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Article

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Weak Investment Dampens Europe's Growth

By Guido Baldi, Ferdinand Fichtner, Claus Michelsen and Malte Rieth

In the course of the economic and financial crisis, investment activity, which was not very strong to begin with, in Europe and especially the Eurozone caved in. In relation to gross domestic product, fixed capital formation declined by four percentage points since 2008. Already prior to the crisis, investment activity was rather weak in parts of the Eurozone – amongst others in Germany. This finding is indicated by model simulations which account for country-specific macroeconomic conditions. On the other hand, especially in southern European economies, investment – mostly in the home construction sector – was markedly high before the crisis. These investments were however mainly financed by capital inflows from abroad. In the course of the crisis, foreign direct investment slumped and so did investment activity in these countries which has not been counterbalanced by higher investments in other parts of the monetary union. As a result, current investment in the Eurozone remains markedly below the level corresponding to macroeconomic conditions. When measured against this baseline, there was an underinvestment of around two percent on average in relation to gross domestic product between 2010 and 2012. This is associated with significant reductions in growth in the short and long run since the capital stock needed to expand production capacity is growing rather slowly. If investment activity in the Eurozone had been correspondingly stronger, potential growth in the monetary union could have been 0.2 percentage points higher than observed since the crisis.

Introduction

The economic and financial crisis has left deep scars in Europe – economic growth is meager and unemployment rates are high in many countries. Investment is also weak: since 2008, gross fixed investment has dropped by around 14 percent in the European Union and by almost 15 percent in the euro area. In the same period of time, the investment rate has decreased by around four percentage points. This stands in contrast to the development in the United States, where the investment rate has gradually increased from its trough during the financial crisis. However, investment in the US is still below its pre-crisis level (Figure 1).¹

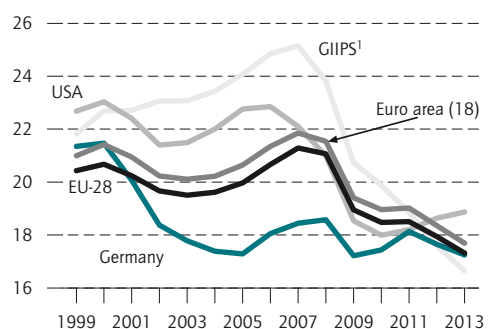
Before the outburst of the financial crisis in 2008, investment followed a positive trend both in the US

1 The real investment rate follows a similar evolution as the nominal investment rate.

Figure 1

Gross Fixed Capital Formation

In percent of nominal GDP



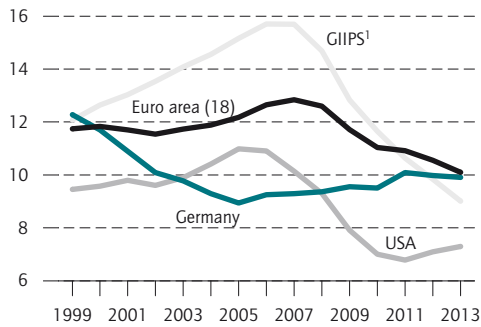
¹ Greece, Italy, Ireland, Portugal, Spain.

Source: European Commission, calculations by DIW Berlin.

Figure 2

Construction Investment

In percent of nominal GDP



1 Greece, Italy, Ireland, Portugal, Spain.

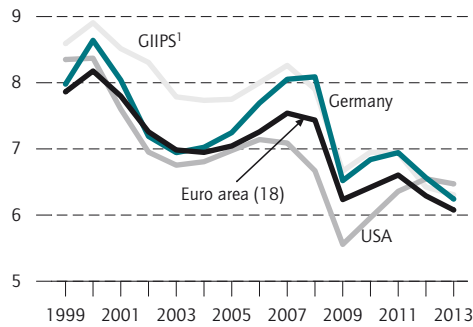
Sources: European Commission, calculations by DIW Berlin.

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Figure 3

Investment in Equipment and Machinery

In percent of nominal GDP



1 Greece, Italy, Ireland, Portugal, Spain.

Sources: European Commission, calculations by DIW Berlin.

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and the European Union. In both economic zones, investment rates steadily increased in the 2000s. In the GIIPS countries², the investment rate had already started to increase in the end of the 1990s. The positive trend for gross fixed investment was to a large extent driven by an increase in construction investment (Figure 2). However, investment in equipment also increased considerably before the crisis (Figure 3). While investment has partly recovered in the US in the last years, investment rates remain at a low level in Europe.³

The absence of a recovery of investment in Europe is worrying, as it likely reflects deep uncertainty and lack of confidence among firms. Persistently low investment rates can seriously damage the productive capacities of European economies. A number of countries—in particular Germany, the Netherlands and Finland—experienced low investment rates even before the crisis.⁴ One would also expect higher investment rates in Central and Eastern Europe, where the process

of economic convergence is far from completed.⁵ In the GIIPS countries, however, considerable over-investments could be observed before 2008. In particular, residential investment rates are considered as having been too high.⁶ Descriptive findings to date raise the question as to whether there is too little investment activity in the euro area or whether, measured against economic conditions, the level is appropriate.

The “Optimal” Level of Investment: An Empirical Approximation

Determining an “optimal” investment rate as a benchmark is very ambitious in theory and subject to significant uncertainty since there are a number of factors—such as expected returns—to take into account, which, in reality, are not observable. On closer inspection, the alternative of an empirical approach based on international comparisons would not really present any less of a challenge since it can ultimately only be conducted by using an enhanced sectoral analysis, taking into account differences and changes in economic structure. Empirical approaches can also be subject to problems of data comparability. For example, public and private rates of investment are defined differently in the

² The GIIPS countries comprise Greece, Italy, Ireland, Portugal and Spain.

