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Martin Gornig and Alexander Schiersch

Weak Investment Poses a Threat to Industry in Europe

The global industrial structure has been in a constant state of change for some time now. While China's share has steadily grown, Western industrialised countries have mostly experienced losses in industrial market share. Within Europe, the fates of the established industrialised nations have all played out very differently. For example, France and the UK have suffered massive losses, while Germany was able to noticeably re-expand production following the 2009 crisis. Industry in Europe is likely to fall further behind in the coming years – not only to catching-up countries like China, but also to other industrialised nations. The US, for example, exhibits far more dynamic industrial investment, outpacing not only France and the UK but also Germany.

Since the 1990s, the structure of global industry has been characterised primarily by the rise of China's industrial base. It was China's market share gains in particular that led to the US and Western Europe's relative losses in industrial production, which gave way to a marked deindustrialisation in many Western countries. In what seemed to be a new constant, the developed (industrialised) countries' share of global industrial production declined, while that of the emerging (e.g. BRIC) countries increased – and accordingly, the importance of the industrial sector shrank in the traditional industrialised countries and increased in other parts of the world. But surprisingly, some established industrialised countries, like Japan and Germany, were still exhibiting high growth rates in the manufacturing sector as well as stable global market shares well after the turn of the century.¹

However, following the big shock of the 2009 financial crisis, industrial production around the world collapsed, and Germany and Japan were particularly affected. While

the demand slump seemed to sound the death knell for industry in these countries, other nations concluded that the industrial sector could serve as an anchor of stability in the midst of the economic crisis, and that economic policy action was required to support it.²

Our analysis focuses on how the industrial sectors of established industrialised countries overcame the crisis and are now positioning themselves in comparison to the BRIC countries. Although we do examine current production, our primary focus is on investment, since it provides clues to the future distribution of production capacities and technological competitiveness. Due to the limited availability of sectoral capital stock data, our analyses are limited to three major European countries – Germany, France and the UK – and the US.

Development of global industrial production

According to UN statistics, 2009 saw a decrease in overall global industrial production for the first time since World War II. Following the crisis, production rose once again, and by 2014, price-adjusted global gross value added in industry was more than 15% higher than it was in 2007.

Japan and Germany were particularly affected by the crisis-induced demand slump (see Figure 1). In Japan the 2009 industrial value added was 17% lower than it was in

1 M. Gornig, A. Schiersch: German Manufacturing Withstands the Rise of Emerging Economies, in: DIW Economic Bulletin No. 5, 2012, pp. 10-14.

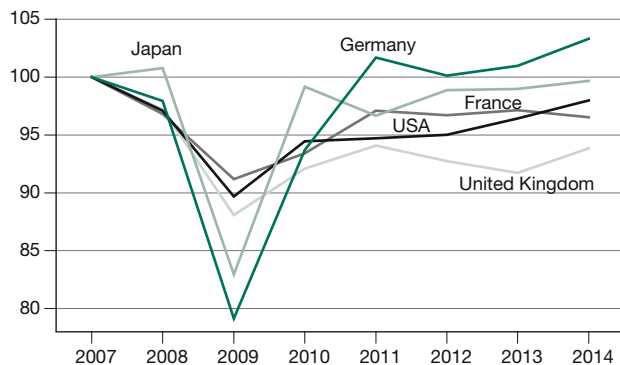
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2 P. Aghion, J. Boulanger, E. Cohen: Rethinking industrial policy, in: Bruegel policy brief, No. 4, 2011; J.E. Stiglitz, J. Yifu, C. Monga: The rejuvenation of industrial policy, Policy Research Working Paper, No. 6628, 2013.

Figure 1
Gross value added in the manufacturing sectors of selected OECD countries, 2007-2014

Index 2007 = 100



Note: Gross value added in US dollars, adjusted for price changes.

Sources: United Nations Statistics Division; own calculations.

2007, and in Germany it was actually more than 21% lower. Other traditional industrialised countries also recorded significant declines in industrial production: 9% in France, 10% in the US and 12% in the UK.

