# The impact of the internationalisation of German firms on domestic investment

*The increasing internationalisation of Germany's economy is multifaceted. Key aspects of internationalisation that frequently court controversy in the public arena are production offshoring (hereinafter referred to simply as offshoring) and German foreign direct investment (FDI). One oft-repeated assertion is that offshoring and FDI crowd out domestic production and hamper investment in Germany. This article presents two recent studies that shed some light on the relationship between the internationalisation of German firms and domestic investment. The studies, which consider different aspects of German firms' international interconnectedness, find both positive and negative effects on domestic investment and show that, overall, the quantitative implications for aggregate investment in Germany are small.*

*One study examines the issue of how offshoring affects the production factor capital and, in particular, investment in various capital goods in Germany. The findings indicate that, as a result of offshoring, domestic demand for capital has shifted away from traditional capital goods in favour of information and communication technologies. One possible explanation for this effect is that, once production stages requiring low-skilled labour have been moved offshore, the requisite capital goods are no longer needed to the same extent as previously. Overall, offshoring by German firms is likely, in aggregate terms, to have had a slightly negative impact on domestic investment – at least until the onset of the 2007-08 financial crisis.*

*FDI represents another field in which firms are active abroad. Studies based on Bundesbank firm-level data and focusing on the impact of FDI on domestic investment show that the establishment or acquisition of a new foreign affiliate by a domestic parent firm is, on average, associated with higher domestic investment by said firm in the same year. This effect is linked, in particular, to better funding conditions in the host country, as well as tax-related factors in some cases. However, the comparatively small number of new affiliates abroad mean that the impact on aggregate investment in Germany is also likely to be fairly small.*

## Introduction

*Increasing internationalisation of German economy …*

The internationalisation of Germany's economy has progressed at a rapid pace over the past two decades. Lower trade and communication costs have made it possible for German firms to organise their production within global value chains and focus their domestic activities on production stages that provide a comparative advantage.[1] Furthermore, German firms have taken advantage of the increasing liberalisation of cross-border capital flows – where significant progress had been made, especially prior to the onset of the 2007-08 global financial crisis – to acquire existing firms abroad and establish new foreign affiliates.[2]

*… against backdrop of recently subdued domestic investment*

At the same time, firms' investment in Germany has been rather subdued recently. In addition to being of significance in terms of future economic growth potential, investment has a direct impact on the German current account surplus, which, owing to the level that it has reached, has been the subject of an annual in-depth review conducted by the European Commission since 2014 as part of its procedure for the prevention and correction of macroeconomic imbalances.[3] One oft-repeated assertion in this regard is that offshoring and FDI by German firms hamper domestic investment in Germany.

*Offshoring and FDI: similarities and differences*

Unlike portfolio investment, FDI is characterised by a long-term investment horizon and is aimed at influencing and controlling the business activity of investment companies abroad.[4] Possible motives for FDI include the scope for producing certain products (or parts of products) more efficiently abroad (vertical FDI) or the wish to tap new sales markets (horizontal FDI).[5] Offshoring is the outsourcing of business activities to locations in another country on the

1 For developments in trade and communication costs, see also J-F Arvis, Y Duval, B Shepherd, C Utoktham and A Raj (2016), Trade costs in the developing world: 1996-2010, World Trade Review, Vol 15, pp 451-474; R Baldwin (2016), The great convergence, Harvard University Press, Cambridge, MA.

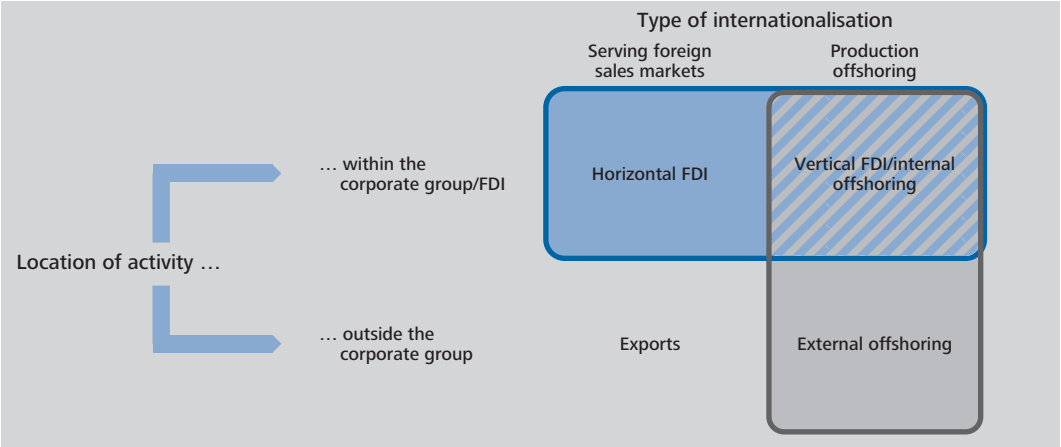
2 For the liberalisation of cross-border capital flows over time, see also M D Chinn and H Ito (2006), What matters for financial development? Capital controls, institutions, and interactions, Journal of Development Economics, Vol 81, pp 163-192; M D Chinn and H Ito (2008), A new measure of financial openness, Journal of Comparative Policy Analysis, Vol 10, pp 309-322.

3 See European Commission, Country Report Germany 2017. Including an in-depth review on the prevention and correction of macroeconomic imbalances, Brussels, 22 February 2017.

4 See also R Albuquerque (2003), The composition of international capital flows: risk sharing through foreign direct investment, Journal of International Economics, Vol 61, pp 353-383.

5 Alternatively, foreign sales markets can be tapped by exporting to them. For more information on how the decision to serve a market by means of exports or horizontal FDI is made, see also S L Brainard (1997), An empirical assessment of the proximity-concentration trade-off between multinational sales and trade, American Economic Review, Vol 87, pp 520-544.