³ For the US, one can observe a higher investment rate than for the EU and the euro area. This difference is mainly due to statistical revisions in the US in July 2013 that will be implemented in European National Accounts in September 2014. These statistical revisions increase the investment rate, because they involve the classification of expenditures for research and development and military weapons systems as investments. See epp.eurostat.ec.europa.eu/portal/page/portal/esa_2010/introduction.

⁴ See also Buti, M., Mohl, P. (2014): Lacklustre investment in the Eurozone: Is there a puzzle? www.voxeu.org/article/raising-investment-eurozone. For the German case, see Bach, S. et al. (2013): Wege zu einem höheren Wachstums-pfad. DIW Economic Bulletin 8/2013.

⁵ See European Bank for Reconstruction and Development (EBRD) (2013): Transition Report 2013, London, www.ebrd.com/downloads/research/transition/tr13.pdf.

⁶ Caldera, A., Johansson, A. (2013): The price responsiveness of housing supply in OECD countries. *Journal of Housing Economics*, 22(3), 231–249; Sanchis, I., Marco, M. (2014): The Spanish Case: The Housing Market Bubble and External Disequilibria. *SpringerBriefs in Economics: The Economics of the Monetary Union and the Eurozone Crisis*, 55–74.

Box 1

Econometric Investigation of the "Optimal" Rate of Investment

The results of the analysis are based on a linear regression with panel-adjusted, auto-correlated error terms. The study uses annual data from 1999 to 2012.¹ The data are from Eurostat, the World Bank and the International Monetary Fund. The countries analyzed include the US, Japan, Turkey, Switzerland, Norway, Iceland, and all the EU countries except Romania.

The dependent variable is the investment rate (nominal gross fixed capital formation in relation to nominal gross domestic product). Explanatory variables in the basic specifications of the estimation include average purchasing power-adjusted gross domestic product per capita in the period 1995 to 1999, the growth rate of real gross domestic product, the savings rate (gross savings in relation to nominal GDP), the employment rate (working population in relation to total population), the industry rate (share of manufacturing – excluding construction industry – of gross value added in percent), market capitalization (as a percentage of nominal GDP), loans by domestic banks to the private sector (as a percentage of GDP), fluctuations in the real effective exchange

rate (standard deviation of monthly data within the respective year), and the annual rate of inflation.

Purchasing power-adjusted per capita GDP in the starting period, real GDP growth, as well as the savings, employment, and industry rates all show a statistically significant correlation with the rate of investment. All explanatory variables have a positive relationship to the investment rate; only per capita GDP in the starting period reduced the rate of investment because the economically weaker economies underwent a convergence process, and as a result tended to have a higher investment rate than the more developed countries (Table).²

The model is used to calculate "investment gaps". This is achieved by entering the country-specific averages of the explanatory variables into the estimated model over the observation period. The predicted investment rates can be

¹ Data on some variables are not yet available for 2013. As a result, the estimation period ends in 2012.

² Various extended models show that bank lending to the private sector, fluctuations in the nominally effective exchange rate and the old-age dependency ratio have no significant effect on the rate of investment. In addition, the inclusion of these control variables does not lead to qualitative changes in the coefficients of the basic model but only to marginal quantitative changes.

official statistics. There is currently also the problem that in particular expenses on research and development are classified as investment in the US whereas other countries classify them differently.⁷

By estimating an econometric model, it is possible to determine the approximate rate of gross fixed capital formation of a country commensurate with its specific macroeconomic conditions. Being aware of the possible weaknesses of the approach, we derive the appropriate level of investment activity for the euro area according to its economic fundamentals (Box 1). The simulations for the euro area for the period from 1999 to 2012 indicate that the actual investment rate was, on average, approximately 0.5 percentage points lower than the rate derived in the model (Table 1). The findings for the US, however, point to over-investment.

Accordingly, the model identifies significant over-investment for the US during the pre-crisis period, i.e.,

Table 1

Average Investment Gaps

In percent of GDP

	1999 to 2012	1999 to 2007	2010 to 2012
Euro area-18	0.5	-0.1	2.0
Germany	2.9	2.5	3.7
Netherlands	2.6	1.9	4.8
Finland	1.5	1.5	2.0
Belgium ¹	-0.8	-0.5	-0.7
France	0.0	0.3	-0.3
Austria	-0.5	-1.0	0.6
Italy	-0.9	-1.4	0.5
Greece ²	-1.5	-5.0	3.0
Portugal	-0.8	-2.7	4.1
Spain ³	-4.3	-6.2	1.1
Ireland	-0.1	-3.6	9.4
USA ⁴	-1.2	-2.3	1.9
Japan	0.1	-0.6	2.4

¹ Calculations based on data from 2002 to 2012.

² Calculations based on data from 2005 to 2012.

³ Calculations based on data from 2000 to 2012.

⁴ Calculations based on data from 1999 to 2011.

Source: Calculations by DIW Berlin.

Constant investment gaps can be observed for Germany, the Netherlands and Finland.

⁷ See footnote 3

interpreted as structural investment rates; the difference between the structural and actual rate of investment is defined as a gap, whereby a positive gap indicates underinvestment compared with the rate derived from the model.

The use of averages is based on the idea of a long-term equilibrium. As a result, some of the explanatory variables are likely to be above the long-term equilibrium during an economic upturn, while during a downturn, they are likely to be below it. This particularly applies to some crisis countries which grew strongly up to 2007 and then experienced a deep recession. These fluctuations are mitigated using averages allowing an approximate structural investment rate to be simulated using the model.

Alternatively, the investment gaps calculated like this could also be understood as cointegration relationship. It provides the answer to the question, what rate of investment is consistent with a situation in which all the explanatory variables are in the long term equilibrium. The idea of using long-term averages can also be found in the procedure for determining macroeconomic imbalances employed by the European Commission.

