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Investment for More Growth—An Agenda for Germany's Future

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Germany Must Invest More in Its Future

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Shortly before the parliamentary election in 2013, Germany is riding on a wave of euphoria: hardly any other euro country has weathered the financial and debt crisis so well. Since 2009, GDP has grown by over eight percent and 1.2 million new jobs have been created. Public finances were consolidated and, in 2012, there was a fiscal surplus of 0.2 percent of GDP. An impressive financial position indeed for a country that, only ten years ago, was considered the "sick man of Europe." But it is also a deceptive one. If one substitutes these for other comparative figures, then this image is seriously tarnished. Since 1999, Germany has achieved lower economic growth than the rest of the euro area. Real wages have barely increased since 1999 and real consumer spending has grown much more in the euro area on average than in Germany. In addition, German net public assets have contracted significantly. In 1999, net state assets were about 20 percent of GDP and, by 2011, they had declined to 0.5 percent of GDP and are, therefore, no longer available for future generations. In many areas, Germany has not really progressed at all and in some areas it has fallen significantly behind other countries. These arrears have not been balanced out by recent positive developments.

Overall, Germany has missed significant opportunities for growth. Not only is the Federal Republic of Germany one of the world's biggest exporters, but it is also one of the best savers in the world. Hardly any developed country has such a high savings rate as Germany. A considerable part of these savings were not invested in Germany, but abroad. However, these foreign investments did not bring the returns investors had hoped for. Since 1999, German investors have lost about 400 billion euros through bad investments abroad, about 15 percent of GDP. From 2006 to 2012, this figure was as high as 600 billion euros—or 22 percent of gross domestic product.

The money lost abroad was not, therefore, available for domestic investment. The German rate of investment is low by international standards, and it continues to drop. In 1999, it represented about 20 percent of GDP and it is currently at just over 17 percent. Even countries with difficult economic environments at present, such as France and Italy, invest more in their own countries. Since Germany places due to its specialization in research-intensive industries and knowledge-intensive services comparatively high demands on its production environment in terms of human capital, resource conservation, and mobility, it should, therefore, invest significantly more than other countries so as to be able to ensure healthy growth and increase income in the long term.

Since 1999, Germany has had an investment gap of three percent of GDP compared with the average in the euro area (not including Germany). Cumulatively, this corresponds to roughly one trillion euros since 1999—over 40 percent of current GDP. Had the rate of investment corresponded approximately to the euro area average, GDP per capita would have grown by almost one percent more each year.

A large portion of total investment is financed by firms and private households. If they were to divert only a portion of their investment and invest it profitably in Germany, instead of losing it abroad as in the past, much would be gained—also for the investors. Investment in Germany in the first decade of this century proved extremely profitable. The government must provide another portion of total investment and it has scope to do so, despite the debt brake. Last year—with weak economic growth—only a small surplus was achieved initially. By 2017, the annual surplus will rise to around 28 billion euros. At the same time, financing costs for the German government are currently lower than ever. This provides flexibility without necessarily the need to discuss the revenue or expenditure side.

The main question is how private investment activity in Germany can be increased and the investment gap bridged in the medium term. The response to the significant losses recorded in foreign investment in recent years will play a role here. Private investors will adjust their investment strategies and investing in Germany should become more appealing. Furthermore, increased public investment in areas such as education and transport infrastructure will improve domestic production conditions. The increased attractiveness of Germany as an investment location will then act as a driver for private investment. In addition, the implementation of the energy policy will also provide significant impetus to private investment activities.

Both the government and employees stand to benefit from the "returns" on these additional investments. According to our estimates, bridging the investment gap could lead to significantly higher economic growth in the medium term. In 2017, potential growth would be 0.6 percentage points higher than it would be in a scenario of persistently low investment activity. Instead of potential growth of about one percent, it would be 1.6 percent. This would not only help to reduce the national debt but also allow greater labor productivity and stronger wage growth.

Researchers at DIW Berlin are interested in highlighting the urgency of the issue and the investment opportunities in Germany, and, for instance, to name three investment areas where additional investment would be particularly fruitful: energy, transport infrastructure, and education. The present study does not claim to outline a detailed investment plan to comprehensively analyze all areas with investment opportunities or to take away investment decisions from individual stakeholders.

The implementation of the energy transition will require significant investment in facilities for the use of renewable energies in the power and heat sectors and in infrastructure, particularly in power grids. In addition, substantial investments are needed to improve energy efficiency, for example, by insulating buildings. Without this form of investment, the objectives of the energy policy are not achievable. We take the implementation of the energy policy in accordance with the German government's plans as given and simply intend to show what opportunities it offers. Our model estimations show that reorganizing energy supply could have a permanently positive effect on added value in Germany. However, the basis for these types of investment, which must be predominantly privately financed, are stable framework conditions in all these areas.

Maintaining a quantitatively and qualitatively efficient transport infrastructure is a fundamental prerequisite for economic success and prosperity in Germany. However, in recent years, substantial investment in the maintenance and quality of transport infrastructure has been neglected. In road maintenance alone, calculations in our brief expert report show that an annual investment gap of almost four billion euros has opened up in the past few years. Assuming that at least this investment gap is required for maintaining the transport infrastructure in coming years, and if the cumulative result of years of neglect is also taken into account, the additional annual investment required will be at least 6.5 billion euros, money which will have to come mainly from public finances. In addition, there is also investment need in vehicles and selective network and capacity expansion that is difficult to estimate.

According to national accounting spending on education does not fall in the category of investment, but in the category of government consumption expenditure. Nevertheless, from an economical perspective the education sector can be seen as one of the most important areas of investment. It is a key factor for the future of modern economies. Investment in this area pays dividends, particularly to the overall economy. With education spending at around 5.3 percent of GDP, Germany is below the EU-21 average and also below the OECD-33 average of 6.2 percent. Germany has a particularly large investment gap in early childhood education where prospective returns on education are especially high.

It is a matter of urgency that Germany deals with this lack of investment and closes the investment gap. It is essential for Germany to pave the way for this now since it takes time for investments to bear fruit. In addition, Germany and especially Europe are still in crisis, and in a very weak position economically. Increased public and private investment today would not only fuel Germany's economic growth but also provide a significant impetus for growth in Europe as a whole. At present, this would be the most effective way for Germany to help its neighbors. Moreover, the investment gap should be tackled now since the German government, and also businesses and private households, have never been so economical to finance as they are today. In the long term, such a strategy is, therefore, not only fiscally possible but also beneficial to a sustained course of fiscal consolidation.

First published as »Deutschland muss mehr in seine Zukunft investieren«, in: DIW Wochenbericht no. 26/2013.

More Growth through Higher Investment

by Stefan Bach, Guido Baldi, Kerstin Bernoth, Björn Bremer, Beatrice Farkas, Ferdinand Fichtner, Marcel Fratzscher, and Martin Gornig

While many countries in the euro area are deep in recession due to a debt and structural crisis, the German economy appears to have excelled compared to many other euro area countries. Unemployment has fallen to the lowest level since German reunification, economic output has grown by over eight percent since 2009, and public budgets have been consolidated, generating a surplus in 2012. But this is no cause for euphoria. On the contrary, if one looks at Germany's economic development from a more long-term perspective, we can see that the country is lagging behind in many areas compared to most EU member states and most euro area countries. Since 1999, the euro area countries have on average achieved more economic growth than Germany and this increase in competitiveness can be largely attributed to wage moderation rather than productivity growth. The rate of investment has been falling for a long time and is very low by international standards. The estimations in this study indicate that Germany has had an annual investment gap of three percent of GDP, on average, since 1999. This means that Germany needs to invest substantially more in order to reduce the investment backlog accumulated in recent years and also to ensure higher potential growth and prosperity in the long term.

At the same time, the savings rate in Germany is one of the highest by international standards. As evidenced by the enormous current account surpluses of seven percent in 2012, a considerable part of Germany's savings went abroad, however, rather than being invested in Germany. Overall, Germany has thus missed out on significant growth opportunities at home. Equally important, since 1999, German investors have lost around 400 billion euros on their foreign assets, which corresponds to approximately 15 percent of GDP. In the period from 2006 to 2012 alone, this figure was 600 billion euros, or 22 percent of GDP. At the same time, Germany shows an average investment gap of around 75 to 80 billion euros each year. Calculations by DIW Berlin in this study indicate that if the German investment gap had been closed, annual German economic growth per capita would have been in the last 15 years on average up to one percentage point higher. Germany also has a high degree of specialization in research-intensive industries and knowledge-intensive services. As a prime location with high requirements concerning human capital, conservation of resources, and mobility, the country has a particularly high demand for structural capital investment.

Simulations show that closing the investment gap of 3 percent of GDP in the medium term would lead to significantly higher economic growth in Germany. Potential growth would be 0.6 percentage points higher by 2017: at 1.6 percent of GDP as opposed to around one percent. The fiscal space to fill the public sector share of this investment gap already exists as fiscal consolidation has already been achieved, and the fiscal surplus is projected to rise to 1 percent of GDP by 2017. Thus the needed public investment spending can be financed with existing surpluses and would not require tax increases or expenditure reduction elsewhere. Also in light of more favorable financing conditions and fewer burdens on public finances in the coming years, the financial scope for public and private investment is currently extremely favorable and good use should be made of it now.

Average annual growth of the German economy has been at 2.6 percent since 2009 and the unemployment rate has dropped to the lowest level since reunification.[1] The export industry is competitive and managing to maintain high market shares in a difficult environment.[2] But we see a completely different picture over a longer period of time. Since 1999, the beginning of the European Economic and Monetary Union, the German economy has been lagging behind the euro area average in many respects. The average annual growth of GDP between 1999 and 2012 was only very moderate at 1.3 percent; up until the financial crisis, it was even 0.4 percentage points below average growth in the euro area (see Figure 1). Although the unemployment rate in Germany, which was very high at the beginning of the millennium, has been continuously falling, real wages stagnated at the same time, however (see Figure 2). It is only since the financial crisis that these have been developing more positively than in the euro area overall. The wage restraint prevalent in Germany up until recently was a disappointing development for many private households and led to low private consumer spending (see Figure 3).

Parallel to the weak development of consumer spending, saving levels in Germany are very high compared to other countries in the euro area. One might suppose that much of this money would then be invested in the country's future. But this is not the case: Germany's rate of investment is very low. At the same time, the country is in urgent need of investment. This shows that despite all the successes of the past few years, Germany has not created an investment basis to ensure robust growth.

Low Investment in Germany—A Study

Domestic investment is very low in Germany. This does not only apply to tangible investment normally reflected in the national accounts, including, for example, the purchase of new machinery by companies or construction of roads by the government. To safeguard the future modern economies, expenditure on product and production planning and on research and education is also growing in importance.[3] However, in the national accounts, this fact has been largely ignored to date.[4] This applies to intangible investment by the corporate sector as well as public spending. For instance, despite its investment character, expenditure on personnel training is recorded as public consumer spending and not as intangible public investment.

1 K. Brenke, "Sharp Drop in Youth Unemployment in Germany but Regional Differences Remain," DIW Economic Bulletin, no. 7 (2013).

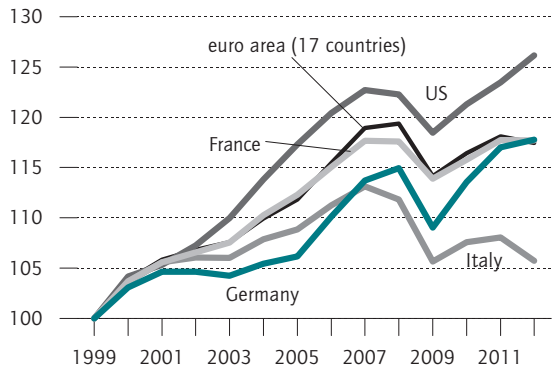
2 M. Gornig and A. Schiersch, "German Manufacturing Withstands the Rise of Emerging Economies," DIW Economic Bulletin, no. 5 (2012).

3 C. Corado, C. Hulten, and D. Sichel, "Intangible Capital and the U.S. Economic Growth," Review of Income and Wealth 55 (3) (2009): 661–685.