**Production offshoring and FDI – a distinction**

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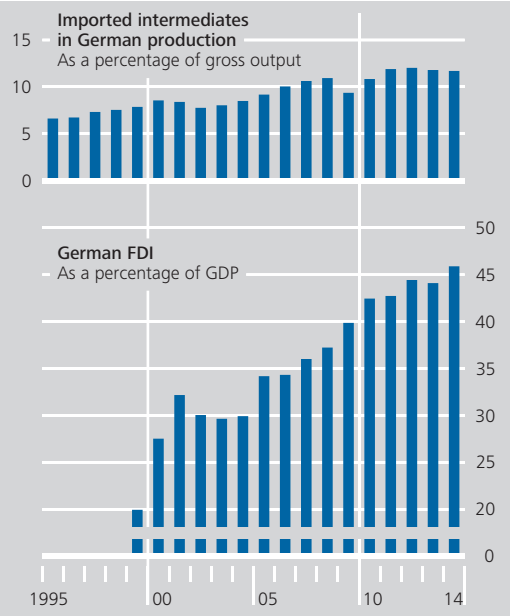
grounds of cost and efficiency.[6] This can take place within corporate groups or via supply contracts with legally independent suppliers, with the former case being identical to vertical FDI. The protection of copyright and transaction cost considerations play a major role when deciding where to locate the outsourced activity.[7]

*Analysis of impact of internationalisation on level and composition of domestic investment*

Econometric analyses can be used to explore the relationship between the internationalisation of the German economy and investment activity in Germany.[8] The first empirical study looks at the impact of offshoring on the composition of domestic demand for capital using a cross-country dataset. On the basis of anonymised Bundesbank microdata, a second study investigates whether German firms' FDI has caused these firms to scale back their domestic investment.

**The internationalisation of the German economy**




Source: Bundesbank calculations based on data from the WIOD (www.wiod.org) and the Microdatabase Direct investment (MiDi). Data on foreign intermediates for the period spanning 1995 to 1999 based on the WIOD 2013 Release; data for the period spanning 2000 to 2014 based on the WIOD 2016 Release. Year-end data for German FDI.

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## Business investment developments in Germany

*Nominal investment ratio experiencing downward trend; …*

One commonly used measure of changes in fixed capital formation in the German corporate sector is the business investment-to-output ratio, ie expenditure on gross fixed capital formation as a percentage of gross value added. In nominal terms, this has been in decline since the early 1990s.[9] While it averaged just over 19½% in the period between 1991 and 1999, it has stood at no more than around 17½% on average over the past decade. It is not least due to this decline in the nominal investment ratio that the German economy has been deemed to have been suffering from weak investment in recent years.[10]

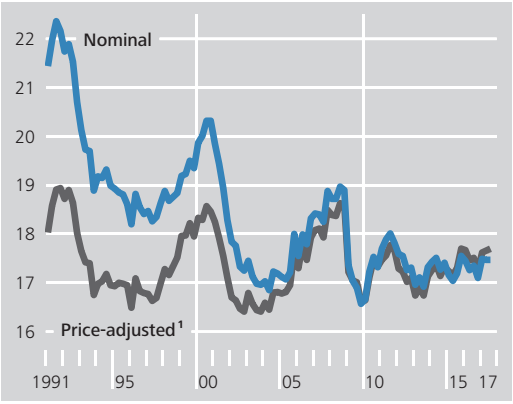
*… by contrast, price-adjusted ratio moving sideways*

However, it should be noted that price trends for capital goods and gross value added differed during this period. For example, while the rise in prices of capital goods between 1991 and 2016 averaged less than ½% *per annum*, the increase in the gross value added deflator was significantly higher in the same period, at just over 1% per year. Consequently, changes in the nominal investment ratio do not necessarily make it possible to draw conclusions about underlying real investment. In fact, the price-adjusted investment ratio – in contrast to the nominal ratio – shows no discernible trend and has largely fluctuated around a constant value since German reunification.

6 By contrast, domestic (or onshore) outsourcing refers to the outsourcing of business activities to locations in the same country.
7 See P Antràs (2015), Global production: firms, contracts, and trade structure, Princeton University Press, Princeton, NJ; and Deutsche Bundesbank, Structure and dynamics of manufacturing production depth as reflected in the financial statements of German enterprises, Monthly Report, June 2016, pp 56-58.
8 The same activities conducted by non-residents in Germany, eg offshoring to Germany and FDI by foreign parent firms in Germany, do not fall within the scope of these studies.
9 The following sectors of the economy are not taken into account: agriculture, forestry and fishing; public services, education, healthcare; other service providers.
10 See, for example, German Institute for Economic Research (DIW Berlin) and Handelsblatt Research Institute Düsseldorf (HRI), Private Investitionen in Deutschland: Studie im Auftrag des Gemeinschaftsausschusses der Deutschen Gewerblichen Wirtschaft, October 2014.

**Business investment-to-output ratio**

Quarterly data, seasonally adjusted




**1** The ratio for 2010 is calculated at current prices. Extrapolation is based on the real growth factors of gross fixed capital formation and gross value added.

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*Effects of a shift towards intangible assets not clear*

In addition, structural changes can have an impact on both the level and composition of business investment in Germany. In particular, the significance of intangible assets with respect to domestic investment has increased considerably since German reunification. For example, investment in research and development (R&D) as a percentage of gross fixed capital formation rose from 8½% to almost 14% between 1991 and 2016, which points to an ongoing shift in the composition of investment spending.[11] The impact of such a shift on the level of investment as a whole, however, is not clear-cut.[12]

## Offshoring and domestic demand for capital

*Technological progress lifts geographical barriers on production process*

Offshoring is a potential factor in both the level of investment and the shift in the composition of investment in Germany, as the restructuring of the production process has made it possible to focus on certain production stages in Germany.[13] The steady decline in trade and communication costs has played a part in fundamentally transforming the production process over the past few decades. While the production of goods was constrained by the regional availability of production factors throughout much of the last century, technological advances in the fields of transportation and telecommunication have increasingly enabled firms to coordinate complex value chains across time and space and split the production process into smaller stages.

