

1 Introduction: Europe and the new manufacturing

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Manufacturing takes up a central position in the agendas of many politicians. It used to provide plenty of jobs that did not require high skills. The idea that such jobs could be revived is behind the demand that products should be ‘made in...’ the countries that consume them, the calls from the European Union for a European industrial revolution and Donald Trump’s promise to create “*millions of manufacturing jobs*”.

The problem with such rhetoric is that it has as its reference point an old version of manufacturing. The new version of manufacturing (sometimes called Industry 4.0) also requires attention from politicians, but for different reasons than the provision of millions of old-style production-line jobs.

There is some good news from manufacturing that can underpin the policy discussion. After a long period of decline in manufacturing’s share in total employment, the bottom seems to have been reached and the decline has stopped or at least its pace has slowed. The massive offshoring of manufacturing jobs to Asia has also slowed, with even some evidence of reshoring. The manufacturing sector is innovating, using new technologies to meet future demand, bringing new kinds of manufactured products to the market, reinventing existing products into new offerings and improving the efficiency of manufacturing processes. Examples of technologies used by innovative manufacturers include 3D printing, robotics, new materials, smart communication systems and ‘big data’ management.

Such innovations have changed how many, where and what type of manufacturing jobs are created. Digitalisation and robotics have powered the automation of production processes. Better transportation and information technology has allowed firms to unbundle different tasks making it possible to design and coordinate longer and more complex supply chains that cross national and firm boundaries. Value creation has shifted from the production and assembly of parts to their development and design, the management of the supply chain and after-sales servicing.

The trend towards more complex value chains has resulted in official statistics, which typically categorise firms according to what their largest block of employees does, misrepresenting the changes in the number of jobs in the manufacturing sector. A shift of jobs outsourced by manufacturing firms to other sectors (such as accounting, marketing and after sales services) might look like a loss of jobs for manufacturing, but is not a loss to the economy. Some trends cut the other way, with manufacturing firms turning themselves into sellers of services. Car manufacturers for example are reinventing themselves as providers of mobility services rather than producers and sellers of machines on wheels. Thanks to big data technologies, manufacturers can use the amount of data they accumulate on their products to sell related services. This has the potential to lead to a growth in jobs within manufacturing firms, but in their services departments. Apple is still classified as a manufacturer though it owns no factories.

There are other encouraging trends emerging from the new version of manufacturing. Thanks to digital technologies, such as 3D printing, the design and production of manufactured goods are increasingly interwoven, allowing high-tech production to remain close to the designers and engineers who thought up the product. Using new technologies to keep design and manufacturing tightly coupled can shorten lead times, which is particularly relevant in industries driven by fashion. Shorter value chains will allow production jobs to be located close to markets and/or the sources of technological

know-how. This could bring back some of the previously offshored jobs. These new production jobs will however no longer be the jobs associated with old-style assembly lines.

This potential for growth in manufacturing-related jobs feeds the inclinations of politicians to support the revival of manufacturing. But the realisation of this potential requires (new) manufacturing firms fully to exploit the potential offered by new (digital) technologies and incumbent firms to reinvent themselves. These (re)new(ed) manufacturing firms will provide good jobs, but these will be jobs of the future, not the past; they need skill and adaptability.

It is clear that the policy discussion on the future of manufacturing requires an understanding of the changing role of manufacturing in Europe's growth agenda. Europe needs to know how it can realise the potential for industrial rejuvenation. How well are European firms responding to the new opportunities for growth, and in which global value chains are they developing these new activities? Does Europe have the right conditions for its economies to create and capture value from the activities that contribute most strongly and sustainably to Europe's growth and external competitiveness? And even if European manufacturing is taking up the new opportunities, the question remains whether rejuvenation will generate the same number and type of jobs as in the past. This discussion goes beyond a discussion about manufacturing production activities. It cuts across sectoral boundaries and the classic divide between manufacturing and services.

The evidence in this Blueprint shows that the challenge for European policymakers is how to promote and attract those high-value added activities within global chains that are the basis for sustainable growth and competitiveness. Such activities are not necessarily production related, but will increasingly have service-like characteristics and do not necessarily require all the activities of the whole value chain to be located at home.

This focus on high-value activities cuts across sectoral boundaries. High-value activities can be identified within all manufacturing

sectors, both low-tech and high-tech, and extend into service activities. We thus need a clearer horizontal perspective on Europe's competitiveness, rather than a sectoral view. The discussion should be about establishing the right conditions for economies and firms to create and capture value from the activities that contribute most strongly and sustainably to Europe's growth and external competitiveness, wherever their intra-EU geographical or sectoral home base might be.

