is regularly affected by general infrastructure problems in Germany (Grömling/Puls

Figure 3

Growth, infrastructure and mobility Change 2010-2017, in %



Source: Dullien und Rietzler (2019).



2018), with just under 52% of all companies citing minor disruption and 16% complaining of major problems. There was a pronounced increase in both categories compared to the equivalent survey of autumn 2013, when just one in ten companies complained of major disruption. Over the same period, the overall proportion of companies that claimed not to have experienced any disruption due to infrastructure problems fell by 10 percentage points, to just 33%.

The most serious disruption occurs on the country's roads, where almost three-quarters of the companies surveyed reported problems. As many as 30% of companies complained of major disruption to their business processes as a result of road transport network deficiencies and congestion – a significant increase compared to 2013. Just under three-quarters of all German companies also complained about the country's inadequate communication networks. Once again, things have got substantially worse since 2013, when just 50% of companies complained about the existing infrastructure. Particularly striking was the rise from 15% to 28% in the proportion of companies experiencing significant disruption to their business processes due to inadequate communications infrastructure.

To some extent, these problems are now being acknowledged by policymakers – there has been a noticeable upturn in the overall public investment trend since 2015. At a time of budgetary consolidation, this was primarily made possible by high tax revenues and low interest expenditure. At €31.3 billion, interest expenditure in 2018 was less than half as high as when government debt peaked in 2012. Incidentally, this is also one of the major reasons for the current budget surpluses.

However, the impact of this increased investment on infrastructure quality remains modest. The upturn in investment has as yet not been strong

enough to compensate for years of infrastructure neglect, and although real investment has risen, so have prices. In fact, price rises have outstripped real increases in public construction investment since 2017, reflecting the high capacity utilisation in the construction industry. Furthermore, local government still lacks the resources to implement all of its planned projects (KfW 2019).

There is also a risk that the recent trend for increased public investment spending could once more go into reverse. As already mentioned, the investments made in recent years have not been geared towards fulfilling long-term needs and stabilising long-term investment. Instead, they were largely carried out with a short-term focus driven by the availability of funds. As well as entailing higher costs, this policy also has a procyclical effect – it provides an unnecessary stimulus during economic upturns while stifling investment as soon as tax revenues decline during a downturn, at a time when public investment is in fact more important than ever.

REASONS FOR THE INADEQUATE LEVEL OF PUBLIC INVESTMENT

The inadequate level of investment in recent years has five fundamental, partly interconnected causes:

- Firstly, the priorities for policymakers have for many years centred on other types of expenditure, on tax cuts and on reducing government debt. From a politician's point of view, neglecting public investment might appear preferable, since the unspent funds immediately show up as a reduction in expenditure in the budget (and can always be used for other types of spending increases or tax cuts), whereas it will be some time before voters notice that the infrastructure has been neglected.
- Secondly, for many years now there has been a widespread assumption among policymakers and many economists that the German economy will only experience slow growth for the foreseeable future and that the country's population will soon start to decline. For example, the 12th coordinated population projection published by the Federal Statistical Office in 2009 predicted that the number of people living in Germany would fall to just under 80 million by as soon as 2020 (Destatis 2009), whereas the most recent population projection published in 2019 forecasts the population in 2020 to exceed 83 million (Destatis 2019). Meanwhile, in 2005 the German Council of Economic Experts estimated the growth potential of the German economy to be no more than 1.2% a year. In fact, the Germany economy has grown much

more strongly, despite the fact that the country experienced a severe economic crisis in 2008/9. In 2018, Germany's gross domestic product was around 5% higher than it would have been if the economy had grown at a constant rate of 1.2% a year since 2005. It is of course possible that with a smaller economy and lower population, Germany might have needed less public infrastructure.