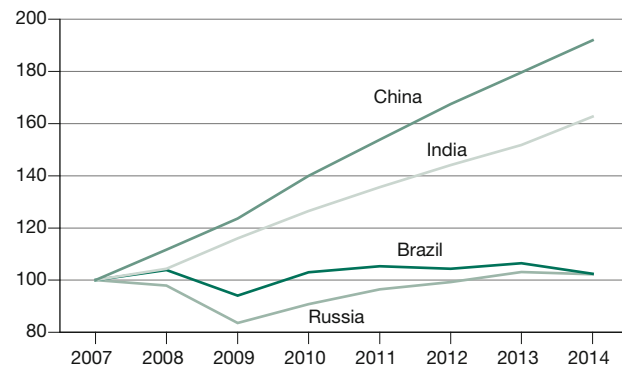
In the years following the crisis, industrial production recovered in most Western countries. In Germany this recovery was particularly swift: by 2014 real production in Germany was roughly 3% higher than it was in 2007. In the US and France, on the other hand, the industrial value added has remained 2-3% below the pre-crisis levels, and in the UK this gap is even larger, at 6%. Japan was able to continue to grow in real terms, and by 2014 it had nearly reached its 2007 production level.

The impacts of the financial and economic crisis on industrial production in the major catching-up economies, such as the BRIC countries, varied significantly. Russia experienced strong production declines, with a drop of more than 16% – and by 2014, the industrial gross value was only slightly higher than it was in 2007. A noticeable dampening also characterised Brazil's industrial development in 2009, when the gross value added decreased by roughly 6%. It has recovered somewhat since then, however, and is now 2% higher than it was in 2007 (Figure 2).

In contrast, the financial and economic crisis had no direct impact on the development of the industrial value added in Asia's major catching-up countries. By 2014 China was exhibiting unbridled growth in industrial production: the real industrial gross value added in 2014 was

Figure 2
Gross value added in the manufacturing sectors of the BRIC countries, 2007-2014

Index 2007 = 100



Note: Gross value added in US dollars, adjusted for price changes.

Sources: United Nations Statistics Division; own calculations.

more than 90% higher than it was in 2007, and nearly as high as that of the US. In India growth continued between 2008 and 2010, with rates similarly high to those of China. Since then, however, growth in India's industrial production has slowed down substantially; nevertheless, industrial production in 2014 was more than 60% higher than it was in 2007.

Changes in the importance of industry

The uneven dynamics in the development of industrial production are also reflected in industry's current importance within the different countries (see Figure 3). Industry is clearly a very powerful growth driver in China,³ where manufacturing's share in the total value added has risen since 2007 by nearly three percentage points and now stands at 35%. Inversely, the importance of industry – when measured by its share in the value added – continues to decline in the developed economies of Western Europe and North America. For example, industry's share in both France and the US is down to roughly 12.5%. In the UK, this decline has been even more significant: by 2014, the proportion of the total value added was only around 10%.

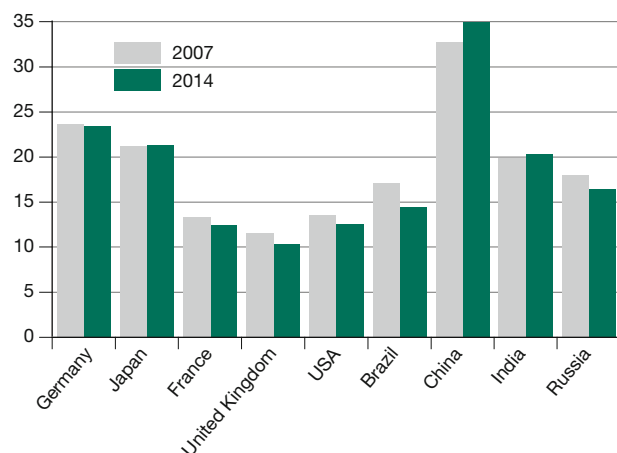
Other countries, however, are not necessarily developing in line with the expected structural development patterns. For example, although the Indian economy exhib-

3 M. Schüller: Chinas Industriepolitik: auf dem Wege zu einem Erfolgsmodell?, in: WSI Mitteilungen, No. 7, 2015, pp. 542-549.

Figure 3

Share of manufacturing in the gross value added of selected OECD and BRIC countries, 2007-2014

in %



Note: Gross value added in US dollars, adjusted for price changes.

Sources: United Nations Statistics Division; own calculations.

ited strong growth, industry's share there has stagnated at roughly 20%. And between 2007 and 2014, industry's importance actually declined in the two other BRIC countries, in Russia from 18% to 16%, and in Brazil from 17% to 15%.