Imposing tariffs and taxes on companies that seek to move jobs overseas, as President Trump threatens to do, is not the way to go. Most manufacturing jobs that were lost are not going to return because they were not shipped abroad in the first place. Rather, they were lost because of the introduction of new ways of boosting productivity and reducing costs. Restricting trade will only disrupt the complex cross-border supply chains on which manufacturing firms rely to build global competitiveness. On the contrary, all kinds of trade costs should be reduced, and interconnecting infrastructure should be prioritised, to allow firms to participate in international value chains whenever that allows them to create more value.

A priority should be a policy framework that removes barriers and creates the framework conditions that give firms the incentive to develop innovative strategies to create new higher-value activities. As large, open and interconnected consumer markets remain a major motivator for business, an effective internal market and an innovation-friendly regulation and competition policy will and should remain EU priorities. Completing the single market, particularly the single market for supporting business services (including cross-border transport, digital and energy infrastructure), is perhaps the most important policy objective for reinforcing manufacturing's role in driving growth.

A further challenge is the structural shift from classic production jobs towards higher value-added types of jobs, and the implications this has for the labour market. Governments will need to facilitate this

structural shift. This implies an education policy agenda to ensure that engineers and technical workers are in good supply and to provide more vocational training and retraining programmes to refresh the skills of current workers or laid-off workers.

As the challenges and trends are common for all value-added creating sectors, government intervention should be sufficiently horizontal. Governments should not succumb to the temptation to pick particular sectors.

In 2012, the European Commission published a communication on a new industrial policy¹ that set out a roadmap for reindustrialising Europe, with the aim of “*raising the share of industry in GDP from the current level of around 16 percent to as much as 20 percent in 2020*”. Although the Commission stressed the need for a comprehensive vision “*mobilising all the levers available at EU level, notably the single market, trade policy, SME policy, competition policy, environmental and research policy in favour of European companies’ competitiveness*”, the communication returned to a more targeted approach, identifying six priority action lines (including key enabling technologies, clean vehicles and smart grids). The communication was followed by action plans for specific sectors. As argued in a previous Bruegel Blueprint², it is doubtful that targeting a minimum share of GDP for manufacturing and focusing on specific sectors and technologies is the right approach. The issue is not whether manufacturing is or should be important for economies, nor is it how many manufacturing jobs to have or save. Rather it is what type of activities Europe should focus on in the value chain for goods, which will allow the creation of sustainable jobs and growth in Europe. This discussion cuts across sectoral boundaries and requires a horizontal approach rather than a sectoral

1 'A Stronger European Industry for Growth and Economic Recovery', available at <http://eur-lex.europa.eu/legal-content/EN/TXT/?uri=CELEX:52012DC0582>.

2 This Blueprint updates and complements a previous Bruegel Blueprint: Veugelers, R. (ed) (2013) *Manufacturing Europe's future*, Blueprint 21, Bruegel, available at <http://bruegel.org/2013/10/manufacturing-europes-future/>.

view, establishing the right conditions for economies to create and capture value from activities that contribute most strongly and sustainably to Europe's growth and external competitiveness.

Further European Commission communications on industrial policy, such as the 2014 communication 'For a European Industrial Renaissance'³ continued with this two-tiered strategy by emphasising a holistic horizontal approach with "*policies and actions for the modernisation of the industrial base and for the transition towards an ever more innovative, modern and sustainable economy*", while also developing sector-specific action plans that support key industrial sectors and specific actions directed at specific sectors, such as space and defence. Key enabling technologies remain a particular focus of the EU's industrial policy⁴.

On 29 May 2017, the Council of the European Union called on the Commission⁵ to provide a holistic EU industrial policy strategy in time for the spring 2018 European Council meeting. The Council of the EU emphasised that this should be based on integrated value chains and inter-clustering linkages, encompassing enterprises of all sizes operating in the manufacturing industry and related services sectors. The Council highlighted that "*this should embrace, amongst others, human capital, research, development and innovation, digital transformation, tackling efficiently and robustly unfair commercial practices, sustainable and affordable energy sources, resource efficiency, industrial servitisation and better regulation*". While this seems a call for a

3 Available at <http://eur-lex.europa.eu/legal-content/EN/TXT/?uri=CELEX:52014DC0014>.

4 These are a group of six technologies: micro and nanoelectronics, nanotechnology, industrial biotechnology, advanced materials, photonics, and advanced manufacturing technologies. They have applications in multiple industries and help tackle societal challenges.

5 'Conclusions on a future EU industrial policy strategy', available at <http://www.consilium.europa.eu/en/press/press-releases/2017/05/29-compet-conclusions-future-industrial-policy-strategy/>.

much-needed truly horizontal EU growth policy, as Bruegel scholars have already advocated (see footnote 2), it at the same time continues to mention the importance of the cumulative effect of policies and their consistency and states that “*the approach should include, when necessary, sectorial initiatives for sectors facing economic change and high growth potential sectors*”.