*Germany relatively well integrated into international production networks*

Offshoring and the resulting emergence of cross-border production networks go hand in hand with international trade in intermediates.[14] According to data from the WIOD,[15] intermediates accounted for almost two-thirds of the global trade in goods and services in 2014. Overall, imported intermediates held an 8¼% share in global production in 2014, while, in Germany, this share stood at 11¾%. Compared with other large EU countries, such as France, Italy and the United Kingdom, the German economy is relatively well integrated into international production chains. And, at only 4½% in 2014, the share of imported intermediates in production in China and the United States, the two largest economies in the world, was also well below the German figure.

*Offshoring primarily in manufacturing*

The share of imported intermediates varies considerably by economic sector in Germany. In manufacturing, the level of international interconnectedness measured in this manner stood at one-quarter in 2014, after almost doubling over the past two decades in some manufacturing sectors. By contrast, the share

**11** Investment in other assets as a whole (intellectual property and cultivated assets) as a percentage of gross fixed capital formation rose from just over 11½% to 19% during the same period.

**12** Substitution effects could raise the share of investment in intangible assets at the expense of traditional capital goods and lift capital stock productivity as a result of the higher productivity of intangible assets. While higher capital productivity probably dampens necessary capital formation to a certain extent at a given production level, it could nevertheless increase the relative demand for fixed capital formation at the same time.

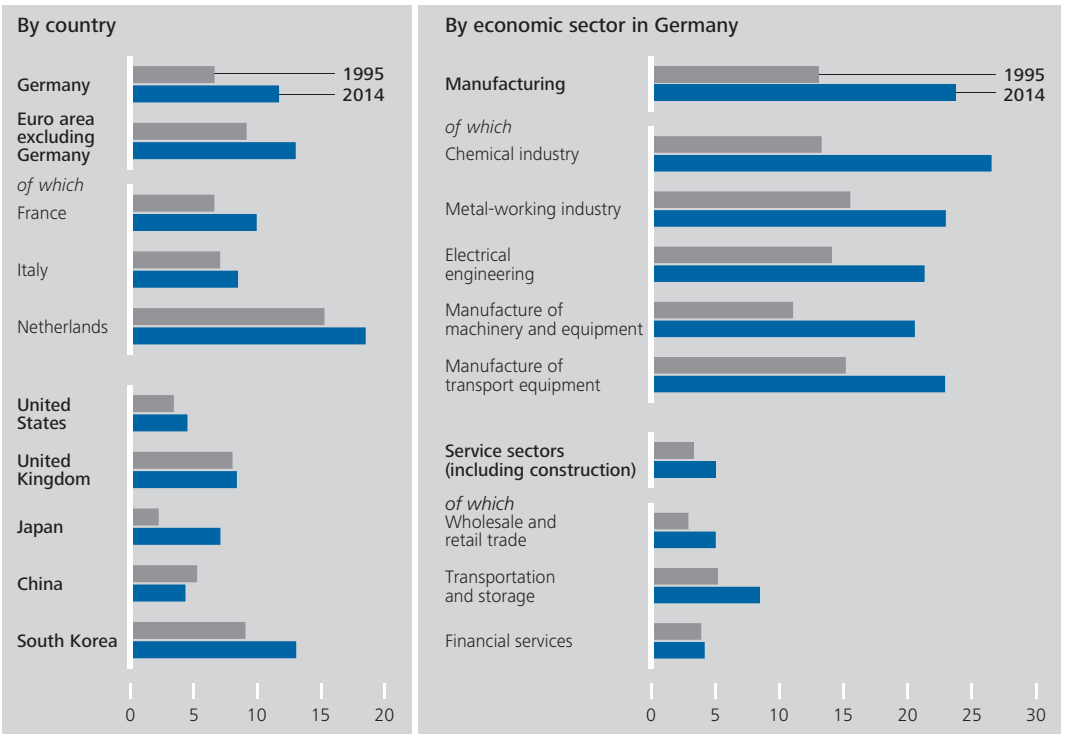
**13** For more information on the impact of offshoring on investment in R&D, see also A J Glass and K Saggi (2001), Innovation and wage effects of international outsourcing, European Economic Review, Vol 45, pp 67-86; H Beladi, S Marjit and L Yang (2012), Outsourcing: volume and composition of R&D, Review of International Economics, Vol 20, pp 828-840.

**14** See Deutsche Bundesbank, The German economy in the international division of labour: a look at value added flows, Monthly Report, October 2014, pp 27-42.

**15** WIOD stands for World Input-Output Database. The data are available at www.wiod.org

**Imported intermediates in production**

As a percentage of gross output




Source: Bundesbank calculations based on WIOD data (www.wiod.org). Data for 1995 based on the WIOD 2013 Release; data for 2014 based on the WIOD 2016 Release.

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of imported intermediates is much lower in the service sectors, as there are limits on the extent to which some of the services they offer can be provided directly across borders – due to language barriers or country-specific requirements, for instance.

*Significance of imported intermediates from China and CEECs up significantly*

Imported intermediates in Germany come largely from neighbouring countries, as the geographical proximity simplifies the coordination of complex production processes and minimises transportation costs. After the fall of the Iron Curtain, central and eastern European countries (CEECs) were increasingly integrated into the German production network. However, the significance of intermediates from China has also increased markedly over the past two decades. Besides supplier relationships with EU countries, intermediates from the United States also play an important role – particularly in the high-tech sector.

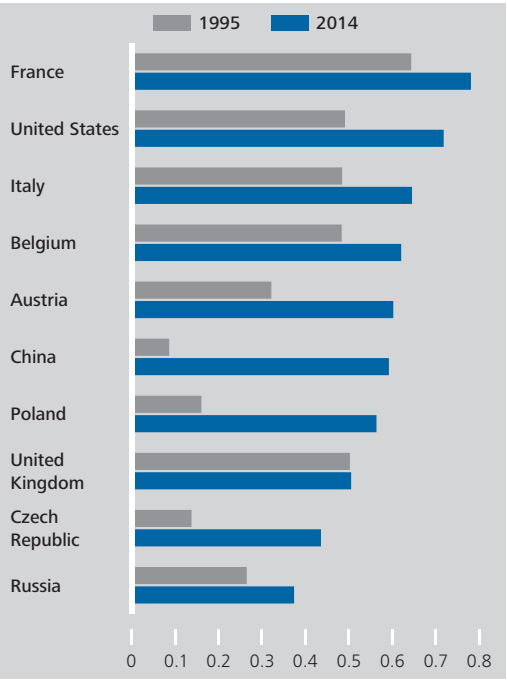
*Routine tasks show most potential for offshoring*