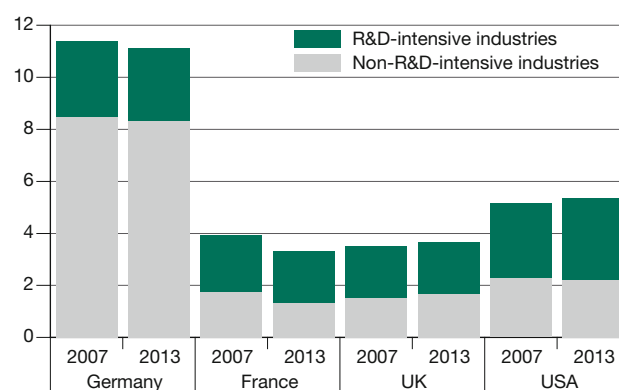
Conversely, a deindustrialisation process is not strictly observable among all the traditionally industrialised countries, particularly in Japan and Germany. In both countries, the industrial sector's share of the value added remained nearly constant during the crisis, at 21% in Japan and 23% in Germany, and by 2014 the two had the highest shares among all countries considered here (apart from China).

One reason for the significant differences in the size and evolution of countries' industrial sectors stems from the fact that different countries specialise in different kinds of industry. In established economies, it is important to focus on R&D-intensive sectors, since such countries can exploit their advantages in science, research and human capital to remain competitive.⁴ We can divide these R&D-

Figure 4

Share of R&D-intensive industries in the value added of various countries

in %



Note: Groupings based on categorisations derived in B. Gehrke, R. Frietsch, C. Rammer, P. Neuhäusler: Neuabgrenzung forschungsintensiver Industrien und Güter, NIW/ISI/ZEW-Listen 2012, in: Expertenkommission Forschung und Innovation, Berlin 2013.

Sources: OECD-STAN; EUROSTAT; BEA; BOK; own calculations.

intensive industries into those with especially high research expenditure, i.e. the cutting-edge industries such as pharmaceuticals, electronic and optical equipment, and aerospace equipment, and those that require slightly lower research expenditure, i.e. the high-tech industries such as computer equipment, machinery and automotive engineering.⁵

The OECD countries differ primarily with regard to the importance of their high-tech industries. Often, the countries that still have very high industrial shares are also the ones specialising in these specific industries – for example Germany, where high-tech industries account for more than 8% of the country's total value added (see Figure 4).

Although no sufficiently differentiated data has been recorded for Japan in recent years, analyses of previous years show that Japan has the second highest share of such industries – though still well behind that of Germany.⁶ In the other OECD countries considered here, high-tech industries did not amount to even a quarter of Ger-

4 B. Gehrke, A. Schiersch: FuE-intensive Industrien und wissensintensive Dienstleistungen im internationalen Vergleich, in: Expertenkommission Forschung und Innovation, Berlin 2016; M.P. Timmer, A.A. Erumban, B. Los, R. Stehrer, G.J. de Vries: Slicing Up Global Value Chains, in: Journal of Economic Perspectives, Vol. 28, No. 2, 2014, pp. 99-118; G.M. Grossmann, E. Rossi-Hansberg: Trading Tasks: A Simple Theory of Off-shoring, in: American Economic Review, Vol. 98, No. 5, 2008, pp. 1978-1997.

5 For an overview of which individual sectors are grouped into R&D-intensive and non-R&D-intensive sectors, see B. Gehrke, R. Frietsch, C. Rammer, P. Neuhäusler: Neuabgrenzung forschungsintensiver Industrien und Güter, NIW/ISI/ZEW-Listen 2012, in: Expertenkommission Forschung und Innovation, Berlin 2013.

6 B. Gehrke, A. Schiersch: Globale Wertschöpfungsketten und ausgewählte Standardindikatoren zur Wissenswirtschaft, in: Expertenkommission Forschung und Innovation, Berlin 2015.

many's share in 2013: in France and the UK, this share stood at just under 2%, and in the US, it was just over 2%.

In cutting-edge industries, the US exhibits the highest level of specialisation: such industries accounted for more than 3% of the US's value added in 2013. But cutting-edge industries are gaining prevalence in Germany as well, where the share of the value added currently stands at just under 3%. France and the UK, where the share of these industries is 2%, lag behind the US and Germany. In all of these countries, there were only slight differences in these shares before and after the crisis.

