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Dynamics of productive investment and gaps between the United States and EU countries

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Contents

Tables and figures

Appendix

Summary

This report offers a detailed documentation and assessment of the differences in real productive investment between the United States and EU countries, focusing especially on the period 2013-2019. The analysis is based on capital stock and gross fixed capital formation (GFCF) data taken from Eurostat and the recent EU KLEMS releases, which provide comparable data for the US. The study considers various measures: investment gaps (defined as the difference in investment rates); the growth of real GFCF; and the accumulation of stocks. It documents differences in trends and in asset-type composition, as well as variations across the different EU countries. The study thus brings the existing literature up to date and adds investment dynamics to the discussion. The findings indicate the existence of a gap in productive investment in the period since the onset of the global financial crisis (caused largely by lower rates of investment, specifically in tangible information and communication technology and intangible assets) and gaps for larger EU member states. When we consider investment dynamics, we find more robust growth rates in productive investment in the EU than in the US over this period; however, again investment was lower in telecommunications equipment and software and databases. Since growth rates in the EU27 and the US have been similar since 2013, the EU27 has been unable to catch the US up in terms of capital accumulation. However, these results are sensitive to the application of asset price deflators: when US deflators are applied to the EU27, the differences are much less significant.

Keywords:

Productive investment, investment gap, investment dynamics, European Union, US

JEL classification:

E22

1 Introduction

After the global and financial crisis, investment fell more substantially than in the wake of previous recessions. With investment seemingly recovering faster in the United States than in Europe, the fear of a lasting gap emerged in Europe. The slower recovery there was due to a protracted lull in construction activities and the effects of the euro crisis, which delayed the start of the recovery until 2013. Then, in November 2014, the European Commission Investment Plan for Europe – the so-called Juncker Plan – was announced, with the aim of fostering investment in infrastructure in Europe. The European Investment Bank, however, warned of a gap in productive investment between the European Union and the US, particularly in information and communication technology (ICT) and intangible assets.

This study examines whether there is such an investment gap, and (if there is) how it evolved in the years between the end of the global financial crisis and the start of the pandemic. As well as investigating whether there is indeed an investment gap between the EU and the US, it seeks to identify any particular assets for such a gap is especially visible and how large that gap is. More specifically, the study documents the differences in real productive investment – defined as investment in all asset types apart from construction – between the US and the EU countries. The analysis is based on gross fixed capital formation (GFCF) data taken from Eurostat and the recent EU KLEMS releases, which provides comparable data for the US. In addition, it examines the evolution of capital stocks and the growth of the capital-to-output ratio. While the period covered ranges from 2000 to 2020, analysis will focus more on recent trends: it will look especially at the period from 2010 to 2012 and from 2013 to 2019, when investment growth again picked up in Europe.[1] The study considers two measures with respect to investment: the investment gap and the investment dynamics; also, as previously mentioned, it looks at capital accumulation in terms of stocks. It documents differences in total trends, asset-type composition, and differences across the various EU countries. This study thus brings the existing literature up to date and adds investment dynamics to the discussion. Methodologically, it also carefully assesses whether differences in the asset price deflators applied might play a role in answering the question, whether such a gap actually exists and if this is the case, how large it is.

The paper is structured as follows: Section 2 provides a brief overview of selected literature on the topic, and Section 3 discusses some methodological aspects, especially related to differences in the asset price deflators applied. Section 4 focuses on our main findings by comparing the investment gap, i.e. investment rates in the EU relative to the US. Chapter 5 then analyses trends in gross fixed capital formation, i.e. investment growth rates and the accumulation of stocks. Section 6 summarises the main results and presents some conclusions. The appendix provides selected additional detailed information.

[1] We therefore mark the years 2010, 2013, and 2019 in the figures below.

2 Selected literature

Today, several years after the global financial crisis, it has become clear that investment − which plummeted considerably in the wake of the crisis − has recovered only very slowly. The literature has focused on measuring the investment gap compared to previous recessions and on factors that can explain the main determinants (e.g. Lewis et al., 2014; Barkbu et al., 2015; European Commission, 2015; Kose et al., 2017). Lewis et al. (2014) calculated an investment gap relative to projected future steady-state levels of around 2 percentage points (or more) of GDP in many countries. Barkbu et al. (2015) summarised the main reasons for the weak investment, including output dynamics, high cost of capital, financial constraints, corporate leverage and uncertainty. Some more recent literature has focused on individual countries: the International Monetary Fund (IMF) looked in more detail at Greece, which in 2019 exhibited one of the lowest investment rates in the world (Hua et al., 2022). And the European Commission investigated the low level of business investment in Slovenia, highlighting the extensive deleveraging process in the private sector there (Damijan et al., 2022).

The level of investment in Europe and in the United States has long been the subject of comparison by the European Investment Bank (EIB). Specifically, in its Investment Reports it has investigated the trends and variations across different dimensions in the EU and the US (EIB, 2021, 2022, 2023). The main focus of interest has been the question of whether there has been – and still is – an investment gap between the two regions. In its latest report, the bank states that 'The gap in productive investment between the European Union and the United States equals up to 2% of GDP' (EIB, 2023: 10). In fact, disregarding residential buildings, the gap between the EU and the US widened in the wake of the global financial crisis to about 2 percentage points (pp) of GDP in favour of the US – a figure that persists. If we exclude other buildings and structures, the gap widens further – to 3.8 pp (all data in real terms). The drivers behind the gap include investment differences in machinery, equipment and innovation. In particular, there is a big gap in investment in ICT equipment (especially in the services sector) and in intellectual property products (particularly in the public and defence sectors) (EIB, 2023).

3 Data and methodological issues

3.1 Data

The data we use are collected from Eurostat and comprise National Accounts data that provide information on value added (*nama_10_a64*) and gross fixed capital formation (*nama_10_nfa_fl*). Furthermore, we use data on net capital stocks that are also taken from Eurostat National Accounts (*nama_10_nfa_st*).[2] These data are provided in current prices and chain-linked volumes, with reference year 2015. Time series in current prices are converted using the current exchange rate, while for chain-linked volumes the exchange rate used is that for the reference year 2015. These data cover all EU27 member states over at least the period 2000-2020. We show the year 2020 in the figures when we report time series, but exclude that first year of the pandemic when presenting averages over time. The EU27 aggregate has been calculated by summing these time series over countries.[3]

The data for Ireland include a major break in the time series due to the relocation of the intellectual property (e.g. R&D) of multinational companies from (mostly) the US to Ireland. Another contributor to such the upsurge is transport equipment, since most aircraft leasing companies are based in Ireland: though these never service Irish routes, they are registered as Irish investment.[4] We therefore also calculate and report data for the EU27 overall, but excluding Ireland (denoted as EU27x).[5]

In addition, we use data from the EU KLEMS website, which provides comparable data for the US.[6] These data are provided in current prices and chain-linked volumes, with reference year 2012. The data are converted to reference year 2015 (using the quantity index provided), to make them compatible with the data for the EU.

The study investigates the potential investment gaps for total GFCF and ten detailed asset types listed in Table 3.1, according to National Accounts definitions.[7] The final category listed – other intellectual property products (N117x) – is not an official category and is calculated as a residual, i.e. intellectual property products (N117) minus R&D (N1171) and software and databases (N1173). Cultivated biological resources (N115) is not reported for the US and so is not considered in this study.[8]

The focus of the study is on 'productive investment', which is defined as total gross fixed capital formation or net capital stock excluding dwellings (N111) and other buildings and structures (N112). However, since asset N112 (other buildings and structures) also includes a non-negligible productive part (e.g. factory buildings, office space, retail stores, warehouses and other types of infrastructure), we report an aggregate that includes this asset (i.e. total GFCF or net capital stock excluding dwellings (N111) only).

Table 3.1 / Asset classification

Code	Name
N11	Total GFCF
N111	Dwellings
N112	Other buildings and structures
N1131	Transport equipment
N11321	Computer hardware
N11322	Telecommunications equipment
N11O	Other machinery
N115	Cultivated biological resources

2 Data downloaded on 28/08/2023.
3 The level of investment in computer hardware in Poland for 2020 in chain-linked volumes is an outlier and has been replaced by the value for 2019 times the long-term growth rate.
4 For details, see EIB Investment Report, Chapter 2, Box C.
5 Formally, we calculated the EU27x aggregate by summing over all EU27 countries, excluding Ireland.
6 https://euklems-intanprod-llee.luiss.it/
7 The section featuring the EIB survey uses a different classification of investment types.
8 It is, however, included in total GFCF or net capital stocks for the EU27. The share of this asset is very small, though.

N1171	Research and development
N1173	Software and databases
N117x	Other intellectual property products*

Note: * not official asset type and calculated as residual N117 – (N1171+N1173).
Source: National Accounts.

There is wide variation in the share of the different asset types in total GFCF: Table 3.2 shows these shares for year 2019. Dwellings and other buildings account for almost 50% of GFCF in the EU27, whereas in the US their share is lower, at less than 40%. The share of transport equipment is greater in the EU27 (9.1%) than in the US (6.4%). Another substantial difference is visible for computer hardware and for telecommunications equipment: in both cases the share is larger in the US (1.8% vs 2.5%, and 1.4% vs 2.7%, respectively; and similar for EU27x). This is also the case for investment in software and databases, where the US has a share of 11.1%, compared to 8.2% for the EU27. Finally, the share of other intellectual property products is far greater in the US (5.0%) than in the EU27 (less than 1%). Larger differences are also observed for research and development, with a share of 13.7% in the EU27, compared to 15.3% in the US; and if we exclude Ireland, the share in the EU27x drops to only 9.8%. The share of productive investment in total GFCF accounts for 52.9% in the EU27 (50.6% in the EU27x), compared to 61.8% in the US.

Table 3.2 / Share of GFCF by asset types in %, 2019

	EU27	EU27x	US
00 Total GFCF	100.0	100.0	100.0
01 Dwellings	23.5	24.8	18.5
02 Other buildings	23.9	24.9	19.8
03 Transport equipment	9.1	9.0	6.4
04 Other machinery	17.5	18.6	18.7
05 Computer hardware	1.8	1.9	2.5
06 Telecommunications equipment	1.4	1.5	2.7
08 Research and development	13.7	9.8	15.3
09 Software and databases	8.2	8.7	11.1
10 Other intellectual property products	0.7	0.8	5.0
11 Total GFCF minus dwellings	76.8	75.5	81.5
12 Productive investment (total GFCF minus construction)	52.9	50.6	61.8

Source: Eurostat NA, EU KLEMS; own calculations.

3.2 Methodological aspects

3.2.1 Investment gaps and dynamics of total GFCF

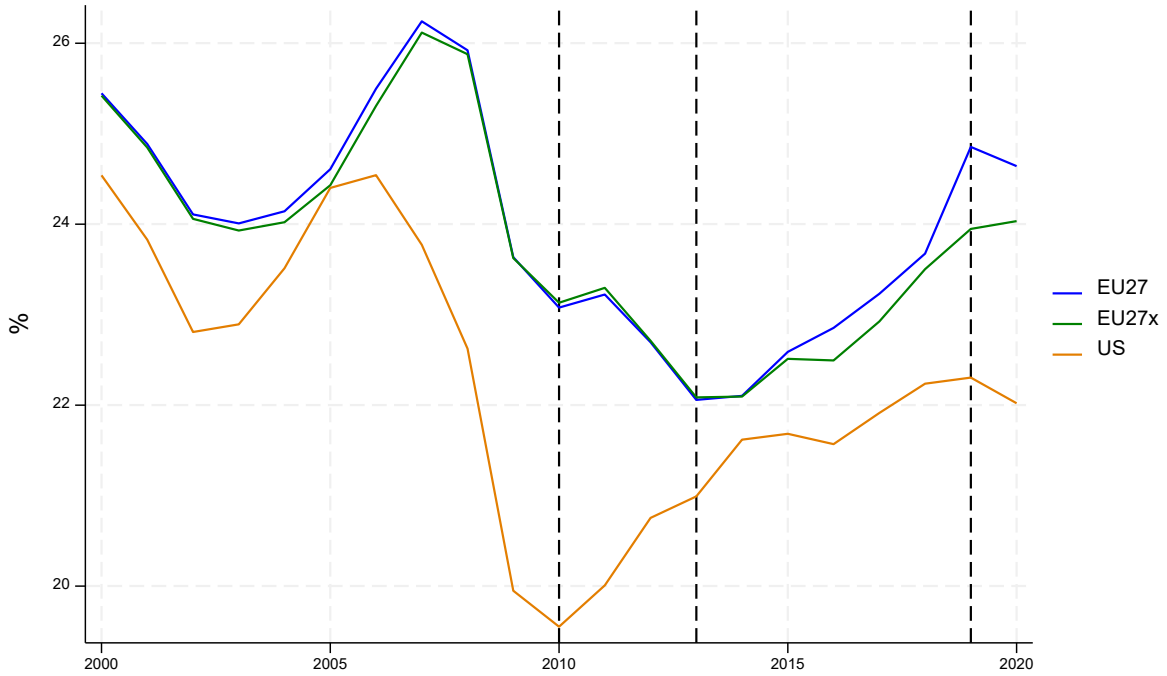
In this study, we consider two measures that compare gross fixed capital formation patterns in the EU and the US: (i) the investment rate (the ratio of GFCF to value added), from which percentage-point differences between the EU27 and the US can be derived (referred to as 'investment gaps'), and (ii) the investment dynamics – i.e. the growth in GFCF (which can be compared to the growth in value added).[9]

The investment rate is calculated as GFCF relative to gross value added at the total economy level. Figure 3.1 shows this investment rate for the EU27, EU27x and the US for total GFCF in current values. The investment gap between the EU27 (or EU27x) and the US is then calculated as the investment rate for the EU minus the investment rate for the US, i.e. the difference in percentage points – or graphically, the distance between the

[9] In Section 5.2 we also present differences in the accumulation of stocks and the dynamics of the capital-to-output ratios (referred to in the literature as changes in 'capital intensity').

two lines. A negative figure indicates an 'investment gap' between the EU and the US. An analogous approach is applied to individual EU member states, i.e. comparing their investment rates to US investment rates.

Figure 3.1 / Investment rates (at current prices), in %



Source: Eurostat NA, EU KLEMS; own calculations.

As Figure 3.1 shows, the investment rate in nominal terms in the EU fluctuated between 26% (2008) and 22% (2013), and in the US between 24% (2006) and 19% (2010). In all years, the investment rate was higher in the EU. In the period before the financial crisis (2000-2008), the average investment rate in the EU was 24.6%, compared to 22.8% in the US – thus a 'gap' of 1.8 pp in the EU's favour. In the period following the financial crisis and the euro area crisis and before the pandemic (2013-2019), the average investment rate was 23.0% in the EU and 21.8% in the US, resulting in an investment gap of 1.2 pp – again in the EU's favour. If we exclude Ireland, the investment rate in the EU falls by about half a percentage point.

These investment rates depend, however, on price movements and include a large share of investment in dwellings (N111) and other buildings and structures (N112), accounting for about 50% in the EU27 and 40% in the US (Table 3.2). These measures are therefore refined in Section 4 by (i) excluding construction investments (and thus focusing on productive investment) and (ii) using data in real terms.[10] In the next sections, we follow EIB (2023) in looking at investment rates (and gaps) in real terms, because 'the prices of goods normally purchased for investment have evolved very differently from overall prices' (EIB, 2023: 49).[11] Thus, we calculate the investment ratio as GFCF in chain-linked volumes (reference year 2015), divided by value added in chain-linked volumes (reference year 2015); for comparison, we selectively also report results in current values. When considering GFCF growth, the latter approach is preferable, as it provides information on the real growth in investment and the respective asset types.

The investment gap and its evolution over time thus depend on the share of GFCF in value added and the growth rate of value added and GFCF. In the short run, if GDP is growing rapidly because of high growth in other components (e.g. household consumption, government expenditure, exports), then the investment ratio will fall over time. By contrast, if investment is more dynamic than the other components, the investment ratio will increase. Thus, the evolution of the investment gap depends on GFCF and growth in value added, which explains

[10] In addition, we provide results when US deflators are applied (see discussion in Section 3.2.2).

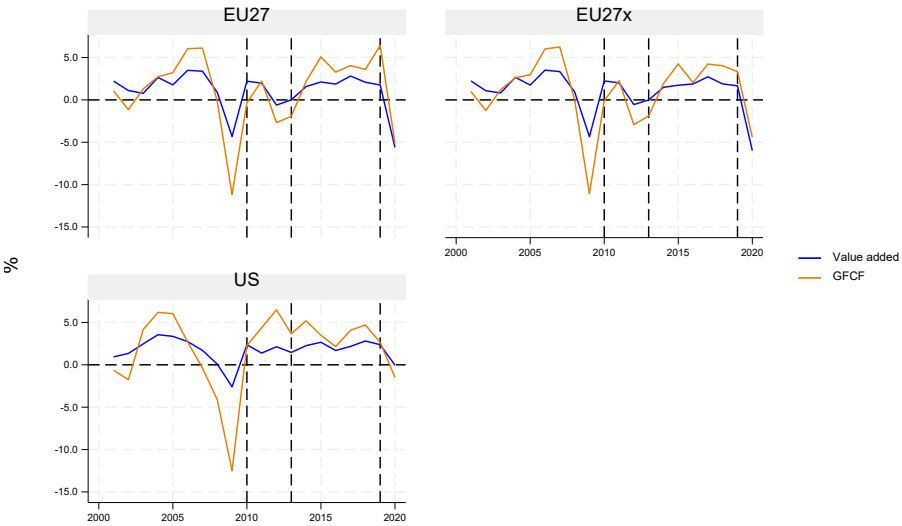
[11] Conceptually this is not fully consistent, as data in chain-linked volumes are not additive, which matters as GFCF is part of GDP. The differences resulting from this non-additivity are, however, generally small and disregarded. In the appendix, we also report results in current prices.

the changes over time (Figure 3.2).[12] This issue may be even more relevant for the detailed asset types and will be discussed further in Section 4.

A second way of comparing investment dynamics (besides the investment rate) is therefore to calculate the growth rates of investment or an index which then focuses on the investment dynamics (disregarding its share in the total economy, which depends also on the growth in value added and its components).