Foreign locations are attractive for offshoring if the benefits that can be derived from focusing on core competencies at home and from cost savings resulting from factor price differences outweigh the additional coordination and trade costs associated with the fragmentation of the production process. Accordingly, certain production stages show greater potential for offshoring than others. For example, routine tasks that do not require personal contacts or geographical proximity are more likely to come into consideration, while production stages that are interactive or difficult to coordinate are offshored less often.[16] The restructuring of the production process at the domestic location as a result of offshoring may also have an impact on the composition of labour demand. Empir-

**16** See E E Leamer and M Storper (2001), The economic geography of the internet age, Journal of International Business Studies, Vol 32, pp 641-665; F Levy and R J Murnane (2004), The new division of labor, Princeton University Press, Princeton; A Blinder (2009), Offshoring: the next industrial revolution? Foreign Affairs, Vol 85, pp 113-128.

**Origin of imported intermediates in German production**

As a percentage of gross output




Source: Bundesbank calculations based on WIOD data (www.wiod.org). Data for 1995 based on WIOD 2013 Release; data for 2014 based on WIOD 2016 Release.

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ical studies show that, for example, in the United Kingdom and the United States, offshoring has played a key role in the decline in demand for low and medium-skilled workers and in the increase in the pay gap between those workers and high-skilled workers.[17]

*Up to now, few insights into impact of offshoring on production factor capital*

However, to date, little is known about the implications of offshoring for domestic demand for the production factor capital and its composition. If production stages that require the use of certain capital goods are moved offshore to cut costs, this could cause redundancies in the domestic capital stock. It is conceivable, for example, that moving production stages offshore would reduce the need for certain machinery, equipment and commercial properties, causing investment in these goods to fall. At the same time, specialisation in strategic and high value added functions such as development and marketing would likely attract higher investment in R&D and information and communication technology (ICT).[18]

*Cross-country study on impact of offshoring on composition of demand for capital*

The issue of how offshoring affects the production factor capital and, in particular, the capital goods ICT, non-ICT and R&D capital is examined in an empirical study.[19] The study is based on a panel data analysis of 32 economic sectors in 11 advanced economies, which, in addition to Germany, are Austria, Denmark, Finland, France, Italy, the Netherlands, Spain, Sweden, the United Kingdom and the United States. Detailed data on the production side are available for these countries for the period from 1995 to 2014, including information on ten different asset classes as well as on the sectoral and country-specific origin of intermediates.[20] These are used to estimate a system of relative factor demand equations in which, in a departure from the majority of existing studies, the production factor capital is considered a variable input factor in order to make it possible to directly determine elasticities of substitution between capital and offshoring.[21] The relative demand for a certain input factor is defined – in keeping with the literature – as its compensation relative to gross output.

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**17** See A Hijzen, H Görg and R C Hine (2005), International outsourcing and the skill structure of labour demand in the United Kingdom, Economic Journal, Vol 115, pp 860-878; R C Feenstra and G H Hanson (1999), The impact of outsourcing and high-technology capital on wages: estimates for the United States, 1979-1990, Quarterly Journal of Economics, Vol 114, pp 907-940.

**18** For information on the value added content of various production stages, see R Baldwin, T Ito and H Sato (2014), Portrait of factory Asia: production networks in Asia and its implications for growth – the "smile curve", IDE-JETRO Joint Research Program Series, No 159; M Ye, B Meng and S-J Wei (2015), Measuring smile curves in global value chains, IDE Discussion Paper, No 530.

**19** See D Bursian and A J Nagengast, Offshoring and the polarisation of the demand for capital, in preparation for publication as a Deutsche Bundesbank Discussion Paper.

**20** The study is based on data from EU KLEMS and the World Input-Output Database (WIOD), whose data can be accessed at www.euklems.net and www.wiod.org

**21** The factor demand equations are derived from a translog cost function. In the analyses, it is ensured that the estimated translog cost function possesses characteristics that are consistent with economic theory. See L R Christensen, D W Jorgenson and L J Lau (1971), Conjugate duality and the transcendental logarithmic production function, Econometrica, Vol 39, pp 225-256. Estimates of factor demand equations based on a dynamic translog cost function that permit a sluggish adjustment to the long-term equilibrium of the input factors have no effect on the findings. For the methodology, see G J Anderson and R W Blundell (1982), Estimation and hypothesis testing in dynamic singular equation systems, Econometrica, Vol 50 (6), pp 1559-1571.

*Shift in demand for capital by asset class*

The results of the empirical analyses point to a shift in the demand for capital by asset class. While offshoring significantly decreases the non-ICT share in production, it has only a slightly negative effect on R&D capital.[22] By contrast, no statistically significant relationship is observed between ICT capital and offshoring. A large number of sensitivity analyses, relating to individual variable definitions and econometric specification, for example, confirm these findings. A specification with more disaggregated asset classes also shows that the relative factor demand for machinery, equipment and commercial property correlates negatively with offshoring, while there is no significant relationship for any of the ICT asset classes. Although the empirical study is based on cross-country data, additional analyses suggest that the results for Germany do not differ substantially with regard to the shift in demand for capital. Unlike the estimate for the broad group of countries, however, a similar estimate based exclusively on German data shows a slightly positive coefficient for R&D capital.

*Complementarity between capital and labour is a possible explanation*

One possible explanation for the decline in the non-ICT share in production is its complementarity with the factor labour in the offshored production stages.[23] As in other studies, the results of further estimations suggest that offshoring reduces the domestic share of low and medium-skilled workers. There are also indications that changes in capital and labour inputs are related. For instance, the negative impact on the share of the input factors non-ICT capital and low and medium-skilled labour is particularly pronounced in sectors with a high proportion of production stages with low skill requirements. If, in addition to this, imported intermediates are divided into two groups according to the skill level of labour, the offshoring of production stages with low skill requirements has a particularly negative impact on non-ICT capital and the use of low and medium-skilled workers in Germany.