4 Only with the upcoming revision of the national accounts are there plans to include corporate expenditure on research and development under investment.

Figure 1

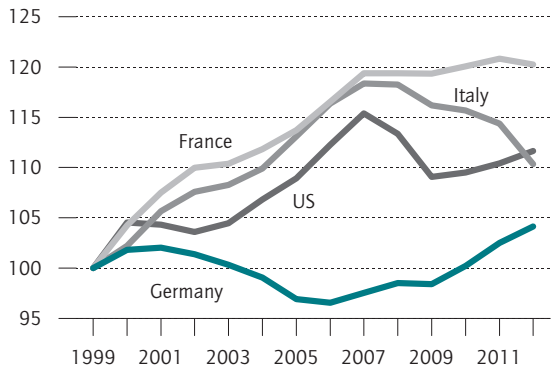
Real GDP
Index 1999 = 100



Source: European Commission.

Figure 2

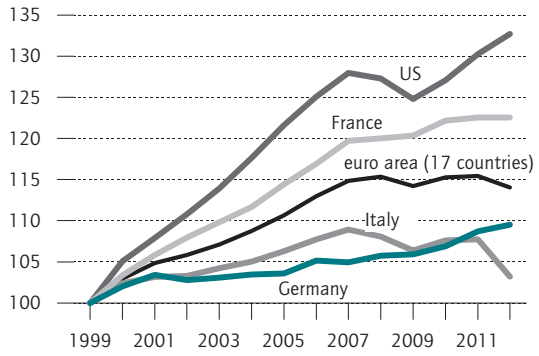
Real Wages
Index 1999 = 100



Source: European Commission.

Figure 3

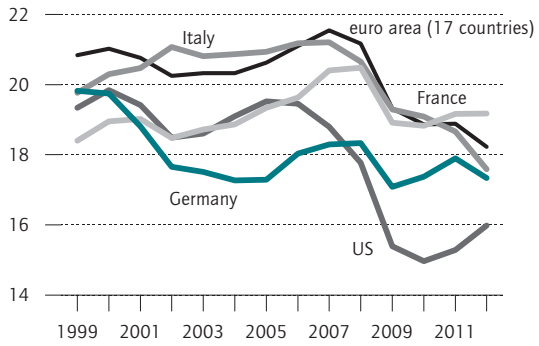
Real Private Consumer Spending
Index 1999 = 100



Source: European Commission.

Figure 4

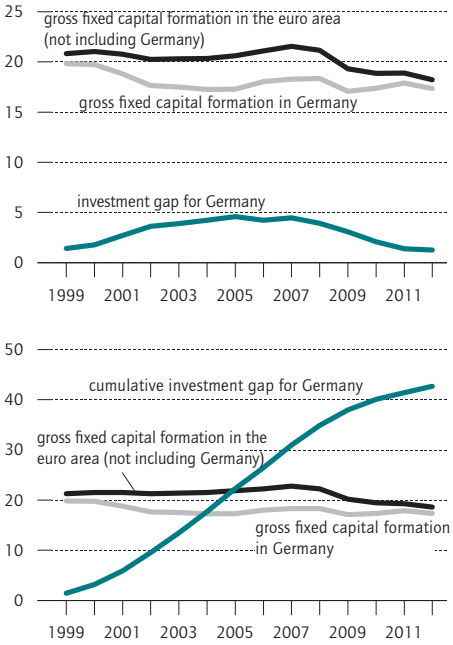
Gross Fixed Capital Formation
In percent of GDP



Source: European Commission.

Figure 5

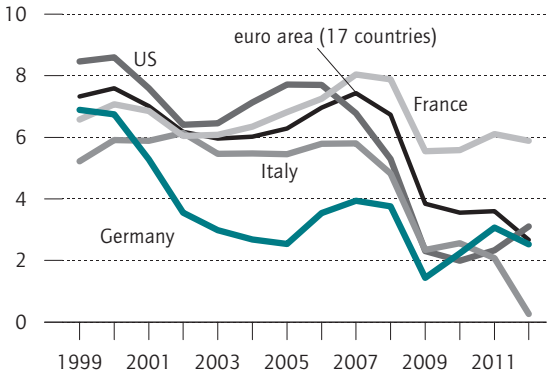
Germany's Investment Gap
In percent of GDP



The investment gap for Germany is calculated as the difference between investment in the euro area and in Germany (in relation to GDP).
Source: European Commission, calculations by DIW Berlin.

Figure 6

Net Fixed Capital Formation
In percent of GDP



Source: European Commission.

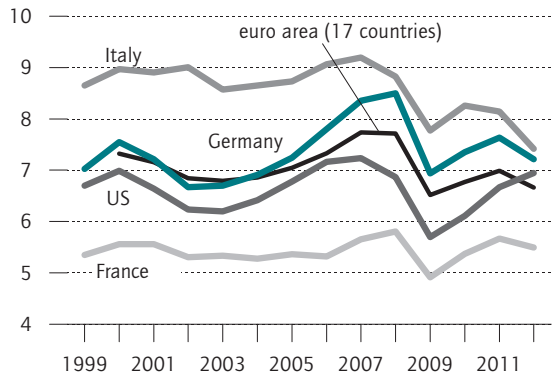
Using the available data, the present empirical analysis concentrates initially on presenting the tangible (physical) investment activity. In addition, on the basis of current research, intangible investment of companies will then also be examined by means of an international comparison. As a key area of intangible public investment, the education sector is analyzed in a separate article.[5]

The rate of investment—i.e., the ratio between gross fixed capital formation and GDP—in Germany was still at just under 20 percent in 1999. It is currently only just over 17 percent. Investment activity (in equipment and construction) in Germany is therefore significant-

5 See C. K. Spieß "Investitionen in Bildung: Frühkindlicher Bereich hat großes Potential," Wochenbericht des DIW Berlin, no. 26 (2013).

Figure 7

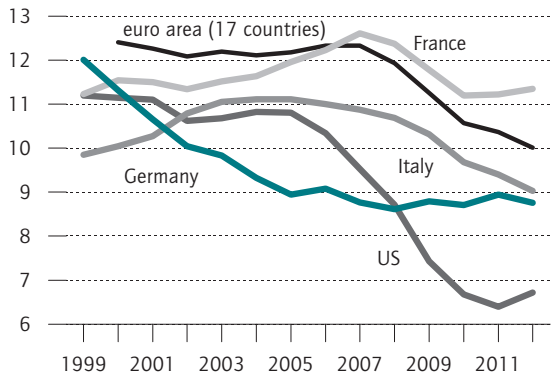
Investment in Equipment
In percent of GDP



Source: European Commission.

Figure 8

Investment in Construction
In percent of GDP



Source: European Commission.

ly lower than in many other countries (see Figure 4).[6] Only in the US is less invested than in Germany. Since 1999, compared to the rest of the euro area, Germany has recorded an annual investment gap of around three percent of its GDP on average. If this backlog is accumulated over the years, this would correspond to about 40 percent of current GDP—approximately one trillion euros (see Figure 5). As far as net investment is concerned—i.e., taking into account depreciation of existing capital stock—the low investment activity in Germany is even more evident (see Figure 6).

If individual investment components are taken into consideration, it can be seen that particularly in construction, investment in the first decade of this century was low by international standards; of the countries studied, only the United States demonstrated an even lower level of investment activity in this area recently (see Figures 7 and 8). One key factor causing Germany to lag behind in construction investment is the years of underfinancing of new residential construction and the below average development of privately financed infrastructure development.[7]

Private Intangible Investment

Countries with a large manufacturing industry such as Germany typically also have a high level of physical investment. When it comes to quality-based competition, it is increasingly important for companies to invest in their knowledge potential, however. This type of investment in research and development, marketing, further training, and management skills is defined as "intangible."

In this field, too, investment activity in Germany is weak overall, despite relatively high levels of research and development. Intangible investment as a share of GDP is at just under six percent (see Figures 9 and 10). In the US, however, almost nine percent of GDP is devoted to developing companies' knowledge capital. Among the countries studied here, only in Italy is intangible investment even lower than in Germany.

Public Tangible Investment

If we only look at public investment activity, we can see that in Germany since the end of the 1990s, particularly investment in the infrastructure and other construction work in relation to the GDP was gradually scaled back (see Table 1). The effect might be somewhat exaggerated due to what is defined as the government sector, since in the '90s economic activity at the municipal level was shifted to the corporate sector. The increased level in the '90s may also be largely due to German reunification. Overall, however, there has been a clear downward trend over the last ten years.

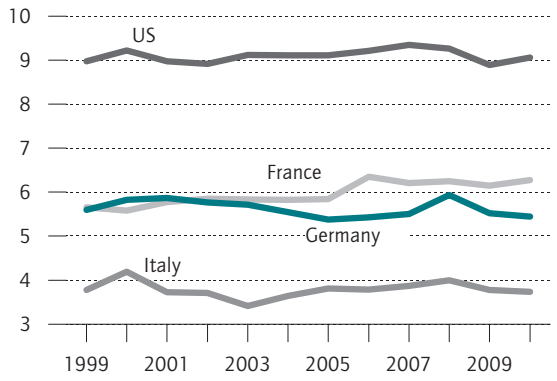
An international comparison shows not only that public investment in Germany has deteriorated over time, but also its level is considerably lower. The difference can be partly explained by changes in the scope and definition of the government sector, but even then, the differences in level are likely to remain significant. Apart from

6 See also J. Zeuner, "Zukunft braucht Investitionen," KfW Economic Research. Fokus Volkswirtschaft, no. 21, (May 3, 2013).

7 M. Gornig and H. Hagedorn, "Germany's Construction Industry: Strong Growth Followed by Stagnation," DIW Economic Bulletin, no. 1 (2012).

Figure 9

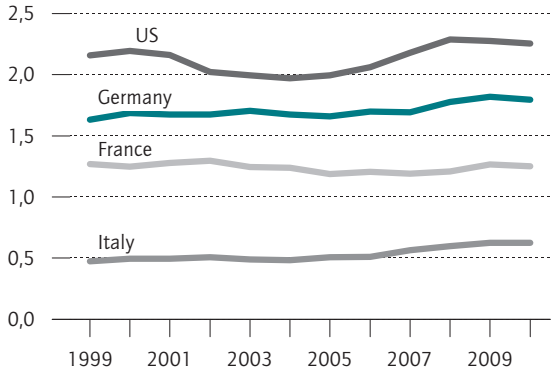
Intangible Investment*
In percent of GDP



** All intangible investment which is not included in the national accounts.*
Sources: INTAN-INVEST Database, Corrado. C., Haskel, J., Iommi, M., Jonc-Lasionio, C. (2012): Intangible Capital and Growth in Advanced Economies: Measurement and Compara-tive Results. CEPR Discussion Paper no. DP9061, calculations by DIW Berlin.

Figure 10

Investment in Research and Development*
In percent of GDP

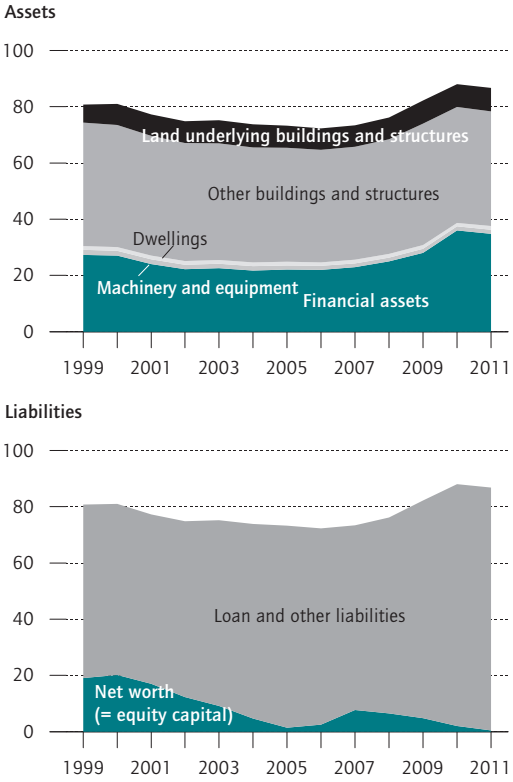


** Not included in the national accounts.*
Sources: INTAN-INVEST Database, Corrado. C., Haskel, J., Iommi, M., Jona-Lasionio, C. (2012): Intangible Capital and Growth in Advanced Economies: Measurement and Compara-tive Results. CEPR Discussion Paper no. DP9061, calculations by DIW Berlin.

in Germany, there has only been a decline in gross public investment in Austria, Belgium, and Switzerland. In most countries in the euro area, the EU, or in the US, public investment relative to the GDP has remained virtually constant over the years.