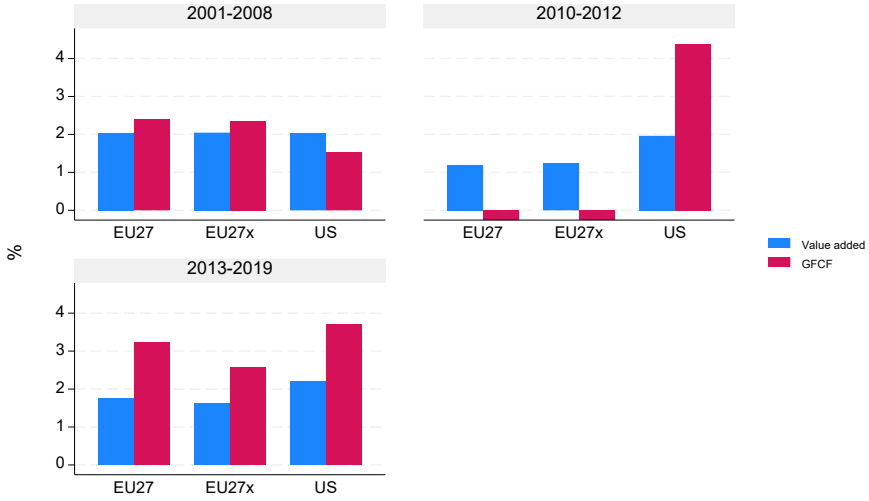
The findings may be presented either descriptively for the entire period 2000-2020 (Figure 3.2) or else – given the volatility – by summarising the dynamics as an average over several years. In this latter case, we distinguish between the periods 2000-2008 (before the global financial crisis), 2010-2012 (recovery in the US and the euro crisis) and 2013-2019 (i.e. after the global financial crisis and the euro crisis, but before the COVID-19 pandemic began in 2020) (Figure 3.3).

Figure 3.2 / Growth rates of value added and total GFCF, in %



Source: Eurostat NA, EU KLEMS; own calculations.

Figure 3.3 / Growth rates of value added and GFCF, average annual growth rates, in %



Source: Eurostat NA, EU KLEMS; own calculations.

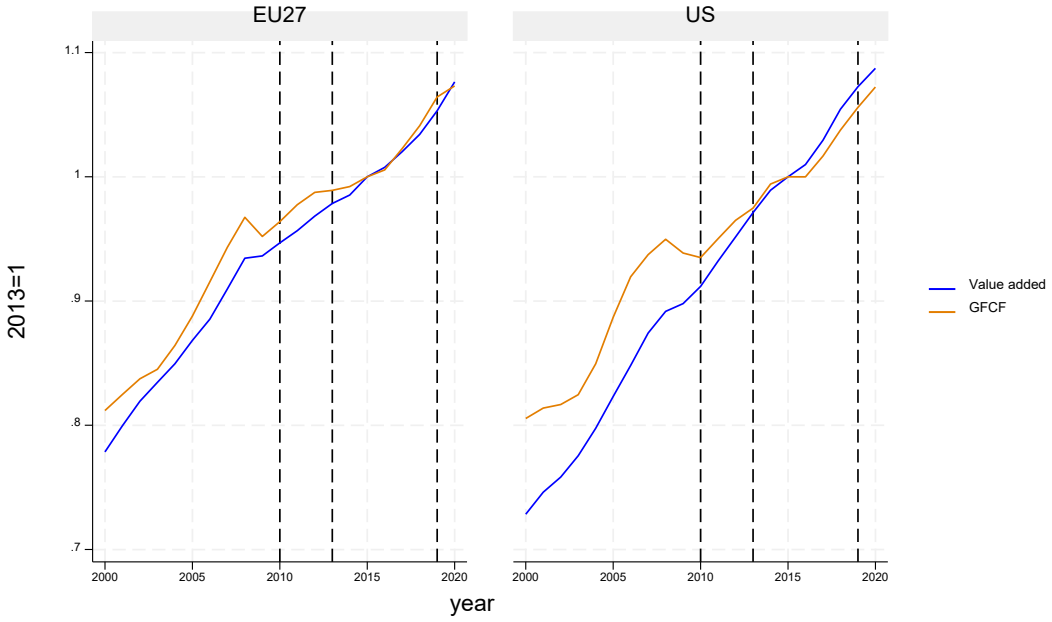
[12] Of course, in the medium-to-long run, investment enhances the productive capacity; thus, a lack of investment reduces the growth potential and might lead to weak GDP growth.

As Figure 3.3 shows, prior to the crisis the growth rate of value added was fairly similar in the EU and the US, while the rate of growth of GFCF was slightly higher in the EU27 (and the EU27x) than in the US. Over the euro-crisis years (2010-2012), the rate of growth in value added in the US was much higher. Moreover, whereas the GFCF growth rate in the EU27 was slightly negative, in the US the figure surged to over 4%. In the period 2013-2019, growth in both value added and GFCF remained about 0.5 pp higher in the US. Once Ireland is excluded, the growth differential between the EU27x and the US reaches 1.1 pp. There is considerable variation in the growth dynamics across the EU member states, as is shown in Figure A.1 to Figure A.3 in the appendix (which reflect Figure 3.1 to Figure 3.3 at the country level).

3.2.2 The role of asset price deflators

The above strategy of mainly focusing on results in real terms (using data in chain-linked volumes) renders it necessary to take a closer look at the price deflators that are applied. Figure 3.4 reports the (implicit) price index for value added and total GFCF for the EU27 and the US over the period 2000-2020.[13] The price index for GFCF in particular varies considerably over the years of the great financial crisis, displaying increased volatility.[14] However, in the periods before and after those crisis years, the differences are not too great (except that the reported price index remained more or less stable between 2015 and 2016 in the US).

Figure 3.4 / Price indices for value added and GFCF, 2000-2020



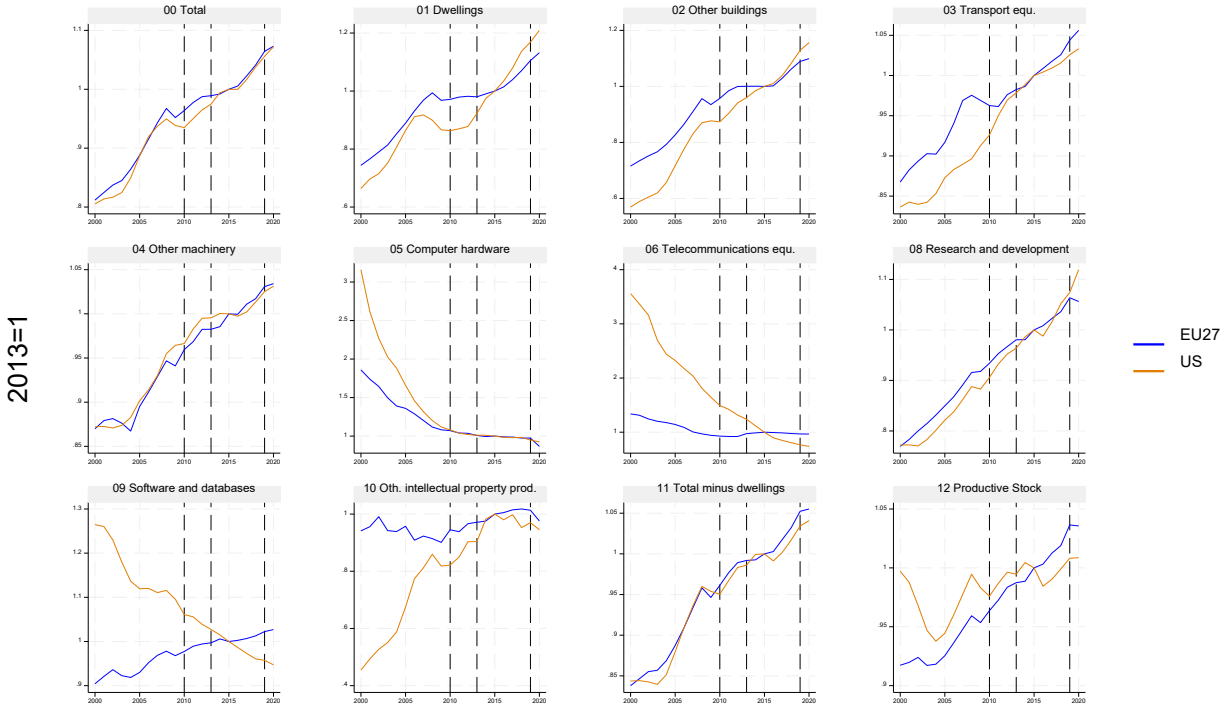
Source: Eurostat NA, EU KLEMS; own calculations.

A second concern with regard to comparability is whether the price indices are comparable for the detailed asset types considered. According to the literature, there are major differences across countries in the application of deflators, particularly for ICT assets (see, for example, Ahmad et al., 2017). In Figure 3.5, we show the price index resulting from the time series in current prices and chain-linked volumes, comparing the EU and the US in terms of those asset types considered in the study over the period 2000-2020.

[13] Appendix Figure A.4 shows these price indices for the individual countries.

[14] This might be driven by business-cycle movements and the housing price bubble before the crisis (see Appendix Figure A.5) which shows the price index of dwellings.

Figure 3.5 / Price index for asset types, 2000-2020



Source: Eurostat NA, EU KLEMS; own calculations.

As is immediately apparent, there are certain major differences in the deflators applied – particularly in the cases of the tangible ICT assets computer hardware and telecommunications equipment, and the intangible software and databases.[15] The index for computer hardware decreased from 3.16 in 2000 to 0.95 in 2019 in the US (a fall of more than two thirds), compared to a decline from 1.86 to 0.97 in the EU (a fall of around a half). Similarly, for telecommunications equipment, the index dropped from 3.56 to 0.74 in the US, and from 1.3 to 0.97 in the EU. For the asset software and databases, the price index actually moved in different directions: while it declined from 1.27 to 0.95 in the US, it rose from 0.90 to 1.03 in the EU. Other important differences are visible for the residual asset type other intellectual property products (in this case with a big increase in the US, but not especially in the EU). The price indices for the other asset types are more similar, though in some cases (such as dwellings or transport equipment) they were differently affected by the crisis years. Similar results – and also big differences – are to be found for the individual EU member states: in Figure A.1 we present the price index by country for selected asset types (computer hardware; telecommunications equipment; and software and databases). Price indices for the EU and the US are, however, fairly similar for total GFCF, as those asset types with a big difference in deflators have quite a small share in total GFCF. Considering only productive investment – i.e. excluding construction, which accounts for roughly half of GFCF – the differences between the EU and the US become more significant. These results suggest that countries do apply very different strategies in deflating GFCF. Thus, to rule out the possibility that the overall results are driven by these differences, we also present the investment rates and gaps, as well as the growth rates, applying the US deflators.[16]

[15] The US Bureau of Economic Analysis uses hedonic price indices for these assets, which are better at taking account of quality improvements. This hedonic pricing is applied only by a few European countries, resulting in diverse deflation procedures (see Appendix Figure A.6 to Figure A.8 which present the price indices for information technology, telecommunications technology, and software and databases).

[16] Specifically, we calculated the US price index by asset type and applied it to the nominal series for the EU. For the EU member states, we calculated the nominal series as the chain-linked volume for 2015 times the price index (resulting in a nominal series though at exchange rates for 2015) and divided by the price index from the US.

4 Investment gaps and dynamics in productive assets

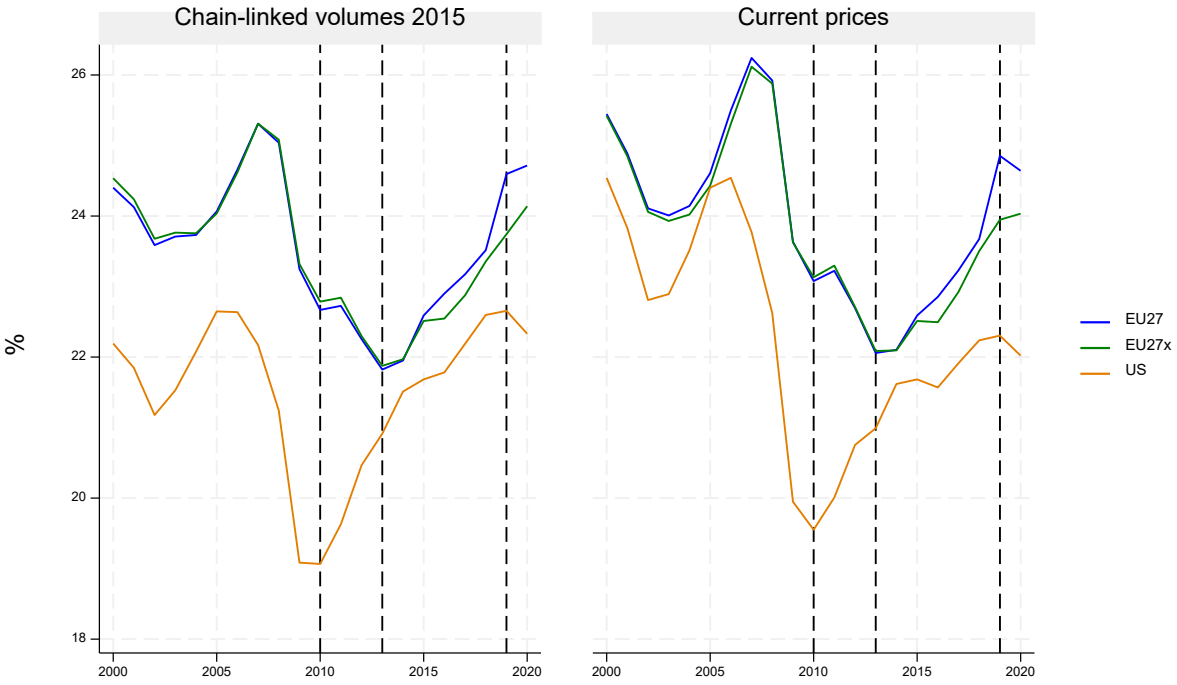
4.1 Investment gap: GFCF as share in value added

In this section, we analyse investment rates – defined as investment as a share of value added – for the EU27 versus the US. We provide an overview of the investment gap at the aggregate level, look at different asset types, and then focus on individual EU member states. For comparison, selected results from the EIB survey will be presented.

4.1.1 Investment rates in the EU27 and the US

The total investment rate – i.e. GFCF for all assets, as a percentage of GDP – was higher for the EU than for the US throughout the period 2000-2020 (Figure 4.1).

Figure 4.1 / Investment rates of total GFCF in current and real values



Source: Eurostat NA, EU KLEMS; own calculations.

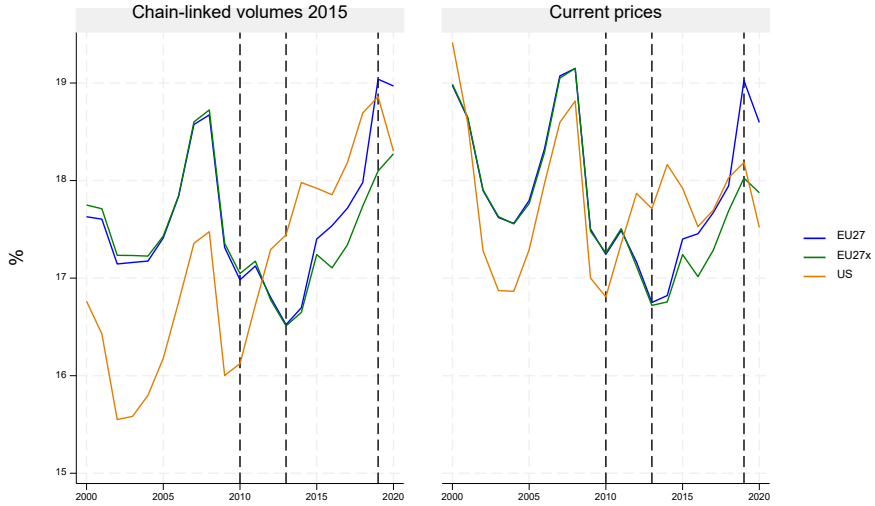
Thus, the picture normally presented in the literature shows that Europe is not lagging behind the United States – quite the opposite. The trends in the real (left panel) and the nominal (right panel) terms are similar. The investment rate in both regions shows two troughs during the period considered: first following the recession in the early 2000s and then in the aftermath of the global and financial crisis in 2008. For the EU, the investment rate declined until 2013, while the investment rate in the US started to recover back in 2010. If we exclude Ireland, the EU27x investment rates are lower (as already described in Section 3).

In the final years before the pandemic hit the world economy in 2020, the investment gap between the EU and the US widened to 2.5 pp in nominal and 2.0 pp in real terms. The average gap over the period 2012-2020 was 1.5 pp (nominal) and 1.0 pp (real).

However, a large chunk of GFCF is construction investment, which accounts for about 50% in the EU and 40% in the US. If we exclude dwellings from total fixed assets (which account for about 25% in the EU and 20% in the US on average over the period since 2000), we see that the investment rate in the EU was slightly above that in the US up until 2011; but after 2012 the US opened up an investment gap between it and the EU (see Figure 4.2). In

nominal terms (Figure 4.2, right), the EU investment rate again surpassed the US rate in 2019 (by 1 pp), whereas in real terms (Figure 4.2, left), the gap remained until 2019, and the EU investment rate moved above the US only in 2020. The gap in real terms ranged from 1 to 2 pp during that period. On average over the period 2012-2020, almost no gap is evident in nominal terms (0.2 pp), whereas in real terms it stood at 1 pp. As concerns the dynamics in the crisis years (2010-2012) one again sees that investment rates in the US had already picked up, whereas they were still falling in the EU27.

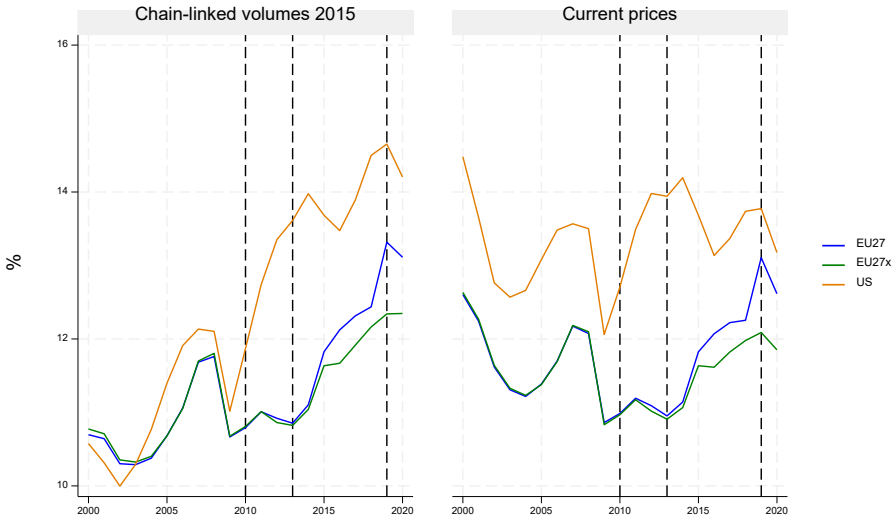
Figure 4.2 / Investment rates of total GFCF, excluding dwellings



Source: Eurostat NA, EU KLEMS; own calculations.