The results obtained so far consider the partial effect of offshoring on the demand for capital, but neglect additional repercussions for firms. For instance, offshoring might strengthen the competitiveness of the firms and their profitability, which would suggest a strengthening of domestic demand for investment. However, in the approach chosen here, these feedback mechanisms can only be estimated indirectly as the path of the demand for investment without offshoring is not directly observable. To nonetheless gauge the aggregate importance of offshoring for investment in Germany, actual growth in real gross fixed capital formation is compared to a hypothetical scenario in which cross-border production did not become more interconnected in the period from 1995 to 2014.[24] On the one hand, the absence of the estimated substitution effect would mean that the capital share of production would be higher than the actual values in this hypothetical scenario. On the other hand, without productivity gains and cheaper imported intermediates, growth in gross output would probably have shown flatter development.[25] Without these scale effects, the rate of change for real gross fixed capital formation in Germany in this hypothetical scenario, excluding offshoring, would be 0.09 to 0.13 percentage point per year higher on average than the actual values, de-

*Offshoring probably has a slightly negative impact on domestic investment in aggregate terms*

22 An increase in the share of imported intermediates by 10 percentage points is associated with a reduction of 1.7 percentage points in the non-ICT share of production. In the case of R&D capital, the corresponding decline amounts to just 0.4 percentage point.

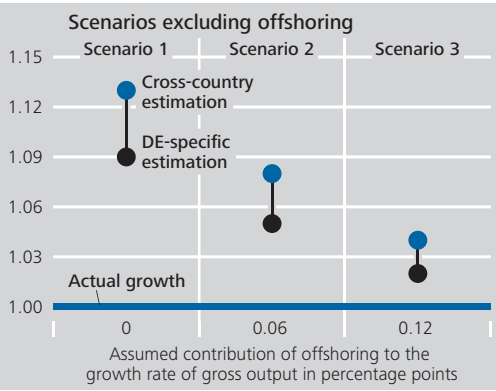
23 Even so, reductions in the price of the factor labour abroad could lead to a direct substitution of capital in Germany. All other things being equal, this would mean a reduction in the capital share of production abroad. However, empirical evidence suggests that the share of capital tended to increase in both advanced economies and emerging market economies in the period from 1995 to 2009. See M Timmer, A A Erumban, B Los, R Stehrer and G J de Vries (2014), Slicing up global value chains, Journal of Economic Perspectives, Vol 28, pp 99-118.

24 For the sake of simplicity, the calculations in this section are based on estimations using a production function with just three variable input factors (labour, capital and intermediates).

25 This hypothesis disregards potential and difficult-to-quantify price effects which may arise from changes in the terms of trade and a reduction in demand for capital in Germany. By contrast, interactions between the substitution effect and the scale effect resulting from the inclusion of gross output in the factor demand equations are taken into account. See G M Grossman and E Rossi-Hansberg (2008), Trading tasks: a simple theory of offshoring, American Economic Review, Vol 98, pp 1978-1997.

**Growth in real gross fixed capital formation in Germany**

1995 to 2014, as an annual percentage




Source: Bundesbank calculations based on data from EU KLEMS (www.euklems.net) and WIOD (www.wiod.org).
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pending on the estimation.[26] Applying realistic scale effects, which are derived here from the relevant literature, would result in a higher growth rate for gross fixed capital formation of between 0.05 and 0.08 percentage point; in the case of the Germany-specific estimation, this would correspond to an average of around €9 billion per year, or 1¾% of the gross fixed capital formation of the respective years.[27] If very large scale effects through offshoring are assumed, this could possibly even lead to a positive relationship between offshoring and the domestic demand for capital.[28] In summary, it can be concluded from the estimations that offshoring over the period from 1995 to 2014 had a slightly negative impact on investment in Germany. This effect is likely to have been mainly concentrated on the period before the onset of the 2007-08 global financial crisis given that offshoring was significantly less common in the following years as measured by the ratio of imported intermediates.

## FDI and domestic investment

*Clear increase in direct investment stock since 1999*

Over the last two decades, the internationalisation of German firms has taken place not only through offshoring, but also in the form of FDI. According to international standards, FDI is defined as a cross-border participation in the capital or voting rights of a firm of 10% or more. The stock of German firms' FDI rose from €412 billion in 1999 to €1,444 billion in 2015.[29] At the same time, certain countries have grown in terms of economic importance. China, in particular, as well as the central and eastern European countries of the Czech Republic, Poland and Hungary are playing an increasingly important role. In these countries, the FDI stock has risen by several times the average of other countries. Based on the UNCTAD (United Nations Conference on Trade and Development) statistics, it is striking in an international comparison that the share of the global FDI stock held by Germany has remained largely constant, while the share held by many other advanced economies, such as the United States and the United Kingdom, has declined given the increasing importance of large emerging market economies such as China, as direct investors amongst other things.

*Multinational firms invest abroad for different reasons*

German firms use FDI – which is a rather long-term instrument – to pursue a range of strategic objectives. In a survey by the Association of German Chambers of Commerce and Industry (DIHK) of member firms in the manufacturing sector, 45% of the companies surveyed reported that setting up sales and customer ser-

**26** The offshoring coefficient for the factor capital varies between a cross-country estimate and an estimate for which only the data for Germany are used.
**27** On the basis of estimates taken from the literature, the contribution of offshoring to the growth rate of gross output is calculated to be 0.06 percentage point per year in the period from 1995 to 2014. See M Amiti and S-J Wei (2008), Service offshoring and productivity: evidence from the US, The World Economy, Vol 32, pp 203-220.
**28** This would mean that the scale effect of the growth in production would more than offset the decline in the capital share of output through offshoring. This is the case if the contribution of offshoring to the growth rate of the production volume is assumed to be at least around three times the figure of 0.06 percentage point per year estimated for Germany.
**29** In this article, FDI includes both primary and secondary foreign direct investment. The aggregate figures are based on the Microdatabase Direct investment (MiDi). The figure of €1,444 billion in 2015 is comparable to the current figure for "claims arising from outward foreign direct investment" as reported in: Deutsche Bundesbank, Foreign direct investment stock statistics, Special Statistical Publication 10, April 2017. However, the claims arising from affiliated loans are not assigned depending on the country in which the corporate headquarters are resident.

vices was their main reason for investing abroad in 2017.[30] Furthermore, investing in foreign production sites for market development (response given by 31% of firms) was a key motivating factor. Only just under a quarter of the firms surveyed said that they mainly invested abroad to save costs, which was the reason most often given at the beginning of the 2000s.

