
The EU has to tackle the lack of investments to secure its industrial future

29 October 2014

Executive Summary

- Investment in Europe is in a declining trend since the onset of the economic crisis in 2009
- Europe is in a downward spiral of “low investment – low productivity – low value added – low profitability” which hampers competitiveness and growth
- A delayed recovery in “industrial equipment and machinery” investments point out that Europe’s industrial infrastructure is becoming obsolete
- Europe lags behind major competitors in terms of labour, material and energy costs; investing in advanced manufacturing capabilities is key to boost productivity whilst optimizing resource use
- “Advanced manufacturing” should be placed at the top of the EU Industrial Policy as the major driver of competitiveness in the face of global competition

I. Introduction

The European Council of 21 March 2014 stated in its conclusions that “Europe needs a strong and competitive industrial base, in terms of both production and investment, as a key driver for economic growth and jobs”. However, latest indicators show that six years after the economic crisis, industrial production in the EU remains below the 2008 levels whereas investments remain stubbornly unresponsive to economic reform programmes¹.

According to Eurostat figures, **industrial production in the EU dropped by 22 % in 2009 and afterwards it steadily increased to regain over 90 % of its pre-crisis value by summer 2011** (see Annex – Figure 1). From that moment on until the end of 2012, industrial production in the EU-28 has been on a slow downward trend and then it has stabilized². When it comes to investment, **since the onset of the crisis the investment level in the EU has dropped by nearly four percentage points of GDP, from 21.1 % in 2007 to 17.5 % by June 2013**³.

Europe is currently suffering from a gap in total factor productivity compared to international competitors. This translates into an inability to generate growth and jobs. The manufacturing industry has higher labour productivity growth and higher total factor productivity growth than services⁴.

¹ Member States’ Competitiveness, Performance and Implementation of EU Industrial Policy, SWD(2013) 346, European Commission, 2013, p.10 http://ec.europa.eu/enterprise/policies/industrial-competitiveness/monitoring-member-states/index_en.htm

² Industrial Production Volume Index Overview, Eurostat, Data from May 2014 http://epp.eurostat.ec.europa.eu/statistics_explained/index.php/Industrial_production_%28volume%29_index_overview

³ Member States’ Competitiveness, Performance and Implementation of EU Industrial Policy SWD(2013) 346, p.10

⁴ According to an analysis by the European Commission as regards the state of industry in 2013, labour productivity growth has been higher in manufacturing than in services in the post-crisis period. Manufacturing industries have also outperformed services industries in total factor productivity (TFP) growth, which measures the efficiency by which companies convert inputs into output. Source: *State of the Industry, Sectoral overview and Implementation of the EU Industrial Policy*, SWD(2014) 14/3 accompanying document to the European CECIMO - Avenue Louise 66 – B-1050 Brussels - +32 2 502 70 90 | www.cecimo.eu – information@cecimo.eu

Therefore, investing in advanced manufacturing capabilities (equipment and technology) is key for Europe to close its productivity gap with competitors.⁵

II. Lack of investments in industrial equipment threatens Europe's industrial future

In the EU, machinery and equipment constitute one third of the overall fixed investment (see Annex – Figure 2). Investment in equipment and machinery is an important measurement tool for the competitiveness of an economy. It provides an indicator of how well businesses can keep up their manufacturing capability over a period of time.

Investment figures on production machinery and systems provide a gloomy picture for Europe. European domestic consumption of machine tools had dropped by 50% in 2009 from EUR17.8 billion in 2008 to EUR9.6 billion in 2010. Today, the level of European machine tool consumption, which represents the level of investments in productive capital assets, is still 30% below the pre-crisis level. In the aftermath of the economic crisis, corporate investments remain weak and do not compensate the rate of depreciation even in industrial powerhouses of the EU-28. According to a study⁶ by Roland Berger, currently, the industrial investment level in Europe is EUR 30 billion lower than the level of depreciation. As a result, the machinery park in Europe is ageing and becoming obsolete.