The picture becomes even more pronounced, however, when we exclude other buildings and structures as well – i.e. all construction activities are omitted from total assets, allowing us to focus on 'productive investments'. In this case, the investment rate for the EU was significantly lower than for the US in nominal terms for the whole period (Figure 4.3, right). In real terms (Figure 4.3, left), the EU investment rate was only slightly below that of the US in the years 2000 to 2008 (around 11% of GDP). The gap between the EU and the US widened after 2012 to between 2 pp and 3.5 pp in the subsequent period. The gap persisted and was still at 2 pp in 2020, when the US investment rate reached 15% and the EU rate 13%. This indicates the growing importance of productive investment within the economy, but also a persistent investment gap of about 2 pp for the EU compared to the US. On average over the period 2012-2020, the average gap in nominal terms was 1.7 pp, and in real terms 2.6 pp.

Figure 4.3 / Investment rates – productive investment (total GFCF less construction)



Source: Eurostat NA, EU KLEMS; own calculations.

4.1.2 Investment rates and gaps by asset category

These results suggest that a closer look at individual asset types might bring further insights to explain the variations between the EU and US investment rates. Appendix Table B.1 to Table B.3 show the investment rates (share in value added, as an average over the respective period) in current values, chain-linked volumes and chain-linked volumes applying US deflators. Based on this, Table 4.1 illustrates the 'investment gaps' as defined above, i.e. the investment rate in the EU minus the investment rate in the US for individual asset types, in percentage points, for the periods 2000-2008, 2010-2012 and 2013-2019. For the sake of completeness, dwellings and other buildings and structures investments are also shown.

If we look at the construction asset types – dwellings and other buildings and structures – we find that the EU has a higher investment rate (i.e. a surplus) than the US for both these asset types. As the share of these two asset types reaches almost 50% (see Table 3.2), which explains why the EU shows no investment shortfall in terms of total GFCF (as already seen in Figure 4.1).

Table 4.1 / EU investment gaps and surpluses by asset type (based on data in chain-linked volumes), in pp

	EU27			EU27x		
	2000-2008	2010-2012	2013-2019	2000-2008	2010-2012	2013-2019
Total GFCF	2.4	2.9	1.0	2.4	2.9	0.8
Dwellings	0.9	2.6	1.6	0.9	2.6	1.7
Other buildings and structures	1.4	2.0	1.4	1.4	2.0	1.4
Transport equipment	0.8	0.7	0.4	0.8	0.7	0.4
Computer hardware	0.5	0.0	0.0	0.6	0.1	0.1
Telecommunications equipment	0.1	-0.2	-0.1	0.1	-0.2	-0.1
Other machinery	0.0	-0.1	-0.3	0.0	-0.1	-0.3
Research and development	-0.9	-0.9	-0.5	-0.9	-1.0	-0.9
Software and databases	0.2	-0.1	-0.4	0.2	-0.1	-0.4
Other intellectual property products	-1.2	-1.2	-1.1	-1.2	-1.2	-1.1
Total GFCF excl. Dwellings	1.3	0.3	-0.5	1.4	0.3	-0.9
Productive investment	-0.3	-1.8	-2.0	-0.2	-1.8	-2.3

Source: Eurostat NA, EU KLEMS; own calculations.

Looking at transport equipment, the investment rate in the EU is also 0.8 pp higher than in the US over the first period, and 0.4 pp higher over the third. For other machinery, the EU and the US investment rates are quite similar, though the EU lagged behind the US slightly in the third period (by 0.3 pp).

The picture is rather different when we consider tangible ICT assets. Regarding computer hardware, a small gap of -0.5 pp between EU and US investment is evident in the first period, though this vanishes in the third period. For telecommunications equipment, the gap changed from 0.1 pp to -0.1 pp in the second period.

Regarding intangible assets, for R&D the EU showed a big investment shortfall of 0.9 pp relative to the US in the first period, though in the third period the deficit narrowed to 0.5 pp. For software and databases, the investment rate in the EU27 was 0.2 pp larger than in the US in the first period; however, a shortfall of 0.4 pp emerged in the third period. Finally, for the asset type other intellectual property products, the EU lagged substantially behind the US – by 1.2 pp in the first two periods and by 1.1 pp in the third.[17]

To summarise: first, according to this indicator the EU enjoyed a large investment 'surplus' compared to the US in tangible non-ICT assets: this was driven particularly by construction assets, but also by transport equipment. Second, the investment gaps persist for ICT assets, particularly for telecommunications equipment. And third, the EU's investment shortfall is largely driven by intangible assets: specifically, the lag suffered by the EU vis-à-vis the US in productive investments increased from 0.3 pp in the first period to 2.0 pp in the third period; and in that latter period the gap is even larger if we exclude Ireland (see columns for EU27x). Similar patterns are to be found if we

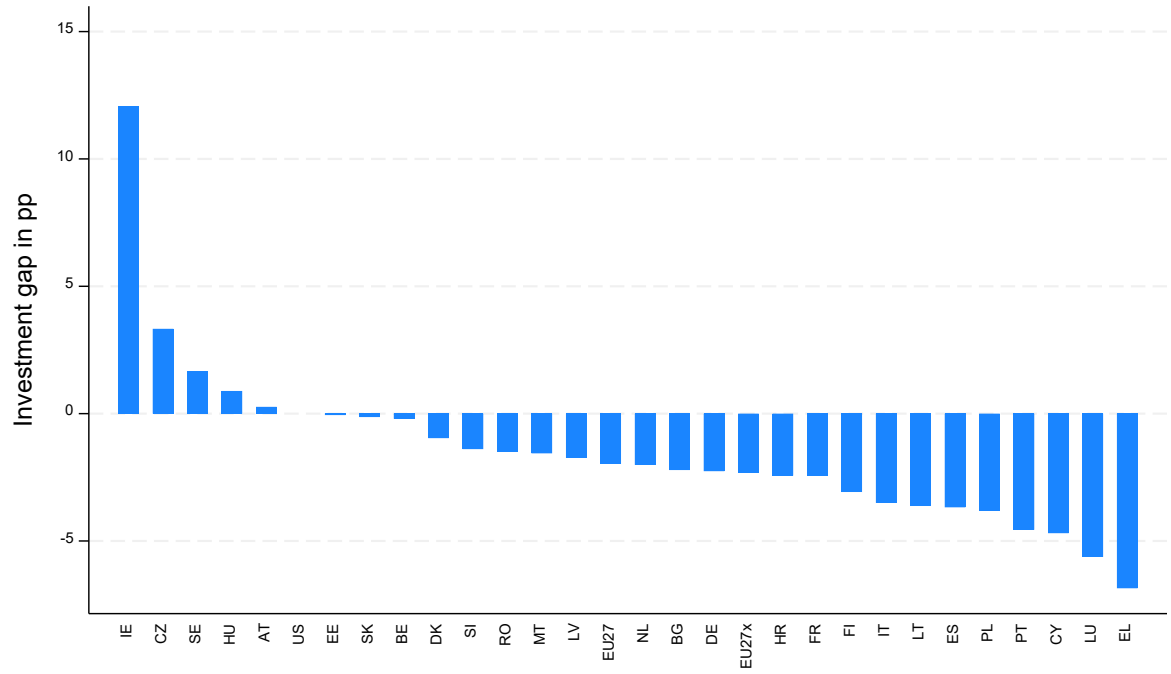
[17] Note, however, that this asset type is calculated as a residual (intellectual property products minus R&D and software and databases) and could comprise different detailed categories.

calculate the gaps in nominal terms or if US deflators are applied (as presented in Appendix Table B.4 and Table B.5). In the latter case, the investment gap however becomes slightly lower and amounts to -1.5 pp in the second period for productive investment.

4.1.3 Investment gaps in EU member states

Turning now to individual EU member states and considering only productive investment (i.e. GFCF less construction), there is quite some heterogeneity in the investment rates within the EU (Figure 4.4). In 2020, the highest investment rate was to be found in Ireland,[18] where investment was more than 10 pp greater than in the US. It was followed by Czechia (3 pp higher than the US) and Sweden (1.2 pp higher); Hungary, Austria and Estonia all saw levels similar to the US. For those countries where investment was lower than in the US, the gap ranged from 0.4 pp in Slovakia to more than 7 pp in Greece. Fifteen countries had an investment shortfall vis-à-vis the US that was larger than the EU average, including some of the bigger economies, such as the Netherlands (2.7 pp), Germany (2.8 pp), Italy (4.0 pp) and Spain (4.3 pp).

Figure 4.4 / Investment gap in productive investment (chain-linked volumes 2015), average 2013-2019, percentage points



Source: Eurostat NA, EU KLEMS; own calculations.

Figure 4.5 reports the investment gaps for each EU member state by asset type. In line with the findings for the EU, larger shares of GFCF in gross value added are to be found in the tangible non-ICT assets, particularly in other buildings and structures and (for many countries) in dwellings; that said, some countries (Greece, Ireland, Latvia, Poland, Romania and Slovenia) also report large gaps vis-à-vis the US in the dwellings category. Investment shortfalls are evident for several countries in the asset category other machinery.

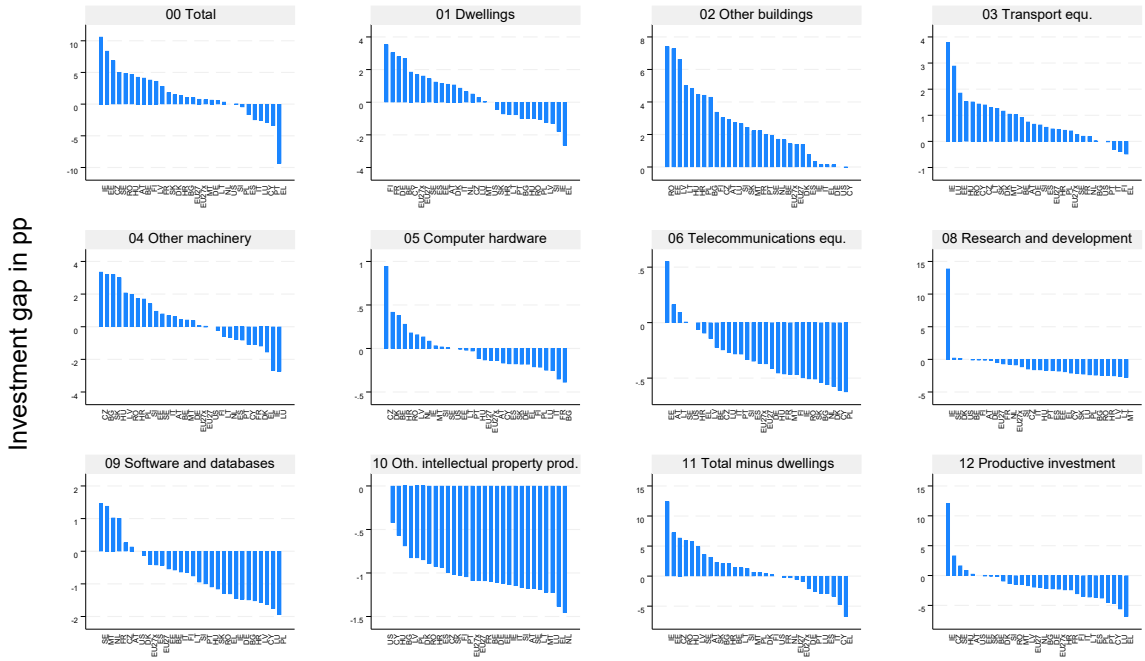
Considering tangible ICT investments, there is evidence of an investment shortfall in telecommunications equipment, though not for investments in computer hardware. Concerning intangible assets, there are large investment shortfalls in R&D, particularly among the Central and Eastern European economies. In line with the findings for the EU, the gaps are also large in software and databases and other intellectual property products.[19]

[18] See, however, Figure 4.5, where one can see that this mostly stems from GFCF in R&D and, to some extent, from recorded investments in transport equipment, as outlined in Section 3.

[19] However, one should note that comparability of this asset type across countries is limited.

To summarise, the picture found for the EU also largely prevails for the individual member states. There are some exceptions, in that certain countries also face a larger shortfall in dwellings and, in some cases, other machinery. Moreover, there are large differences across EU member states in terms of the gap in R&D spending, with the countries of Central and Eastern Europe mostly experiencing a big shortfall.[20]

Figure 4.5 / Investment gaps by country and asset type (chain-linked volumes), averages 2013-2019



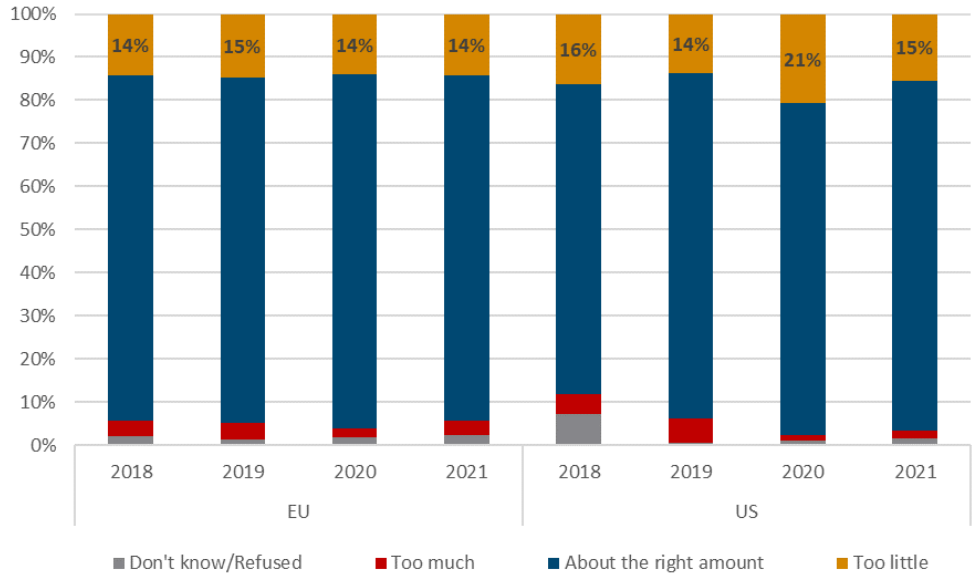
Source: Eurostat NA, EU KLEMS; own calculations.

[20] Results when using current values or applying US deflators are presented in Appendix Figure B.1 and Figure B.2.

4.2 Findings from EIB survey

The findings above, based on GFCF and value-added time series from National Accounts, can be compared with the findings from the EIB survey. The European Investment Bank conducts an annual survey of investment – the EIB Investment Survey (EIBIS) – to investigate the investment behaviour and characteristics of corporations. Since 2019, it has also included a sample of US firms (EIB, 2019). A comparison of the data provides further insight into the differences in investment behaviour between European and US companies.

Figure 4.6 / Perceived investment gap in the EU and US, 2018-2021

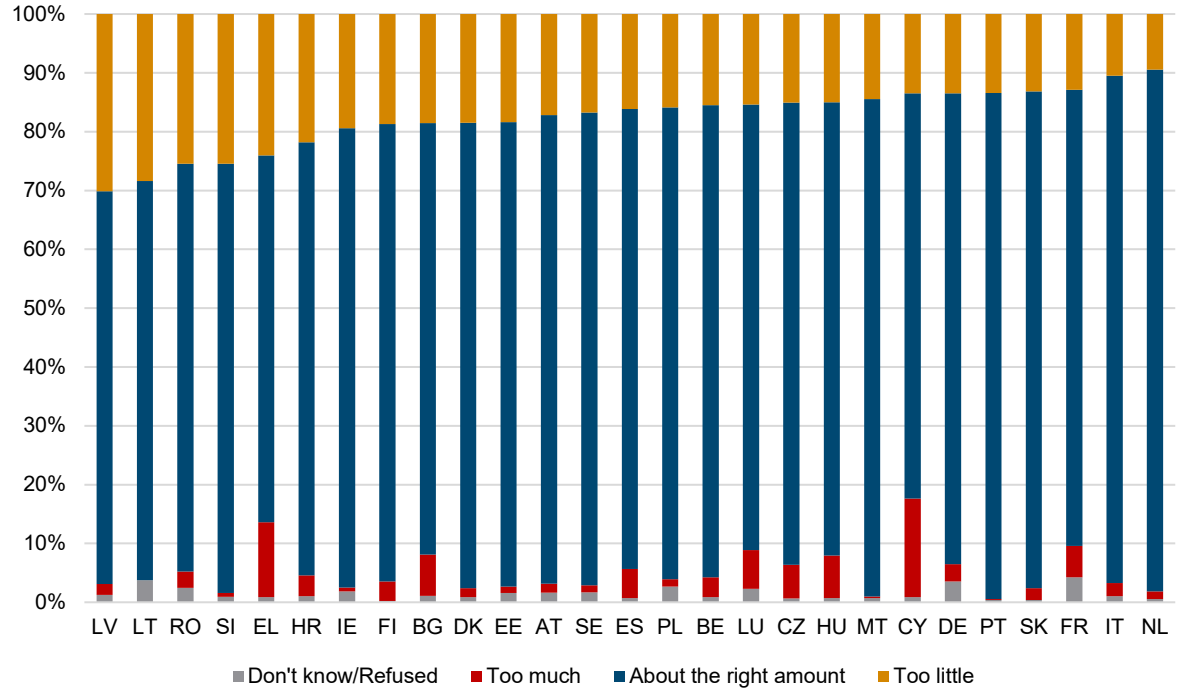


Note: Survey question: Looking at your investment over the last 3 years, was it too much, too little or about the right amount?
Source: EIBIS, wave 2019-2022.

Looking at the assessment by companies of their investment over the last three years, about 80% of EU businesses deemed their investment activities to be at about the right level between 2018 and 2021 (Figure 4.6). In the US, again about 80% considered their investment activities to be appropriate, except for in 2018, when only 72% thought that was the case (though many firms either did not know or refused to answer). The share of companies stating that they were investing too much was small, reaching only 4% in the EU in 2018 and 2019 and declining to 2-3% in the following two years. In the US, the share declined from 5% in 2018 and 2019 to 1-2%. These data further show that firms do not perceive any major gaps in terms of their investment strategies: the share of those companies that state they have invested too little is fairly constant in the EU, at 14%. The share fluctuates more in the US, and the investment gap perception is slightly higher, ranging between 14% and 16%, and even reaching 21% in 2020. As such, over time US firms perceive a larger gap in investment than do European businesses.