Table

Important Determinants of the Investment Ratio

Panel of 33 OECD countries, 1999 to 2012, pooled OLS

GDP per capita (average 1995-1999)	-0.16***	-0.16***	-0.16***	-0.16***
GDP growth	0.32***	0.31***	0.29**	0.31***
Savings rate	0.17***	0.15***	0.15***	0.17***
Employment rate	0.19***	0.21***	0.19***	0.19***
Industry rate	0.04**	0.03	0.05	0.04**
Market capitalization	-0.004	0.09	0.07	-0.01
Loans to private sector	0.008		0.01	0.01
Fluctuations in real effective exchange rate	0.04	0.03		0.03
Inflation	0.007	-0.001	0.06	0.0003
Bank loans to private sector		0.004		
Fluctuations in nominal effective exchange rate			-0.11	
Dependency ratio				-0.02
Observations	434	434	434	434
R ²	0.36	0.36	0.37	0.36

*, ** and *** signal a level of significance at 10, 5 and 1 percent.

Sources: IMF, Eurostat, Worldbank, own calculations.

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The investment rate can be explained by structural factors and the economic environment.

1999 to 2007. Investment in the euro area was also slightly higher than the model value which was primarily the result of overheating in the real estate sector in individual countries. However, since the onset of the debt crisis in the euro area (2010–2012), the actual investment rate has been two percentage points lower than the model estimate.

Heterogeneous Investment Activity across Euro Area Member States

The overall situation across the individual euro area countries is decidedly heterogeneous. Between 1999 and 2012, Germany and the Netherlands recorded a high average investment gap of around three percent of GDP; and for Finland, too, the investment figures derived from the model were higher than those actually recorded. In the second subperiod, the investment backlog strongly increased again in all countries.

From 1999 to 2012, the crisis countries mostly recorded negative gaps, on average, which means that more was in

fact invested than predicted by the model. This holds true for Italy, Portugal, and Ireland. Based on the estimates, Spain and Greece in particular demonstrated a high level of investment over the entire period. Here, the annual investment backlog compared to the model-based rate was, on average, -4.5 percent and -1.5 percent for Spain and Greece, respectively. This was primarily due to residential construction investment which extended far beyond the structurally appropriate level as a result of excessive price increases and excessive lending to households (Box 2).

The collapse of the construction industry that accompanied the crisis, an industry which, at times, accounted for more than 20 percent of GDP in Spain and Ireland for example, has, in a typical counter reaction, in fact resulted in a lower than commensurate level of residential construction investment recently. The situation in the euro area countries with more stable economies is quite different. Germany, Finland, Austria, and Belgium, for instance, currently have a comparatively small or even negative backlog when it comes to residential construction investment.

Box 2

Construction Investment: A European Comparison

Construction investment is a key component of gross fixed capital formation in all European countries. In 2013, almost a trillion euros was invested in construction across the euro area, which corresponds to approximately 55 percent of total gross fixed capital formation. In the pre-crisis period, there was significantly more investment in buildings in small countries like Slovenia or Luxembourg, and also in the crisis countries of Spain, Greece, Ireland, and Portugal (Figure 1). In the major economies, such as Germany, France, and Italy, and also in Austria, Belgium, the Netherlands, and Finland, investment in construction was significantly lower—its ratio to GDP in most of these countries actually even decreased over time.

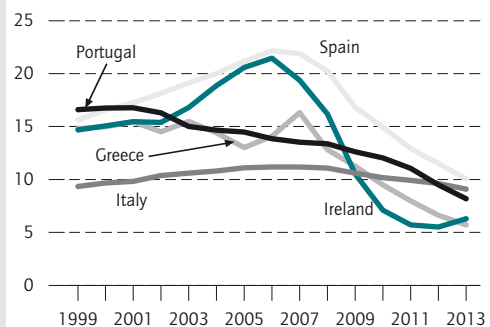
In view of the speculative real estate bubble,¹ which was particularly pronounced in Spain and Ireland in the run-up to the crisis, it can be surmised that these differences can be traced back to residential construction in particular. Investment in residential buildings makes up the largest part of total construction investment in most countries—its share in the euro area was a good 52 percent in 2013. Investment in residential construction in the euro area is not very high by international standards: until the crisis, its share was relatively stable at between 6.5 and 7 percent of GDP (Figure 2). In the US, the proportion increased strongly up to the start of the financial crisis, albeit starting at a lower level. In Germany, residential investment declined in the same period by a good two percentage points—however, this is largely due to the high level of investment in the mid-1990s.

There are significant differences between the individual euro area countries. Residential investment per capita (Figure 3) was clearly highest in Ireland—but Greece and Spain also invested heavily in construction during the mid-2000s. However, this alone does not suggest that investment would have been disproportionately high or low. Nevertheless, a corresponding assessment can be derived from an econometric estimate: the estimation approach developed by the European Central Bank can be used here. It closely follows the concept of Tobin's-Q.² This and the underlying model describe the calculus involved in investment decisions: it uses market prices and the reproduction

1 Brent W. Ambrose, Piet Eichholtz, and Thies Lindenthal, "House prices and fundamentals: 355 years of evidence," *Journal of Money, Credit and Banking* 45(2-3) (2013): 477-491; Morgan Kelly, "Whatever Happened to Ireland?," no. 7811, *CEPR Discussion Papers* (2010). M. Sanchis i Marco, "The Spanish Case: The Housing Market Bubble and External Disequilibria," in *SpringerBriefs in Economics: The Economics of the Monetary Union and the Eurozone Crisis* (Springer International Publishing, 2014), 55-74.