Figure 11

Macroeconomic Balance Sheet of the General Government in National Accounts
Year-end figure in percent of GDP of the relevant year



Sources: Federal Statistical Office, Bundesbank, calculations by DIW Berlin.

Public Wealth in Germany

Weak public investment activity has contributed to the considerable decline in Germany's public wealth (see Figure 11).[8] On the asset side of the general government's balance sheet, we see fixed assets, divided into land underlying buildings and structures, dwellings, other buildings and structures, as well as machinery and equipment and intangible fixed assets. Most of the public fixed assets fall under other buildings and structures, i.e, the public infrastructure in the form of transport rou-

8 Here, we use data from the marcoeconomic balance sheets, compiled by the Federal Statistical Office and the Bundesbank as part of the national accounts and financial accounts. The assets and debts are shown in relation to the GDP. Deutsche Bundesbank, Federal Statistical Office, Sectoral and macroeconomic balance sheets 1991-2011 (Deutsche Bundesbank, 2012). On the data sources and methods, see German Federal Bank, "Integrierte sektorale und gesamtwirtschaftliche Vermögensbilanzen für Deutschland," Monatsbericht (January 2008).

Table 1

Gross Capital Formation of the General Government in Selected OECD Countries
In percent of GDP

	1999	2000	2001	2002	2003	2004	2005	2006	2007	2008	2009	2010	2011	2012
Germany	2.0	1.9	1.9	1.8	1.6	1.5	1.4	1.5	1.5	1.6	1.7	1.7	1.6	1.5
Netherlands	3.0	3.1	3.3	3.5	3.6	3.2	3.3	3.3	3.3	3.5	3.8	3.6	3.4	3.4
Sweden	3.0	2.8	2.9	3.1	2.9	2.9	3.0	3.0	3.1	3.3	3.5	3.5	3.4	3.5
Austria	1.8	1.6	1.2	1.4	1.3	1.2	1.2	1.0	1.2	1.1	1.2	1.1	1.0	1.0
Finland	2.7	2.4	2.5	2.7	2.8	2.9	2.6	2.4	2.5	2.5	2.8	2.5	2.5	2.6
Switzerland	2.6	2.4	2.5	2.5	2.5	2.3	2.2	2.1	2.0	2.1	2.2	2.2	2.2	
Belgium	2.0	2.0	1.7	1.7	1.6	1.6	1.7	1.6	1.6	1.6	1.7	1.7	1.8	1.7
France	3.0	3.1	3.1	3.0	3.1	3.1	3.3	3.2	3.3	3.3	3.4	3.1	3.1	
Italy	2.4	2.3	2.4	1.7	2.5	2.4	2.4	2.3	2.3	2.2	2.5	2.1	2.0	1.9
Spain	3.4	3.2	3.3	3.5	3.6	3.4	3.6	3.7	4.0	4.0	4.5	4.0	2.9	1.7
Portugal	4.5	4.1	4.4	4.1	3.9	3.8	3.6	2.8	2.7	2.9	3.0	3.8	2.6	1.9
Greece	3.2	3.7	3.6	3.4	3.5	3.6	2.8	3.4	3.4	3.7	3.1	2.3	1.7	1.8
Ireland	3.1	3.5	4.3	4.2	3.6	3.5	3.5	3.8	4.7	5.5	3.8	3.5	2.6	2.1
UK	1.3	1.2	1.5	1.6	1.6	1.8	0.7	1.8	1.9	2.3	2.7	2.5	2.2	2.1
US	2.4	2.5	2.5	2.6	2.5	2.4	2.4	2.4	2.4	2.6	2.6	2.5	2.3	
Canada	2.3	2.3	2.5	2.5	2.5	2.5	2.7	2.8	3.0	3.3	3.7	4.1		
Japan							3.6	3.3	3.1	3.0	3.4	3.3	3.2	
Australia	3.0	3.0	3.0	2.8	2.8	2.9	3.0	3.0	3.3	3.6	4.2	3.9	3.5	
New Zealand	2.8	2.5	2.8	2.8	3.1	3.2	3.5	3.5	3.4	3.9	3.9	3.3		
Korea	5.4	5.4	5.5	5.2	5.7	5.8	5.4	5.0	4.9	5.0	6.2	5.1		
Euro area	2.6	2.5	2.6	2.5	2.6	2.5	2.5	2.5	2.6	2.6	2.8	2.6	2.3	
EU-27	2.4	2.3	2.4	2.4	2.5	2.4	2.3	2.5	2.6	2.7	2.9	2.7	2.5	

Source: OECD, National Accounts Database, May 2013.

tes, utilities and waste management systems, administrative and other buildings.

The financial assets and liabilities are from the financial accounts of the Bundesbank (German Federal Bank).[9] The government's financial assets are primarily deposits in the banking system, shares in companies, and loans to companies, private households, or foreign countries and organizations.

In 1999, net worth (= equity capital) of the general government sector was about 20 percent of GDP and, by 2011, it had declined to 0.5 percent of GDP and is, therefore no longer available for future generations.

High Savings Rate But Lack of Investment

Germany's persistently weak investment is even more striking considering the development and high national savings rate (see Figure 12). Between 1999 and 2003, saving at the macroeconomic level was almost consistently over 20 percent of GDP. Subsequently, savings formation increased dramatically, reaching a peak value of almost 27 percent in 2007. During the global financial crisis, a slight decline was recorded, but at approximately 24 percent in 2012, the figure was still considerably higher than in the 1990s.

However, rather than being used to develop the domestic capital stock, a significant share of German savings is invested abroad. Banks invested part of their savings deposits in the US subprime or Spanish property markets; private investors used their money to buy securities worldwide or transferred it to foreign bank accounts. Over the years, the current account surplus has continued to grow (see Figure 13). However, overall, investments abroad did not pay off. Foreign investment—defined here as cumulative current account balances—resulted in an increase in net foreign assets only initially (see Figure 14). However, since the financial and economic crisis, German investors have had to accept significant valuation losses. While domestic investment generally maintained its value, investment in foreign real estate markets or securities, for instance, saw its value plummet. Since 1999, German investors have lost approximately 400 billion euros on their foreign assets, which corresponds to around 15 percent of the country's GDP. In the period between 2006 and 2012 alone, the figu-

9 Deutsche Bundesbank, Financial accounts for Germany 2006 to 2011, Special Statistical Publication (June 24, 2012).

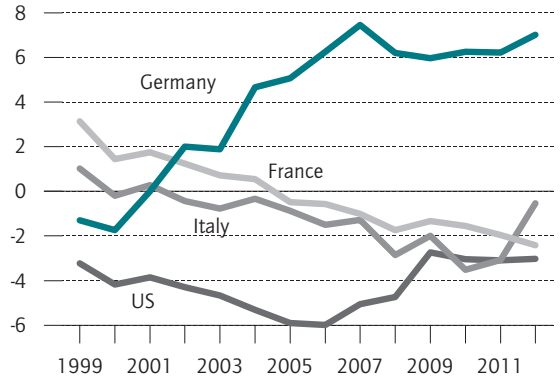
Figure 12

National Savings
In percent of GDP

Source: IMF.

Figure 13

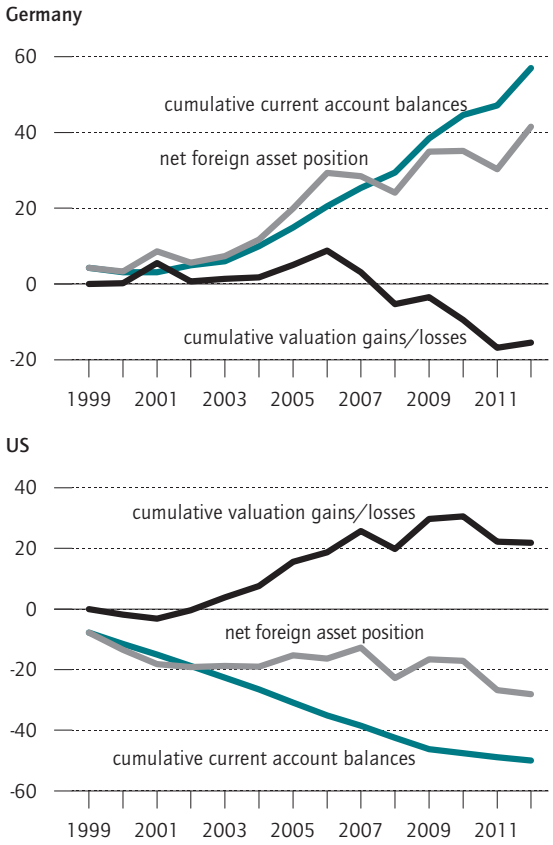
Current Account Balance
In percent of GDP



Source: IMF.

Figure 14

Net Foreign Assets
In percent of GDP



Source: IMF, calculations by DIW Berlin.

re was even as high as 600 billion euros, or 22 percent of GDP.[10] Despite high annual current account surpluses, in fact, in 2011, Germany's net foreign assets slid back to the 2005 level. Although other euro area countries also had to accept a decline in the value of their foreign assets during the economic crisis, these were, for the most part, minimal. Some countries, such as the US in particular, were even able to secure valuation gains in the long term. Despite high cumulative current account deficits, the US has only experienced a slight drop in the value of its net foreign assets since 1999.

A comparison of the average macroeconomic profitability of investment in the individual OECD countries between 2000 and 2010 makes it even more surprising that German savings were invested abroad on such a large scale. The ICOR,[11] which measures the average rate of investment in relation to GDP growth, indicates that with investments made, by international standards, Germany achieved high economic growth (see Figure 15). Only in the UK, the US, and Sweden was the investment efficiency higher than in Germany.

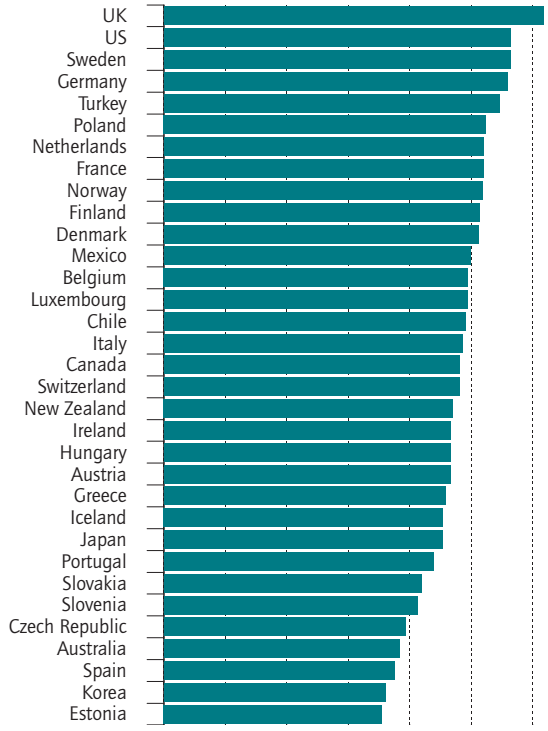
A significant impetus for German investment abroad was probably the expectation of high returns. However,

10 See also E. Klär, F. Lindner, and K. Sehonic, "Investitionen in die Zukunft? Zur Entwicklung des deutschen Auslandsvermögens," Wirtschaftsdienst 3 (2013): 189–197.