However, there is great variety in terms of the perceived level of investment across the EU member states. In 2021, in only seven countries did less than 14% (the EU average) of companies believe they were investing too little; in the remaining 20 countries, the figure was above the EU average. Perceived lack of investment was quite high in Latvia, Lithuania, Romania and Slovenia, with 25-30% of businesses believing they were investing too little (Figure 4.7).

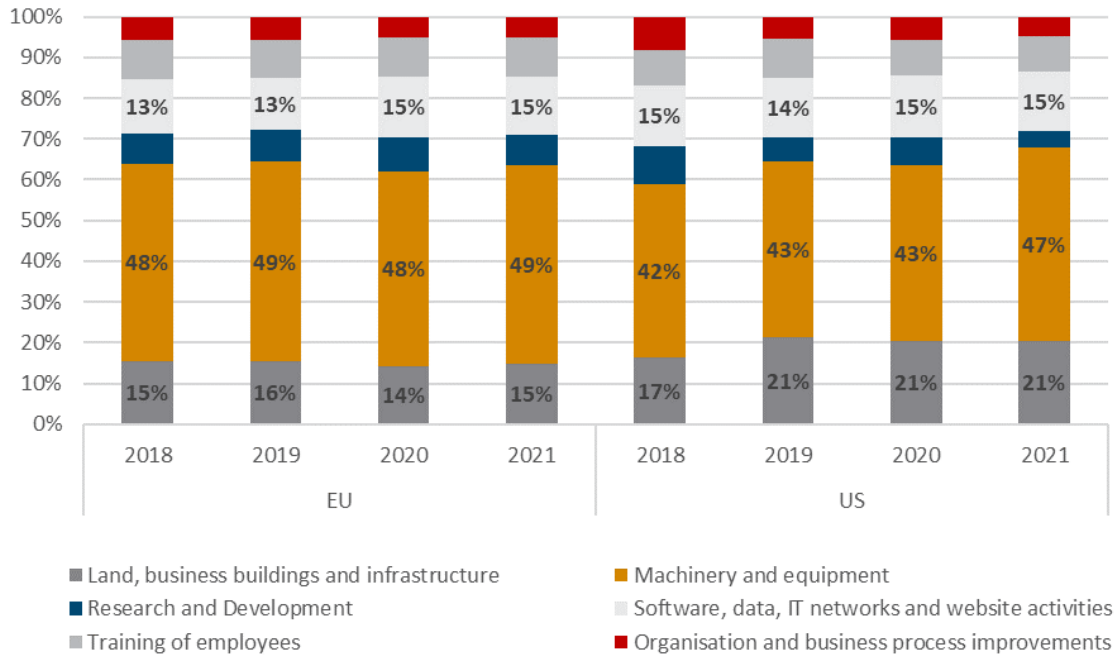
Figure 4.7 / Perceived investment gaps, EU countries, 2021



Note: Survey question: Looking at your investment over the last 3 years, was it too much, too little or about the right amount?
Source: EIBIS, 2022.

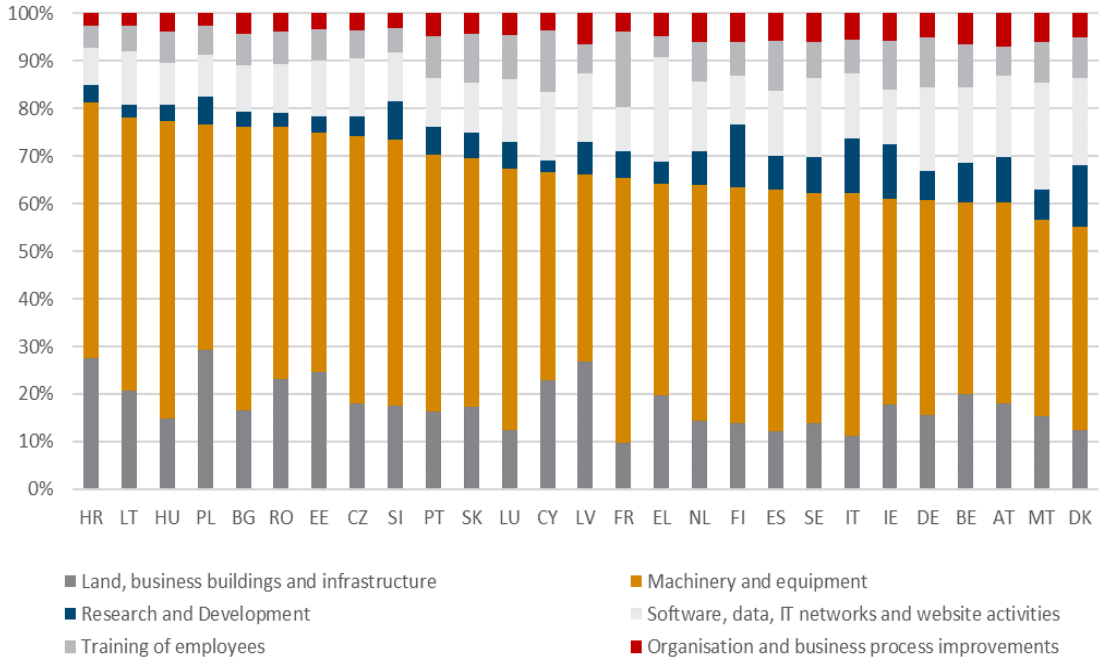
Regarding the detail of investment patterns, there are certain differences in the investment activities of EU and US firms (Figure 4.8). On average, EU firms put about 15% of their total investment into land, business buildings and infrastructure, while the share is somewhat higher in the US, at 21% of total investment. The greatest part of investment goes on machinery and equipment: around 48% in the EU and about 43% in the US between 2018 and 2020, but 47% in 2021. The share of investment in intangible assets (including here R&D, software and databases, employee training and organisational capital) ranged from 36% in 2019 to 27% in 2021 in the EU; in the US, the share declined from 41% in 2018 to 32% in 2021. The share of intangibles varies within the EU and in 2021 was lowest in Croatia, Lithuania, and Hungary (reaching only 20% of total investment), whereas in Malta and Denmark it stood at over 40% that year (Figure 4.9).

Figure 4.8 / Investment patterns in the EU and US (as a percentage of total investment), 2018-2021



Note: Survey question: In the previous financial year, how much did your business invest in each of the following with the intention of maintaining or increasing your company's future earnings?
Source: EIBIS, waves 2019-2022.

Figure 4.9 / Investment patterns in EU countries (as a percentage of total investment), 2021



Note: Survey question: In the previous financial year, how much did your business invest in each of the following with the intention of maintaining or increasing your company's future earnings?
Source: EIBIS, 2022.

5 Investment dynamics and capital accumulation

5.1 Investment dynamics

In this section we compare the investment dynamics as such, i.e. not relative to value-added growth. Specifically, we present the growth dynamics in terms of an index and growth rates to compare the evolution of GFCF levels between the EU and the US. As these growth rates are sometimes heavily impacted by Ireland, we only present results for EU27x (i.e. the EU27 excluding Ireland) in the main text. Selected additional results for EU27 are presented in Appendix C.

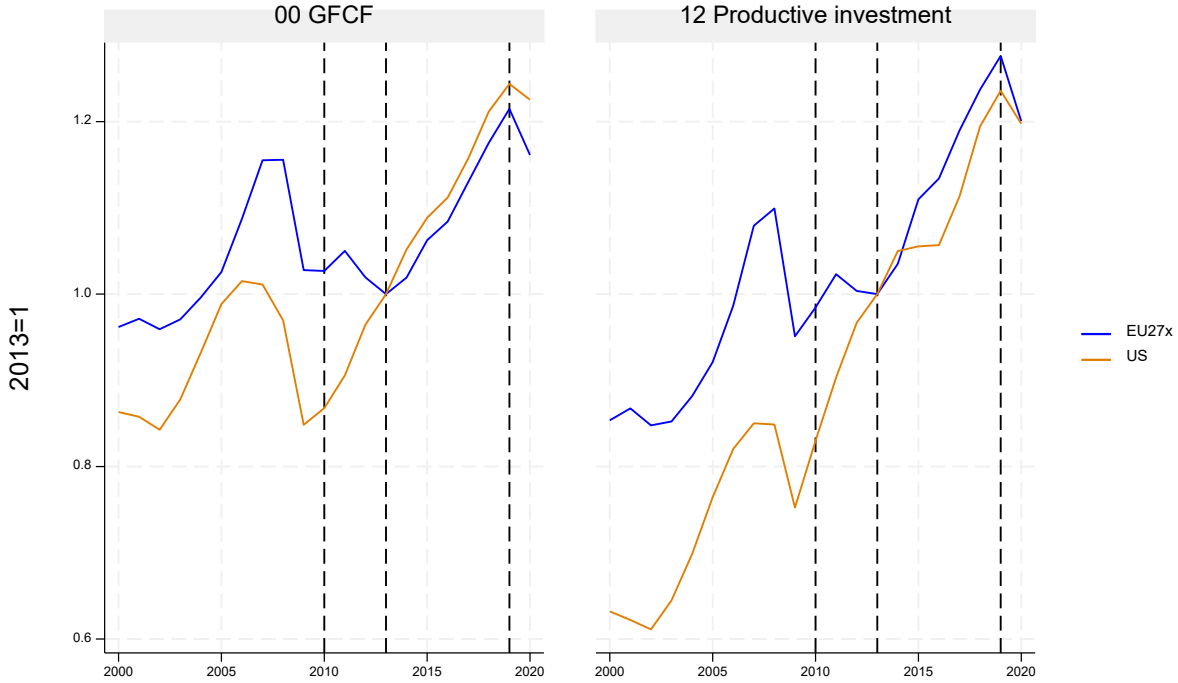
5.1.1 Comparing the EU and US

The upper panel of Figure 5.1 presents the index of GFCF in real terms (2013=1). For total GFCF (upper-left panel) these results indicate that since 2013 there has been scarcely any difference in the growth dynamics between the EU and the US. When considering productive investment (i.e. GFCF minus construction, upper-right panel) this shows that since 2013 growth in the EU has even been a little more rapid than in the US (however, this is largely because there was very little growth between 2014 and 2016 in the US). However, even though the growth rates since 2013 are similar, the investment gap that emerged in the years 2010-2012 (lower panel in Figure 5.1) persists: considering the period since 2010, it becomes evident that EU27x investments continued to lag behind US investments over the decade in question. Considering productive investment, in 2019 the index for the US stood at 1.44, compared to 1.22 for the EU27x (2010=1).

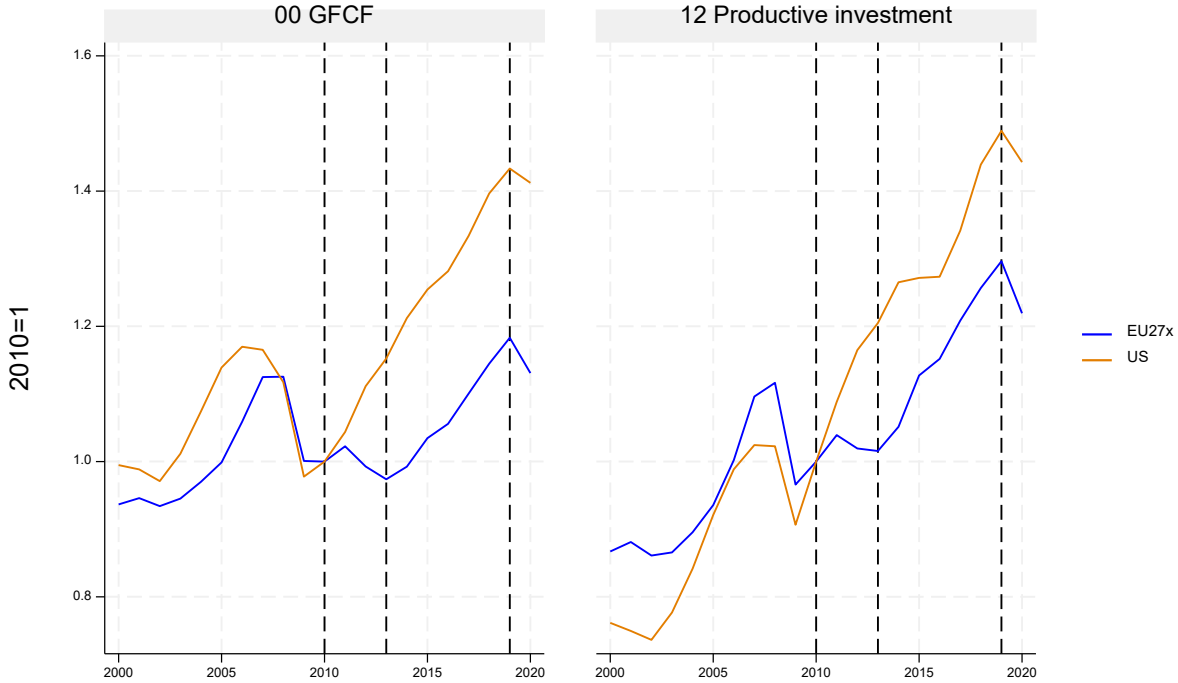
The upper panel of Figure 5.2 shows these differences for the individual asset types. Focusing on productive assets, the largest gaps opened up in transport equipment (index of 2.0 in the US, compared to 1.4 in the EU27x), telecommunications equipment (2.4 vs 1.1) and software and databases (2.1 vs 1.6). However, these differences largely disappear when US deflators are applied to the individual asset types (see the lower panel of Figure 5.2). This is particularly the case for telecommunications equipment, but also to a lesser extent for software and databases. Nevertheless, a narrow gap remains, mostly driven by a different dynamic of investment in transport equipment. Figure 5.3 presents the index with base year 2013. When US deflators are applied (lower panel), investments in productive assets were even a bit larger in the EU27x than in the US in this recovery phase. Nonetheless, this was not enough to close the gap that had opened up in the period 2010-2012 (as seen in Figure 5.2).

Figure 5.1 / Index of GFCF and productive investment

Index 2013=1



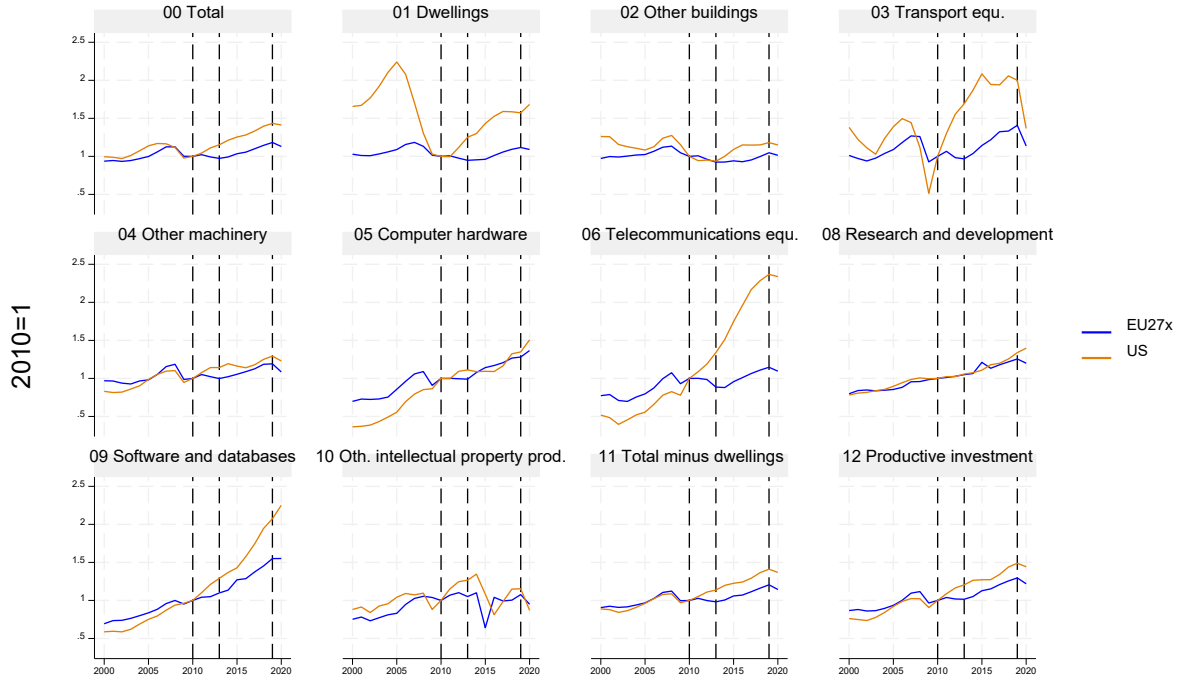
Index 2010=1



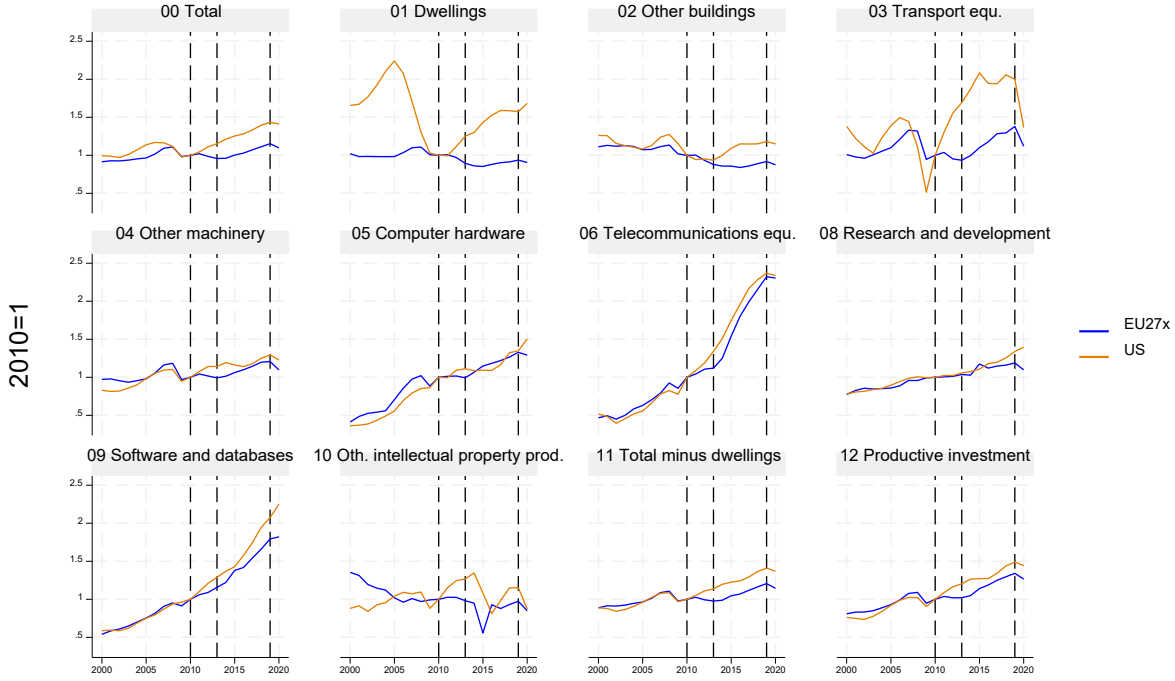
Source: Eurostat NA, EU KLEMS; own calculations.