2 J. Tobin, "A General Equilibrium Approach to Monetary Theory," in *Journal of Money, Credit and Banking*, vol. 1, no. 1 (1969): 15-29

Figure 1

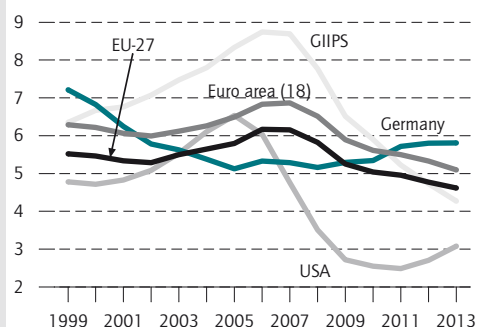
Construction Investment in Crisis Countries
In percent of nominal GDP

Sources: EU-Commission, calculations by DIW.

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The construction boom was particularly strong in Spain and Ireland.

Figure 2

Residential Construction Investment
In percent of nominal GDP

Sources: EU-Commission, calculations by DIW Berlin.

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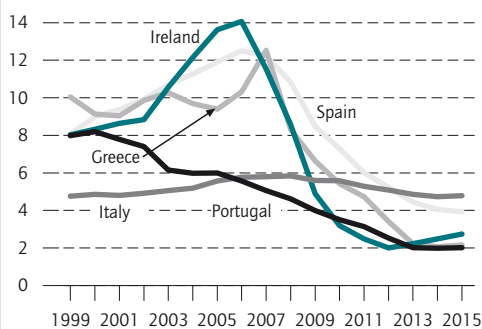
Residential construction investment was particularly strong before the outburst of the crisis.

costs of capital goods in relation to each other to determine the attractiveness of the investment for investors. The underlying hypothesis is that market prices, as long as they are undistorted, depict the relative scarcity of goods and—in

Figure 3

Residential Construction Investment in Crisis Countries

In percent of nominal GDP



Sources: EU-Commission, calculations by DIW Berlin.

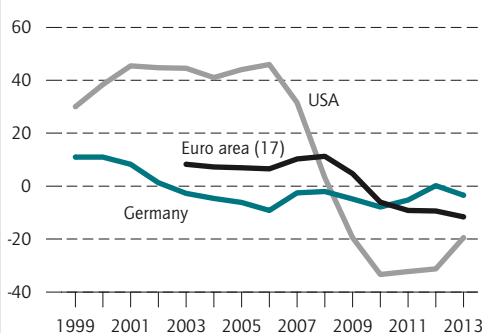
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There was no housing boom in Italy and Portugal.

Figure 4

Over and Under-investment in Residential Construction

In percent of modelled residential construction



Sources: EU Commission, calculations of DIW Berlin..

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the case of the real estate market—increased construction activity appears to be prudent if the reproduction costs, i.e., the construction costs, are lower than the market prices, i.e.,

Table 1

Results of the Panel Regression

Coefficients

Interest Rates	−0.010*
Construction costs	−0.004*
Real estate prices	0.007*
Excessive price increases	0.165*
Constant	4.259*
Observations	820
F(4,785)	84.97*
R ²	0.302

* Significance at the 1 percent level.

Sources: EU Commission, OECD, calculations by DIW Berlin.

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the sales price of the real estate. However, prices can be distorted depending how regulated the real estate market is and how efficiently lending and land designation responds to demand—speculative developments could further exacerbate this.

Nevertheless the approach itself, even taking into account similarly opaque information, provides a good basis for estimating the magnitude of fundamentally justified construction activity; in particular, since this method does not require uncertain assumptions about future demand or depreciation of stock to be made. The difference between the basic level and actual construction activity thus highlights any possible current over- or underinvestment. The findings of a corresponding model are summarized in Table 2.

The econometric estimates indicate increasing underinvestment in the field of residential construction investment (Figure 4). Since 2008, investment in the euro area countries (Euro 17) has declined significantly. For this group of countries, the current investment level is approximately 58 billion euros, or nearly 12 percent of the estimated basic level, too low. This figure is higher for the US, where, measured against the model-based level, \$ 108 billion (19 percent) too little was invested in residential buildings. However, there was significant over-investment in residential construction in the pre-crisis period in the US.

continuation of the Box 2

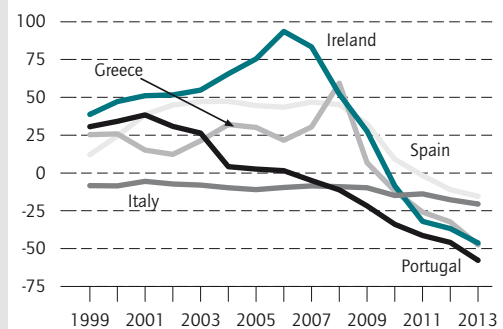
Within Europe, developments have varied greatly. Before the crisis, construction activity was excessive in the crisis countries of Spain, Greece, Portugal, Italy, and Ireland (Figure 5). Price bubbles, also triggered by generous lending and strong inflows of capital from abroad, led to a surge in new building activity. Since then, measured against the model value, there has been insufficient investment (assuming that real estate prices were adequately adjusted), at a level amounting to considerable sums in the crisis years. For example, less than half of the amount that would be fundamentally justified was actually invested in Portugal in 2013; in Greece, the corresponding figure was 48 percent, followed by Ireland with approximately 46 percent. But, in the Netherlands too, residential investment is about 20 percent below the value predicted by the model.

However, these developments are certainly not uncommon—residential construction activity typically over- or underreacts to fluctuations in real estate prices; the comparatively weak investment prevailing in some economies can therefore at least partly be explained by overinvestment during the pre-crisis period. In addition, some lead time is usually required for project planning and implementation. The low investment activity could also be due to a lack of confidence by investors in the profitability of longer-term projects, which must first be regained, primarily in the crisis countries.