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For instance, the age of the machinery park⁷ in France increased from 17,4 years in 2008 to 19 years in 2013 and it has increased in Germany from 18,2 years to 19,1 years in the same period. In the case of both countries, the number of machines which are more than 15 years old has increased during this period. Estimations for Italy suggest a similar trend. It is estimated⁸ that machine tools come to the end of their life between 10 years (for numerically controlled (NC) machines) and 18 years (for non-NC machines). Europe cannot continue in the global race with outdated industrial infrastructures.

The installed machine tool base in Europe is ageing whilst the continent lags behind Asian competitors in the adoption of industrial robots.

The European industry is lagging behind its competitors in embracing novel production tools and equipment. According to statistics⁹ from 2012 from the International Federation of Robotics, South Korea has the highest robot density in the world employing 396 robots for every 10,000 workers. It was followed by Japan and Germany, which recorded figures of 332 and 273 respectively. Therefore, only one European country could enter the top three ranking. The average robot density in Europe was 80 for every 10,000 workers, which is above the world average but much lower than major competitors in Asia.

Investments in **new production machinery and automation systems enable the transfer of new capabilities to industrial enterprises to produce more complex products with higher value added** and at higher productivity rates. It is widely recognized that there is a strong relationship between capital stock and growth¹⁰ (see Annex- Figure 3). The creation of higher value-added products leads

Communication: *For an Industrial Renaissance*, (COM(2014)14), p.6 http://ec.europa.eu/enterprise/initiatives/mission-growth/index_en.htm

⁵ Since the onset of the crisis, the euro area countries have continued losing total factor productivity relative to the US and Japan, the indicator that best captures the impact of innovation and technological changes on the competitiveness of the economy. Source: *Member States' Competitiveness, Performance and Implementation of EU Industrial Policy SWD(2013) 346*, p.23

⁶ Industry 4.0 – The new industrial revolution – How Europe will succeed, Roland Berger, March 2014, p.15. Source: http://www.rolandberger.com/media/pdf/Roland_Berger_TAB_Industry_4_0_20140403.pdf

⁷ The machinery park includes production machines such as machine tools, robots, assembly, welding machines.

⁸ EC Product Group Study related to the Ecodesign of Energy-related Products (ErP) Directive 2009/125/E, Lot 5 Machine tools and related machinery Task 2 Report – Economic and Market Analysis, p.26 <http://www.ecomachinetools.eu/typp/reports.html>

⁹ <http://www.ifr.org/industrial-robots/statistics/>

¹⁰ One of the most important underlying reason for this explanation is that fixed capital investments are made if they are judged to be profitable, and profits are closely linked to output produced and sold, using the capital stock resulting from this investment. Source: *Investment and Investment Finance in Europe*, European Investment Bank, p. 35

http://www.eib.org/attachments/efs/investment_and_investment_finance_in_europe_en.pdf

to a higher level of profitability which then translates into new investments in innovation and further growth. A prolonged underinvestment in productive capital assets in Europe indicates a dangerous trend down the road, as it may deal a heavy blow on the competitiveness of the European industry and on economic growth.

III. Europe needs to have state-of-the art manufacturing capabilities to cope with global competition

Europe is traditionally a high-cost location for manufacturing but leading European sectors, such as machinery, automotive and aerospace, have managed so far to maintain a competitive edge by producing high value-added and innovative products. These sectors have relied on a strong research base, a highly skilled workforce and an excellent infrastructure as well as a competitive and highly integrated industrial “value chain” in Europe. However, in the aftermath of the economic crisis, Europe is further losing ground in cost competitiveness, seeing its infrastructure becoming obsolete and is lagging behind competitors in research and innovation spending. A significant number of manufacturers fear that parts of the industrial value chain is exposed to a risk of dismantlement¹¹ due to the inability to cope with global competitive pressures.

Europe cannot continue in the global race with an outdated industrial infrastructure.

III.a. Creating a competitive edge in a high-cost manufacturing location...

Currently, the average manufacturing costs in Germany, France and Italy are around 25% more expensive than in the US.

According to the Manufacturing Cost-Competitiveness Index for Top 25 Export Countries across the globe, launched by the Boston Consultancy Group¹², the average manufacturing costs in the US have recently come almost to parity with China, mainly due to the shale gas revolution and reduced energy costs (see Annex- Figure 4). Germany, France and Italy are around 25% more expensive than the US and around 10 to 15% more expensive than South Korea and Japan. Moreover, manufacturing costs in Eastern European countries, such as Poland and Czech Republic, are higher than in the US. Eastern Europe can thus no longer be qualified as a low-cost production location. New low-cost manufacturing centres, such as Mexico and Indonesia, are taking over China, which further increases competitive pressure on manufacturing locations in this part of Europe.