Figure 5.2 / Index of GFCF and productive investment by asset type, 2010=1

National deflators



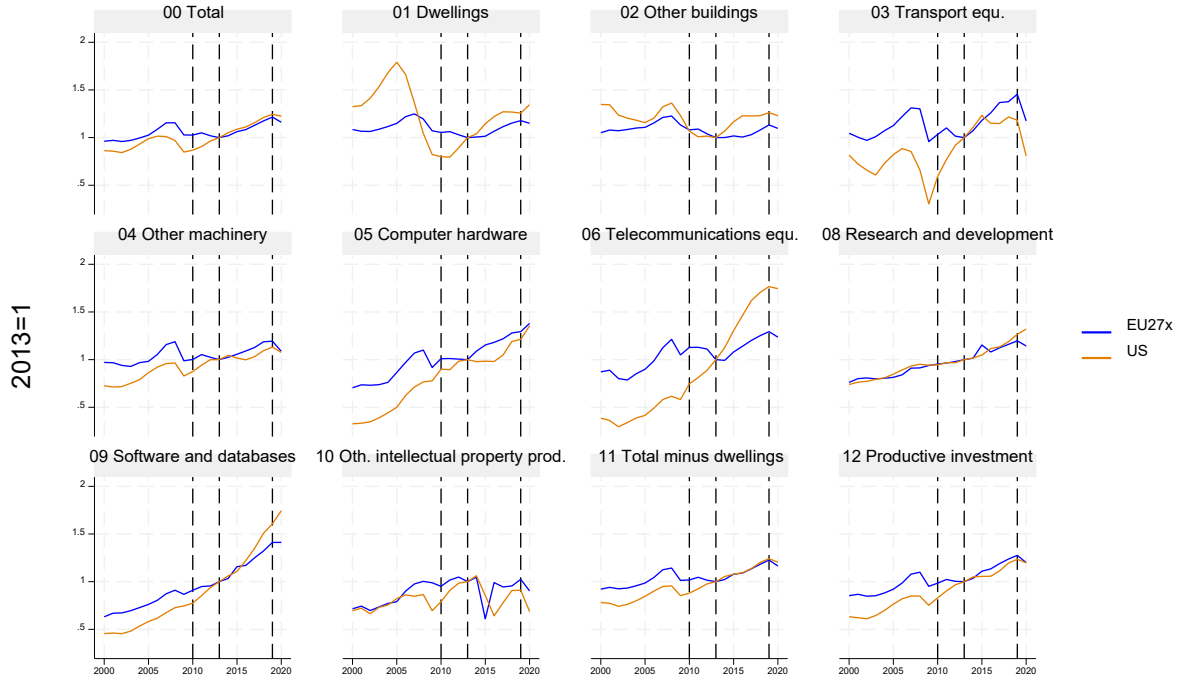
Applying US deflators



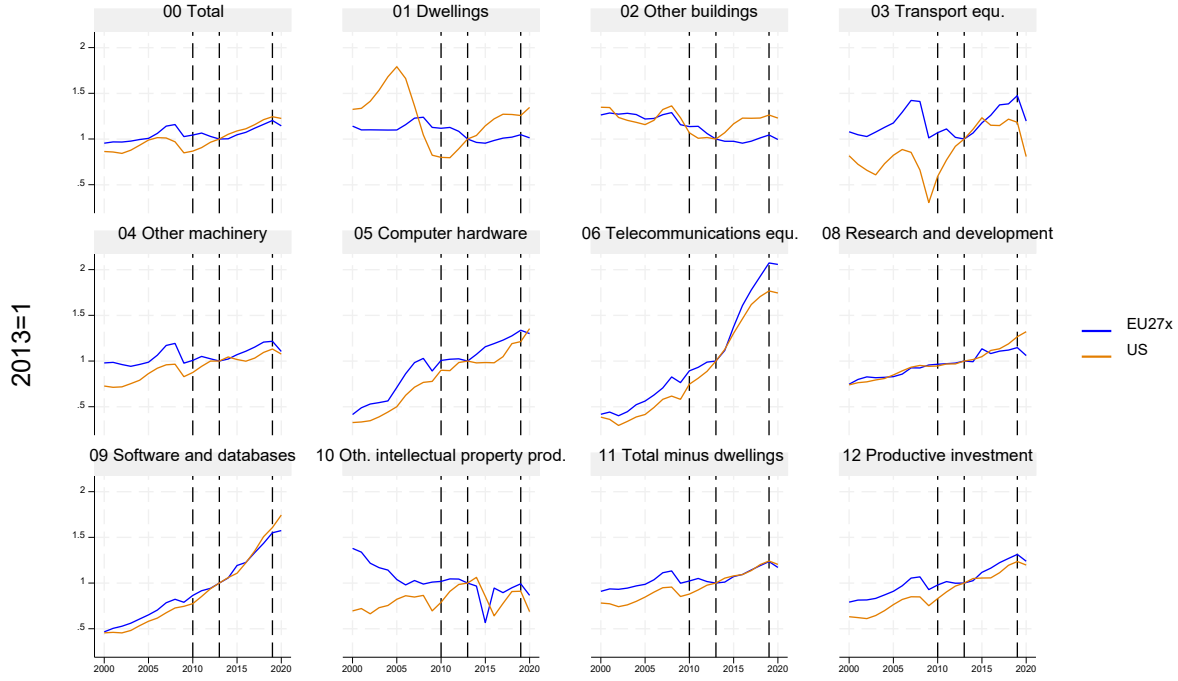
Source: Eurostat NA, EU KLEMS; own calculations.

Figure 5.3 / Index of GFCF and productive investment by asset type, 2013=1

National deflators



Applying US deflators

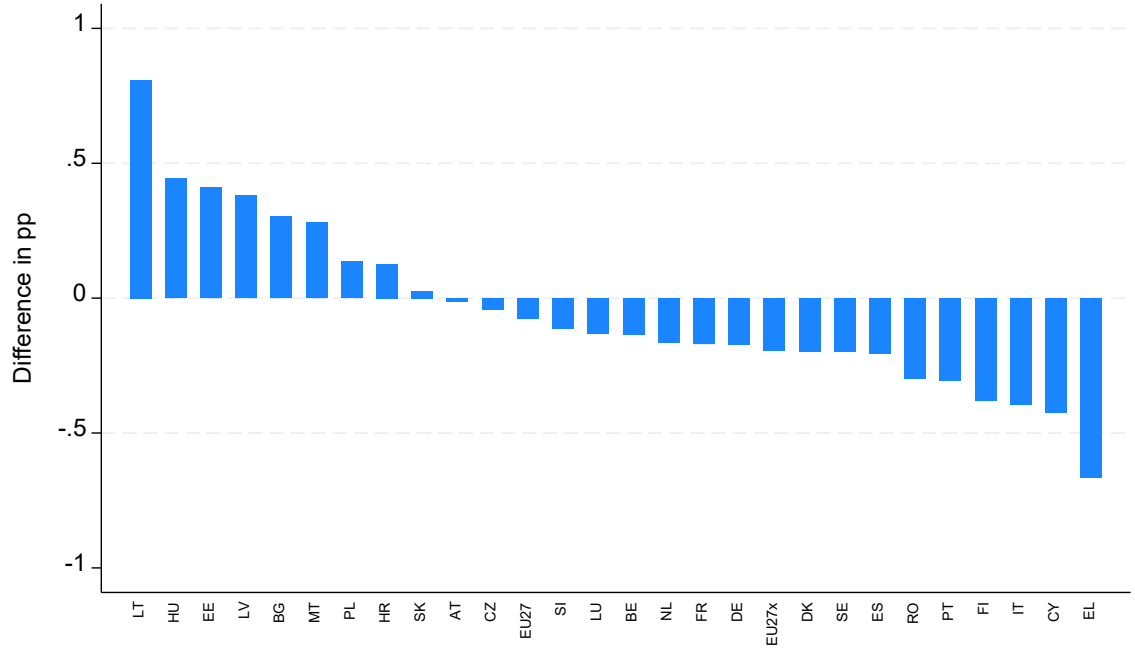


Source: Eurostat NA, EU KLEMS; own calculations.

5.1.2 Investment dynamics in EU member states

The same exercise is applied to the individual EU member states. Taking 2010 as the base year, Figure 5.4 presents the difference in the index between the EU member states and the US for productive investment when national deflators are applied. First, a number of countries experienced even greater investment growth than the US: this group includes Malta and some of the Central and Eastern European countries. Many of the countries with growth dynamics similar to (or lower than) the US are larger Western European economies, such as France, Germany, Italy, Sweden and Finland.

Figure 5.4 / Difference between individual EU countries and the US, 2019 (2010=1)



Note: Ireland not presented.
Source: Eurostat NA, EU KLEMS; own calculations.

Again, these differences can be charted in terms of the detailed asset types. Taking 2010 as the base year, the differences in the index in 2019 are shown in Table 5.1 (using national deflators). As with the EU27x results, one finds a larger gap in investment, particularly in telecommunications equipment, but also to a lesser extent in transport equipment and software and databases. However – and again similarly to the results for the EU27x – when US deflators are applied, these patterns become much weaker and lower investment is mostly to be found in transport equipment (Table 5.2).

Table 5.1 / Differences between EU countries and the US in 2019, applying national deflators, 2010=1

	GFCF	Dwellings	Other buildings and structures	Transport equipment	Other machinery	Computer hardware	Telecommunications equipment	Research and development	Software and databases	Other intellectual property products	GFCF less dwellings	Productive investments
EU27	-0.2	-0.5	-0.1	-0.5	-0.1	0.0	-1.2	0.4	-0.5	-0.1	-0.1	-0.1
EU27x	-0.3	-0.5	-0.1	-0.6	-0.1	-0.1	-1.2	-0.1	-0.5	-0.1	-0.2	-0.2
AT	-0.1	-0.4	0.0	-0.6	0.1	0.1	-1.0	0.1	0.0	-0.2	-0.1	0.0
BE	-0.1	-0.4	0.2	-0.6	-0.1	0.1	-1.1	0.2	-0.7	0.2	-0.1	-0.1
BG	-0.3	-0.3	-0.6	-0.2	0.6	-1.2	-1.5	1.5	0.6	0.4	-0.3	0.3
CY	-0.4	-0.4	-0.5	-1.3		-0.7		2.0	-0.7		-0.5	-0.4
CZ	-0.1	-0.2	-0.2	-0.8	0.0	0.1	-1.3	0.5	0.3	0.5	-0.1	0.0
DE	-0.2	-0.3	-0.1	-0.6	-0.1	-0.2	-1.1	0.1	-0.5	0.0	-0.2	-0.2
DK	-0.1	-0.1	0.2	-0.7	-0.2	0.4	1.6	-0.2	-0.6	-0.1	-0.1	-0.2
EE	0.4	1.1	0.4	-0.6	0.5	0.5	0.7	0.4	0.5	1.9	0.3	0.4
EL	-0.9	-1.4	-0.6	-1.2	-0.6	-0.7	-1.4	0.1			-0.7	-0.7
ES	-0.3	-0.4	-0.4	-0.5	-0.1	-0.1	-1.9	-0.2	-0.6	0.1	-0.4	-0.2
FI	-0.3	-0.5	0.0	-1.1	0.3	0.2	-1.2	-0.6	-0.8	-0.1	-0.3	-0.4
FR	-0.2	-0.5	-0.1	-0.6	-0.2	0.9	-0.9	-0.2	-0.4	-0.1	-0.2	-0.2
HR	-0.2	-0.7	-0.3	-0.1	0.6	-0.6	-0.6	0.1	-1.0	2.1	-0.2	0.1
HU	0.3	-0.4	0.5	0.4	0.7	1.7	-0.9	0.0	-0.2	-0.1	0.4	0.4
IE	4.0	-0.4	0.7	0.7	0.7	1.1	0.1	15.5	0.0	-0.7	5.0	6.5
IT	-0.5	-0.8	-0.4	-0.8	-0.3	-0.4	-1.0	-0.1	-0.7	-0.4	-0.4	-0.4
LT	0.4	0.3	0.3	1.6	1.0	-0.2	0.1	0.2	-0.1	2.4	0.5	0.8
LU	-0.1	0.2	-0.1	-0.8	0.5	0.1	-0.8	-0.2	-0.2	-0.8	-0.2	-0.1
LV	0.2	-0.1	0.3	0.3	0.6	1.2	-1.3	-0.2	-0.6	1.0	0.2	0.4
MT	0.3	0.5	0.3	-0.6	-0.1	1.9	-1.2	-0.2	1.6	-0.9	0.3	0.3
NL	-0.1	-0.1	0.0	0.1	-0.2	-0.1	-0.6	-0.1	-0.6	-0.8	-0.2	-0.2
PL	0.0	-0.3	0.2	-0.5	0.4	-0.1	-1.3	0.6	8.9	-0.5	0.1	0.1
PT	-0.5	-0.7	-0.4	-0.7	-0.2	-0.2	-1.6	-0.4	-0.5		-0.4	-0.3
RO	0.0	-0.4	0.5	-0.7	-0.2	-0.4	-1.9	0.0	-0.3	9.5	0.0	-0.3
SE	-0.1	-0.2	0.2	-0.5	-0.1	0.0	-0.5	-0.3	-0.7	0.3	-0.1	-0.2
SI	-0.3	-0.8	-0.3	0.0	0.0	-0.1	-0.9	-0.3	-0.5	-0.9	-0.3	-0.1
SK	-0.1	-0.1	-0.2	-0.1	0.4	-0.5	-1.8	0.7	-1.4	-0.2	-0.1	0.0

Source: Eurostat NA, EU KLEMS; own calculations.

Table 5.2 / Differences between EU countries and the US in 2019, applying US deflators, 2010=1

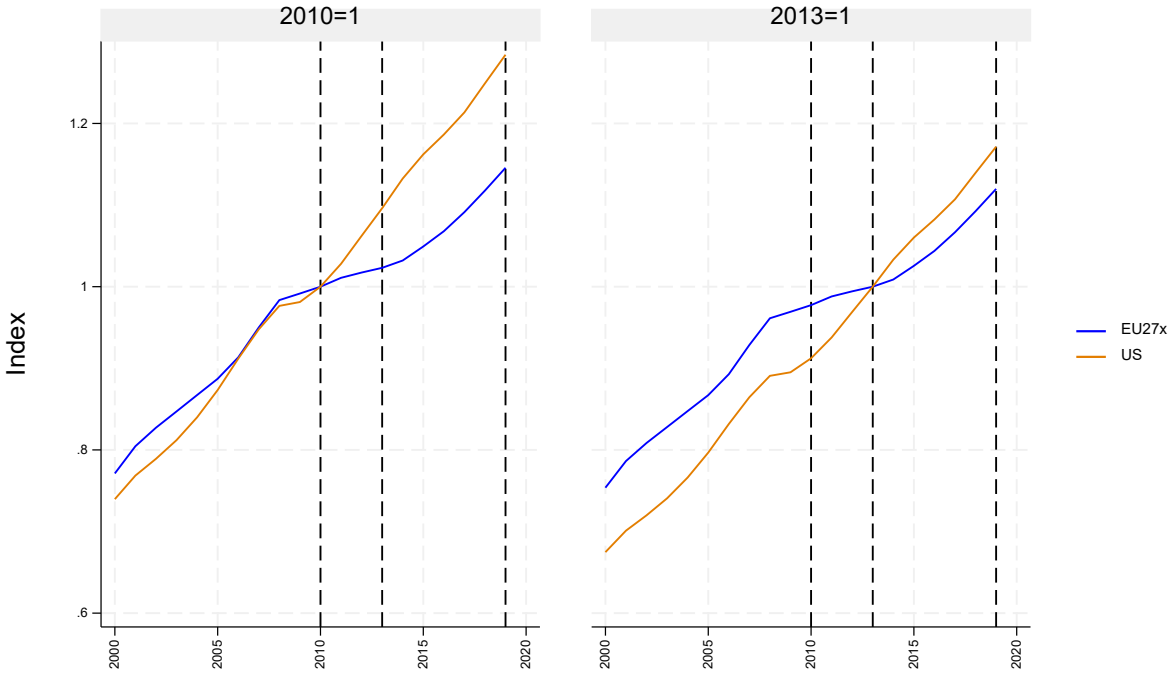
	GFCF	Dwellings	Other buildings and structures	Transport equipment	Other machinery	Computer hardware	Telecommunications equipment	Research and development	Software and databases	Other intellectual property products	GFCF less dwellings	Productive investments
EU27	-0.2	-0.6	-0.3	-0.6	-0.1	0.0	0.0	0.4	-0.3	-0.2	-0.1	0.0
EU27x	-0.3	-0.6	-0.3	-0.6	-0.1	0.0	0.0	-0.2	-0.3	-0.2	-0.2	-0.1
AT	-0.1	-0.5	0.0	-0.6	0.1	0.2	0.2	0.0	0.4	-0.2	0.0	0.1
BE	-0.2	-0.6	0.0	-0.7	0.0	0.2	-0.1	0.2	-0.4	0.3	0.0	-0.1
BG	-0.2	-0.3	-0.6	0.2	0.8	-1.1	-0.6	1.0	1.0	2.1	-0.2	0.5
CY	-0.5	-0.7	-0.6	-1.4		-0.6		1.5	-0.4		-0.5	-0.4
CZ	-0.2	-0.5	-0.3	-0.8	0.0	0.1	-0.6	0.6	1.1	0.4	-0.1	0.0
DE	-0.1	-0.3	-0.1	-0.7	0.0	-0.1	-0.2	0.1	-0.2	-0.1	-0.1	-0.1
DK	-0.1	-0.3	0.0	-0.8	-0.1	0.0	2.9	-0.2	-0.3	-0.1	-0.1	-0.2
EE	0.6	1.0	0.4	-0.4	0.6	0.5	2.8	0.5	1.6	2.6	0.5	0.6
EL	-1.0	-1.5	-0.8	-1.2	-0.7	-0.6	-0.5	-0.1			-0.8	-0.7
ES	-0.5	-0.8	-0.6	-0.6	-0.2	0.0	0.0	-0.4	-0.4	0.0	-0.4	-0.2
FI	-0.2	-0.5	0.0	-1.1	0.4	0.2	-0.3	-0.6	-0.5	0.0	-0.2	-0.3
FR	-0.3	-0.6	-0.3	-0.6	-0.2	0.5	0.2	-0.3	-0.2	-0.2	-0.2	-0.1
HR	-0.3	-0.9	-0.4	-0.3	0.5	-0.6	0.6	-0.3	-0.8	1.9	-0.2	0.1
HU	0.3	-0.4	0.5	0.3	0.5	1.8	0.1	0.0	0.2	-0.2	0.5	0.4
IE	4.4	-0.4	1.0	0.6	0.6	1.3	2.7	15.1	0.9	-0.6	5.6	7.4
IT	-0.5	-1.0	-0.5	-0.9	-0.3	-0.1	0.0	-0.3	-0.6	-0.4	-0.4	-0.4
LT	0.5	0.3	0.3	1.6	0.9	0.0	1.4	0.2	0.9	2.3	0.6	0.9
LU	-0.1	0.0	-0.2	-0.7	0.5	0.1	0.0	-0.1	0.2	-0.8	-0.1	0.0
LV	0.4	0.5	0.2	0.3	0.7	1.7	-0.3	0.2	0.5	1.2	0.4	0.6
MT	0.3	0.4	0.2	-0.6	-0.1	1.0	-0.4	-0.2	2.7	-0.7	0.3	0.4
NL	-0.2	-0.6	-0.2	0.1	-0.1	-0.1	0.0	-0.2	-0.4	-0.8	-0.2	-0.1
PL	-0.2	-0.7	-0.2	-0.5	0.2	0.0	-0.3	0.3	9.9	-0.7	-0.1	0.1
PT	-0.5	-0.8	-0.5	-0.7	-0.3	-0.3	-0.7	-0.4	-0.2	-0.2	-0.4	-0.4
RO	0.0	-0.5	0.0	-0.5	0.1	0.1	-1.2	0.3	-0.3	2.5	0.0	0.0
SE	-0.2	-0.4	0.0	-0.6	-0.1	-0.1	0.2	-0.4	-0.5	0.1	-0.2	-0.3
SI	-0.3	-0.9	-0.4	-0.2	0.1	-0.1	0.2	-0.3	-0.1	-0.9	-0.2	-0.1
SK	-0.2	-0.3	-0.3	-0.4	0.3	-0.4	-1.4	0.4	-1.3	-0.3	-0.2	0.0