11 ICOR stands for Incremental Capital-Output Ratio and is used to denote investment efficiency.

Figure 15

Efficiency of Investments Based on Inverse ICOR*
Average from 2001 to 2010



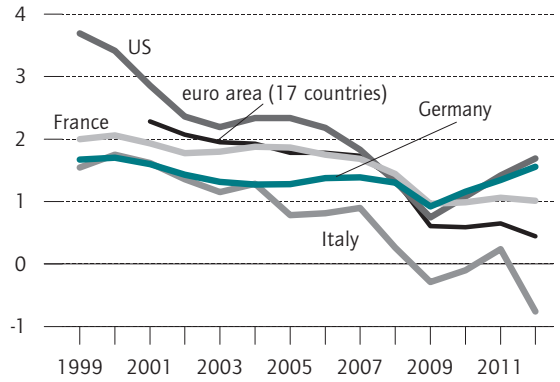
ICOR = average investment rate / GDP growth.
Source: OECD, calculations by DIW Berlin.

with hindsight, in recent years, this expectation was not fulfilled. The losses on investments abroad have made domestic investment more attractive, resulting in more funds flowing into certain sectors in Germany, such as construction.

Alongside private investment, public investment also plays a major role in Germany's future economic development. On the one hand, public investment has to increase in order to bridge the substantial investment gap that has developed in recent years. On the other hand, this type of investment is necessary to secure Germany's position as an attractive business and investment location in the long term.

Figure 16

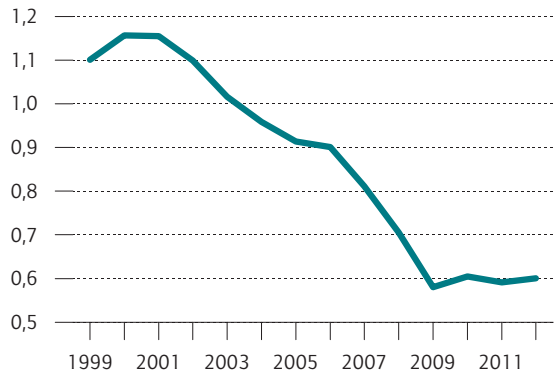
Growth in Potential Production
In percent



Potential production denotes the macroeconomic production that would be achievable if economic production factors were fully exploited.
Source: European Commission.

Figure 17

Growth in Total Factor Productivity
1995–2008, in percent



Total factor productivity denotes the share of economic growth not caused by labor and capital input but rather technological progress and use of resources.
Source: European Commission.

Investment Pivotal for Productivity and Growth

In the last decade, the potential growth of the German economy was very low and certainly weaker than in other developed countries (see Figure 16). For the development of potential economic growth, total factor

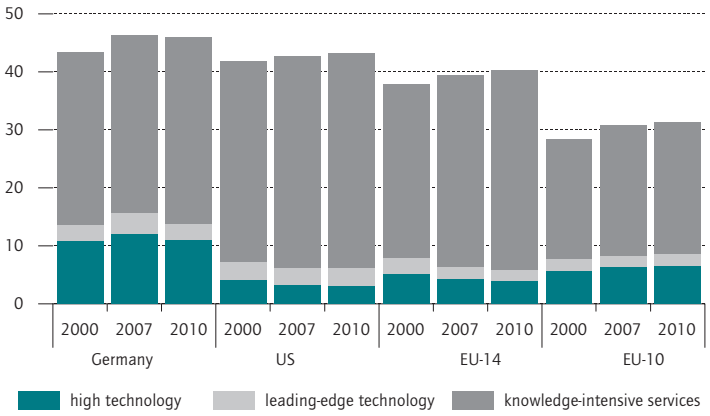
productivity (TFP) plays a decisive role, i.e., the share of economic growth that cannot be attributed to the traditionally measured factors, labor and capital input, but rather technological progress and resource management. Growth of TFP in Germany has also been declining since 1999 (see Figure 17).

Germany has a high degree of specialization in knowledge-intensive sectors (see Figure 18). It has also maintained a competitive edge on the global market, particularly with its research-intensive industries in the high-tech sector (chemical industry, mechanical engineering, electrical engineering, and automobile production).[12] However, knowledge-intensive services are also gaining ground. To secure and expand the knowledge-intensive industries, significant investment is required—both private and public, frequently both tangible and intangible.[13] Therefore, investing in the promotion of research and development as well as in education can make a significant contribution to boosting total factor productivity.

Figure 18

Sectoral Specialization

Sectoral share of gross value added, in percent



Sources: WIOD (2012); OECD STAN (2012); Eurostat (2012); UNSD (2012), calculations and estimates by DIW Berlin.

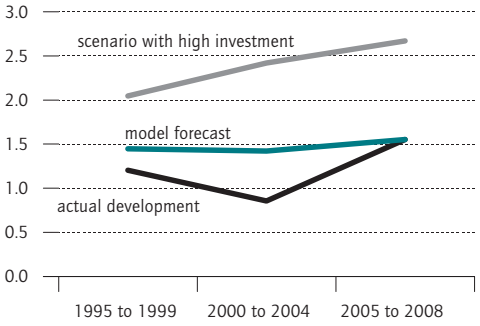
Several scientific studies show that TFP—and thus also potential growth—is, to a significant extent, defined by a country's investment activity along with the level of education and investment in research and development.[14] It can, therefore, be assumed that the slow productivity development and moderate economic growth observed in Germany in recent decades can also be attributed to weak domestic investment activity.

A regression analysis conducted by DIW Berlin confirms a positive correlation between per capita economic growth and investment activity in general and investment in education and research and development in particular (see box). Based on estimates, this study calculates the effect of two different scenarios on Germany's per capita economic growth: a) A three-percent increase in Germany's rate of investment, more or less corresponding to the average investment gap since 1999 as compared with the euro area as a whole could result in per capita GDP growth of around 0.85 percentage points higher. b) A rate of investment equivalent to the longstanding OECD average, which corresponds to around 22 percent, could see Germany's per capita economic growth increase by as much as one percentage point. The historical path of per capita economic growth with a higher rate of investment is simulated to substantiate this finding (see Figure 19).

Figure 19

Simulation of Germany's Per Capita Growth

In percent



Sources: European Commission; Penn World Tables; World Bank, calculations by DIW Berlin.

A continuous increase in investment activity is shown to trigger an increase not only in per capita economic growth but also in potential growth.[15] Assuming TFP

12 Gornig and Schiersch, "German Manufacturing wthstands the Rise of Emerging Economies", DIW Economic Bulletin 5, 2012: 10-14.

13 "Bedeutung der Wissenswirtschaft im Euroraum und in anderen Industrienationen," Studien für die Expertenkommission Forschung und Innovation 7 (2013).

14 See, for example, R. Barro, X. Sala-i-Martin, Economic Growth, 2nd ed. (MIT Press Books, 2003); D. Coe, E. Helpman, and A. Hoffmaister, "International R&D Spillovers and Institutions," European Economic Review 53 (7) (2009): 723–741.

15 The European Commission's method framework is particularly suitable for simulating potential growth in the medium term. For a detailed description of this method, see F. D'Auria, C. Denis, K. Havik, K. McMorrow, C. Planas, R. Raciborski, W. Röger, and A. Rossi, "The Production Function Methodology for

Box

Regression Analysis

Table 1

Dependent Variables: Per Capita GDP Growth

	(1)	(2)
Per capita GDP in 1995 (in log)	–12.76***	–10.48***
Investment (in log)	3.01	4.78**
Education (average years of schooling)	0.66***	
Direct investment	0.03**	0.02**
R&D	1.15*	1.24
Expenditure per elementary school student		–0.1
Constants	115.88***	95.06***
Number of observations	55	51
R^2	0.74	0.71

, **, * denotes significance at the 10, 5, and 1-percent level.*

Table 2

Dependent Variables: Growth in Total Factor Productivity (TFP)

	(1)	(2)
TFP (–1)	0.21**	0.22***
Per capita GDP in 1995 (in log)	–8.65***	–8.43***
Investment (in log)	–2.78**	–4.14***
Education (public expenditure)	0.22**	
R&D	0.41	0.39
Direct investment	-0.02	0.007
Openness of the economy (in log)	4.02***	3.19***
Expenditure per elementary school student		0.04*
Constants	80.03***	85.84***
Number of observations	53	51
R^2	0.84	0.82

, **, * denotes significance at the 10, 5, and 1-percent level.*

In order to examine the impact of investment in the infrastructure and in education and research on long-term per capita GDP growth, a regression analysis was conducted using panel data for 19 OECD countries for the period from 1995 to 2008 (see Table 1). The findings indicate that investment and the level of education, measured as total years of schooling,[1] have a significant impact on economic performance per capita, even in the medium term. The estimated values remain robust, also when the remaining control variables are factored in.[2]

The estimated findings show that a ten-percent increase in the rate of investment boosts per capita economic growth by almost 0.5 percentage points. This means that an increase in the German rate of investment of four percentage points, from its current level of just over 17 percent to the longstanding OECD average, could result in economic growth of almost one percentage point. An increase in the level of education would trigger a further surge in growth, and research and development expenditure also has a positive impact on economic growth.

1 This corresponds to the proxy variable that is usually used for the level of education of the country.

2 See Barro and Sala-i-Martin, Economic Growth, The MIT Press, 2nd edition, 2003.

growth continues to rise from 2013, compared to levels reached between 2000 and 2008 by the highly productive group of European countries (Sweden, Finland, and Austria), and also assuming the rate of investment continually increases from 22 percent—the longstanding average OECD rate—by 2017, Germany's potential growth could be at 1.6 percent and thus around 0.6 percentage points higher than would be the case if investment, education, and research expenditure remain unchanged (see Figure 20).

The growth-promoting effect of stronger investment activity in Germany would create the basis for a sustainable increase in real disposable income. A regression analysis with income growth as a dependent variable

Calculating Potential Growth Rates and Output Gaps," Economic Papers 420 (2010).

Table 3

Dependent Variables: Annual Growth of Real Disposable Income
In percent

	(1)
Investment (in log)	1.76*
Primary education	0.04
R&D	1.1**
Direct investment	0.01**
Constants	-7.3***
Number of observations	44
R^2	0,64

, **, * denotes significance at the 10, 5, and 1-percent level.*

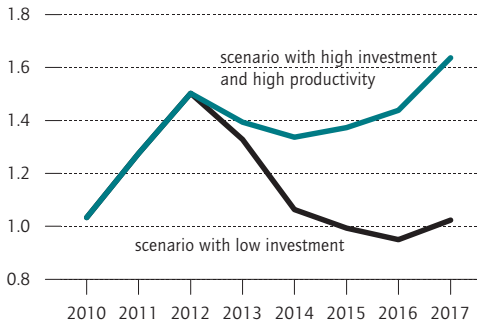
Furthermore, it is evident from the regression analyses that the positive effect of investment in education and research primarily influences total factor productivity. This emphasizes the crucial importance of this type of investment for future economic growth, particularly for the knowledge-intensive industries (see Table 2).

To examine how investment in the infrastructure and in education and research impacts income growth, the regression analyses were repeated using the annual growth of real disposable income as an independent variable (see Table 3). Both investment in general and investment in research and development in particular promote income growth. A four percentage point increase in the current rate of investment of 17 percent would lead to an increase in the growth of annual disposable real income of 0.4 percentage points.

shows that the three determining factors, total investment, the degree of education, and the level of expenditures in research and development can lead to excessively higher incomein the medium term. If Germany's rate of investment were to increase to the level of the longstanding OECD average, this would result in a 0.4 percentage point increase in the annual growth of real disposable income.

Figure 20

Potential Growth with Increased Investment and Total Factor Productivity
In percent



Source: European Commission, calculations by DIW Berlin.

Table 2

Selected Fiscal Figures
In relation to nominal GDP

	2012	2013	2014	2015	2016	2017
Nominal fiscal balance*	0.2	0.1	0.4	¾	¾	1
Structural fiscal balance*	0.4	0.6	0.7	¾	¾	1

** Based on the national accounts as of February 2013.*
Source: Federal Statistical Office, calculations by DIW Berlin.

Sufficient Financial Leeway Exists

The financing conditions for public and private investment are currently extremely favorable. This situation is also unlikely to change dramatically in the coming years. Germany is continuing to profit from the sustained uncertainty on the European financial markets; in search of comparatively secure investment opportunities, investors have increasingly focused on Germany. Furthermore, the real economic situation is also good, but, more importantly, the structure of economic growth with regard to public budgets is very favorable. Thus, economic growth is currently supported by the domestic market, and the labor market is developing positively. A study by DIW Berlin shows that, over the medium term, government budgets are expected to enjoy increasing surpluses. For the year 2017 alone, a surplus of just under 28 billion euros is anticipated, which corresponds to approximately one percent of German GDP

(see Table 2).[16] These surpluses are expected to be mainly of a structural nature, i.e, not driven by economic developments. During the same period, the debt ratio is expected to decrease substantially, particularly because some of the contingent liabilities resulting from the financial crisis are likely to be dissolved. German financial policy should make use of this excellent fiscal situation and create a road map today for higher potential growth in the future. Investment in research and education should be prioritized.