International competitors from low cost countries have a higher productivity growth rate even in key European industrial sectors such as mechanical engineering,¹³ allowing them to catch up with Europe. Meanwhile, they continue enjoying much lower wages. “The new member states’ companies have to further increase their know-how and the ability to manufacture more advanced products to justify current wage levels to meet the - Chinese challenge and not to lose workplaces in course of globalization”, concludes an EU funded study¹⁴ on the competitiveness of the mechanical engineering industry. Furthermore, even the top manufacturing countries in Europe show lag behind competitors in advanced economies in terms of labour productivity, gross operating rates and unit labour costs, which indicates a lower economic performance and profitability.

Investment in advanced manufacturing systems is key to improve productivity and compensate high labour costs.

¹¹ For instance, actors of the EU mechanical engineering industry fear that the production less complex parts, such as casting and welded steel constructions, originating in Eastern Europe may relocate due to cost pressure. Whereas, as far as other key components, such as hydraulics and engines, are concerned, it is feared that better opportunities to exploit scale effects in emerging markets could induce European component suppliers to dismantle capacities in the EU Source: *An introduction to Mechanical Engineering: Study on the Competitiveness of the EU Mechanical Engineering Industry*, pp.118, 182, http://ec.europa.eu/enterprise/sectors/mechanical/files/competitiveness/comp-mech-eng-2012-frep_en.pdf

¹² *The Shifting Economics of Global Manufacturing / How Cost Competitiveness Is Changing Worldwide*, bcg.perspectives, 19 August 2014, https://www.bcgperspectives.com/content/articles/lean_manufacturing_globalization_shifting_economics_global_manufacturing/

¹³ For instance, in the mechanical engineering industry, China has caught up with labour productivity rates in some Eastern European countries like Czech Republic, Poland and Slovakia. All of these countries specialize in low-to-medium tech products. Meanwhile, Chinese wages amount to one third of the wage level in these countries. This shows that China has become much stronger in cost competitiveness. Source: *An introduction to Mechanical Engineering: Study on the Competitiveness of the EU Mechanical Engineering Industry*, p.183

¹⁴ *An introduction to Mechanical Engineering: Study on the Competitiveness of the EU Mechanical Engineering Industry*, p.260

The European mechanical engineering industry is a world champion generating 37% of the global trade and EUR119 billion trade surplus. However, in an increasingly challenging global business environment, necessary steps need to be taken in a timely manner to ensure a strong future for this key sector in Europe. Investment in advanced manufacturing capabilities is a pre-requisite for the EU to improve labour productivity and increase value added creation through innovation, which will help compensate high labour costs. Furthermore, energy-efficient and resource-efficient production technologies will also become important to minimize energy and material use in production. Currently, the slowdown of investments in productive machinery and equipment deprive European manufacturing from much needed efficiency gains.

III.b. Keeping a strong industrial ecosystem as the backbone of the EU industrial base...

The competitiveness of strategic sectors in Europe, such as automotive, aerospace and machinery, relies on excellent upstream suppliers of key parts, components and production machinery. Value chains are highly integrated in Europe, which creates a dynamic environment (ecosystem) for innovation cooperation across companies and sectors. There is a strong level of specialization and a division of labour between European regions, which has been further consolidated with the entry of Eastern European countries in the EU after 2004. The sharing of low-cost and high value-added operations across European regions with different wage differentials and capabilities has contributed to a high level of specialization and to improving the cost competitiveness of the EU overall¹⁵.

The cost of losing production capacities to low-cost countries may be too high as it may result in losing of key manufacturing know-how.

Nevertheless, the industrial ecosystem in Europe is threatened by competitive pressures from low cost countries. Those latter continuously improve their productivity whereas high growth in wages coupled with low productivity levels hamper Europe's cost competitiveness. Moreover, due to the impact of macroeconomic policies in EU countries affected by the Eurozone crisis, manufacturers in these countries face additional constraints on their business growth, such as economic uncertainty, low demand from their customers and difficulties in accessing to bank finance. External factors which are not linked to their business performance undermine the competitiveness of these manufacturers in European and global markets.