- Thirdly, this formerly prevalent pessimism about the outlook for the German economy also explains the focus on debt reduction that is reflected, for example, in the incorporation of the debt brake into Germany's constitution in 2009. The risk of public borrowing getting out of hand and resulting in over-indebtedness is far greater with a declining population, stagnating economic output and positive real interest rates than with a growing economy and low interest rates. The debt brake made debt reduction an even stronger budgetary policy priority.
- Fourth, the difficult financial situation of the municipalities has constrained investment at the local government level which is especially important for Germany's public infrastructure investment and in particular for construction projects. The pressure to consolidate that existed for a variety of reasons in the 2000s led the Länder to make cuts both in current and capital transfers ("investment grants") to the municipalities, with the consequence that increased social spending squeezed out investments in the municipalities' budgets (Truger 2009, Arnold et al. 2015, Bertelsmann-Stiftung 2015). The Federal Government and the Länder violated the principle of related actions, which states that measures should be paid for by whoever initiates them, leaving the municipalities to shoulder the financial burden on their own.
- Fifth, a rapid turnaround of the weak investment trend is currently being hindered by a lack of planning capacity at local government level coupled with the fact that construction companies have limited spare capacity. Years of budgetary constraints have resulted in planning staff cutbacks in many municipalities. Meanwhile, with the public authorities only making investments when their cash position permits, construction companies are reluctant to expand their capacity because of concerns that any increase in their public sector order book will be short-lived. This means that a rapid increase in investment would at the very least result in significantly higher prices, and may not even be feasible at all (Hentze/Kolev 2017).

A CONCERTED, LONG-TERM INITIATIVE TO TURN AROUND THE INVESTMENT TREND

To address the abovementioned obstacles to delivering the required expansion of the public capital stock, it will be necessary to implement a concerted initiative to turn around the investment trend by systematically removing the current barriers. In essence, this initiative would involve a reliable long-term plan (covering at least 10 years) for addressing the deficiencies in the public capital stock. This plan could be used by municipalities and businesses as a point of reference for their own planning. Municipalities would be more likely to increase their planning capacity and companies would be likelier to expand their production capacity if they had a more reliable idea of future public investments.

As discussed in Grömling et al. (2019), Dullien/Rietzler (2019) and Grömling et al. (2019a), it is not merely a case of increasing public investment spending to meet some quantitative target, say for net public investment. To make sure that investment expenditure really secures the future of the German economy, it will instead be necessary to produce a detailed inventory of the requirements and to address them systematically.

In order to facilitate this investment programme, a stable financing needs to be provided that can be relied on regardless of the current budgetary and economic situation. The objective is to facilitate sustained investment in the growth potential. Against the backdrop of the debt brake – which will be extended to the Länder from 2020 – and the EU fiscal rules, it seems likely that, as in the past, investment will be the first casualty in the event of an economic downturn and deteriorating fiscal balances. While the cyclical adjustment provided for by the fiscal rules makes perfect sense in theory, it is proving difficult in practice. The estimates resulting from the methodology of the European Commission are prone to major revisions, and the reported output gaps are consistently very close to zero in real time (Ademmer et al. 2019). However, this also limits the scope for economic stabilisation. Given the high levels of additional investment that will be necessary in the future, the limit of 0.35% of GDP that the debt brake places on the Federal Government's structural (investment-related) borrowing would appear to be rather low.²

In order to achieve a sustained turnaround in the investment trend, it will also be necessary to put local government finances back on a sound footing.

2 Especially since this figure refers to GDP in the year before the budget is drawn up – i.e. as a rule two years before the relevant year (Section 4 Article 115 of the relevant law). With nominal GDP growth as in the past two years, the permissible structural borrowing is thus reduced to just under 0.33% of the GDP at the same time.

At present, the burden is very unevenly distributed among the municipalities, and this is resulting in growing financial disparities (KfW 2019 and preceding years). The parlous state of some municipalities' finances can also be partly attributed to the fact that the municipalities in question are among the losers of globalisation and are still struggling with structural change (Truger 2018). The Federal Government has now recognised this problem and initiated a comprehensive raft of measures to relieve the burden on municipalities. For instance, it has assumed full responsibility for the basic subsistence income for the elderly and for persons with reduced earning capacity, as well as increasing its share of the housing costs for subsistence income claimants. In addition, it has established a Municipal Investment Fund and will in future also be able to provide targeted funding for school infrastructure. However, these measures have only had limited success in reducing the disparities. Moreover, it is important to guard against further diluting the "principle of related actions" and undermining the autonomy of the Länder and municipalities and the special responsibility that the Länder have towards their municipalities.