In contrast to the crisis countries, construction activity in economies such as Belgium, Finland, Slovakia, Luxembourg, the Czech Republic, and Austria differed little from the fundamentally justified level in the run-up to the crisis. Currently, in these countries, relatively small gaps or even

Figure 5

Over and Under-investment in Crisis Countries In percent of modelled residential construction investment



Sources: EU Commission, calculations by DIW Berlin..

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surpluses can be identified (Table 2). In Germany, residential construction investment is close to the estimated fundamental level with a gap of about 3.5 percent or 4.5 billion euros. With the strong upturn in residential construction currently being observed and moderate real estate price increases at the same time, this gap should close in 2014.

Due to its “safe haven” status, Germany is profiting from a relatively significant inflow of foreign capital which boosts property price increases and stimulates investment activity.

Lack of Investment Curbs Potential Growth

As a result of investment activity that is rather weak by international standards, the real capital stock⁸ in the euro area also only slightly increased; it grew by just 1.9 percent from 1999 to 2012, which was significantly less than in the US, for example (Figure 4).

⁸ For the simulations, historical data are used for the depreciation rate, the price index for investment and nominal GDP.

Due to the high level of heterogeneity of investment activity in the pre-crisis period, development of capital stock in the different member countries of the monetary union has increasingly diverged. While the real capital stock in the crisis countries has experienced strong growth—of an annual average of 4.6 percent between 1999 and 2007 in Spain, for example—corresponding growth in Germany, for instance, was only 1.3 percent.

Had the level of investment in Germany been as high as approximated by the model calculations outlined in the previous section, then the real capital stock would have increased by an annual average rate of 2.1 percent between 1999 and 2007. But growth in

Table 2

Over and Under-investment in Residential Construction in 2013

In percent of modelled investment levels
in billions of respective currency

	Gap in percent	Over and Under-investment respectively
Portugal	-58	-4.8 Euro
Greece	-48	-5.4 Euro
Ireland	-46	-4.3 Euro
Great Britain	-34	-19.3 (Pound Sterling)
Sweden	-22	-23.8 (Swedish Crowns)
Italy	-21	-17.2 Euro
Netherlands	-20	-6.0 Euro
USA	-19	-108.5 (US-Dollar)
Slovenia	-16	-0.2 Euro
Spain	-15	-10.9 Euro
Denmark	-13	-9.7 (Danish Crowns)
France	-13	-14.7 Euro
Euro area 17	-12	-57.9 Euro
Austria	-11	-1.4 Euro
Germany	-3	-4.6 Euro
Czech Republic	-2	-2.5 Euro
Luxembourg	0	0.0 Euro
Belgium	7	1.1 Euro
Finland	8	0.8 Euro
Slovakia	11	0.1 Euro

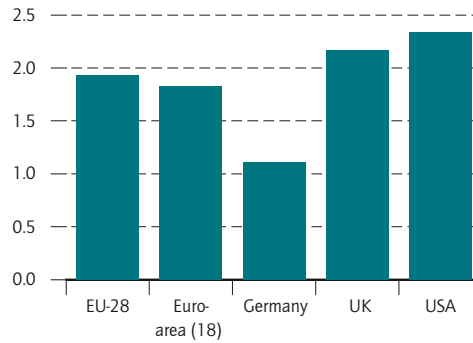
Sources: EU Commission, OECD, calculations of DIW Berlin.

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Figure 4

Changes in Net Capital Stock 1990 to 2012

Yearly average in percent



Source: EU-Commission

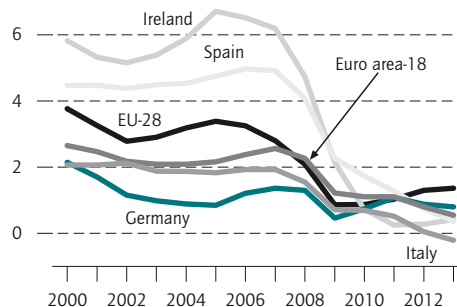
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The Capital Stock has only moderately grown in the euro area.

Figure 5

Net Capital Stock

Annual changes in percent



Source: EU-Commission; calculations by DIW Berlin.

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The growth rate of the capital stock is particularly low in the crisis countries.

Spain would have only been at three percent, which is almost two percentage points lower than the actual value.⁹

At the current juncture, however, the lack of investment observed in the euro area as a whole also has a significant impact on the capital stock (Figure 5). During the period from 2010 to 2012, the capital stock grew by just one percent per year on average. This is six-tenths of a percentage point less than the investment activity to be expected according to the model-based

estimates (Table 2). The downturn is particularly marked in the crisis countries; in Spain, between 2010 and 2012, the capital stock would have grown at an average rate of 1.3 percentage points more than the growth rate in fact observed if there had been no investment gap. In Germany, too, the growth of capital stock has been hampered by the low level of investment activity; between 2010 and 2012, the average increase was 0.6 percentage points lower than in the model simulation.

Poor growth of the capital stock has an impact on an economy's long-term growth potential. Had the euro area recorded the rate of change in the capital stock generated by the model-based estimates for investment activity

⁹ For the purpose of the simulation, it is assumed that the rate of depreciation, prices of investment goods (deflator), and nominal GDP all behave in the same way as observed in the historical data.