Conclusion

It is a matter of some urgency that Germany deals with this lack of investment and closes the investment gap as soon as possible. It is essential for Germany to pave the way for this now since it takes time for such investment to bear fruit. Increased public and private investment today would not only fuel Germany's economic growth but also provide a significant impetus for growth in Europe as a whole. At present, this would be the most effective way for Germany to help its neighbors.

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JEL: E210, E220, E230, O470
Keywords: Public and private investment, potential growth, net foreign assets

First published as »Wege zu einem höheren Wachstumspfad«, in: DIW Wochenbericht no. 26/2013.

16 See K. van Deuverden, "Mittelfristige Wirtschaftsentwicklung: Stabiles Wachstum und hohe Überschüsse der öffentlichen Haushalte," Wochenbericht des DIW Berlin, no. 16 (2013).

Prof. Marcel Fratzscher, Ph.D., President of the German Institute for Economic Research (DIW Berlin).

SEVEN QUESTIONS TO MARCEL FRATZSCHER

»Germany's Big Weakness is a Lack of Investment«

1. Professor Fratzscher, in comparison with the rest of Europe, the German economy seems to be flourishing. Is Germany really doing as well as it appears to be? Germany weathered the crisis very well. However, if we look back 15 or 20 years, even by European standards, Germany was performing comparatively poorly. In the last 15 years, German growth has been very weak, its productivity growth marginal, and its wage development also very disappointing. Therefore, we really have no reason to be riding on a wave of euphoria as is currently the case.

2. So, what is the problem? Germany's biggest weakness is a lack of investment. Germany has one of the lowest rates of investment in the world. Relative to economic output, in the last 20 years, investment in Germany has plummeted. It would also make sense to use additional investment opportunities in the public sector, particularly in the transport infrastructure and in education. In the private sector, significant investment is needed to implement the energy transition. To improve Germany's medium and long-term growth prospects, we would need to see an increase in investment of three percent of GDP.

3. The German government has adopted a rigid austerity policy. Should it abandon this approach? No, fiscal consolidation is important. Public budgets must have a solid foundation. This is something that can be seen quite clearly from the debt crises in Europe. German public budgets are already generating slight surpluses again, which means that we already have the financial means to be able to make the necessary investments immediately.

4. How can investors be persuaded to invest more in Germany? The main aim should be to improve Germany's appeal as an investment location. To do this, we have to create the right framework conditions to convince companies to invest here. Obviously, this includes the infrastructure in the widest sense, an adequate skilled labor force, as well as legal certainty and planning security for businesses.

5. Lured by high returns, banks have tended to invest abroad. Yes, but that proved to be a mistake since, particularly in the last ten years, not only banks but also private companies and private households have recorded significant losses on their foreign investment. Our study highlights that, in the last ten years, investment in Germany has been very profitable compared to other countries.

6. When should we start to address the problem? These investments should be made as a matter of urgency. First, because Germany's economy is continuing to falter. Second, because financing conditions for the German government have never before been as favorable as they are at present. Third, because many of these investments will not bear fruit immediately but rather will need years to yield profits.

7. How much could the gross domestic product profit from more investment, in the medium and long term? According to our calculations, potential growth could be almost 50 percent higher. More specifically, this means that the ability of the German economy to generate growth and thus also employment, wage increases, and income has, at just under one percent of economic output per annum, been very limited to date. Implementing these investments would increase potential growth to almost 1.6 percent.

Interview by Erich Wittenberg.

Automobility in Flux: More Women and Older Drivers at the Wheel

by Uwe Kunert, Sabine Radke, Bastian Chlond, and Martin Kagerbauer

Having barely registered an increase at the beginning of the new millennium, during the economic upturn after 2009, there was significant growth in the mileage by registered motor vehicles in Germany, both in the case of utility vehicles and automobiles. Overall, in 2011, automobiles covered a higher mileage than ever before. Despite more efficient engines, this resulted in fuel consumption stagnating in recent years, although the long-term trend is one of decline. With an 85-percent share of total mileage, automobiles dominate our roads. This transport demand pattern is predominantly created by the needs of private households and it is currently in a state of flux when it comes to gender and age balance. Women's growing presence in education and on the labor market has, in turn, resulted in an increase in their car ownership and mileage. At the same time, men and women are maintaining a more mobile lifestyle by retaining their cars into older age. However, more limited car use has been observed, particularly among young people who, more frequently than previously, seem to be opting for the most suitable form of transport rather than traveling exclusively in their own vehicles.

The development of transport demand is closely related to important components of economic progress. Passenger transport[1] is strongly correlated to household consumer spending and freight transport services[2] have a clear correlation to gross value added. To accurately depict and understand transportation, regular information is required that gives an insight into the causal relationships. Information about the socio-economic and demographic determinants of mobility are essential for transport policy and planning, and for evaluating them.

This report first outlines the development of mileage and fuel consumption by motor vehicles. Commercial vehicles have covered approximately 15 percent of total distances, passenger cars around 85 percent. Furthermore, this report analyzes in more detail the changes that have taken place in socio-demographic factors and in the behavior of car users in recent years (see box), based on data from the German Mobility Panel.

Further Increases in Registrations and Mileage by Commercial Vehicles

New registrations of trucks and semi-trailers continued to rise in 2011 and reached 316,000 units, more than in the years immediately before the crisis of 2008/2009. These commercial vehicles traveled more than 80 billion kilometers which exceeded the mileage in more recent years. 2.7 million trucks and semi-trailers contributed to one tenth of total mileage by German vehicles (see Figure 1).

The heavier trucks and semi-trailers with a payload of 3.5 tonnes or more are mainly used for freight transport over longer distances. In 2011, the mileage by these vehicles, currently 460,000, exceeded 30 billion kilome-

1 Expressed as the sum of the distances traveled—passenger-transport performance in passenger-kilometers.

2 Freight transport performance in tonne-kilometers.

Box

Data on Vehicle Use and Mobility

In addition to official statistics, representative surveys of passenger, commercial and vehicle transport are carried out at irregular intervals.[1] The Federal Ministry of Transport, Building and Urban Development surveys the mobility of households and their vehicle use with annual sampling for the German Mobility Panel. In addition, DIW Berlin calculates annual mileage (in vehicle-kilometers) by German vehicles by type of vehicle and engine as an essential component of transport demand.

Calculating Mileage by German Vehicles

Complete and consistent information about the distance driven by German vehicles is not available at regular intervals. Official statistics only provide annual information on mileage for heavy goods vehicles over 3.5 tonnes, and for tractors and buses. These figures are recorded by the Federal Motor Transport Authority (KBA) and the Federal Statistical Office.[2] Representative surveys on the usage and mileage by passenger cars and light commercial vehicles have only been conducted at long intervals, most recently in 1993 and 2002.

To obtain a consistent data basis, DIW Berlin has calculated the development of annual mileage and fuel consumption according to vehicle and propulsion type.[3] DIW Berlin has estimated the mileage based on the fuel consumed by road traffic, the number of vehicles, the average consumption per vehicle, and the average mileage.[4]

In addition to making calculations based on fuel consumption, the development of the mileage of cars is estimated using structural features. These estimates are based on known usage parameters for vehicle types from the survey of mileage from 2002. Variance analyzes of data from the 1993 and 2002 surveys on mileage show that average distance driven can be estimated from vehicle characteristics, such as vehicle age, propulsion type, capacity, engine power, top speed, tare weight and holder category.[5] The average consumption values for passenger cars are calculated on the basis of test consumption data.

German Mobility Panel

The travel behavior survey by the German Mobility Panel (MOP) is commissioned by the Federal Ministry of Transport, Building and Urban Development. The fieldwork is carried out by specialized research institutes. The Institute for Transport Studies at the Karlsruhe Institute of Technology (KIT) is responsible for the design and for the scientific management and analysis of the survey.

Since 1994, almost 2,000 people have been asked annually about their mobility behavior for the MOP. Participants in the study reported socio-demographic characteristics about their households and the people living in them as well as all trips taken in a week, the reasons for taking those trips, the modes of transport used and the distances and duration of those trips. The same people were interviewed in the two subsequent years. This everyday mobility data can be used to analyze the travel behavior of the German population, and to identify and interpret changes in that behavior.

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1 The nationwide sample surveys relevant to passenger transport are Mobilität in Deutschland from 2002 to 2008 (mobilitaet-in-deutschland.de) and the annual German Mobility Panel (mobilitaetspanel.de). Kraftfahrzeugverkehr in Deutschland was a survey carried out in Germany in 2002 and 2010 on commercial and freight transport vehicles (kid2010.de). Freight vehicle transport statistics continuously monitor German commercial vehicles over 3.5 tonnes (kba.de). The mileage of all German vehicles were last recorded in the Fahrleistungserhebung 2002 (bast.de).

2 Federal Motor Transport Authority, Verkehr deutscher Lastkraftfahrzeuge. The Federal Statistical Office, Specialist Series 8, Series 3.

3 The mileage is calculated for compiling Verkehr in Zahlen on behalf of the Federal Ministry of Transport, Building and Urban Development (BMVBS) (ed.), compiled by S. Radke, DIW Berlin, annually, Hamburg. This Economic Bulletin publishes information and estimates that extend beyond this publication.

4 Important data sources for these calculations are the Federal Motor Vehicle Office, Federal Statistical Office, Association of the German Petroleum Industry. This report takes account of all motor vehicles registered in Germany and their mileage, including journeys traveled abroad. It does not include the mileage of vehicles registered abroad. For procedures and revisions compared to calculations up to 2002, see J. Kloas, H. Kuhfeld and U. Kunert, "Straßenverkehr: Eher Ausweichreaktionen auf hohe Kraftstoffpreise als Verringerung der Fahrleistungen," Wochenbericht des DIW Berlin, no. 41 (2004).

5 See D. Kalinowska, J. Kloas, H. Kuhfeld, and U. Kunert, Aktualisierung und Weiterentwicklung der Berechnungsmodelle für die Fahrleistungen von Kraftfahrzeugen und für das Aufkommen und für die Verkehrsleistung im Personenverkehr (MIV) (2005). On behalf of the Federal Ministry of Transport, Building and Housing, Berlin; D. Kalinowska and H. Kuhfeld, "Motor Vehicle Use and Travel Behaviour in Germany: Determinants of Car Mileage," DIW Berlin Diskussionspapier, no. 602 (2006).

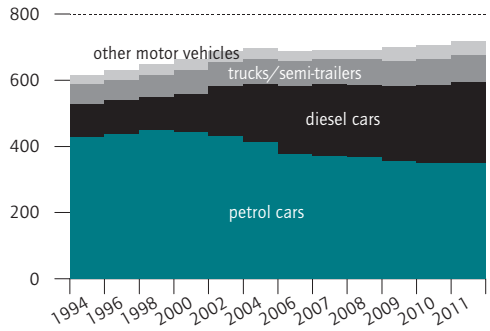
In addition, the mileage driven as well as tanked and consumed fuel volumes are recorded as part of MOP's odometer reading and fuel consumption survey for all vehicles in participating households for eight weeks in spring, to analyze the mileage and real consumption values of all German passenger cars.

The MOP provides representative results for Germany and publishes annual results for mobility parameters, such as transport participation, number of trips per person, vehicle performance (kilometers per person per day), modes of transport and data on the use of passenger cars (distance driven and consumption figures). The longitudinal nature of the survey (data over a week and for three consecutive years) makes is possible to analyze changes in respondents' travel behavior. Linking data from the MOP everyday mobility survey with data from the MOP odometer reading and fuel consumtion survey allows detailed analyzes of the interactions and relationships of the mobility behavior of individuals across different modes of transport and the mileage and fuel consumption of the cars.