Under the current circumstances, parts of the European industrial value chain may be forced to relocate to benefit from cost advantages and higher growth outside Europe, if not to close down. The disappearance of some strategic production capacities in the European industry value chain may be too costly. This may wipe away some key manufacturing know-how and skills in Europe, and it cannot be undone. Recent studies have proven that there is a strong link between innovation and the production location¹⁶; losing production leads to the loss of research and innovation capabilities which are required to ensure a sustained competitive advantage for industry.

Automated and flexible manufacturing will help SMEs restore competitiveness.

Therefore, it should be a high priority for European policy-makers to help businesses, especially SMEs, to upgrade their manufacturing systems. Shifting to automated and flexible manufacturing processes and to mass-customisation can help these companies differentiate themselves from competitors who rely on standard volume production. Innovation in production processes has therefore become an essential factor to gain a competitive advantage over low-cost countries. Moreover, better supply chain management and business process improvement are pivotal to boost

¹⁵ An introduction to Mechanical Engineering: Study on the Competitiveness of the EU Mechanical Engineering Industry, pp.198, 208

¹⁶ According to a recent report by the MIT, companies having access to a rich and diverse set of complementary capabilities enjoy a comparative advantage. It is stated that innovation in European regions builds on legacies: in industrial specializations, longstanding relationships with customers, workforce skills, and proximity to suppliers with diverse capabilities. Source: *Report of the MIT Task Force on Production and Innovation: A Preview of the MIT Production in the Innovation Economy Report*, Massachusetts Institute of Technology, February 22, 2013 http://web.mit.edu/pie/news/PIE_Preview.pdf

business performance in a globalized world. This requires also a greater focus on educating and training SMEs which are the backbone of the manufacturing industry in Europe.

III.c. Winning in the next rounds of innovation...

The European Commission Communication on industrial policy (2012) hailed a new era for the manufacturing industry which can result in the re-industrialization of Europe. This refers to a shift toward smart factories built on the basis of cyber-physical systems and Internet of Things, and which connect machines, work pieces and systems. Nevertheless, such a leap forward (or the so-called 'new industrial revolution') will not happen overnight. Europe needs to build on its industrial strengths, especially in innovation, and on its comparative advantages.

Today, a bunch of new technologies in the pipeline, such as machine-to-machine communication (M2M), the Internet of Things and additive manufacturing, have the potential to drastically change the world manufacturing landscape. Especially, advanced manufacturing systems powered by digital and communication technologies will be the driving force for optimizing costs and resource use for design, production and distribution in all industries. This way, the manufacturing comparative advantage can be expected to shift from low-cost countries to advanced economies.

If not reversed, the current interruption of investments will delay Europe's shift to smart factories incorporating interconnected products, processes and services.

Europe needs, therefore, to keep a close eye on advanced manufacturing investments and technology transfer. The timely adoption of new production technologies by industry will lay down the foundations for factories of the future which are smart, resource-efficient and human-centered.

European policy makers should pay equal attention to incremental and breakthrough innovation.

At the same time, Europe should maintain a strong suppliers' base to be the first to commercialize and exploit new manufacturing techniques. In a world characterized by fast technological change, the co-location of innovation and production is key to maintain a competitive edge in the introduction of new production technologies to industry which ultimately need to improved production processes and products.

As a matter of fact, there is a straightforward link between demand and innovation in manufacturing technology. New investments stimulate innovation on the supply side. Therefore, ***if not reversed, the current interruption of investments (prolonged situation of low demand) will make it difficult for the European industry to invent next generations of technology and enable their adoption in European factories.*** If Europe fails to adopt today's state-of-the art technologies, this will delay the transition of European manufacturing to the creation of intelligent factories (smart factories) that incorporate fully inter-connected products, processes and services.

It is of utmost importance that European policy makers pays equal attention both to breakthrough and incremental innovation. The second type of innovation includes engineering improvements in production processes of companies, providing European businesses with significant efficiency gains. Not all European industries create new businesses through start-ups as it is the case in the U.S. For instance, mechanical engineering companies generate new processes and products through the transformation of old capabilities and their reapplication, repurposing, and commercialization¹⁷.