Despite the Federal Government's measures to reduce the burden on the municipalities, the demands on them continue to increase. Spending on integration assistance for people with disabilities and youth welfare services is rising sharply, while the integration of refugees remains a challenge in terms of house and school building and childcare provision. However, the municipalities' current surpluses point to the fact that, at present, even if the financial restrictions are relaxed, the extent to which they can meaningfully increase investment is often severely limited. Any measures aimed at improving the municipalities' ability to finance investments must take account of their different individual situations, since a scattergun approach could generate a significant deadweight effect. The Länder in particular will need to take responsibility, as illustrated for example by the use of the Hessenkasse as an instrument for the targeted reduction of the municipalities' debt.

HOW MUCH PUBLIC INVESTMENT IS REQUIRED?

In addition to systematically tackling the backlog in upgrading the existing infrastructure, additional spending will also be required in a number of strategic areas if the future of the German economy is to be secured. Achieving the goal of full decarbonisation by 2050 will call for massive investment in the expansion of alternative energy, power grids and new transport infrastructure, as well as meas-

ures to improve the energy efficiency of existing housing stock. There will also need to be more investment in early childhood education and childcare in order to mitigate the effects of demographic change. Early childhood education enhances the prospects of children being able to participate productively in the economy when they grow up, while childcare helps to boost the labour force participation by allowing both parents to work.

Below, we present a rough estimate of the additional public investment required from 2020 on in order to meet these needs. We employ a broad definition of "investment" that includes types of government spending that are not classified as public investment in the national accounts, such as spending to promote private investment (e.g. subsidies for energy efficiency improvements to existing housing stock) and investment in human capital.³ This definition of investment encompasses government spending geared towards increasing the future potential output of the German economy or delivering long-term net returns for the economy as a whole.⁴ The figures are based on a price-adjusted forward projection of the expenditure included in the Federal Budget for 2019. In the case of Deutsche Bahn, for example, the figures are based on the expenditure allocated in the second performance and financing agreement (LuFV II), but do not reflect the planned increases expected to be included in LuFV III from 2020 on.⁵

Any estimate of this kind will always be open to criticism for overestimating or underestimating particular figures. Nevertheless, we are confident that our approach, which draws on evidence-based individual studies, can be relied on to provide a realistic idea of the scale of the challenge facing the economy as a whole.

We estimate that the approximate additional investment requirements over the next 10 years will be as follows:

³ In some areas, the IMK and the IW see even higher needs for public investment than those listed here (such as military spending or public housing construction). The figures listed here should therefore be taken as a guideline.

⁴ Investments in climate protection are included in this analysis because they reduce the environmental costs of economic activity. Investments in the health and long-term care sector are explicitly not considered because, although they are indirectly financed by health and long-term care insurance funds, the investments are usually made by private sector units.

⁵ In the case of housing, this means that the indicated funds are to be understood in addition to the measures adopted at the Housing Summit in 2018, and in the case of public transport, in addition to the funds earmarked for 2019 through the Municipal Transport Financing Act. As the details of the climate package were not yet available at the time of writing and, moreover, the package will not take effect until 2020, the decisions of the Climate Cabinet in September 2019 were not taken into account.