Figure 1

Mileage by Motor Vehicles Registered in Germany

In billion vehicle-kilometers



Source: calculations by DIW Berlin.

Is the decline of mileage by petrol cars phasing off?

ters. Corresponding to this rise in mileage, transport performances (in tonne-kilometers) of goods vehicles has also increased.[3]

Commercial vehicles are almost exclusively powered by diesel engines. Their share of diesel fuel consumption in 2011 was 47 percent (see Table 3).[4]

Passenger Cars: Significant Increase in Numbers and Mileage

At the beginning of 2012, there were nearly 43 million registered passenger cars in Germany. New car registrations were below the long-term average in 2011 at almost 3.2 million. However, the stock of vehicles grew by more than 600,000. This is due to only 2.5 million cars being scrapped or exported, which is below the average of previous years. Obviously, the effects of the scrapping premium, which led to the disposal of around 3.5 million cars in 2009, were still ongoing today. But, at the same time, this means that the average age of German cars continues to rise and now stands at a new high

3 For the current statistics on transport services, see S. Radke, Verkehr in Zahlen 2012/2013.

4 Here and in the following the fuel data include biogenic shares which in 2011 had an energy share of 5.5 percent of total fuel consumption (gasoline and diesel), see Federal Ministry for the Environment, Nature Conservation and Nuclear Safety (BMU), Renewable Energies in Figures (Berlin: 2012). Consumption figures include refueling abroad.

Table 1

Fleet and Mileage by Motor Vehicles Registered in Germany

		1996	1998	2000	2002	2004	2006	2008	2010	2011
Mopeds or similar[1]										
Fleet[2]	1,000	1,667	1,747	1,595	1,584	1,786	1,930	2,043	2,043	2,096
Average mileage[3]	1,000 km	2.5	2.5	2.4	2.4	2.4	2.4	2.3	2.3	2.3
Total mileage[3]	Million km	4,168	4,280	3,827	3,754	4,232	4,575	4,700	4,699	4,821
Motorcycles[4]										
Fleet[2]	1,000	2,470	2,926	3,338	3,643	3,814	3,956	3,659	3,828	3,908
Average mileage[3]	1,000 km	4.1	3.9	3.9	3.3	3.3	3.3	3.0	3.0	3.0
Total mileage[3]	Million km	10,131	11,411	13,017	12,167	12,739	13,213	11,122	11,646	11,887
Passenger cars										
Fleet[2]	1,000	40,988	41,674	42,840	44,605	45,258	46,427	41,321	42,302	42,928
Average mileage[3]	1,000 km	13.2	13.2	13.1	13.1	13.0	12.6	14.1	14.2	14.2
Total mileage[3]	Million km	539,473	550,779	559,467	583,560	590,409	583,905	584,589	599,010	608,769
Motor bus[5]										
Fleet[2]	1,000	85	83	86	85	86	84	75	76	76
Average mileage[3]	1,000 km	43.4	45.0	43.7	42.5	41.5	41.7	44.1	43.6	43.6
Total mileage[3]	Million km	3,683	3,752	3,740	3,634	3,562	3,502	3,322	3,336	3,316
Trucks[6]										
Fleet[2]	1,000	2,273	2,371	2,527	2,632	2,579	2,584	2,347	2,441	2,529
Average mileage[3]	1,000 km	23.5	23.5	23.3	22.1	22.4	22.3	25.7	24.9	24.7
Total mileage[3]	Million km	53,446	55,714	58,878	58,210	57,702	57,649	60,291	60,705	62,537
Semi-trailers										
Fleet[2]	1,000	130	141	162	179	182	201	177	178	184
Average mileage[3]	1,000 km	73.7	86.6	78.2	76.6	83.0	82.6	102.0	94.9	94.8
Total mileage[3]	Million km	9,585	12,211	12,695	13,702	15,104	16,604	18,039	16,904	17,472
Other tractors[7]										
Fleet[2]	1,000	603	690	769	850	921	992	1,065	1,155	1,209
Average mileage[3]	1,000 km	4.4	4.4	4.4	4.4	4.3	4.3	4.3	4.2	4.2
Total mileage[3]	Million km	2,626	3,008	3,352	3,705	3,971	4,281	4,528	4,896	5,125
Other motorized vehicles[8]										
Fleet[2]	1,000	625	630	655	680	692	284	261	264	267
Average mileage[3]	1,000 km	11.7	12.0	12.3	12.4	12.5	12.6	13.5	13.6	13.6
Total mileage[3]	Million km	7,307	7,546	8,069	8,461	8,678	3,568	3,525	3,583	3,632
Total motor vehicles										
Fleet[2]	1,000	48,843	50,262	51,970	54,258	55,318	56,458	50,947	52,287	53,197
Total mileage[3]	Million km	630,419	648,701	663,045	687,325	696,399	687,297	690,116	704,780	717,559

1 At the beginning of the insurance year, including wheelchairs.
2 Up to 2006, annual mean values, including from 2007 year-end values excluding vehicles temporarily deregistered.
3 Mileage of domestic vehicles including distances abroad.
4 Including light motorcycles and mopeds.
5 Including trolley coaches.
7 Including common tractors.
8 Including work machines without vehicle registration documents but with a registration plate.
Sources: Federal Motor Transport Authority; Federal Statistical Office, calculations by DIW Berlin.

The total mileage reached a new high in 2011.

of 8.5 years.[5] Total car use increased this year to almost 610 billion kilometers (see Table 1).

Due to their lower average use of 11,500 km per year, the 30.5 million passenger cars with petrol engines (71 percent of all units) only contribute 350 billion kilometers (57 percent) to the total mileage by cars (see Table 2). However, 11.9 million diesel cars drove almost 250 billion kilometers at an average of 20,700 kilometers which is equivalent to 41 percent of total mileage by cars (see Figure 1 and Table 3). A further 13 billion kilometers were driven by 530,000 cars that can run on liquid petroleum or natural gas. In addition, 49,000 cars were equipped with hybrid engines.[6]

5 Source: Federal Motor Transport Authority.

6 Since they can only draw their operating power from internal combustion engines, cars with hybrid drive are included in the driving performance of conventional engines. Approximately 4,500 cars are electrically operated, see

Table 2

Consumption Figures Calculated for Motor Vehicles Registered in Germany with Petrol Engines

		1996	1998	2000	2002	2004	2006	2008	2010	2011
Mopeds or similar[1]										
Fleet[2]	1,000	1,667	1,747	1,595	1,584	1,786	1,930	2,043	2,043	2,096
Average mileage[3]	1,000 km	2.5	2.5	2.4	2.4	2.4	2.4	2.3	2.3	2.3
Total mileage[3]	Million km	4,168	4,280	3,827	3,754	4,232	4,575	4,700	4,699	4,821
Average petrol consumption /100 km	Liters	2.0	2.0	2.0	2.0	2.0	2.0	2.0	2.0	2.0
Total petrol consumption[4]	Million L	83	86	77	75	85	91	92	92	94
Motorcycles[5]										
Fleet[2]	1,000	2,471	2,926	3,338	3,643	3,814	3,956	3,659	3,812	3,897
Average mileage[3]	1,000 km	4.1	3.9	3.9	3.3	3.3	3.3	3.0	3.0	3.0
Total mileage[3]	Million km	10,131	11,411	13,017	12,167	12,739	13,213	11,122	11,587	11,848
Average petrol consumption /100 km	Liters	4.5	4.5	4.7	4.8	4.8	4.7	4.7	4.7	4.7
Total petrol consumption[4]	Million L	456	525	612	584	611	621	521	543	555
Passenger cars										
Fleet[2]	1,000	35,357	36,187	36,879	37,297	36,446	35,944	31,031	30,545	30,505
Average mileage[3]	1,000 km	12.4	12.4	12.0	11.6	11.3	10.5	11.9	11.4	11.5
Total mileage[3]	Million km	438,564	449,475	442,855	431,246	412,820	378,705	367,959	349,416	349,301
Average petrol consumption /100 km	Liters	9.1	8.8	8.6	8.5	8.4	8.3	8.1	7.9	7.9
Total petrol consumption[4]	Million L	39,691	39,747	38,129	36,633	34,582	31,157	29,031	27,724	27,705
Motor buses[6]										
Fleet[2]	1,000	0.6	0.4	0.3	0.3	0.2	0.2	0.1	0.1	0.1
Average mileage[3]	1,000 km	11.0	11.0	11.0	11.0	11.0	11.0	15.5	15.5	15.5
Total mileage[3]	Million km	7.0	4.9	3.6	3.1	2.4	2.2	2.0	1.5	1.4
Average petrol consumption /100 km	Liters	18.0	18.0	18.0	18.0	18.0	18.0	18.0	18.0	18.0
Total petrol consumption[4]	Million L	1.3	0.9	0.7	0.6	0.4	0.4	0.3	0.3	0.2
Trucks										
Fleet[2]	1,000	330	305	284	264	224	193	142	136	132
Average mileage[3]	1,000 km	12.0	12.0	12.0	11.9	11.9	11.9	14.0	14.0	14.0
Total mileage[3]	Million km	3,956	3,657	3,410	3,144	2,666	2,291	1,991	1,904	1,850
Average petrol consumption /100 km	Liters	12.9	12.7	12.5	12.4	12.4	12.4	12.0	11.5	11.5
Total petrol consumption[4]	Million L	510	464	426	390	331	284	229	219	213
Tractors[7]										
Fleet[2]	1,000	12.0	12.0	13.3	14.7	16.2	15.9	21.0	30.5	32.7
Average mileage[3]	1,000 km	2.1	2.1	2.1	2.1	2.1	2.1	2.0	2.0	2.0
Total mileage[3]	Million km	25	25	28	31	34	33	43	61	65
Average petrol consumption /100 km	Liters	18.0	18.0	18.0	18.0	18.0	18.0	17.0	17.0	17.0
Total petrol consumption[4]	Million L	4.5	4.5	5.0	5.5	6.1	6.0	7.0	10.4	11.1
Other motorized vehicles[8]										
Fleet[2]	1,000	154.0	137.0	121.5	109.5	95.0	37.6	30.0	26.6	24.9
Average mileage[3]	1,000 km	8.3	8.3	8.5	8.5	8.4	8.4	10.0	9.9	9.9
Total mileage[3]	Million km	1 278	1 137	1 033	930	798	316	295	263	247
Average petrol consumption /100 km	Liters	18.0	18.0	17.8	17.6	17.6	17.6	17.0	17.0	17.0
Total petrol consumption[4]	Million L	230	205	184	164	140	56	50	45	42
Total motor vehicles										
Fleet[2]	1,000	39,992	41,314	42,231	42,913	42,381	42,076	36,926	36,593	36,689
Average mileage[3]	Million km	458,129	469,991	464,175	451,275	433,291	399,135	386,111	367,933	368,134
Total mileage[3]	Million L	40,977	41,032	39,433	37,852	35,756	32,216	29,931	28,633,	28,621
Total petrol consumption[4]	1,000 t	30,733	30,774	29,575	28,389	26,817	24,162	22,448	21,475	21,466

1 At the beginning of the insurance year, including wheelchairs.
2 Up to 2006, annual mean values, including from 2007 year-end values excluding vehicles temporarily deregistered.
3 Mileage of domestic vehicles including distances abroad.
4 Including light motorcycles and mopeds.
5 Including trolley coaches.
7 Including common tractors.
8 Including work machines without vehicle registration documents but with a registration plate.
Sources: Federal Motor Transport Authority; Federal Statistical Office, calculations by DIW Berlin.

The consumption of petrol continues to decline.

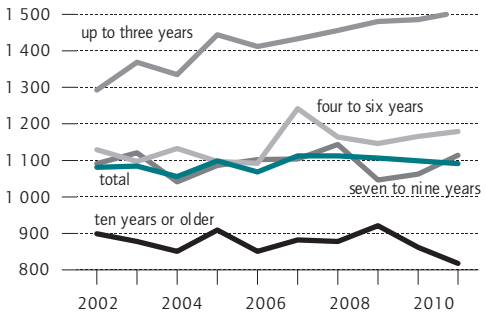
The analysis of the German Mobility Panel produced similar results for average mileage for cars. The MOP records kilometers driven in Germany in the spring. Differentiating average mileage by vehicle age, there have been increases among newer cars (especially in cars up to three years old, and even among four to six-year-old-cars) in recent years, whilst the mileage by older cars has stagnated or declined slightly (see Figure 2).