IV. The new Commission should stick with its predecessor's policy targets and priorities

Recognizing the link between capital stock and growth, the European Communication on Industrial Policy (2012) has set the target of increasing the share of gross fixed capital formation in GDP from 18,6% in 2011 to levels above 23% by 2020. In addition, the Communication affirmed ***that***

¹⁷ Report of the MIT Task Force on Production and Innovation: A Preview of the MIT Production in the Innovation Economy Report, p.20

investment in equipment¹⁸ currently between 6 and 7% of GDP had to reach pre-crisis levels and grow at rates above 9% until 2020. Improving investment rates in productive capital assets is key to introduce new technologies in industry that will increase productivity rates and boost innovation.

Advanced manufacturing technologies (AMT) were identified as one of the six priority areas in the Commission's Communication. A Task Force was launched in late 2013 to investigate the barriers to the development and adoption of AMT in Europe. Advanced manufacturing had already entered in the radar screen of the European Commission when 'advanced manufacturing systems' was identified as one of the 'key enabling technologies' in the 2010. The Commission Communication on KETs (2009) highlighted that "advanced manufacturing systems are important to produce high-value marketable knowledge-based goods and the related services"¹⁹.

Recognizing the link between capital stock and economic growth, the previous Commission has set European targets for capital investments.

The Task Force on Advanced Manufacturing Technologies issued its final report in March 2014. It recognized the strategic role of AMT for the European industry, highlighting their importance for process innovation in the manufacturing industry and the fact that they enable the manufacturing of new products. The report analysed the state of technology transfer in Europe and concluded that although Europe remains a world leader in the supply of AMT (including automation, robotics, machine tools)²⁰, low demand induced by macroeconomic conditions is a constraint on deploying AMT in Europe. Besides the deterioration of business confidence, some other barriers to technology transfer have been identified, such as access to finance, low user awareness and a lack of internal competencies and skills.

The **Task Force report correctly pointed out that "tackling low demand" should be a high priority for improving Europe's position both in the supply and adoption of the state-of-the-art manufacturing technologies.** "More investment in equipment by European businesses would be needed to bring advanced manufacturing technologies into the factory floors and plants of Europe" the report stated. Moreover, bringing investments back on track is also crucial to stimulate innovation on the supply side and to ensure Europe's leadership in the development of advanced production technologies. Being the inventor of new production techniques allows a region to be the first to transfer them to its industrial base and to market these technologies globally.

V. The way forward

The report of the Task Force on Advanced Manufacturing Technologies identified and examined the ongoing European and national initiatives which support the development and adoption of advanced manufacturing technologies in Europe. Based on these important findings, we invite the new Commission to ensure the continuation of the work on advanced manufacturing technologies.

We are convinced that the right policy measures could help stimulate productive investments in Europe and help industry **break the vicious cycle of "low investments – low productivity – low profitability"**. This is also crucial to accelerate the forces driving innovation. Given the complexity of the challenges, no actor alone can overcome the problem of weak investments in European

¹⁸ ESA 95 provides a breakdown of machinery and equipment into two sub-groups. The first sub-group comprises transport equipment such as motor vehicles, trailers, ships, railway locomotives and rolling stock. The second group includes a wide variety of equipment ranging from machinery for the production and use of mechanical power and machine tools to communication equipment and medical instruments. Source: *Investment and Investment Finance in Europe*, European Investment Bank, p. 32
http://www.eib.org/attachments/efs/investment_and_investment_finance_in_europe_en.pdf

¹⁹ *Preparing for our future: Developing a common strategy for key enabling technologies in the EU*, COM (2009) 512/3
http://ec.europa.eu/enterprise/sectors/ict/files/communication_key_enabling_technologies_en.pdf

²⁰ The EU is the global market leader with a global trade share in advanced manufacturing technologies of 38%. For example, in robotics and factory automation, the global market share of EU producers is around 50% and in process automation around 30%. Source: *Advancing Manufacturing - Advancing Europe, Report of the Task Force on Advanced Manufacturing for Clean Production*, SWD 2014(120),
http://ec.europa.eu/enterprise/policies/innovation/policy/amt/index_en.htm

manufacturing. Public and private actors, including national and regional authorities, public and private banks, and universities should work together to address the different barriers to investments and technology transfer.