- Tackling the backlog in upgrading the municipal infrastructure: The KfW Municipal Panel (KfW 2019) puts the required investment volume at €138.4 billion, a figure that appears broadly plausible despite a degree of uncertainty. In this paper, we assume that the backlog will be cleared over a ten-year timeframe.
- In addition to the relatively low volume of investment in childcare included by the KfW Municipal Panel, a significant expansion of early childhood education and all-day schooling would be both desirable and economically efficient in view of the likely demographic trends. Based on the calculations of Krebs/Scheffler, €50 billion would be required over the next 10 years for improvements to early childhood education, along with €9 billion for the expansion of all-day schools and a further €25.5 billion to run them.
- Decarbonisation will require an expansion of local public transport that goes beyond the (very low) volume of investment in this area called for by the KfW Municipal Panel. To date, investment projects amounting to around €8.2 billion have been submitted or accepted for financing via the Municipal Transport Financing Act (GVFG). It is projected that it would take 24 years to complete the projects in question if they were financed using the funds currently provided for under the GVFG. Consequently, we have allocated an increase in funding that would allow these projects to be completed within the next decade. In addition, according to a survey of its members carried out by the Association of German Transport Companies, Federal Government investment totaling €15 billion would be necessary to deliver the required expansion of the local public transport network throughout Germany (VDV 2017). This gives a total investment requirement of approximately €20 billion.
- Massive investment is also needed to modernise and increase the capacity of Deutsche Bahn's long-distance and freight services. Based on the new performance and financing agreement between the Federal Government and Deutsche Bahn that will come into force in 2020, and on the figure calculated by Gerbert et al. (2018) for the investment needed to decarbonise the rail sector, we estimate that the additional investment requirement will come to at least €60 billion. In addition, approximately €20 billion is required for ongoing road maintenance of the national highway system and to address the trunk road maintenance backlog.
- Germany is lagging behind the global leaders in university and R&D funding. We estimate that an additional €2.5 billion a year is required to modernise Germany's universities and strengthen research funding.
- Many of Germany's larger cities are currently facing a housing shortage. However, estimates of housing demand over the coming years differ significantly. While Henger/Voigtländer (2019) predict that current house building projects will largely suffice to ease the pressure in the housing market, Baldenius et al. (2019) forecast that the housing shortage will continue unabated until 2030, especially in the most densely populated areas. The extent to which the governments of different federal levels should intervene by strengthening its role as a housing provider is also disputed. We have opted to take a relatively conservative approach in this report, allocating a modest increase in targeted housing subsidies of around €1.5 billion a year.
- Modern communication network coverage in Germany is poor compared to many other countries, especially outside of the most densely populated areas. According to a committee of experts appointed by the Federal Minister for Economic Affairs and Energy, it would cost €60-100 billion to roll out high-speed broadband right across the country and a further €60 billion to deliver nationwide 5G coverage. While most of these costs should be met by private telecom companies, it is unlikely that all gaps in service will be closed without government subsidies. We estimate that €20 billion of public spending will be required over the next ten years to ensure modern communication network coverage throughout the whole of Germany.
- The decarbonisation of the German economy poses a particular challenge. The latest studies estimate that it will be necessary to invest somewhere between €1.7 trillion (Dena 2018) and €2.3 trillion (Gerbert et al. 2018) in order to achieve a 95% reduction in the Germany economy's CO₂ emissions by 2050. If we take the lower of the two estimates, spread the cost over the entire period up to 2050 and assume that the State will cover approximately 15% of the total cost,⁶ the required volume of public investment comes to around €7.5 billion a year.⁷

Adding all these figures together gives a minimum investment requirement of €450 billion between now and 2030 (Table 1).

⁶ This rather low approach of public participation in the costs can be justified, as part of the decarbonisation costs are already included in the costs for upgrading rail transport listed above.

⁷ This calculation is based on the assumption that a constant share of GDP will be invested in climate protection every year until 2050. Under current assumptions on potential growth, this would result in a total economic investment requirement of around €500 billion by 2030.

Table 1

Additional public sector investment requirements in Germany over the next 10 years (bn €)

| | |
|---|------------|
| Infrastructure at municipal level | |
| municipal infrastructure | 138 |
| expansion of public transportation | 20 |
| Education | |
| early childhood education | 50 |
| expansion of all-day schools | 9 |
| operation of the all-day schools | 25 |
| increase of expenditure for universities and research funding | 25 |
| Housing construction | |
| government share | 15 |
| Supraregional infrastructure | |
| expansion of broadband/5G | 20 |
| railway (federal government share; expansion freight traffic) | 60 |
| expansion of highways | 20 |
| Decarbonisation | |
| government share | 75 |
| Total sum | 457 |

Sources: KfW (2019), Krebs/Scheffel (2016), Baldenius et al. (2019), DENA (2018), calculations and estimations by IMK and IW.