Source: Eurostat NA, EU KLEMS; own calculations.

5.2 Capital accumulation

Finally, we analyse the evolution of capital stocks in the EU27 and the US. In so doing, as well as new investment, we also take account of retirement patterns and the depreciation of existing stocks.[21] Figure 5.5 presents the accumulation of stocks for the EU27 (excluding Ireland) and the US up to 2019. Capital accumulation was faster in the US after the onset of the great financial crisis. After 2010, the stock of productive assets increased by almost 30% in the US, compared to about 15% in the EU27x, a pattern similar to the one presented in the previous section.

Figure 5.5 / Evolution of the productive capital stock



Source: Eurostat NA, EU KLEMS; own calculations.

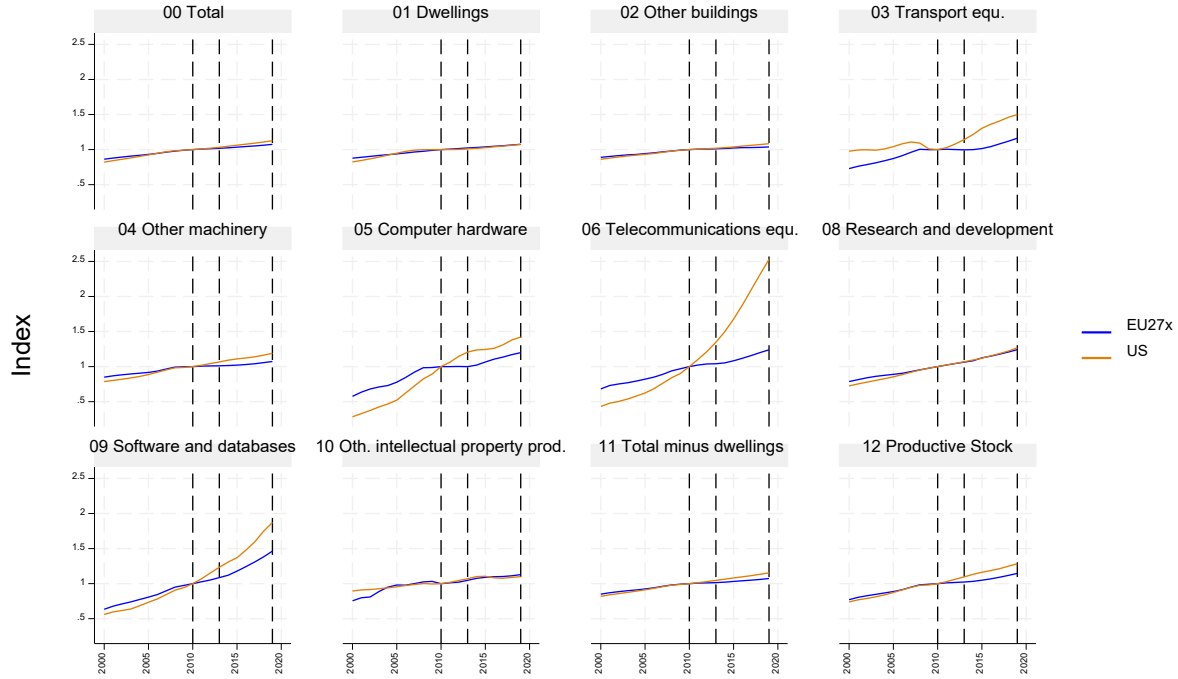
Figure 5.6 shows the patterns of capital accumulation for the individual asset types. The differences are again significant particularly in transport equipment, telecommunications equipment, and software and databases (and to a lesser extent in computer hardware). However, again one finds that once US deflators are applied, the differences become far smaller (see lower panel of Figure 5.6).

Finally, we relate the growth rates of capital accumulation to the growth of value added – i.e. the change in the capital-to-value-added ratio. The findings are presented in Figure 5.7 as averages over the three periods already used. The US experienced an increase in this ratio (of productive assets) in all three periods, i.e. capital growth was greater than value-added growth. This was not the case for the EU27 (excluding Ireland): particularly in the period after 2013, the capital growth of productive assets was only slightly greater than the growth in value added.

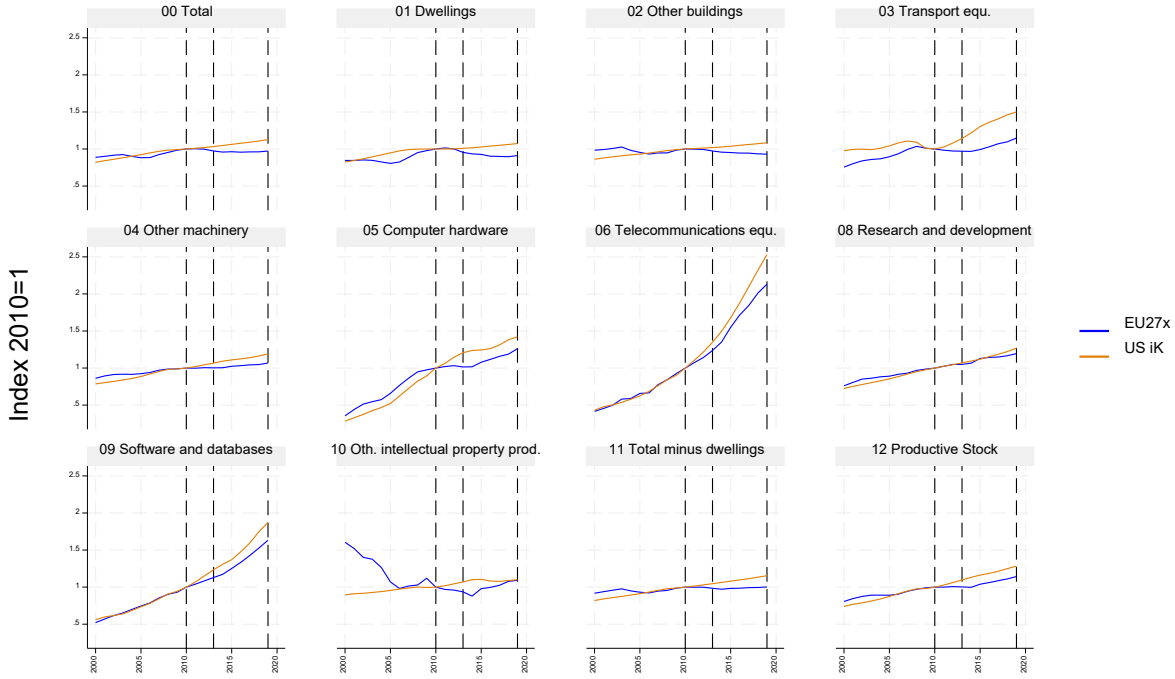
[21] One should note that the methodologies for calculating stocks are not fully harmonised across countries.

Figure 5.6 / Accumulation of stocks by asset type, 2010=1

National deflators



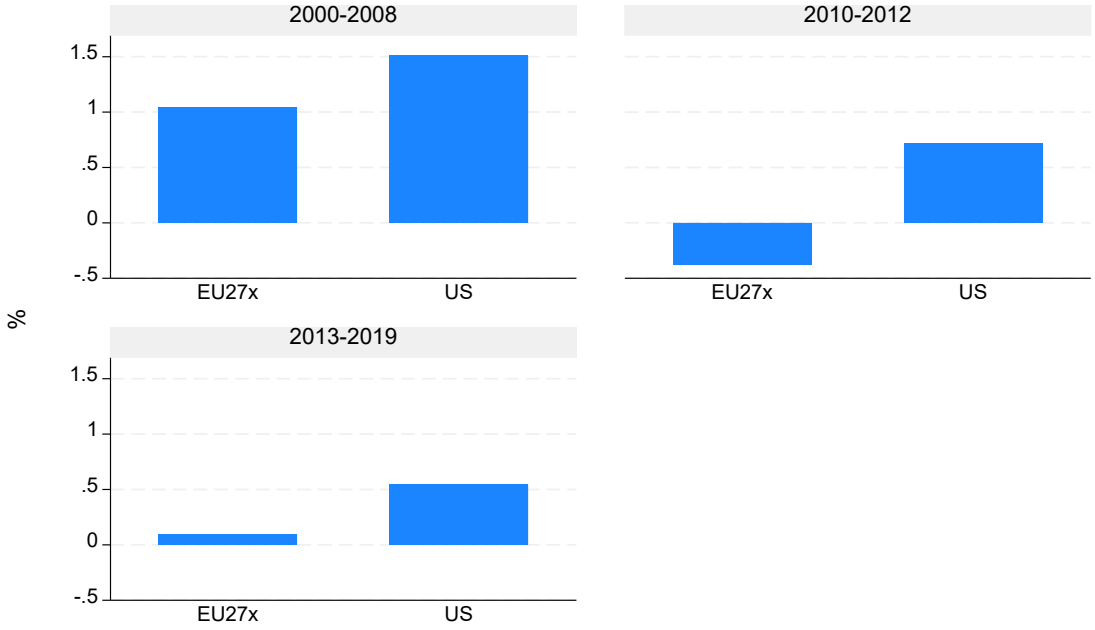
Applying US deflators



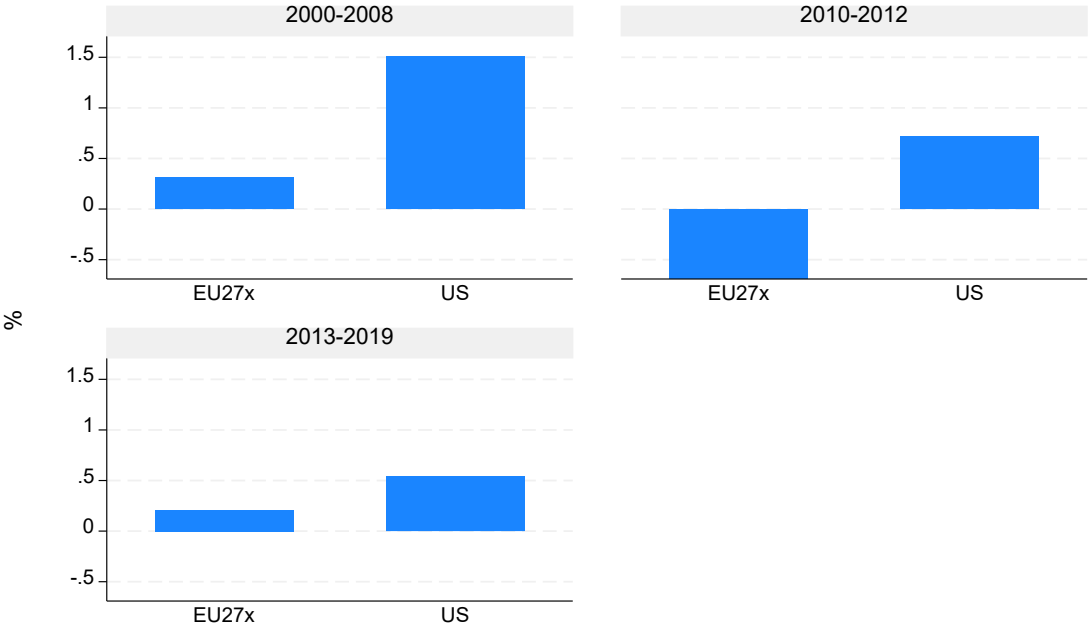
Source: Eurostat NA, EU KLEMS; own calculations.

Figure 5.7 / Annual average changes in the capital to value added ratio of productive assets

Applying national deflators



Applying US deflators



Source: Eurostat NA, EU KLEMS; own calculations.

The lower panel of Figure 5.7 shows these growth rates when US deflators are applied. This has little impact on the growth rate of the capital-to-value-added ratio. But one can see that the change in the capital to value added ratio is a bit more pronounced in the EU27x in the years after 2013 when US deflators are applied; however, the rate does not reach that of the US.

6 Conclusions

This report investigates whether there is an investment gap between the EU27 and the US. Defining the investment rate as the ratio of GFCF to value added, the investment gap can be defined as the difference in the investment rate between the EU and the US. We find that, according to this indicator, the EU has a large investment 'surplus' compared to the US in tangible non-ICT assets (driven particularly by construction assets, but also by transport equipment). However, 'productive investment' (i.e. excluding construction) relative to value added is indeed lower in the EU, indicating an investment shortfall. Specifically, the investment gap (thus defined) widened for ICT assets, particularly for telecommunications equipment. Thus, the EU's investment shortfall relative to the US is largely driven by intangible assets (software and databases, R&D and other intellectual property products). The picture found for the EU overall largely holds for the individual member states, except that some countries also face a larger shortfall in dwellings and (in some cases) other machinery. Furthermore, there are big differences between EU member states in terms of the gap in R&D spending, with the countries of Central and Eastern Europe tending to experience a bigger gap. In addition, there are relatively big investment gaps (compared to the EU as a whole) for some of the larger EU member states, notably Germany, France and Italy. Over time, we can see that the investment gap (for productive investments) widened sharply in the wake of the global financial crisis (starting in 2008), and since then has closed only marginally. The investment gap (thus defined) also narrows when US asset price deflators are applied.

A slightly different picture emerges if we consider investment dynamics (i.e. the growth in GFCF). In this case, one finds that productive investment in the US and the EU27x has been very similar since 2013.[22] However, as the growth in GFCF in the EU27 over the years of the euro crisis (2010-2012) was negligible, the GFCF level in the EU27 had still not fully recovered by 2019.

A closer look at asset types reveals that, after the crisis years, the result was mainly driven by higher EU growth rates in transport equipment, other machinery and equipment, and telecommunications equipment when US deflators were applied.[23] The findings depend largely on differences in the application of deflators, specifically for telecommunications equipment: when US deflators are applied, the differences in the evolution of GFCF or the accumulation of stocks are much less pronounced. Again, there are big variations across EU member states, with some large countries – Germany, Italy and France – experiencing particularly low growth rates in productive investments.

As a last step, the report provides evidence that the growth in the capital-to-value-added ratio was stronger in the US than in the EU27x, which would indicate a lack of accumulation of productive capital.

[22] Similarly, in the EIB survey about the same share of firms in the EU and the US answered that they had invested the right amount (in 2018 and 2019).

[23] Again, this pattern finds confirmation in the EIB survey, according to which investment in machinery and equipment was about 6 pp higher in the EU than in the US.