It should be noted that the situation with regards to investments is different across EU Member States. The most problematic areas remain the Southern parts of Europe, and especially countries which were affected by the sovereign debt crisis. Nevertheless, ***manufacturing value chains in the EU are highly integrated and are characterized by a strong specialization and a division of labour across European regions. Therefore, the weakening of parts of the value chain affect the competitiveness of the entire EU manufacturing industry.***

In current circumstances, ***external factors - which are not linked to the economic performance of a businesses but to the macroeconomic conditions and policies of the country in which the business is located – limit their ability to invest in productive capital assets and technology transfer. This creates an uneven playing field in the EU and hampers competition.*** Such a situation also contributes to the widening of the competitiveness gap between EU member states at the expense of manufacturers and investors in the periphery, which ***damages economic and social cohesion objectives.***

We recommend the Commission to undertake the ***following actions*** to advance the agenda on “advanced manufacturing technologies”:

- Set out an action plan to meet the targets of the previous Commission in gross fixed capital formation and investment in equipment
- Place the development and adoption of AMT as a high priority in the EU industrial policy, recognizing its benefits across sectors
- Conduct a pilot survey on levels of industry investment in productive assets and attitudes and barriers to increased investment. Gather (through the survey) economic data regarding the age of the installed machinery park to assess the competitiveness position of European regions
- Create a forum composed of industry specialists across the spectrum to discuss and validate the barriers to investments and technology transfer identified by the Task Force for AMT
- Prepare a monitoring and evaluation framework to underpin the efficiency and effectiveness of the delivery of the activities set out on the above-mentioned action plan. ■

Annex

Figure 1: EU-28 Industrial production for total industry and the main industrial groupings, monthly data, seasonally adjusted, 2000-2014, Source: http://epp.eurostat.ec.europa.eu/statistics_explained/index.php/Industrial_production_%28volume%29_index_overview

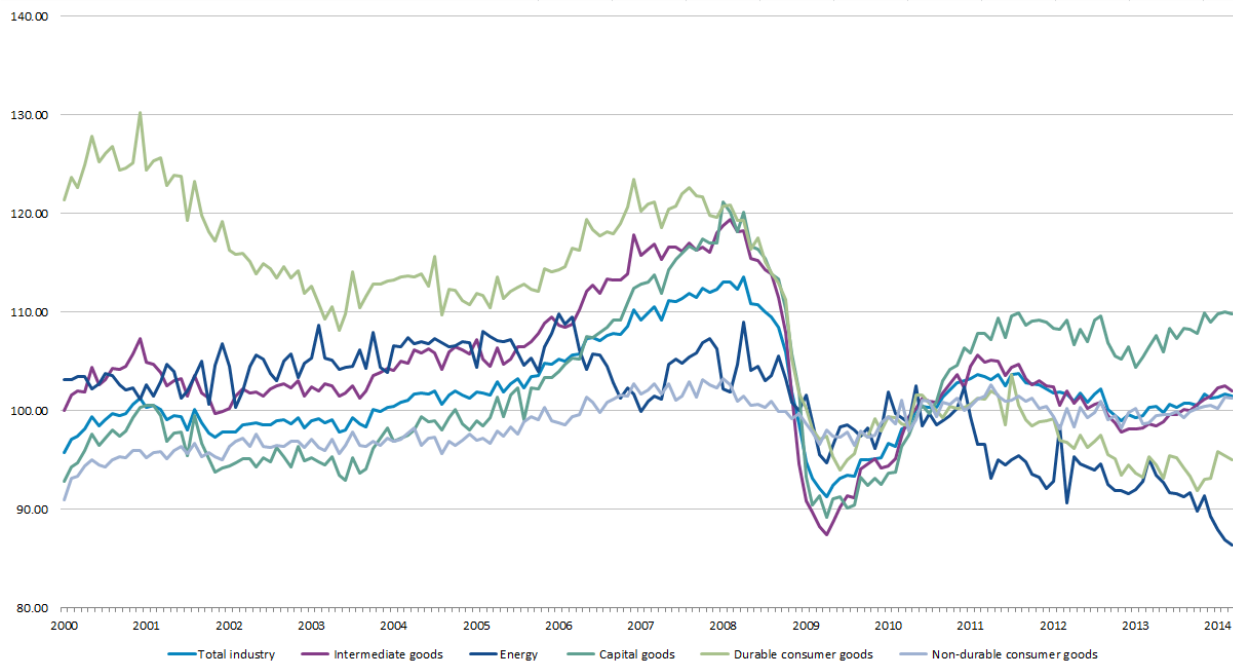
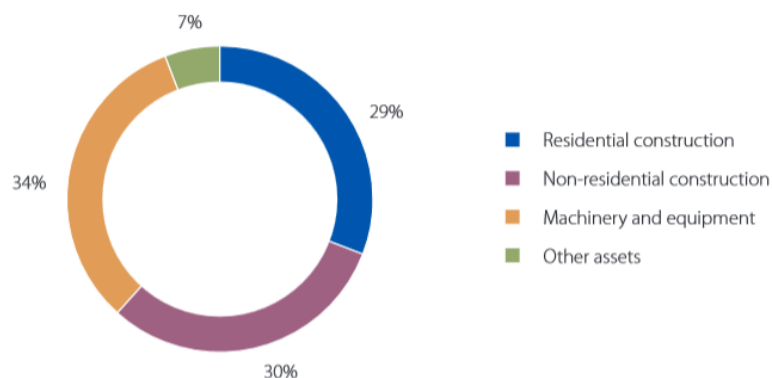