AN ECONOMICALLY SOUND FINANCING APPROACH

The financing requirement calculated on this basis is not unreasonably high in relation to Germany's economic output. It equates to average public expenditure of around €45 billion a year, currently equivalent to 1.3% of annual economic output.

A small fraction of the investment requirements outlined above is already provided for in recent decisions by the federal government and in the medium-term financial planning for the period starting in 2020. For example, the federal funding provided through the Municipal Transport Financing Act will rise to €1 billion a year from 2021, roughly three times the 2019 level. The funds available for investment in rail transport are also set to increase significantly under the LuFV III performance and financing agreement, from €3.5 billion in 2020 to €4.6 billion in 2021.

However, this additional funding only accounts for a relatively small proportion of the total investment requirements outlined above. Realistically, the shortfall is too great to be made up through the short-term reallocation of public budgets, while the scope left for structural borrowing under the cur-

rent debt brake rules is also insufficient to cover the necessary investment.

In addition, it is not always easy to explain why the abovementioned expenditure should necessarily be paid for out of the current budget. Expenditure on decarbonisation, for example, will lead to a massive reduction in Germany's energy import bill once the process is complete. In other words, the money spent today will generate savings in the future. The same is true of early childhood education – more early childhood education today should translate into higher employment, productivity and incomes in the future. It is a matter of simple economic sense to spread the burden of these major challenges across several generations.

This is especially true now, at a time of extremely favourable financing conditions for the public authorities, when the federal government can obtain loans with maturities of 10 years and more at negative interest rates, meaning that it doesn't even have to repay the full nominal value of the loan to its creditors. At the same time, it is expected that the level of government debt in Germany will soon drop below 60% of GDP, with investors even facing a growing shortage of German government bonds.

Consequently, the current budgetary policy framework – including the debt brake, Stability and Growth Pact and Fiscal Compact – should be utilised (and if necessary modified) in such a way as to enable the financing of the required investment through new borrowing. From an economic perspective, it would make sense to follow a "Golden Rule" that exempts investments from the limit on new borrowing, at least up to a certain threshold (Sachverständigenrat 2007, Truger 2016). One option proposed by the German Council of Economic Experts (Sachverständigenrat 2007) would be to allow new borrowing equivalent to the value of the net investment. The adjusted gross investment figure (gross investment minus disposals of old assets) could be used as an alternative basis (Hüther 2019). It would be sound economic practice to follow such a rule if the aim of the debt brake is to prevent over-indebtedness and protect future generations against excessive debts resulting from today's budgetary policy, since doing so leaves scope for investment without compromising the goal of the debt brake. Although debt-financed net investment or adjusted gross investment increases the level of debt, it also increases the economy's asset base, preventing the erosion of its net assets. By applying this Golden Rule, the federal government in particular would be in a position to cover the big future costs associated with the digitalisation and decarbonisation of the economy as they arise. This approach would also create the opportunity for a stable, long-term federal investment budget (covering at least ten years) in the shape of an off-budget entity (Hüther 2019).

From a technical perspective, there are two main ways of implementing a Golden Rule. The

first would be to explicitly enshrine the Golden Rule in the constitution through an amendment to its debt rules. Alternatively, the flexibility built into the debt brake by its architects could be exploited in such a way as to permit investment in accordance with a Golden Rule.

Another key argument in favour of a Golden Rule is that interest rate trends have fundamentally altered the debt brake's underlying premise since it was introduced (Figure 4). In recent times, there has been much discussion of the continuous decline in real interest rates that has occurred since the 1990s due to a fundamental change in the relationship between investment and saving (Blanchard 2019). A number of different hypotheses have been proposed to account for this phenomenon (Demary/Voigtländer 2018), including a "savings glut", "secular stagnation", the growing gap between the supply of and demand for safe assets, demographic change, the digital transformation and "superstar firms". Model-based forecasting of future long-term real interest rate trends (to 2050) suggests that although there is likely to be a slight increase if and when monetary policy is normalised, interest rates are set to remain low in the long run (Demary/Voigtländer 2018, Table 6-3; a similar trend is forecast for the USA in Blanchard 2019, p.5 ff.).