Net investment in industry

The previous analysis shows that trends in the manufacturing sector vary greatly even among EU countries. This raises the question of whether the European Union can increase its share in industrial production once again. In other words, do indicators suggest that Europe will exhibit a future industrial development similar to Germany's? Or will Europe head more towards deindustrialisation, as France and the UK have done? A key indicator that can provide clues to industrial sector's future development is the level of investment activity. Today's investment decisions determine the distribution of future production capacities as well as the modernity of the capital stocks overall, and thus the technological competitiveness of the production location.

To empirically analyse investment activity, we use the development of real net capital stocks.⁷ The change in net capital stocks results from the difference between the gross investment and the capital stocks' imputed drop in value (depreciation). The calculation of the depreciation itself is based on internationally agreed-upon assumptions regarding the life cycle and the depreciation functions.⁸ Therefore, the net capital stocks do not necessarily reflect the production potential and are also subject to cyclical developments.⁹ However, they allow conclusions to be

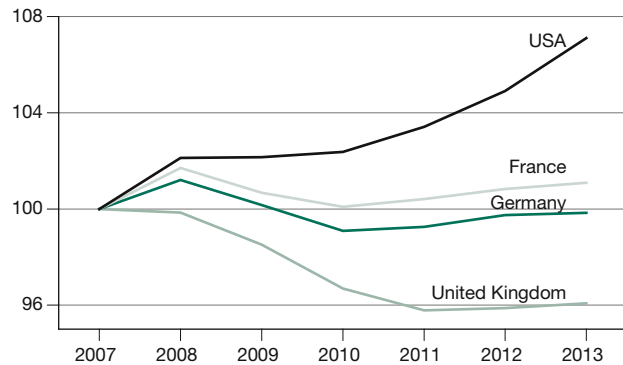
7 In accordance with the new definition of the national accounts, "capital" includes both tangible capital (namely constructions and production facilities) as well as parts of intangible assets (namely R&D); see M. Gornig, A. Schiersch: Perspektiven der Industrie in Deutschland, in: Vierteljahrshefte zur Wirtschaftsforschung, No. 1, 2015, pp. 37-54.

8 G. Ziebarth: Abschreibungen im Spiegel der Volkswirtschaftlichen Gesamtrechnungen, Statistisches Bundesamt, Wirtschaft und Statistik, No. 12, 2002, pp. 1119-1127; O. Schmalwasser, N. Weber: Revision der Anlagevermögensrechnung für den Zeitraum 1991 bis 2011, Statistisches Bundesamt, Wirtschaft und Statistik, No. 11, 2012, pp. 933-947.

9 Bundesministerium der Finanzen: Die Aussagekraft von Nettoinvestitionen in der wirtschaftspolitischen Diskussion, in: Monatsbericht des BMF June, 2015, pp. 6-12.

Figure 5
Development of real net capital stock of manufacturing, 2007-2013

Index 2007 = 100



Sources: destatis; BEA; ONS; INSEE; own calculations.

drawn about the relative level of modernity in an international comparison.

As a first step, we consider the development of the total net capital stock of the manufacturing industry in Germany, France and the UK compared to that of the US. This comparison initially reveals a surprising result: although the real gross value added decreased by almost 4% between 2007 and 2013, the net capital stock of the US manufacturing industry clearly increased (see Figure 5). In fact, it grew by more than 7% in real terms in this period. In the large EU countries, on the other hand, the net capital stock has been shrinking since 2008. This applies not only to the UK and France, which are also experiencing a decline in the produced value added, but also to Germany. While the industrial added value rose by roughly 5% between 2008 and 2013, the net capital stock in the German manufacturing sector shrank by nearly 1.5 percentage points.

These aggregate numbers reveal that at least in the major EU countries, less has been invested into the industrial capital stock since the crisis, on average, than is needed for maintenance. In the US, conversely, the net capital stock in the manufacturing sector has been increasing significantly since 2010. Due to this increase, the level of modernity of the net capital stock in the US is rising noticeably, which could further increase the competitive pressure on European industry.