Table 2

Average Investment Gaps

In percent of Gross Domestic Product

	Historical Data			In the Absence of Investment Gaps		
	1999 to 2012	1999 to 2007	2010 to 2012	1999 to 2012	1999 to 2007	2010 to 2012
Real Capital Stock Growth						
Euro area-18	1.9	2.3	1.0	2.1	2.3	1.6
Germany	1.1	1.3	1.0	1.9	2.1	1.6
Netherlands	1.7	2.0	0.9	2.4	2.6	2.1
Finland	1.6	1.8	1.3	2.0	2.2	1.7
Belgium	1.7	1.9	1.1	1.5	1.8	0.9
France	2.2	2.4	1.7	2.1	2.4	1.6
Austria	1.9	2.2	1.6	1.9	2.0	1.7
Italy	1.5	2.0	0.3	1.3	1.5	0.7
Greece ¹	2.1	3.2	-1.4	1.9	2.6	-0.2
Portugal	2.0	3.0	-0.5	2.2	2.5	1.3
Spain	3.6	4.6	1.0	2.8	3.0	2.3
Ireland ²	4.2	5.9	0.3	4.6	4.7	4.2
USA ³	2.4	3.2	1.2	2.3	2.5	1.8
Potential Growth						
Euro area-18	1.5	2.0	0.6	1.6	1.9	0.8
Germany	1.3	1.4	1.3	1.6	1.7	1.6
Netherlands	1.6	2.2	0.3	1.9	2.4	0.7
Finland	2.1	3.0	0.3	2.2	3.2	0.4
Belgium	1.7	1.9	1.1	1.6	1.9	1.0
France	1.5	1.8	1.1	1.5	1.8	1.1
Austria	1.8	2.3	1.0	1.8	2.2	1.1
Italy	0.7	1.2	-0.3	0.6	1.1	-0.2
Greece ¹	1.9	4.0	-3.1	1.8	3.8	-2.7
Portugal	1.1	1.8	-0.5	1.2	1.6	0.2
Spain	2.5	3.4	0.3	2.2	2.8	0.7
Ireland ²	3.1	5.4	-0.6	3.3	5.0	0.7
USA ³	2.1	2.6	1.6	2.1	2.3	1.8

1 Calculations based on data from 2000 to 2013; 2 Calculations based on data from 2002 to 2013; 3 Calculations based on data from 1999 to 2011.

Source: Calculations by DIW Berlin.

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Higher Investments would have increased potential GDP growth.

since 2010, potential growth¹⁰ between 2010 and 2012 would have been 0.2 percentage points higher on average.

This does not take into consideration, however, that a growing capital stock increases the productivity of other production factors and consequently is generally also likely to result in a stronger increase in employment, for example. This in turn can boost production further. The decline in growth is particularly significant in the crisis countries; for Spain, for instance, the model-based potential growth for 2010 to 2012 is 0.4 percentage points

less than the actual rate. For Germany, the difference is 0.2 percentage points.

Low Efficiency of Investment Activity in Peripheral Countries

The downturn in investment activity and capital stock in the crisis countries is also a consequence of the low efficiency of investment. This can be illustrated using different measures, which individually have considerable shortcomings, but taken together present a comprehensive picture (Figure 6 and 7). The first three key figures show the productivity or efficiency of investments in the production process. The last two criteria provide information on the profitability of these investments (see Box 3).

¹⁰ The EU Commission's approach for calculating potential is used here Standardquelle Kommissionsansatz. When interpreting these figures, it must be borne in mind that all investment expenditure is taken into account even though—in the case of residential construction investment, for example—the direct relevance for the production potential of an economy may be limited.

Box 3

Key Concepts of Investment Efficiency

The present study draws on various measures for the efficiency of investments:

- Capital productivity: Ratio of GDP to net capital stock. This specifies the production quantity that can be produced with one unit of capital.
- Marginal efficiency of capital stock: Ratio of change in GDP over previous year to average investments in previous two years. This figure indicates how much can be additionally produced with one more unit of investment, i. e., one more unit of capital.
- Total factor productivity: additional production quantity not occurring through an increase in labor and capital. It

measures the technological progress in production, in the broader sense.

- Rate of return: operational gross profit of companies¹ in relation to capital stock. It specifies the return that can be achieved with one unit of capital.
- Revenue growth: Percentage change in operational gross profit of companies compared to the previous year.

¹ Following the procedure of the International Monetary Fund, this figure is taken from profits and investment income recorded in the national accounts. See International Monetary Fund (2014), World Economic Outlook April 2014, p. 81 ff.

Greece and Spain had the lowest capital productivity of all 32 countries analyzed, and the figure for Italy was not substantially higher. A similar picture emerges when we take the marginal efficiency of capital stock as a basis. Instead of focusing on the average productivity of the available capital stock, it shows how much can be additionally produced with one more unit of capital; the measure is therefore more future-oriented. Greece, Portugal, and Italy are right at the tail end of the countries analyzed in the international comparison. The development of total factor productivity, which measures the technological progress of an economy in a broader sense, is equally weak. The figure has stagnated since 1999 in Greece, Portugal, and Spain, and it has even declined in Italy. Only when it comes to the rate of return of the capital stock do Greece and Italy occupy a mid-table ranking internationally. For Spain, the same applies to revenue growth.

The different ranks of the individual countries depending on the criterion used are due to the different definitions these criteria are based on. The first three measures focus more on the macroeconomic efficiency of investment. The remaining two concepts assess the profitability of an investment from the point of view of capital as a factor of production by looking at corporate profits. Thus the five criteria illustrate complementary aspects of investment efficiency. Despite the different ranks according to the criterion used, it is evident that all four countries demonstrating over-investment in the pre-crisis period are mostly ranked in the bottom half. This suggests that the profitability of investment in these countries was relatively low, on average, during the period from 1999 to 2013.

A comparison of the euro area as a whole with the US shows that it demonstrates lower values in all five criteria. There are particularly substantial deficits with regard to capital productivity. Also in terms of average growth of total factor productivity (TFP), significant differences between the two economic areas are evident. Whereas growth in the US was particularly high in an international comparison, TFP growth this side of the Atlantic stagnated. The weak development was also reflected in a relatively low rate of return and low revenue growth.