Furthermore, analyses based on data from the German Mobility Panel show that there was an increase in mileage when newer, more fuel-efficient vehicles replaced older cars. Car users compensate for specific savings in cost per kilometer, at least partially, by increases in mileage.[7]

Figure 2

Mileage in Spring Months According to Vehicle Age

Kilometers per car and month



Source: German Mobility Panel.

The use of new cars is still increasing.

Fuel Consumption Stagnates

At almost 28 billion liters, petrol consumption from passenger cars accounted for almost all petrol consumption from road transport. Due to the reduction in the number of vehicles and improvements in efficiency, petrol consumption has decreased by about one-quarter in the last ten years. However, diesel consumption has risen almost continuously. In 2011, it was approximately 17 billion liters for cars, that is an increase of 60 percent in ten years. Including demand from commercial vehicles, that is a total of over 37 billion liters of diesel consumed. Total fuel consumption has tended to decline slightly since 2000, but it has stagnated in recent years at 66 billion liters.

Fuel Consumption of Cars Much Higher Than Officially Stated

Data on fuel consumption for new cars are a deciding factor for car buyers who are informed of standard EU fuel consumption figures by car dealerships (car label). For annual registrations of petrol cars, standard EU fuel consumption[8] has decreased by almost a quarter since 1998, to 6.3 liters per 100 kilometers in 2011. Having stagnated for some years, average consumption for new diesel cars fell in 2011 to 5.5 liters per 100 kilometers, a decrease of 20 percent since 1998. In 2011, all new cars were calculated to have an average standard consumption of 5.9 liters of fuel per 100 kilometers. This corresponds to CO_2 emissions of about 146 grams per kilometer driven.[9]

However, standard consumption data for individual vehicles is 20 to 30 percent lower than actual consumption values, since they do not reflect everyday driving conditions. For example, standard consumption figures do not include journeys at more than 120 km/h or with the use of air conditioning.[10] But in determining annual mileage, DIW Berlin had to take into account actual consumption. These actual consumption values are estimated annually based on available empirical data.[11] When comparing actual and standard fuel consumption values, it becomes apparent that the differences increase over time, particularly for newer diesel vehicles. For new diesel cars, actual consumption is, on average, one-fifth more than standard values. As a result, car buyers receive insufficient information if they want to take account of future operating costs in their purchasing decision. In 2011, car users spent more than 65 billion euros on fuel. Had their cars consumed fuel accor-

W-P. Schill, "Elektromobilität: Kurzfristigen Aktionismus vermeiden, langfristige Chancen nutzen," Wochenbericht des DIW Berlin, no. 27-28 (2010).

7 For the rebound effect, see U. Kunert and S. Radke, "Kraftfahrzeugverkehr 2010: Weiteres Wachstum und hohe Bedeutung von Firmenwagen," Wochenbericht des DIW Berlin, no. 48 (2011).

8 EU Directive 93/116/EC (New European Driving Cycle, NEDC) applies in determining the standard consumption of new registrations.

9 See Federal Motor Transport Authority, Neuzulassungen und Besitzumschreibungen von Kraftfahrzeugen nach Emissionen und Kraftstoffen (2012).

10 See G. Fontaras and P. Dilara, "The evolution of European passenger car characteristics 2000 to 2010 and its effects on real-world CO2 emissions and CO2 reduction policy," Energy Policy 49 (2012): 719-730 and ICCT, "Discrepancies between type-approval and "real-world" fuel-consumption and CO2 values. Assessment for 2001–2011. European passenger cars," Working Paper 2012–02 (2012).

11 For example, Motor Presse Stuttgart GmbH & Co. KG, spritmonitor.de, German Mobility Panel.

Table 3

Consumption Calculation for Motor Vehicles Registered in Germany with Diesel Engines

		1996	1998	2000	2002	2004	2006	2008	2010	2011
Passenger cars										
Fleet[1]	1,000	5,631	5,487	5,961	7,308	8,812	10,483	10,290	11,267	11,891
Average mileage[2]	1,000 km	17.9	18.5	19.6	20.8	20.2	19.6	21.1	21.1	20.7
Total mileage[2]	Million km	100,909	101,304	116,612	152,315	177,589	205,200	216,630	237,700	246,580
Average diesel fuel consumption[3]/100 km	Liters	7.4	7.3	7.1	6.9	6.9	6.9	6.8	6.8	6.74
Diesel consumption,[3] total[4]	Million L	7,498	7,389	8,260	10,529,	12,210	14,058	14,717	16,149	16 613
Motor buses[5]										
Fleet[1]	1,000	84.3	82.8	85.2	85.1	85.5	83.7	75.0	74.8	74
Average mileage[2]	1,000 km	43.6	45.2	43.8	42.6	41.6	41.8	44.2	43.5	43.5
Total mileage[2]	Million km	3,676	3,747	3,736	3,631	3,560	3,500	3,320	3,252	3,234
Average diesel fuel consumption[3]/100 km	Liters	31.0	30.8	30.4	30.2	30.1	30.2	29.0	29.0	29.0
Diesel consumption,[3] total[4]	Million L	1,140	1,154	1,136	1,097	1,070	1,057	963	943	938
Trucks[6]										
Fleet[1]	1,000	1,944	2,066	2,243	2,368	2,355	2,391	2,204	2,282	2,371
Average mileage[2]	1,000 km	25.5	25.2	24.7	23.3	23.4	23.2	26.4	25.5	25.3
Total mileage[2]	Million km	49,490	52,056	55,468	55,066	55,036	55,358	58,300	58,116	59,951
Average diesel fuel consumption[3]/100 km	Liters	22.6	21.5	21.5	20.3	19.5	20.2	19.5	19.0	18.8
Diesel consumption,[3] total[4]	Million L	11,175	11,205	11,953	11,179	10,756	11,189	11,393	11,059	11,293
Semi-trailers										
Fleet[1]	1,000	130	141	162	179	182	201	177	178	184
Average mileage[2]	1,000 km	74.0	87.0	78.0	76.6	83.0	83.0	102.0	94.9	94.7
Total mileage[2]	Million km	9,585	12,211	12,695	13,702	15,104	16,604	18,039	16,856	17,423
Average diesel fuel consumption[3]/100 km	Liters	37.9	36.3	36.6	36.9	36.0	36.4	35.6	35.6	34.6
Diesel consumption,[3] total[4]	Million L	3,633	4,433	4,646	5,052	5,444	6,038	6,426	6,005	6,024
Other tractors[6]										
Fleet[1]	1,000	591	678	755	835	905	976	1,043	1,124	1,177
Average mileage[2]	1,000 km	4.4	4.4	4.4	4.4	4.4	4.4	4.3	4.3	4.3
Total mileage[2]	Million km	2,600	2,983	3,324	3,674	3,937	4,248	4,485	4,835	5,060
Average diesel fuel consumption[3]/100 km	Liters	30.1	30.1	30.1	30.1	30.1	30.1	30.1	30.1	30.1
Diesel consumption,[3] total[4]	Million L	783	898	1,000	1,106	1,185	1,279	1,350	1,455	1,523
Other motorized vehicles[7]										
Fleet[1]	1 ,	471	493	533	570	597	246	231	237	242
Average mileage[2]	1,000 km	12.8	13.0	13.2	13.2	13.2	13.2	14.0	14.0	14.0
Total mileage[2]	Million km	6,029	6,409	7,036	7,530	7,880	3,252	3,230	3,320	3,385
Average diesel fuel consumption[3]/100 km	Liters	23.7	23.7	23.7	23.7	23.7	23.7	23.3	23.5	23.5
Diesel consumption,[3] total[4]	Million L	1,429	1,519	1,667	1,785	1,868	771	753	780	796
Total motor vehicles										
Fleet[1]	1,000	8,851	8,948	9,739	11,345	12,937	14,382	14,021	15,162	15,939
Total mileage[2]	Million km	172,289	178,710	198,870	235,918	263,107	288,162	304,004	324,078	335,633
Diesel consumption,[3] total[4]	Million L	26,356	27,397	30,062	32,418	34,133	35,791	36,901	37,862	38,606
Diesel consumption,[3] total[4,8]	1,000 t	22,007	22,877	25,101	27,069	28,501	29,886	30,813	31,615	32,236

1 At the beginning of the insurance year, including wheelchairs.
2 Up to 2006, annual mean values, including from 2007 year-end values excluding vehicles temporarily deregistered.
3 Mileage of domestic vehicles including distances abroad.
4 Including light motorcycles and mopeds.
5 Including trolley coaches.
6 Including common tractors.
7 Including work machines without vehicle registration documents but with a registration plate.
8 Including unallocated consumption from road transport.
Sources: Federal Motor Transport Authority; Federal Statistical Office, calculations by DIW Berlin.

The consumption of diesel fuel is increasing for both passenger cars and commercial vehicles.

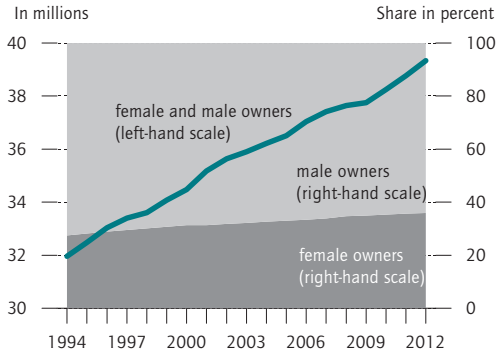
ding to standard values, this figure would have been at least eight billion euros lower.[12]

How consumers take into account fuel economy and future savings has not been clearly documented, based on the numerous studies that have examined this issue. However, the majority of findings suggest that these future

12 Estimated based on the differences between fuel consumption and standard data for all vehicles from individual years.

Figure 3

Car Owners[1] by Gender



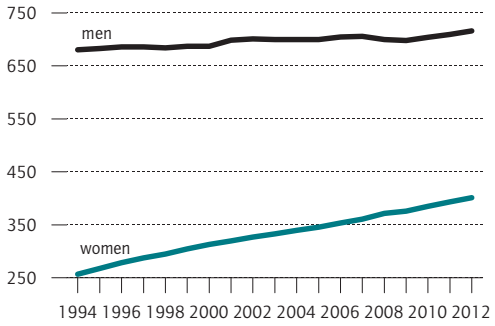
1 Not including legal entities and unknown, excluding cars temporarily off the road/not registered.
Source: Federal Motor Transport Authority, calculations by DIW Berlin.

The share of women owning cars is increasing and has reached 36 percent of 39 million.

Figure 4

Motorization by Gender

Cars per 1,000 inhabitants aged 18 or over



Sources: Federal Motor Transport Authority; Federal Statistical Office, calculations by DIW Berlin.

The share of women with their own car is rising.

savings are undervalued.[13] Certainly, there is less incentive for consumers to purchase more efficient technologies as a result of the incorrect consumption figures.

The actual specific consumption of all passenger cars is significantly higher than the values for newly registered vehicles because usage intensities vary across vehicle classes (for example, new cars and more powerful cars are used more intensively) and because older cars consume more fuel. This is taken into account in the consumption calculations shown in Tables 2 and 3.