However, the aggregate figures might conceal heterogeneous sectoral developments. If a reduction of the capital

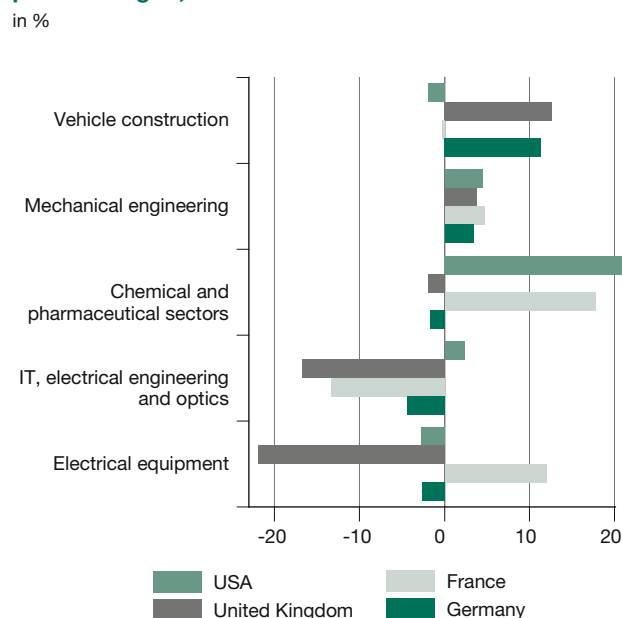
stock in non-R&D-intensive sectors were coupled with a simultaneous expansion of production capacity in the R&D-intensive sectors, this would be less problematic for future industrial competitiveness than a stagnation in all sectors would be. Preliminary analyses using German data point to precisely such an explanation.¹⁰ The real net capital stock has been decreasing in the non-R&D-intensive sectors – such as the wood industry and the textile and garment industry, with declines of 15% and 20% respectively – while the real net capital stock has been increasing in some of the R&D-intensive sectors.

Since the R&D-intensive sectors are already of central importance in the development of the manufacturing sector, we must examine whether the growth of net capital stocks in these sectors is above average in a global comparison.¹¹ Due to limited data availability, the pharmaceutical sector and the chemical sector are lumped together as cutting-edge industries. For the same reason, the motor vehicle industry is combined with other automotive manufacturing, even though some aspects of specialty vehicle manufacturing are not considered R&D-intensive sectors, such as shipbuilding and railroad equipment.

Figure 6 reveals that the development of the net capital stock in the R&D-intensive manufacturing sector of the four countries reviewed here was very heterogeneous between 2007 and 2013. In fact, the mechanical engineering sector was the only sector to see similar levels of net capital stock growth among all four countries. In the remaining R&D-intensive sectors in Germany, it is clear that there has only been significant net capital stock growth in the vehicle construction sector, which grew by more than 12%. The increase in vehicle manufacturing is primarily due to automotive engineering. In the UK, growth in this sector was even more pronounced; this may be partly due to direct investment in the local automotive industry. There was a slight decline, however, in the net capital stock in this sector in the otherwise investment-friendly US.

The situation is even more varied among countries in the chemical and pharmaceutical sectors, which saw slight declines in the net capital stock in Germany and the UK but massive growth in France. A strong growth and modernisation process in this sector can also be observed in the US, where the net capital stock grew by more than 20% between 2007 and 2013. The growth in the US chemical sector is likely a result of the fracking boom and

Figure 6
Net capital stock in various industries, adjusted for price changes, 2007-2013
in %



Note: Industry categories defined by German Statistical Office.

Sources: destatis; BEA; ONS; INSEE; own calculations.

the concomitant decline in energy and commodity prices. The US also has a competitive and growing pharmaceutical sector.

In the IT, electrical engineering and optics sectors, all three EU countries are dismantling production capacities or investing less in their facilities, from a numbers standpoint, than would be necessary to maintain them. Between 2007 and 2013, the net capital stock shrank in Germany by almost 5%, in France by 13% and in the UK by 17%. This is not surprising, however, since the gross value added is sinking in these sectors within Europe, while abroad – not least in Asia – significant amounts are being invested and production capacities are being increased. The slight 2% increase in the net capital stock of this sector in the US makes it clear, however, that the US still plays an important role in this area.