*Literature has mixed evidence on relationship between FDI and domestic investment*

The academic literature provides no clear indication yet as to whether FDI tends to crowd out or complement domestic investment. Based on macroeconomic data, some studies point to a positive relationship, whilst other research identifies a substitution effect in the long term.[31] Only a few empirical studies are based on firm-level microdata which, unlike aggregate data, allow conclusions to be drawn about the direct impact of an investment abroad on the domestic investment decisions of the individual firms. The results of studies such as these tend to show a positive relationship between investment abroad and at home.[32]

*Positive relationship between FDI and domestic investment at the firm level*

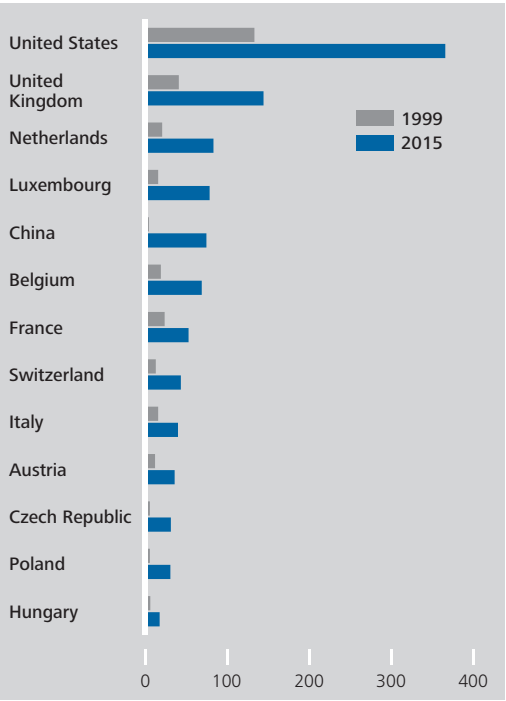
A recent study by the Bundesbank links two datasets with detailed information on German firms.[33] While the Microdatabase Direct investment (MiDi) provides information about individual investment relations to firms abroad, the corporate balance sheet statistics (*Unternehmensbilanzstatistik,* or Ustan) report, amongst other things, the level of a firm's gross fixed capital formation in Germany. An econometric analysis of the relationships at the firm level suggests that, on average, there is a positive relationship between German FDI and the gross fixed capital formation of a firm in Germany (see the box on pages 22 and 23).

*Productivity gains cannot explain results*

There are several possible explanations for this complementarity. For instance, although FDI can be a tool for cost-driven offshoring, it may also lead to an increase in the productivity of the domestic parent firm. Nonetheless, the overall impact of FDI on domestic investment is uncertain, since scale effects are counterbalanced by potential substitution effects between domestic and foreign capital.[34] However, these findings provide no indication that vertical FDI contributes to the expansion of domestic investment. Estimates which examine vertical motives for investing abroad or the change in

**German FDI in major host countries**

€ billion




Sources: Microdatabase Direct investment (MiDi) and Bundesbank calculations.
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30 See DIHK survey – Foreign investments in manufacturing industry, Foreign investments in 2017 higher than ever before, spring 2017.
31 See M A Desai, C F Foley and J Hines (2005), Foreign direct investment and the domestic capital stock, American Economic Review, Vol 95 (2), pp 33-38; Deutsche Bundesbank, Foreign direct investment and domestic investment, Monthly Report, September 2006, p 50; Deutsche Bundesbank, Foreign direct investment and domestic investment, Monthly Report, March 2014, pp 46-47; D Herzer and M Schrooten (2008), Outward FDI and domestic investment in two industrialized countries, Economics Letters, Vol 99 (1), pp 139-143.
32 See M A Desai, C F Foley and J Hines (2009), Domestic effects of the foreign activities of US multinationals, American Economic Journal: Economic Policy, Vol 1 (1), pp 181-203.
33 See S Goldbach, A J Nagengast, E Steinmüller and G Wamser, The effect of investing abroad on investment at home: on the role of technology, tax savings, and internal capital markets, Deutsche Bundesbank Discussion Paper, No 14/2017.
34 See the text on pp 22-23.

## The relationship between foreign direct investment and domestic investment at the firm level*

Two Bundesbank datasets are used to examine the relationship between foreign direct investment (FDI) and domestic investment at the firm level: the Microdatabase Direct investment (MiDi) and the corporate balance sheet statistics (*Unternehmensbilanzstatistik,* or Ustan). Domestic firms are legally obliged to report information on their foreign affiliates to the Bundesbank. The MiDi database contains various balance sheet items, country information and the foreign affiliates' industry classifications. The dataset allows a distinction to be made as to whether or not a domestic parent firm has established (or acquired) a new foreign affiliate in a given year. In addition, country-specific information, such as foreign tax rates, is linked to the MiDi database.

The Bundesbank's Ustan statistics comprise balance sheet data and information from the profit and loss accounts of German firms. The dataset also contains data on gross fixed capital formation in Germany. Other empirical studies tend not to have this information at their disposal as a flow variable, which means that investment is, in these cases, determined as the change in the stock of fixed assets on the balance sheet. The calculated figure is then more in line with net fixed capital formation, as it already includes depreciation.

The MiDi data are merged with the Ustan data using a correspondence table provided by the Bundesbank's Research Data and Service Centre (RDSC).[1] Firms' investment decisions may depend on various regional factors. With that in mind, specific regional information from the national accounts at the state level and from the Federal Statistical Office's GENESIS database are also imported.