In summary, the "Golden Rule of fiscal policy" should be applied to net investment or adjusted gross investment, both in principle and especially in view of current interest rates and their likely future evolution. There is no reason to continue a policy that penalises the current generation and denies future generations room for manoeuvre. Given the interest rate landscape and the productivity effects outlined above, failure by the public sector to

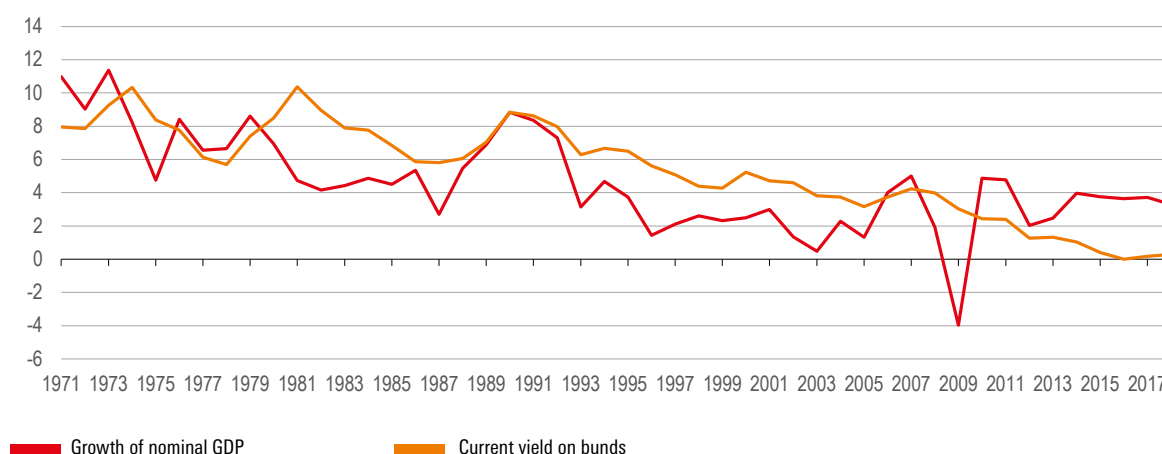
make the necessary investments would constitute a new violation of intergenerational justice, different to any of the issues that have traditionally featured in the debate. Intergenerational justice cannot be secured without optimal development of the public capital stock.

This could be achieved under the existing debt brake rules by creating a federal investment fund to address strictly defined strategic challenges. The fund would be wholly owned by the federal government but would operate as an independent legal entity under public or private law (e.g. a public law corporation, foundation, joint stock company or limited liability company). It would be tasked with delivering the necessary investment and would be allowed a level of borrowing equivalent to the value of its net investments. Provided that it was not purely a financing vehicle and that it performed a genuinely new function, this off-budget entity would not be subject to the constitution's debt brake rules. The public authorities could then "lease" the relevant capital goods from this independent legal entity against payment of the financing costs and the economic depreciation of the capital goods. This solution could be implemented swiftly, since it would not require an amendment to the constitution.

It is true that under the EU fiscal rules the fund would be classified as a public sector entity. However if, as expected, Germany's public debt falls below 60% of GDP at some point in the near future, the strict EU rules that currently apply would be relaxed and the medium-term structural deficit target raised from 0.5% to 1% of GDP. This would allow for additional borrowing of approximately €22 billion a year over and above the current federal government borrowing limit of 0.35%.

Figure 4

Long-term interest rate and nominal GDP growth



Source: Hüther (2019).

In addition, the federal government and the Länder must find a sustainable solution to the municipalities' financial problems. Measures to reduce local government debt have been promised in response to the report of the Commission on Equivalent Living Conditions (BMI 2019). However, these are quite rightly accompanied by the requirement that cash advances provided to the municipalities for future investments must not be diverted to other purposes. In order to achieve this goal, the

federal government and the Länder must help to overcome the disparities in municipal finances and ensure that local government receives an adequate level of financing over the long term. One way of doing this would be for the federal government to take over further social spending costs (Deutsche Bundesbank 2019, p.9, Rietzler 2018), while targeted debt reduction programmes borne mainly by the Länder would also help to restore the municipalities' scope for investment.

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