There has also been a decline in the electrical equipment sector in two of the three European countries. The extent of the negative development in the German sector is rather moderate, whereas in the British sector it is quite significant, at more than 20%. Even in the US, the net investment in the electrical equipment sector is negative on

¹⁰ M. Gornig: Wie viel Industrie braucht das Land?, in: WSI Mitteilungen, No. 7, 2015, pp. 500-506.

¹¹ These sectors generated around 60% of real gross value added in manufacturing during the period.

aggregate. At the same time, we see a massive increase in the French sector – and since power plant construction has been in a state of crisis in France, this development is surprising.

Overall, it nevertheless remains the case that the weak or negative development of the net capital stock in the manufacturing sector is not solely due to a shift towards specialisation in R&D-intensive sectors in the EU countries considered here. Indeed, even in these sectors, investment lags behind depreciation. In the US, however, the R&D-intensive sectors in particular – apart from vehicle construction and electrical equipment – are directly benefiting from the fast pace of modernisation.

Conclusions

The developed economies in Europe have been losing ground as global industrial locations since the financial and economic crisis. France and Britain, for example, have suffered massive losses in the industrial value added. Other countries, such as Germany, were largely able to limit their loss of market share, and German manufacturing's share of the value added was actually noticeably higher in 2014 than it was in 2007. One reason for this is the focus on R&D-intensive industries such as electronics, mechanical engineering, chemicals and automotive construction.

Nonetheless, the future for the industrial sector in Europe appears to be much gloomier than the present. This is partially because of further losses to China and other catching-up countries, which according to corporate estimates will become even more attractive as manufacturing locations and will continue to outpace European production sites.¹² However, even compared to other established industrialised nations, Europe seems to be lagging. For example, the US exhibits significantly higher industrial investment dynamics, which indicates that a modernisation of the capital stock has begun. Meanwhile, investment in the large European countries is only enough to compensate for the depreciation of industrial capital stock. In many industries, the net capital stock is even falling markedly. Even in Germany, this affects the R&D-intensive industries that are still doing well, with the exception of the engineering and automotive industries.

Consequently, a proactive and broadly designed industrial policy is even more critical for the future success of

Europe's major industrial sites.¹³ And though industrial policy is first and foremost innovation policy,¹⁴ given that investment is currently weak, modernisation of the capital stock must also become a central field of activity for industrial policy. An easy starting point is to make tax law more investment-friendly, which could allow for broader depreciation allowances, either through an expansion of the tax base or the implementation of degressive depreciation rates. Currently there is a high level of heterogeneity in the depreciation rates and methods within the EU,¹⁵ and these differences can be used to identify the most investment-friendly depreciation methods and rates.

Ultimately, investment in Europe can only be expanded by increasing the continent's long-term attractiveness.¹⁶ This means ensuring a qualified workforce through efficient and effective education and training systems that can guarantee both the skills of the existing workforce as well as the integration of migrants. But maintenance and further development of the energy, transport and communications infrastructure are also needed to make Europe a more attractive location for industry.¹⁷

12 Deloitte, US Council on Competitiveness: 2013 Global Manufacturing Competitiveness Index, 2013, Deloitte Touche Tohmatsu.

13 K. Warwick: Beyond Industrial Policy, Emerging Issues and New Trends, OECD Science, Technology and Industry Papers, No. 2, 2013, OECD Publishing; G. Owen: Industrial Policy in Europe Since the Second World War: What Has Been Learnt, ECIPE Occasional Paper, No. 1, 2012.

14 A. Garybadze: Instrumente der Innovationspolitik. Auf dem Weg zu einer neuen Industriepolitik?, in: WSI Mitteilungen, No. 7, 2015, pp. 516-525; D. Rehfeld, B. Dankbaar: Industriepolitik: Theoretische Grundlagen, Varianten und Herausforderungen, in: WSI Mitteilungen, No. 7, 2015, pp. 491-499.

15 European Commission: Assets and Tax Depreciation, DG Tax and Customs Union, CCCTB\WP\004\doc\en, Brussels 2004.

16 F. Fichtner, M. Fratzscher, M. Gornig: An Investment Agenda for Europe, in: DIW Economic Bulletin, Vol. 3, No. 7, 2014, pp. 3-6.

17 See also the relevant proposals for Germany by the Experts Commission in "Increasing Investment in Germany"; Bundesministerium für Wirtschaft und Energie: Stärkung der Investitionen in Deutschland, Bericht der Expertenkommission, Berlin 2015.