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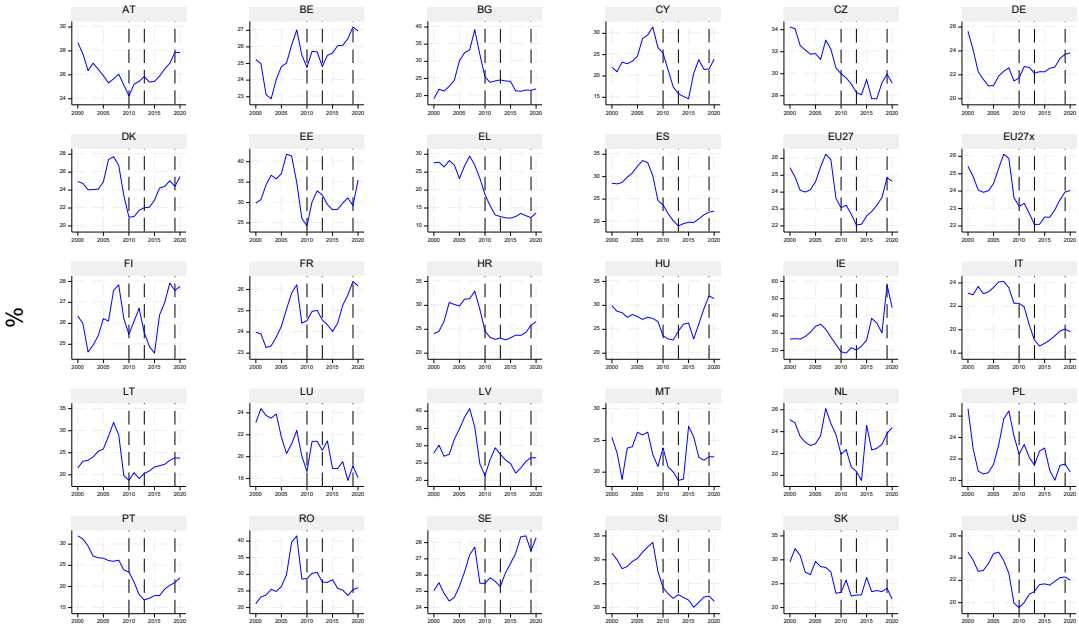
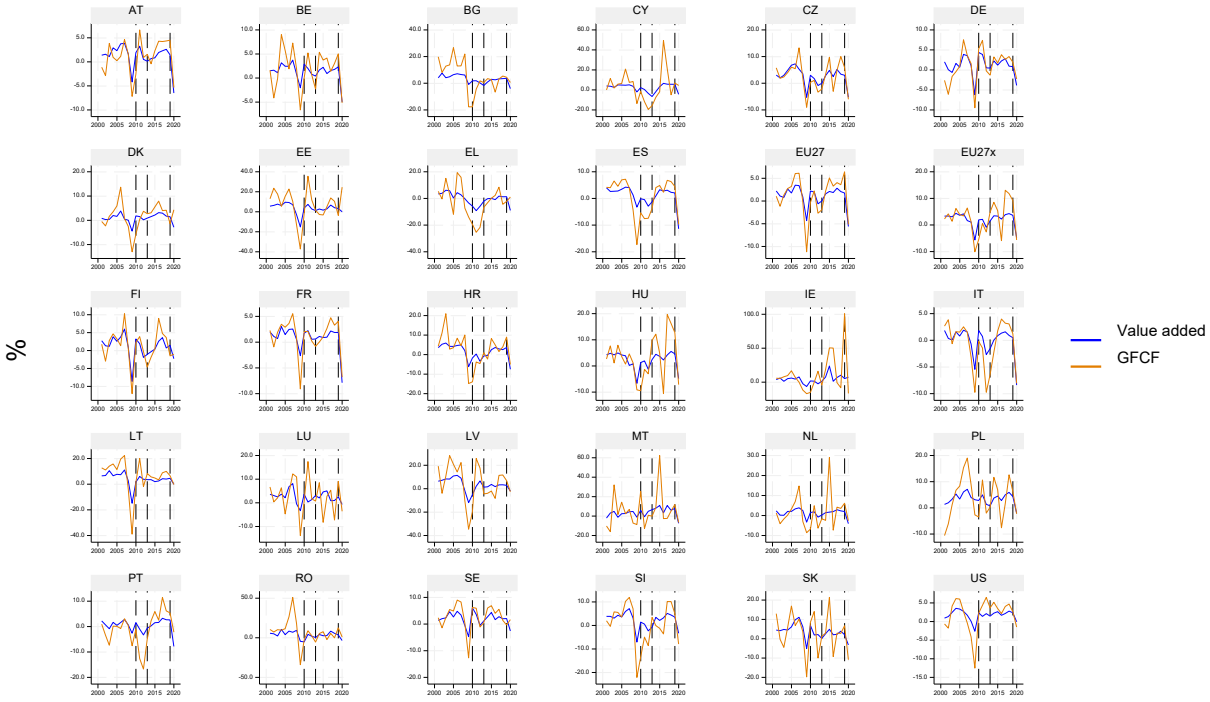
Appendix A – Country-level results for Section 3

Figure A.1 / Investment rates by country in % (current prices)



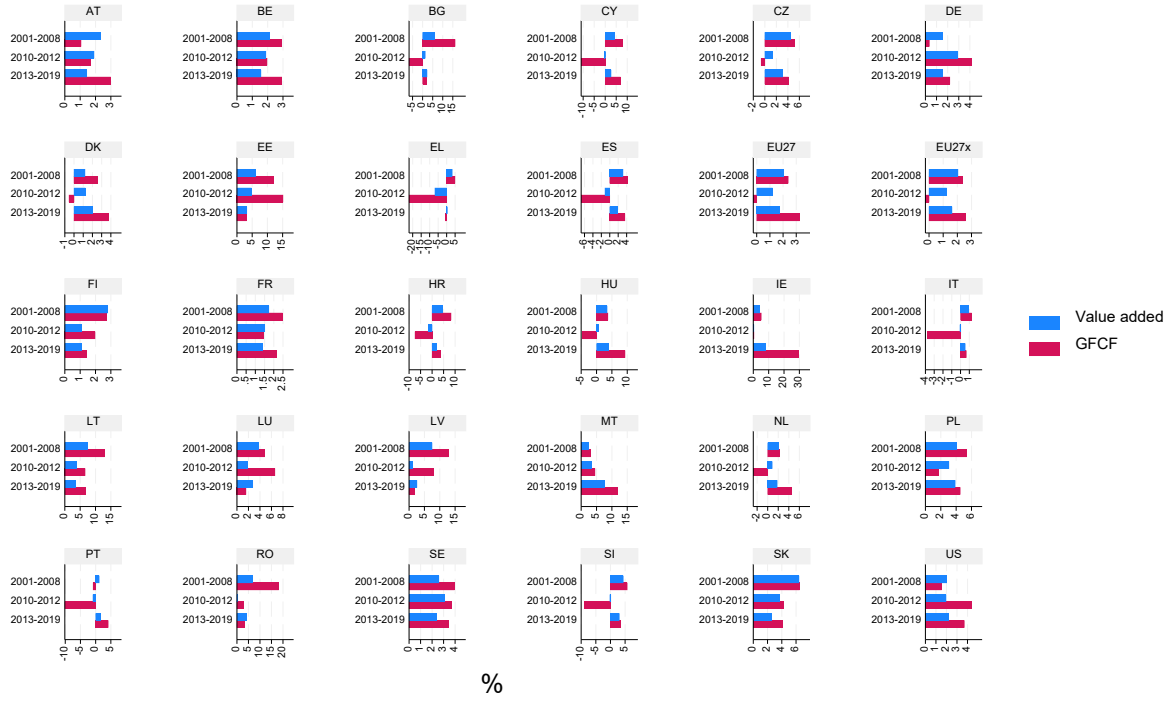
Source: Eurostat NA, EU KLEMS; own calculations.

Figure A.2 / Growth rates of value added and GFCF, in %



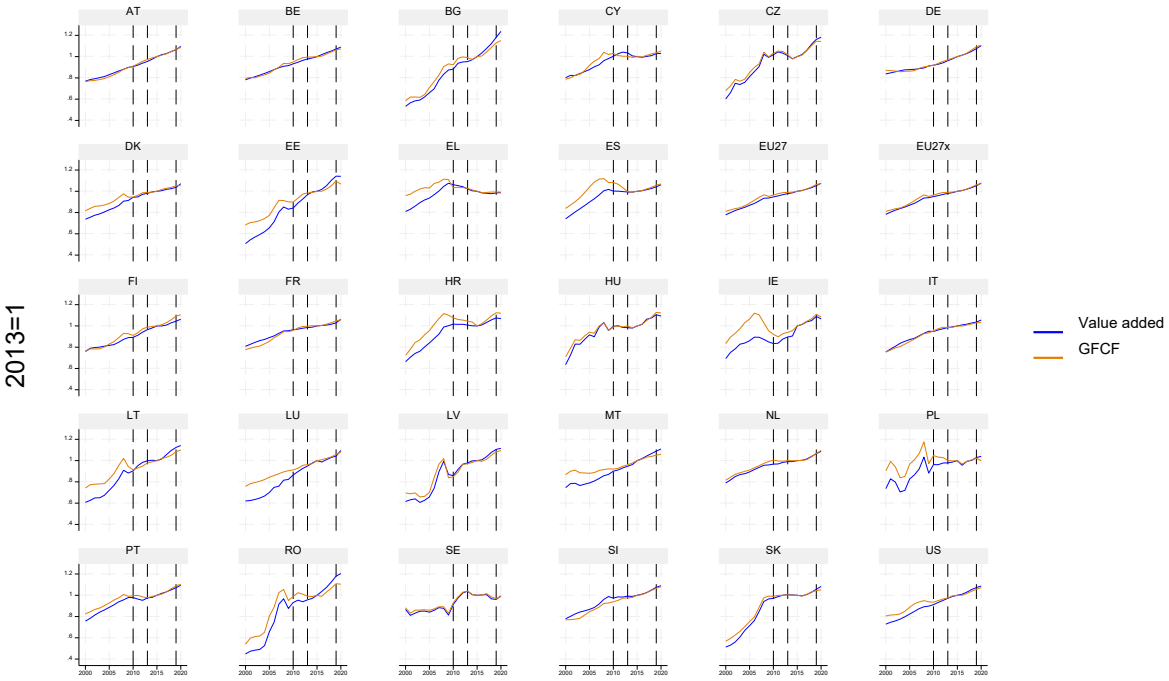
Source: Eurostat NA, EU KLEMS; own calculations.

Figure A.3 / Value added and GFCF growth rates, by country, average annual growth rates, %



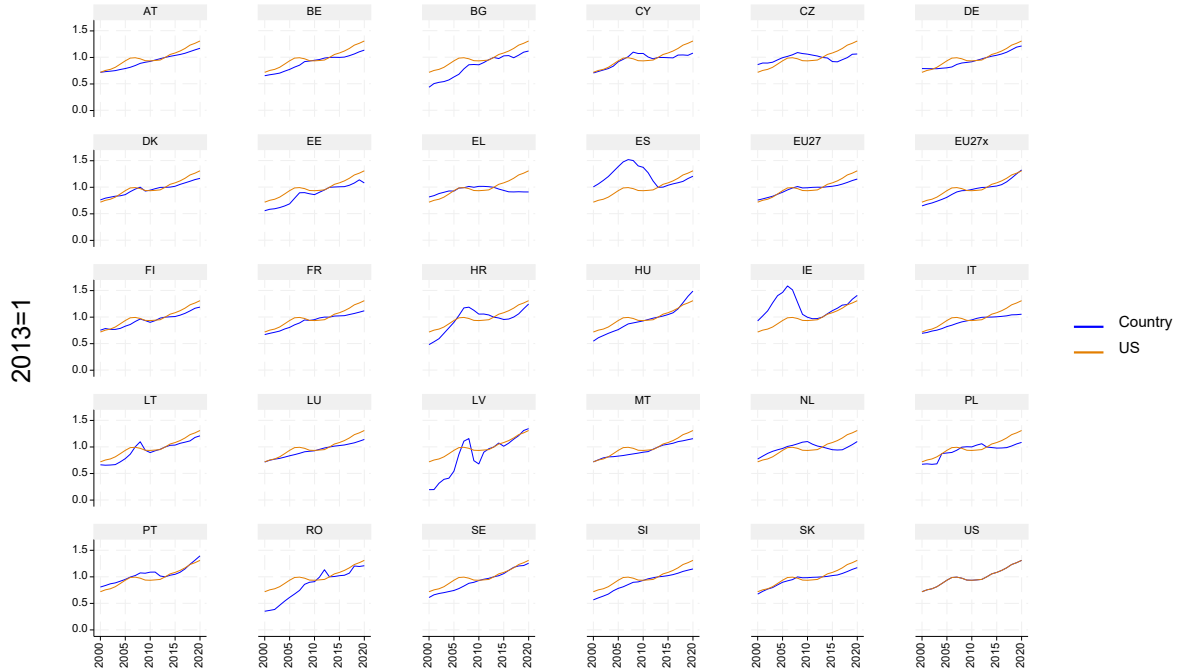
Source: Eurostat NA, EU KLEMS; own calculations.

Figure A.4 / Price indices for value added and GFCF, by country



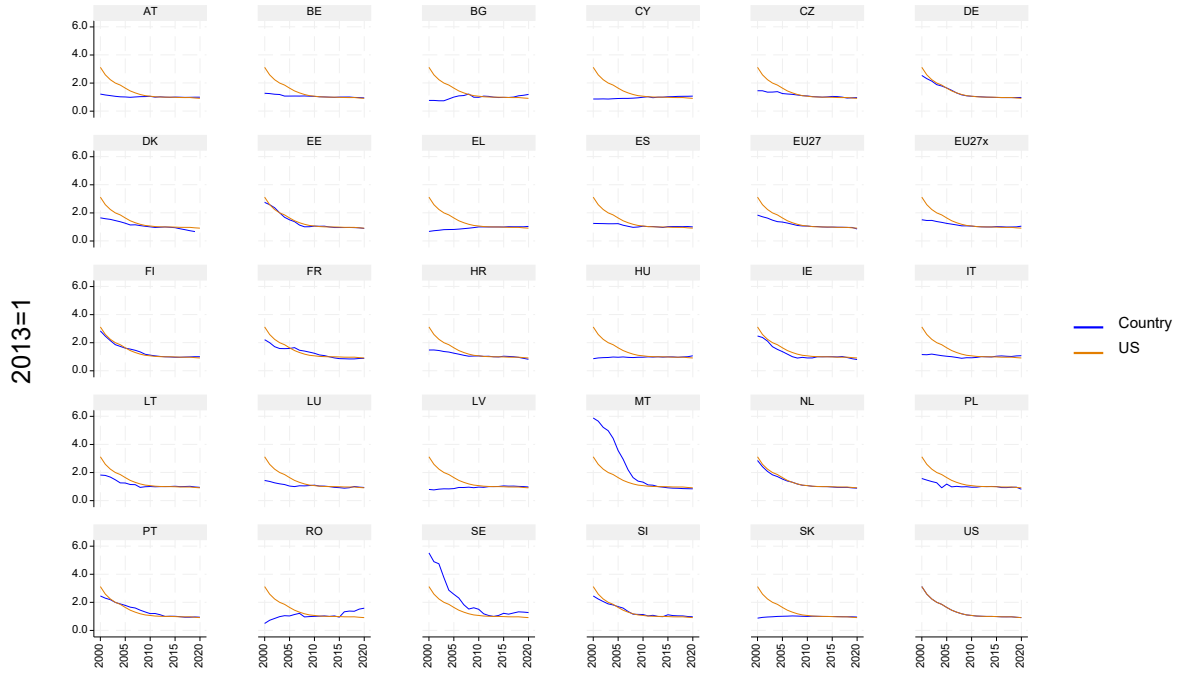
Source: Eurostat NA, EU KLEMS; own calculations.

Figure A.5 / Asset price index for dwellings by country



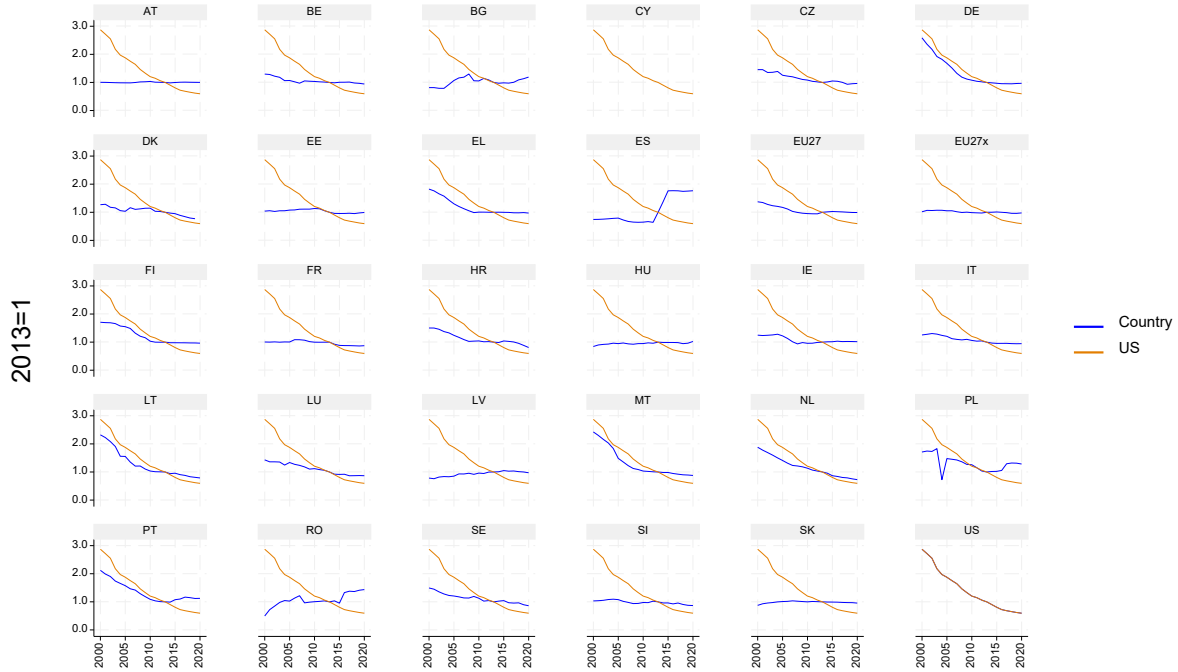
Source: Eurostat NA, EU KLEMS; own calculations.