One difficulty in estimating the relationship between domestic and foreign investment at the firm level stems from the fact that a firm's foreign and domestic investment decisions are not generally independent of one another. Simply comparing domestic gross fixed capital formation between domestic parent firms that have, in a given year, established (or acquired) a new foreign affiliate and other firms that have not done so would therefore paint a distorted picture. In order to account for potential selection and simultaneity bias, the probability of a domestic parent firm establishing (or acquiring) a new foreign affiliate is determined in a first step. This is done using the following estimation equation:[2]

$$(1)\ \mathrm{Treat}_{it} = \alpha \mathrm{X}_{i,t-1} + \delta \mathrm{Z}_{s,t-1} + \beta \mathrm{C}_{k,t-1} + \gamma \mathrm{M}_{l,t-1} + \phi_t + \psi_s + \varepsilon_{it}$$

The binary variable $\mathrm{Treat}_{it}$ assumes a value of one if a domestic parent firm $i$ establishes (or acquires) a new foreign affiliate in period $t$. Otherwise, the value is zero. The specification is based on the assumption

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* See S Goldbach, AJ Nagengast, E Steinmüller and G Wamser, The effect of investing abroad on investment at home: on the role of technology, tax savings, and internal capital markets, Deutsche Bundesbank Discussion Paper, No 14/2017.

1 See C Schild and S Schultz (2016), Linking Deutsche Bundesbank company data using machine-learning based classification, Deutsche Bundesbank, Research Data and Service Centre, Method Report 01-2016.

2 The preferred specification uses a Mundlak-Chamberlain approach, which additionally controls for the averages of the firm-specific variables over time. See Y Mundlak (1978), On the pooling of time series and cross section data, Econometrica, Vol 46 (1), pp 69-85; G Chamberlain (1982), Multivariate regression models for panel data, Journal of Econometrics, Vol 18 (1), pp 5-46.

that establishing (or buying) a new foreign affiliate depends on firm-specific variables at the domestic parent firm $i$ ($X_{i,t-1}$), sector characteristics $s$ ($Z_{s,t-1}$), and regional variables at the county level $k$ ($C_{k,t-1}$) and the municipal level $l$ ($M_{l,t-1}$) in the previous period. In addition, the estimation controls for time-specific ($\phi_t$) and sector-specific ($\psi_s$) fixed effects. Equation (1) is estimated using a probit model. Based on the estimation coefficients and the explanatory variables, a propensity score can be calculated for every firm. These scores can be used to isolate the effect of foreign investment by forming two groups of firms with the same attributes, which differ solely in terms of the presence of a new foreign affiliate.[3] Finally, a second step is undertaken to test whether domestic investment activity differs significantly between the two groups.

The estimation results suggest that a domestic parent firm establishing (or acquiring) a new foreign affiliate is, on average, associated with a €458,000 increase in domestic investment (as measured by the change in gross fixed capital formation). The effect at the firm level is likely to be relevant in economic terms, as this figure equates to around 4% of the average gross fixed capital formation within the group under review (in this case, domestic parent firms that set up or acquire a new affiliate abroad). Alternative measures of domestic investment activity largely yield qualitatively similar results. The results do not change in various robustness tests. Consequently, there appears to be a positive relationship between FDI and domestic investment for German firms.

## Estimated effects of an investment abroad on domestic investment[o]

| Item | Average treatment effect on the treated[1] | Standard error |
|---|---|---|
| Gross fixed capital formation (€) | 1,274,485*** | 394,017 |
| Δ gross fixed capital formation (€) | 458,126*** | 152,253 |
| Gross fixed capital formation relative to stock of fixed assets in the previous period | 0.044*** | 0.009 |
| Net fixed capital formation (€) | 669,878*** | 181,350 |
| Δ net fixed capital formation (€) | – 72,639 | 219,040 |
| Net fixed capital formation relative to stock of fixed assets in the previous period | 0.030*** | 0.010 |

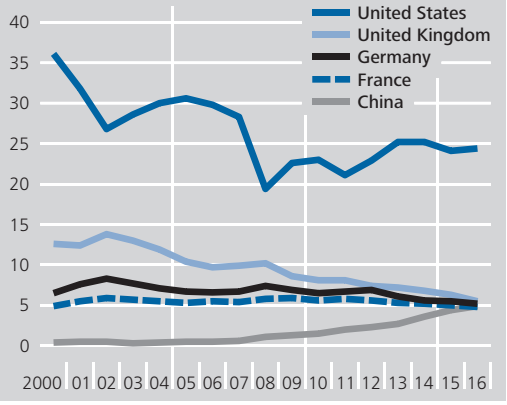
o *** Significance at the 1% level, ** significance at the 5% level, * significance at the 10% level. Standard errors are calculated using weighted regressions which take into account year fixed effects. Moreover, the estimate controls for per capita income at the county level in the period t-1. 1 The average effect of establishing (or acquiring) a foreign affiliate on the domestic investment of the parent firm in question.

Deutsche Bundesbank

3 This is done using a radius matching procedure with a calliper of 0.01.

**Share of selected countries in global FDI stock***

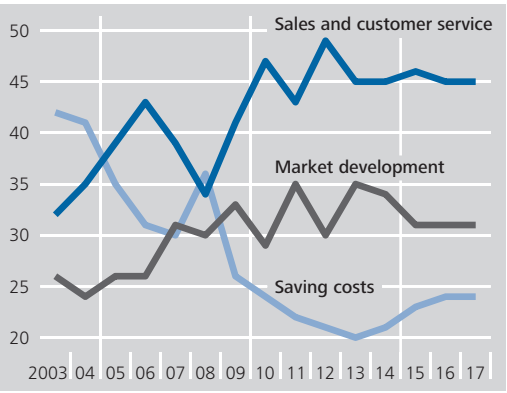
As a percentage




Source: UNCTAD. * Outward FDI.
Deutsche Bundesbank

**German industrial enterprises' reasons for foreign investments**

As a percentage




Source: DIHK survey – Foreign investments in manufacturing industry 2017.
Deutsche Bundesbank

the total factor productivity of multinational firms as further possible causes for domestic investment do not substantiate this hypothesis.