Low Direct Investment Contributes to Weak Investment

In recent years, foreign direct investment inflows¹¹—i. e., equity capital—to the euro area and the EU have been weak (Figure 8), probably contributing to low investment. The shares of direct investment inflows worldwide contributed by countries in the EU and the euro area have steadily decreased since 1999 and fell sharply in the course of the financial crisis and the debt cri-

¹¹ Direct investment is defined as capital investment of at least ten percent in a company abroad. On this, see, for example, International Monetary Fund, *Balance of Payments Manual*, 6th ed. (Washington, D.C.: 2010). Last updated November 2013. Physical investments are frequently made in the course of buying such strategic company shares. It is, however, empirically difficult to establish a direct and precise connection between the strategic company shares and physical investment activities. But there are indications that direct investment leads to physical investment and this in turn results in positive employment effects. On this, see, for example, Ernst & Young, *EY's European Attractiveness Survey: Europe 2014* (2014).

Figure 6

Capital and factor productivity, capital efficiency

Averages, 1999–2013, all in percentage



Source: EU-Commission

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Investments in Crisis countries were often less efficient than in the rest of the euro area.

sis in some countries in the euro area.¹² Germany also lost some of its standing globally as a destination for foreign direct investment in the observation period, in relative terms; temporarily, in the mid-2000s, even more was disinvested than invested. Conversely, the share of

the United States has remained more or less stable since the beginning of the same decade. In the same period, the emerging economies in particular were able to gain considerable ground as investment locations.

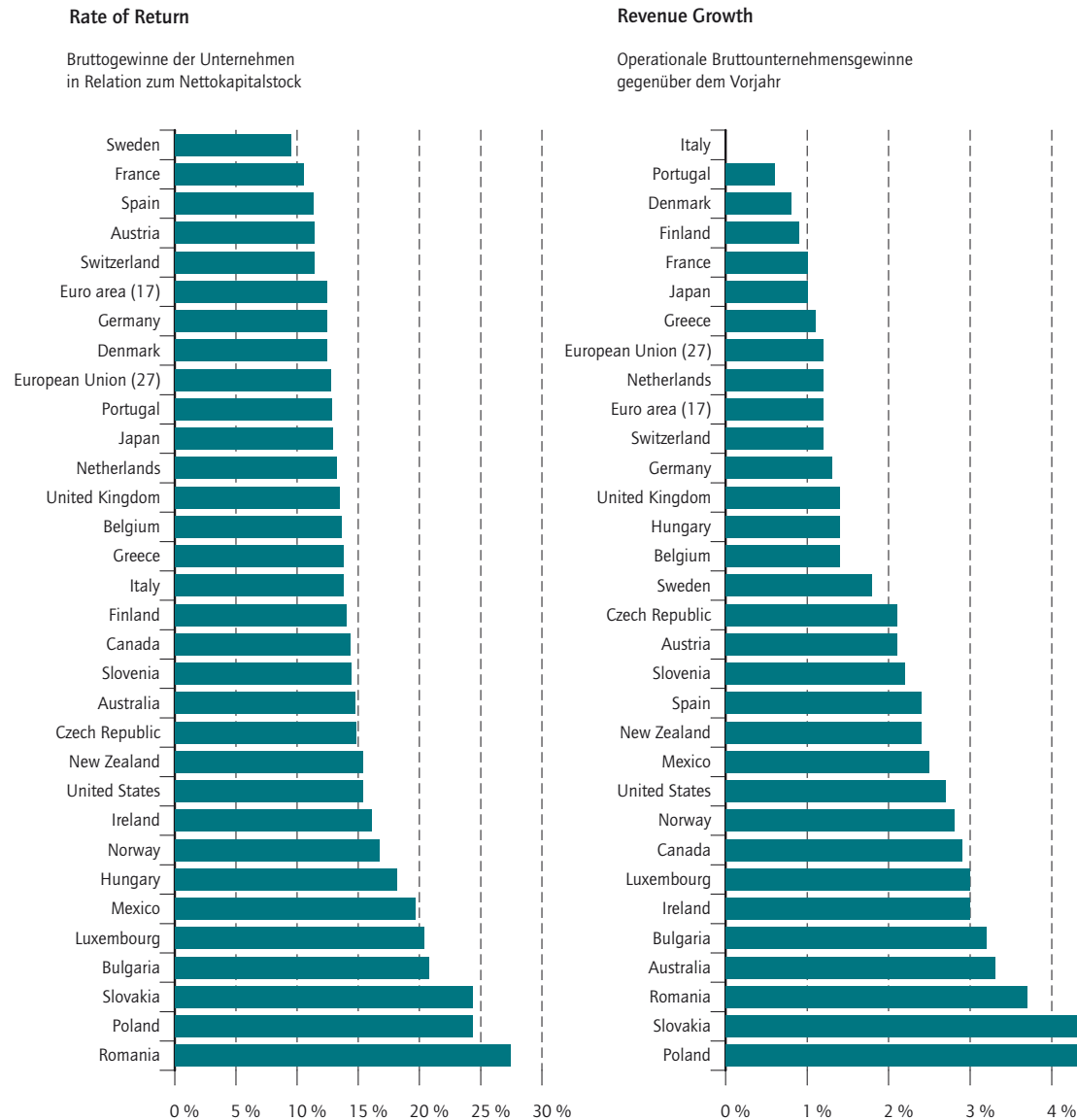
Within the euro area, there is strong heterogeneity across the member states as far as direct investment is concerned. The overall level of foreign direct invest-

¹² On this, see also UNCTAD, *World Investment Report, 2013* (New York and Geneva: 2013).

Figure 7

Profit Rate and Profit Rate Growth

Average, 1999–2013



Source: EU-Commission.