Figure 2: Average share of asset types in real total gross fixed capital formation in the EU-27. Source: European Investment Bank http://www.eib.org/attachments/efs/investment_and_investment_finance_in_europe_en.pdf

Figure 1 Average share of asset types in real total gross fixed capital formation in the EU-27, 1995-2012, in per cent



Source: Eurostat

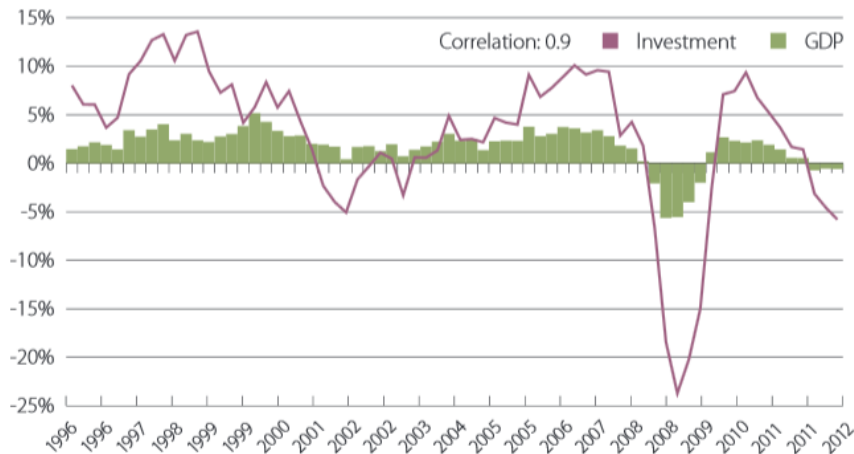
Notes: Data are annual, in 2005 constant prices. The category "Other assets" includes "cultivated assets" (0.3%) and "intangible assets" (6.7%)

Figure 3: The rates of change of real GDP and real gross investment in machinery and equipment over the period 1996-2012 for the EU-27. The two series move together with a correlation coefficient of 0.9.

Source: European Investment Bank

http://www.eib.org/attachments/efs/investment_and_investment_finance_in_europe_en.pdf

Figure 5 Real gross investment in machinery and equipment and real GDP in the EU, rate of change in per cent



Source: Eurostat

Notes: Rates of change are computed with respect to the same quarter of the previous year, based on quarterly (not seasonally adjusted) series in euros, chain-linked volumes with reference year 2005.

Figure 4: BCG Manufacturing Cost Index

https://www.bcgperspectives.com/content/articles/lean_manufacturing_globalization_shifting_economic_global_manufacturing/