More and More Vehicle Owners Are Women …

Over four-fifths of all vehicles on the road are passenger vehicles, which account for around 85 percent of the mileage by German motor vehicles. 38.6 million of a total of almost 43 million passenger vehicles are owned by private households, while households also have around 2.5 million company cars at their disposable for private use.[14] Approximately 80 percent of kilometers driven by all passenger vehicles are for private use. There has been a change in the use of vehicles, for example, through higher labor market participation and altered gender roles. Although overall demand in passenger transport is only rising slightly, there has nevertheless been a marked increase in commuter and leisure travel in recent years.[15]

With higher levels of motorization, women play an increasingly important role as vehicle owners and users. In 1994, 8.8 million passenger vehicles were registered to women, while the corresponding figure today is 14.1 million, that is, 5.3 million more.[16] At the same time, the number of cars registered to men has increased from 23.2 to 25.2 million—up two million (see Figure 3). Therefore, 36 percent of passenger vehicles were owned by women at the beginning of 2012.[17] This equates to 1,000 women (aged 18 or over) sharing 400 cars compared to approximately 715 vehicles for 1,000 men (see Figure 4). This difference is still significant and will continue to decrease in future as mobility habits are maintained in old age (cohort effects) because ownership of passenger vehicles by women is considerably more widespread in the middle-aged groups than for women aged over 64. For men, too, these cohort effects

13 See U.S. Environmental Protection Agency, How Consumers Value Fuel Economy: A Literature Review (2010).

14 See FiFo, Klinski, FÖS (Forum Ökologisch-Soziale Marktwirtschaft), Steuerliche Behandlung von Firmenwagen in Deutschland. Research project commissioned by the Federal Ministry for the Environment, Nature Conservation and Nuclear Safety (BMU), (Cologne: 2011).

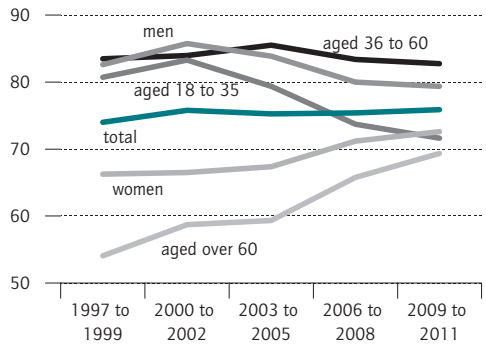
15 On overall transport demand and the purposes of travel, see U. Kunert and S. Radke, "Personenverkehr in Deutschland – mobil bei hohen Kosten," Wochenbericht des DIW Berlin, no. 24 (2012) and Verkehr in Zahlen (2012).

16 Federal Motor Transport Authority (KBA) (various years): Fahrzeugzulassungen. We refer to 1994 when the German Mobility Panel was founded. The data on existing vehicles refer to adjusted statistics, since as of 2007 the KBA's official figures do not include the vehicles which are temporarily not registered.

17 The data refer to just over 39 million cars for which the owner's gender is known, i.e., not including cars with the owner characteristics of legal entity or not known.

Figure 5

Car Availability—Driver's License and Car in Household (Persons Aged 18 Years or Over)
In percent



Source: German Mobility Panel.

Car availability in the age groups is developing differently.

Figure 6

Car Use by Gender (Drivers Only)
In kilometers per person and day

Source: German Mobility Panel.

The intensity of car use by women and men is converging.

are still evident, but the differences in ownership of passenger vehicles are significantly lower from the middle-aged cohorts onwards.[18]

Figure 5 illustrates this fact with regard to people having access to a car (i.e., a person has a driver's license and there is a car in the household) while particularly for younger men there is a decline in the number of people with access to a car, this increases for older men and women as a result of the cohort effect mentioned above. Both effects combined led to a stable level of car availability in the last ten years.

The use of vehicles has also changed in accordance with changes in vehicle-owner characteristics. Using data from the German Mobility Panel, it is possible to trace specific developments in the use of vehicles in households. More women have a car and they travel more kilometers per day (see Figure 6). While a reduction in car use can be seen over the last decade for men, this increases for women. Both demographic and socio-economic processes play a role here: the share of women in employment has increased in recent years. At the same time, retired women have maintained their travel behavior in old age. The share of retired women in particular with access to a car has increased, but this is still around 20 percentage points below that of men in this age group.[19]

A trend towards homogenization of travel behavior and car use can be observed across all age groups: among women, those who work full-time have the highest daily car use. In the course of just under a decade, a rise in car use of 23 to 25 kilometers per female driver per day was noted for this group of people. For men, there was a decline of 42 to 38 kilometers per day over the same period.

... and Older People

If we look at the age of vehicle owners (see Figure 7), there is a significant shift towards older people. While 17 percent of cars were still owned or being driven by people under 30 in 1994, at seven percent today, this share has more than halved. Also, the share owned by the second age group (30 to 39-year-olds) has declined. However, the number and share of cars of the middle-aged group has increased and people aged 65 or over own twice the share of vehicles (20 percent) today than this group did 18 years ago.

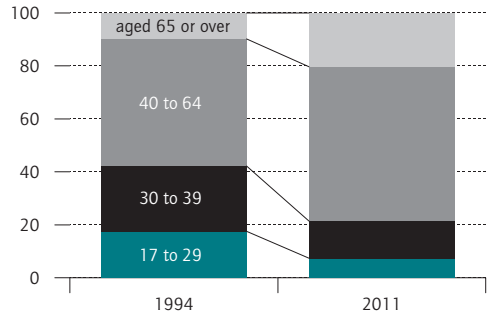
For young men (17 to under 30), car ownership in this period almost halved—down to 260 cars per 1,000 people today (see Figure 8). For several years now an—albeit weaker—decline in car ownership has also been recor-

18 On future motorization and transport demand, see also DIW Berlin and ifmo Mobilität 2025: der Einfluss von Einkommen, Mobilitätskosten und Demografie (Berlin: 2008).

19 See D. Kalinowska and U. Kunert, "Ageing and Mobility in Germany: Are Women Taking the Fast Lane?," DIW Berlin Diskussionspapier, no. 892 (2009).

Figure 7

Car Stock by Owners' Age Group
In percent

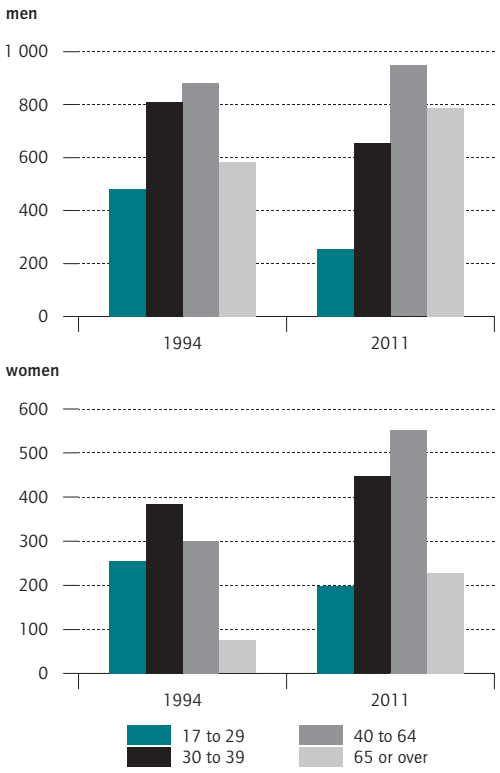


Source: Federal Motor Transport Authority, calculations by DIW Berlin.

The share of pensioners owning cars has doubled.

Figure 8

Motorization by Owners' Age Group
Car owners per 1,000 inhabitants



Sources: Federal Motor Transport Authority; Federal Statistical Office, calculations by DIW Berlin.

For men, the level of motorization only increases in older age; for women, on the other hand, it only falls in the youngest age groups.

ded for young women—recently down to 200 cars per 1,000 persons. In the three categories of older people, motorization rates among women were still increasing. However, car ownership for men is also decreasing in the cohorts of 30 to 39-year-olds.

Not only in terms of having access to a car (availability and driver's license) but also of car use (as a driver only), this trend of changed mobility has been observed in young people over the last 15 years (see Figure 9).

In the last 15 years, the average distance traveled by a car driver per day has remained approximately constant across all persons at just over 20 kilometers, but it varies significantly in the different age groups. For middle-aged people (aged between 30 and 64)—apart from sampling fluctuations—no changes have been observed. Conversely, for older persons (aged over 64) there has been an increase in the distance traveled in the last 15 years (from around ten kilometers per person per day to around 14 kilometers per person per day). However, a significant decrease from around 28 kilometers per person per day to 17 kilometers per person per day was recorded for younger people (aged between 18 and 29). But these different trends among younger and older people even out on average.

Existing studies on the changed travel behavior of young adults concluded that the decline in car use is largely for structural reasons. For example, there is an increase in the share of students, mainly living in cities, where use of a car has less appeal, partly because cities have good public transport systems and there are special offers for students using public transport.[20]

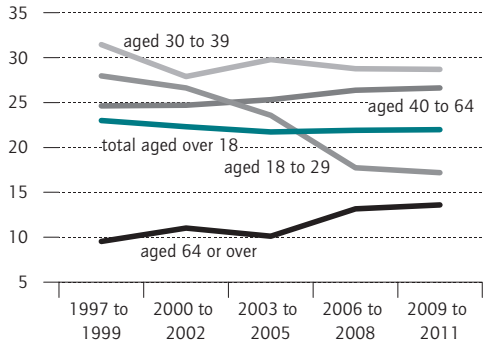
Modes of Transport Used More Flexibly

Moreover, there is a change in travel behavior because the available modes of transport are used more flexibly. People often no longer—as was more common in the past—tend to always use one mode of transport, but they use different ones depending on the situation and suitability. This altered multimodal behavior is becoming more established particularly among younger

20 See T. Kuhnimhof, R. Buehler, M. Wirtz, and D. Kalinowska, "Travel trends among young adults in Germany: increasing multimodality and declining car use for men," Journal of Transport Geography, vol. 24: (2012): 443–450; and ifmo, Mobilität junger Menschen im Wandel – multimodaler und weiblicher (Munich: Institute for Mobility Research, 2011).

Figure 9

Car Use by Age (Drivers Only)
In kilometers per person and day

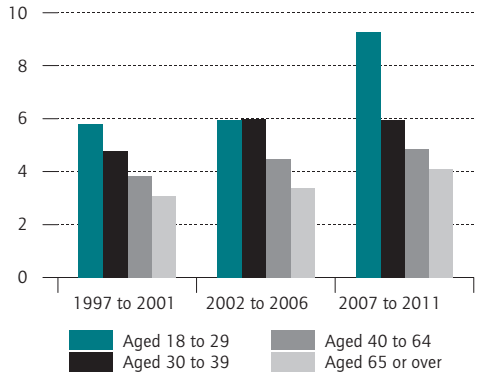


Source: German Mobility Panel.

There is a decline in car use among younger people.

Figure 10

Share of People with Multimodal1 Transport Behavior
In percent



1 Using car, bicycle and public transport in one week.
Source: German Mobility Panel.

Modes of transport are used increasingly flexibly.

people (see Figure 10);[21] over the last ten years, slight increases in multimodal behavior have been observed in people aged 65 or over. The share of people in this age group who are reliant on public transport (public transport captives) is decreasing. However, there is an increase in the share of those who have a car at their disposal and use this for most of their travel. This means there is also a higher share of people who potentially use multiple modes of transport. There is a slight increase in the share of people aged between 30 and 64 who use various modes of transport. For young people (aged 18 to 29), however, this figure has risen sharply in the last decade—by around 50 percent.

Conclusion

In recent years, car use has only increased slightly; the mileage today is only four percent higher than ten years ago. However, various opposing trends are concealed behind this apparent stability, as a result of a change in the significance of user groups and user behavior: on the one hand, people transfer their mobility habits to old age, meaning the mobility and car use of older people increases. Yet, over the last decade, young road users show a lower level of car use at the same time as stable overall mobility, mostly due to changes in circumstances (education or training, urban environment) and also because of a pragmatic attitude to cars: in the last decade, particularly for young people, the car has lost its status as a universal modes of transport for all types of journeys, not least because of increased costs. Today there is often ample opportunity for people to choose a mode of transport to suit their needs, so that many can do without their own private car. For young and middle-aged people, the use of modes of transport is becoming more diversified, with mobility needs better distributed across all modes of transport—there has also been an increase in the use of public transport and bicycles in recent years.[22] Most people retain their mobility behavior as they get older. Therefore, a rise in car use is to be expected in the future, particularly for older women. To what extent those who are still young today will maintain different mobility patterns in later stages of life still remains to be seen.

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21 A person's behavior is said to be multimodal if he or she uses more than one modes of transport on a regular basis. Here the definition of multimodal is rather narrow, since it means a person must have used a car and public transport and a bicycle at least once each during the course of just one week.

22 See U. Kunert and S. Radke, "Personenverkehr" (2012), op. cit.