Figure A.6 / Asset price index for information technology, by country



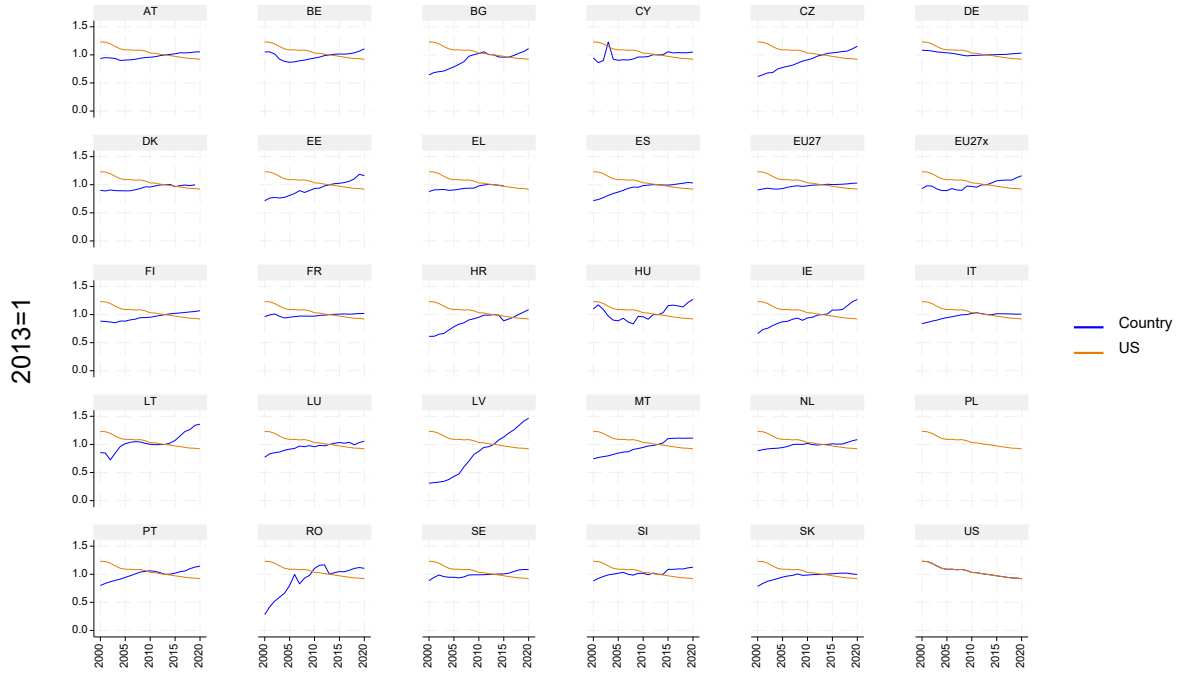
Source: Eurostat NA, EU KLEMS; own calculations.

Figure A.7 / Asset price index for telecommunications technology, by country



Source: Eurostat NA, EU KLEMS; own calculations.

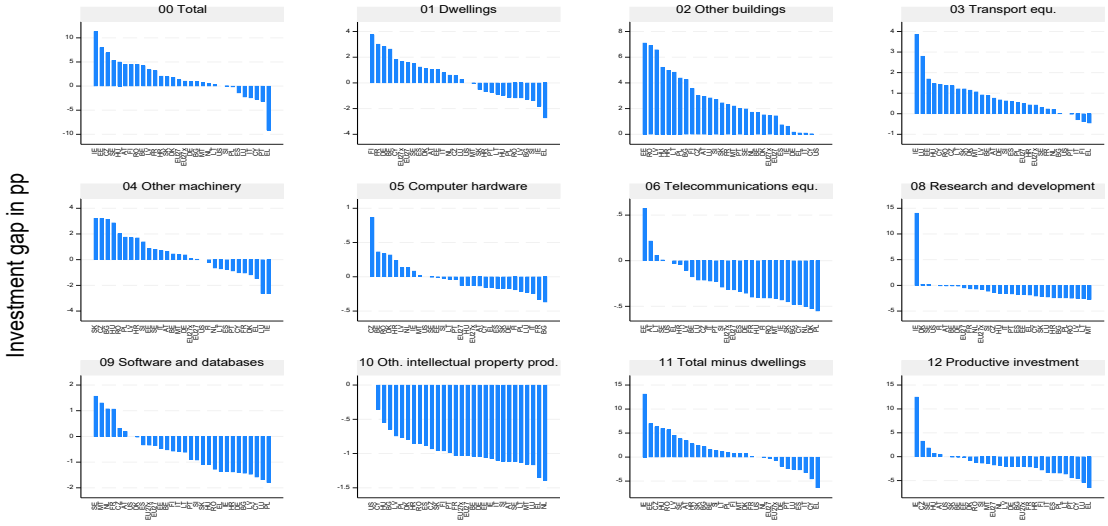
Figure A.8 / Asset price index for software and databases, by country



Source: Eurostat NA, EU KLEMS; own calculations.

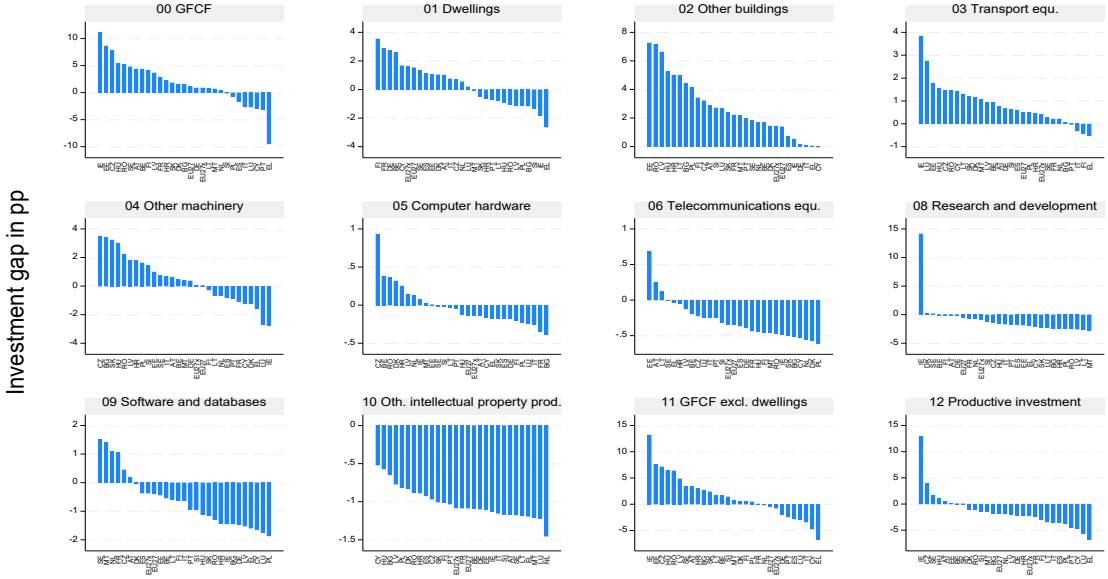
Appendix B – Additional results for Section 4

Figure B.1 / Investment gaps by country and asset types (current values), averages 2013-2019



Source: Eurostat NA, EU KLEMS; own calculations.

Figure B.2 / Investment gaps by country and asset types (chain-linked volumes, applying US deflators), averages 2013-2019



Source: Eurostat NA, EU KLEMS; own calculations.

Table B.1 / Investment rates by asset type (current values, national deflators), %

	EU27			EU27x			US		
	2001-2008	2010-2012	2013-2019	2001-2008	2010-2012	2013-2019	2001-2008	2010-2012	2013-2019
Total GFCF	25.0	23.0	23.1	24.9	23.0	22.8	23.7	20.1	21.8
Dwellings	6.6	5.7	5.5	6.6	5.8	5.5	5.7	2.8	3.9
Other buildings and structures	6.5	6.2	5.6	6.5	6.2	5.7	4.7	4.0	4.2
Transport equipment	2.2	1.8	2.0	2.2	1.8	2.0	1.3	1.2	1.5
Computer hardware	4.8	4.4	4.3	4.9	4.4	4.4	4.6	4.5	4.3
Telecommunications equipment	0.6	0.5	0.5	0.6	0.5	0.4	0.8	0.7	0.6
Other machinery	0.5	0.4	0.4	0.5	0.4	0.4	0.9	0.7	0.7
Research and development	1.9	2.2	2.7	1.9	2.1	2.3	2.9	3.1	3.2
Software and databases	1.5	1.6	1.9	1.5	1.6	1.9	1.8	2.0	2.2
Other intellectual property products	0.2	0.2	0.2	0.2	0.2	0.2	1.1	1.3	1.2
Total GFCF excl. Dwellings	18.3	17.3	17.6	18.3	17.3	17.2	18.0	17.3	17.9
Productive investment	11.8	11.1	11.9	11.8	11.1	11.6	13.3	13.4	13.7

Source: Eurostat NA, EU KLEMS; own calculations.

Table B.2 / Investment rates by asset type (in chain-linked volumes, national deflators), %

	EU27			EU27x			US		
	2001-2008	2010-2012	2013-2019	2001-2008	2010-2012	2013-2019	2001-2008	2010-2012	2013-2019
Total GFCF	24.3	22.6	22.9	24.3	22.6	22.7	21.9	19.7	21.9
Dwellings	6.6	5.6	5.4	6.6	5.6	5.5	5.7	3.0	3.8
Other buildings and structures	6.9	6.1	5.6	6.9	6.1	5.6	5.5	4.1	4.2
Transport equipment	2.0	1.8	2.0	2.0	1.8	2.0	1.2	1.1	1.6
Computer hardware	4.6	4.3	4.3	4.7	4.4	4.4	4.1	4.3	4.3
Telecommunications equipment	0.4	0.4	0.5	0.4	0.4	0.5	0.3	0.6	0.6
Other machinery	0.3	0.4	0.4	0.3	0.4	0.4	0.3	0.5	0.7
Research and development	2.0	2.2	2.7	2.0	2.1	2.3	2.9	3.1	3.2
Software and databases	1.4	1.6	1.9	1.4	1.6	1.9	1.2	1.7	2.3
Other intellectual property products	0.2	0.2	0.2	0.2	0.2	0.2	1.4	1.4	1.3
Total GFCF excl. Dwellings	17.7	17.0	17.6	17.8	17.0	17.2	16.4	16.7	18.1
Productive investment	10.8	10.9	12.0	10.9	10.9	11.7	11.1	12.7	14.0

Source: Eurostat NA, EU KLEMS; own calculations.

Table B.3 / Investment rates by asset type (in chain-linked volumes, US deflators), %

	EU27			EU27x			US		
	2001-2008	2010-2012	2013-2019	2001-2008	2010-2012	2013-2019	2001-2008	2010-2012	2013-2019
Total GFCF	25.9	27.9	24.6	25.8	28.0	24.3	21.9	19.7	21.9
Dwellings	7.4	7.5	5.7	7.3	7.6	5.8	5.7	3.0	3.8
Other buildings and structures	8.4	7.9	5.9	8.4	8.0	6.0	5.5	4.1	4.2
Transport equipment	2.3	2.2	2.2	2.3	2.2	2.1	1.2	1.1	1.6
Computer hardware	4.8	5.1	4.6	4.9	5.2	4.7	4.1	4.3	4.3
Telecommunications equipment	0.3	0.5	0.5	0.3	0.5	0.5	0.3	0.6	0.6
Other machinery	0.2	0.3	0.4	0.2	0.3	0.4	0.3	0.5	0.7
Research and development	2.2	2.7	2.8	2.1	2.6	2.5	2.9	3.1	3.2
Software and databases	1.2	1.8	2.0	1.2	1.8	2.1	1.2	1.7	2.3
Other intellectual property products	0.3	0.3	0.2	0.3	0.3	0.2	1.4	1.4	1.3
Total GFCF excl. Dwellings	18.7	20.6	18.9	18.8	20.7	18.5	16.4	16.7	18.1
Productive investment	11.0	12.9	12.9	11.1	12.9	12.5	11.1	12.7	14.0

Source: Eurostat NA, EU KLEMS; own calculations.

Table B.4 / EU investment gaps (in pp), by asset type (current values)

	EU27			EU27x		
	2001-2008	2010-2012	2013-2019	2001-2008	2010-2012	2013-2019
Total GFCF	1.3	2.9	1.3	1.2	2.9	1.0
Dwellings	0.9	2.9	1.6	0.9	3.0	1.6
Other buildings and structures	1.8	2.2	1.4	1.8	2.2	1.5
Transport equipment	0.9	0.6	0.5	0.9	0.6	0.5
Computer hardware	0.2	-0.1	0.0	0.3	-0.1	0.1
Telecommunications equipment	-0.2	-0.2	-0.1	-0.2	-0.2	-0.2
Other machinery	-0.4	-0.3	-0.3	-0.4	-0.3	-0.3
Research and development	-1.0	-0.9	-0.5	-1.0	-1.0	-0.9
Software and databases	-0.3	-0.4	-0.3	-0.3	-0.4	-0.3
Other intellectual property products	-0.9	-1.1	-1.0	-0.9	-1.1	-1.0
Total GFCF excl. Dwellings	0.3	0.0	-0.3	0.3	0.0	-0.7
Productive investment	-1.5	-2.3	-1.8	-1.5	-2.3	-2.1

Source: Eurostat NA, EU KLEMS; own calculations.

Table B.5 / EU investment gap (in pp), by asset type (based on data in chain-linked volumes, applying US deflators)

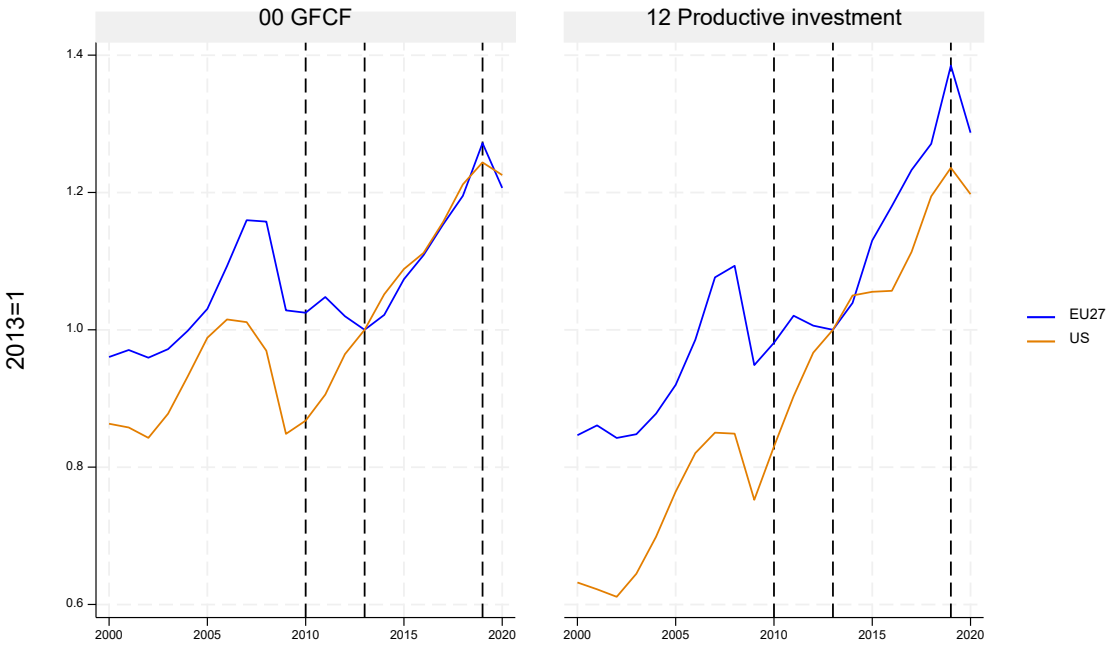
	EU27			EU27x		
	2001-2008	2010-2012	2013-2019	2001-2008	2010-2012	2013-2019
Total GFCF	4.0	8.2	2.7	3.9	8.3	2.4
Dwellings	1.7	4.5	1.9	1.6	4.6	2.0
Other buildings and structures	2.9	3.8	1.7	2.9	3.9	1.8
Transport equipment	1.1	1.1	0.6	1.1	1.1	0.5
Computer hardware	0.7	0.8	0.3	0.8	0.9	0.4
Telecommunications equipment	0.0	-0.1	-0.1	0.0	-0.1	-0.1
Other machinery	-0.1	-0.2	-0.3	-0.1	-0.2	-0.3
Research and development	-0.7	-0.4	-0.4	-0.8	-0.5	-0.7
Software and databases	0.0	0.1	-0.3	0.0	0.1	-0.2
Other intellectual property products	-1.1	-1.1	-1.1	-1.1	-1.1	-1.1
Total GFCF excl. Dwellings	2.3	3.9	0.8	2.4	4.0	0.4
Productive investment	-0.1	0.2	-1.1	0.0	0.2	-1.5

Source: Eurostat NA, EU KLEMS; own calculations.

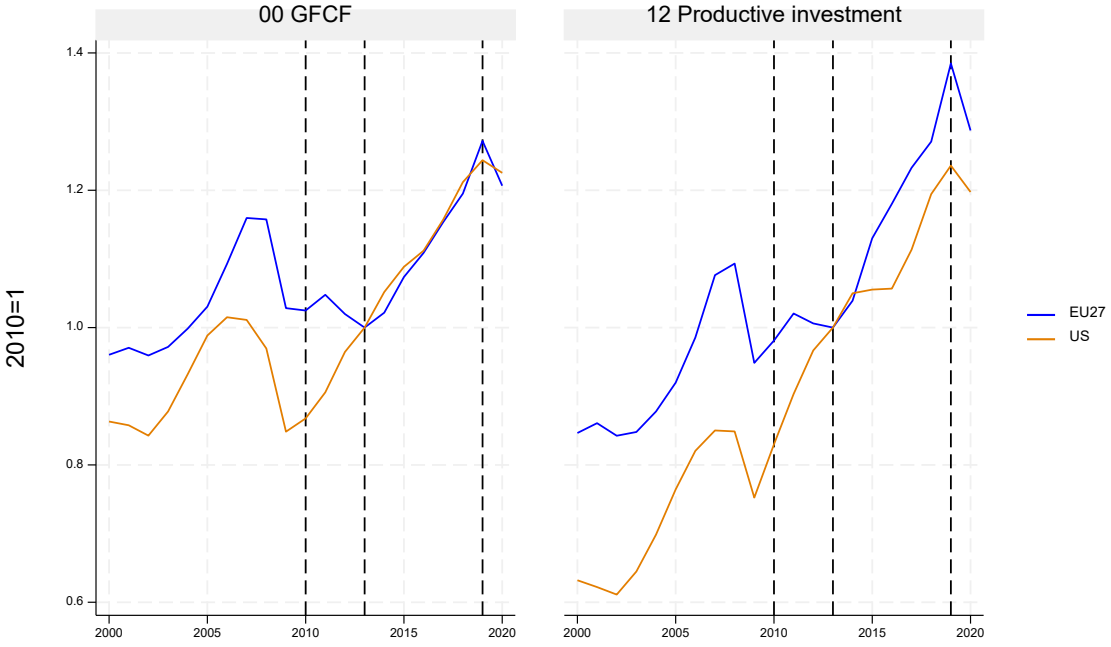
Appendix C – Additional results for Section 5

Figure C.1 / Index of GFCF for EU27

2013=1



2010=1



Source: Eurostat NA, EU KLEMS; own calculations.

Dynamics of productive investment and gaps between the United States and EU countries

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