*Tax considerations …*

Another explanation for the positive relationship between FDI and domestic investment are the potential tax savings arising from the increase in internal debt vis-à-vis foreign affiliates or from transfer pricing. Empirical studies suggest that multinational firms use international tax differentials to shift corporate profits from high-tax to low-tax countries.[35] Theoretical studies show that, in the context of investment decisions, shifting profits from one location to another can reduce a firm's cost of capital and thus facilitate investment in countries with higher tax rates, such as Germany.[36] In line with this theory, the results at hand show that the impact of FDI on investment at home varies depending on the tax rate – the more German firms benefit from a low tax rate in the host country of their affiliates, the more those firms also invest domestically. Affiliates in countries with a lower tax rate than at home can therefore reduce the effective capital costs of the parent firm, thus freeing up additional resources that can be used for domestic investment. Consistent with this, domestic parent firms that invest abroad by establishing a new affiliate pay less tax overall. The higher the parent's liabilities to the foreign affiliate, for example through intra-group lending, the more the parent will save on tax. Amongst other things, the (limited) tax deductibility of borrowing costs is an important factor in that regard.

*… and financing conditions in the host country play an important role, by contrast*

In addition, the financing opportunities in the host country may also be of relevance. Although some studies conclude based on the assumption of financial market frictions that – all other things being equal – an increase in investment abroad raises the cost of capital for investment at home,[37] recent empirical studies conversely emphasise that multinational firms mainly fund their investments via the global and internal capital markets, meaning that access to financial resources in a given country does not necessarily limit business activity, but that improved access to the international financial markets can even reduce the cost of capital

**35** See H Huizinga and L Laeven (2008), International profit shifting within multinationals: a multi-country perspective, Journal of Public Economics, Vol 92 (5-6), pp 1164-1182.
**36** See M Overesch (2009), The effects of multinationals' profit shifting activities on real investments, National Tax Journal, Vol 62 (1), pp 5-23.
**37** See G Stevens and R Lipsey (1992), Interactions between domestic and foreign investment, Journal of International Money and Finance, Vol 11 (1), pp 40-62; M Feldstein (1995), The effects of outbound foreign direct investment on the domestic capital stock, in The effects of taxation on multinational corporations, NBER Chapters, pp 43-66.

throughout the group.[38] According to the Bundesbank's estimates, the positive relationship is likely to be more pronounced if the level of financial market development in the host country is higher – measured here in terms of stock market capitalisation. The results also suggest that the domestic parent company's internal liabilities increase more, the higher the ratio of lending to the private sector relative to gross domestic product and the higher the stock market capitalisation is in the host country. This would appear to indicate that improved access to foreign capital goes some way towards explaining the positive relationship between FDI and domestic investment.

*Effects of horizontal FDI not analysed separately*

Two additional reasons for direct investment (rated as important in the DIHK survey) are sales/customer service and market development. However, the microdata available do not contain any specific information about the reasons for foreign investments, meaning that this aspect cannot be analysed separately here.

*Impact on aggregate investment is likely to be small*

The impact on aggregate investment can also be roughly gauged from the available estimation results. In this case, we assume that the estimated average effect applies to all parent firms with new foreign affiliates[39] and that FDI does not generate any additional indirect spillover effects to other domestic firms. According to this estimation, FDI would increase aggregate domestic gross fixed capital formation by €687 million per year on average.[40] Compared to Germany's total annual gross fixed capital formation, which amounted to €490 billion on average during the period from 2000 to 2013, this is a relatively small figure. This does not contradict the estimated impact of €458,000 at the firm level, which is economically significant to the parent firms in question in terms of their gross fixed capital formation. The extrapolation results at the macro level merely reflect the relatively small number of German firms with new affiliates abroad.

## Conclusion

*Assessment of the impact of internationalisation requires a differentiation by type of foreign activity and domestic asset*

The internationalisation of German firms has repercussions for domestic investment. The results of the analysis presented in this article suggest that, in order to assess the impact of the internationalisation of the corporate sector on investment at home, a differentiation by both type of foreign activity and domestic asset is required.

*Both capital and labour input side must be examined in order to analyse the effects of offshoring*

The effects of offshoring on demand for capital at home differ depending on asset type. The results suggest that offshoring does reduce the non-ICT capital share in production but does not have any noticeable impact on the ICT capital share in output. Across countries, offshoring is likely to have caused a slight decline in the share of R&D capital in production, although the R&D share may have increased somewhat in Germany. One possible explanation for the variation of the effect by asset class are redundancies in the complementary asset classes on the capital input side which occur once production stages with low skill requirements have been moved offshore. Furthermore, offshoring allows countries to specialise in areas in which they enjoy a comparative advantage, which for advanced economies is mainly likely to be in the areas of high-skilled labour, and ICT and R&D capital. In future, the expected decline in the labour force in Germany and the resultant potential shortage of skilled workers could see firms decide to offshore production stages requiring higher-skilled labour, too. Nonetheless, rising labour costs abroad and new manufacturing opportunities at home through technological advances could also lead to production reshoring in some cases.

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**38** See M A Desai, C F Foley and J Hines (2005), op cit; M A Desai, C F Foley and J Hines (2009), op cit.
**39** Owing to the limited availability of the corporate balance sheet statistics data, the estimation results are based on a smaller sample of parent firms.
**40** These calculations are based on the results of the change in gross fixed capital formation.

*Offshoring and FDI tend to have opposing effects on domestic investment*

The restructuring of the production process, which can also take place via supply contracts with legally independent suppliers, is likely to have had a slightly negative effect on aggregate business investment in Germany in the past. This was probably particularly true in the decade before the 2007-08 financial crisis broke out, given that offshoring has developed at a markedly more subdued pace since then. By contrast, offshoring is not the only reason for establishing or acquiring new foreign affiliates – they also provide German firms with access to new markets, open up additional funding opportunities and can sometimes allow tax savings if profits are shifted abroad. Here, the results of the analyses point to a positive overall firm-level relationship between FDI and gross fixed capital formation at home. All things considered, it is therefore possible to identify opposing transmission channels through which the various types of foreign activity by firms influence domestic demand for investment. However, both studies have in common that the quantitative impact on overall domestic investment is small.