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Profits are also below average in most crisis countries.

ment—i.e., the cumulative inflows, adjusted for fluctuations in value, in the past—was and still is significantly lower in the southern peripheral countries in relation to GDP than in the rest of the monetary union (Figure 9). Probably, this is linked to the low investment efficiency in these countries in the past. Moreover, in recent years, the political and real economic uncertainty in the crisis countries may have discouraged

international investors from expanding their activity there (Figure 10).¹³

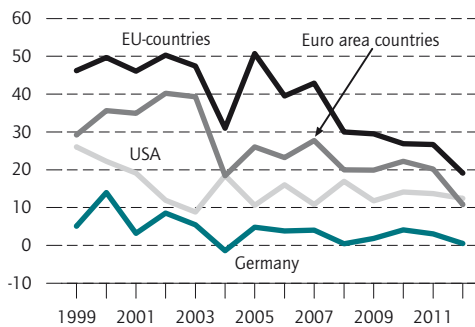
In the course of the debt crisis, direct investment from the non-crisis countries to southern Europe also de-

¹³ See Ernst & Young, *EY's European Attractiveness Survey*.

Figure 8

International Importance of Europe as an Investment Location

In percent of world wide total direct investment flows



Source: UNCTAD.

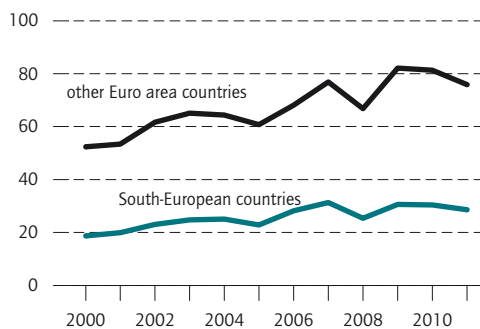
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Europe's attractiveness for foreign direct investment has declined.

Figure 9

Stock of Direct Investment from Abroad

In percent of Gross Domestic Product



Source: Updated data set from Lane and Milesi-Ferretti (2007).

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The level of direct investment has stagnated, in particular in Southern Europe.

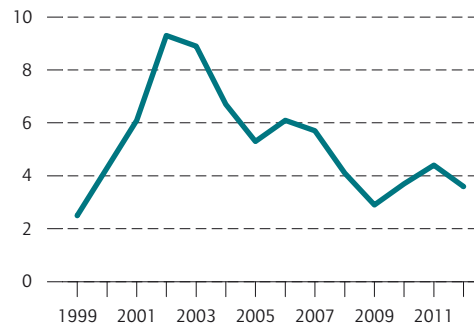
creased significantly (Table 3).¹⁴ While in the pre-crisis period, on average, around eight percent of total direct investments were still channeled into the peripheral countries by the northern member states of the monetary

¹⁴ In the analysis of bilateral direct investments, it should be noted that many global companies make their direct investments through subsidiaries based in different countries and so the available data should be interpreted with some caution.

Figure 10

Direct Investment to Southern Europe

In percent of world wide direct investment flows



Sources: UNCTAD, calculations by DIW Berlin.

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The share of direct investment to Southern Europe is declining.

Table 3

Direct Investment into South-European Euro countries from the rest of the Euro area

Share of total investment of northern Euro countries in percent

	2001 to 2007	2008 to 2012
Greece	0,4	0,2
Portugal	0,8	0,8
Spain	2,5	0,6
Italy	3,9	2,1

Sources: OECD, calculations by DIW Berlin.

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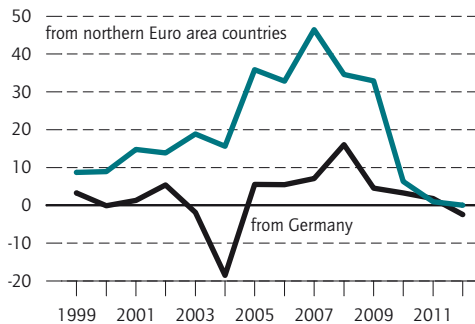
Spain and Italy have lost in terms of attractiveness for FDI.

union, this share has fallen since 2008 to less than 5 percent on average. This decrease is even more visible and dramatic when considering nominal values (Figure 11). German companies have also been somewhat cautious about investing in southern Europe in the past, which was probably due to a lack of opportunities for efficient investment. German investments in southern Europe have further decreased since 2008. In 2012, German companies even disinvested more than they invested.

Figure 11

Direct Investment to Southern Europe

In billion euro



Sources: OECD, calculations by DIW Berlin.

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Less and less FDI is flowing from the rest of the euro area to Southern Europe.

Conclusion

Investment activity in Europe and in the euro area is very heterogeneous. Before the debt crisis, investment as a share of GDP clearly diverged from one country to another. In some countries, such as Germany or the Netherlands, investment activity in the pre-crisis period was extremely subdued; measured against

macroeconomic conditions, rates of investment would have been expected to be two to three percentage points higher than the values that were actually observed. However, some other countries, for instance, Spain, Ireland, or Greece, witnessed significant investment. Thus, considerable overcapacities developed here, primarily financed by investment capital from abroad. However, the presented evidence indicates that investment in these countries was far from efficient.

With the uncertainty on capital markets as a consequence of the global financial crisis, the inflow of financing in the crisis countries fell sharply and the expansion of capital stock could not be sustained. Because of inefficient investments, this was accompanied by a sudden fall in asset prices for the capital stock with low returns, resulting in further capital outflows.

Therefore, the monetary union is now in a situation in which investment activity in both the crisis countries and the rest of the monetary union is extremely weak. This has consequences: since the development of the capital stock in an economy is crucial to its macroeconomic production potential, a lack of investment has a considerable impact on the production potential of the monetary union; its annual growth rate in the period from 2010 to 2012 could have been 0.2 percentage points higher on average if there had been more investment and the investment gap from the previous years had been closed.

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