The analysis in this Blueprint provides further support for a holistic, horizontal EU growth policy, which seems to be the direction taken in the latest European Commission communication. The effectiveness of the deployment of this industrial policy should be closely monitored, with regular empirical analyses and feedback to inform follow-on policy making. This monitoring should include a sectoral perspective, concentrating particularly on how Europe is faring in new emerging sectors that are still fragile. Such sectoral monitoring would allow assessment of how the multitude of policy instruments, from various policy domains and from EU, national or regional levels, interact to affect the efficiency of the sectoral eco-system and would underpin policy realignment when needed. Sectoral monitoring within an effects-based holistic horizontal growth policy can thus substitute for *ex-ante* targeting with specific actions and funding for selected ‘strategic’ sectors and technologies. Establishment of a unit inside the European Commission dedicated to such monitoring and analysis would allow for a long-term commitment and a critical scale for expertise building. As the analysis will integrate evidence from different Commission directorates, such a monitoring unit should sit at a central level within the Commission services, such as within the Secretariat-General or the European Political Strategy Centre.

A summary of the issues covered by this Blueprint is as follows:

Chapter 2, *European and global manufacturing: trends, challenges and the way ahead* by Reinhilde Veugelers and Uuriintuya Batsaikhan, takes stock of the long-term trends in value added and employment in manufacturing. Despite its declining value added and employment shares, manufacturing continues to be a vital contributor to the EU’s

innovation performance and external competitiveness. But in order to sustain manufacturing's competitive advantage, a sufficient shift to higher value-added activities and higher-skilled jobs needs to take place. The EU needs to move up the innovation ladder from its current position in medium technology-intensive activities to high R&D intensity activities, on a par with the United States and Japan. Investment in services sectors is equally important. The chapter shows that market services sectors represent an increasing share of value-added growth, while non-market services sectors account for large part of within-EU productivity growth.

Chapter 3, *The competitiveness of European industry in the digital era* by Carlo Altomonte, Filippo Biondi and Valeria Negri, documents how recent productivity trends in European industry are related to the adoption of information and communications technologies and related investments. The aggregate productivity of manufacturing has substantially recovered in Europe, but its contribution to overall country productivity is small because the manufacturing sector is losing ground in terms of share of hours worked throughout the EU. Greater growth in IT capital stock is associated with better productivity performance, in terms of both labour productivity and total factor productivity. However, all indicators at industry or country-level are by definition averages, which reflect both leading and lagging firm performance and thereby could lead to so-called aggregation and dispersion biases. The effects of ICT capital investments are on average positive and significant for productivity, but these are essentially driven by the most productive companies. Thus, while policies aimed at increasing digitalisation and the development of 'Industry 4.0' are powerful tools to foster the competitiveness of EU industry, they are also likely to increase the gap between the most successful companies and those left behind.

Chapter 4, *Firm growth dynamics and productivity in Europe* by Albert Bravo-Biosca, zooms in on firm growth as an important driver of economic growth. Despite the recognised importance of this process,

there is limited cross-country comparable data to inform policy. The chapter presents a database that measures the distribution of firm growth in twelve countries. The data allows measurement of average growth and also the growth rate for all the percentiles of the growth distribution, broken down by size, sector and age. This shows that firms in the US grow and shrink more rapidly than in Europe, which has a much larger share of static firms. Having a higher share of static firms is associated with slower productivity growth.

Chapter 5, *A revival of manufacturing in Europe? Recent evidence about reshoring* by Dalia Marin, Reinhilde Veugelers and Justine Felieu, examines offshoring of European manufacturing jobs. Globalisation and the international division of labour have shaped the relocation of manufacturing jobs and raised concerns in advanced economies. In the era of advanced manufacturing technologies, the factors that matter for deciding on the location of manufacturing facilities and jobs are quickly evolving. With global value chains not expanding since 2011, we might have entered a new period of globalisation in which firms reorganise into shorter, regional or local value chains. The chapter identifies a slowly changing pattern of offshoring around the world driven particularly by reshoring by Chinese companies and significantly less offshoring to southern Europe. Activity moved from southern Europe to China and central and eastern Europe, leaving total offshoring activity mostly flat in most European countries.

Chapter 6, *Manufacturing in central and eastern Europe* by Maciej Bukowski and Aleksander Śniegocki, considers industrialisation in central and eastern European countries from a historical perspective. After 45 years of communism and centrally planned systems, a process of intensive industrialisation in the region and catching up with the west took place on the back of a rapid inflow of technology and know-how through foreign direct investment. After EU entry, central and eastern European countries rapidly integrated into European and global value chains. However, full quantitative and qualitative convergence with western Europe is likely to happen only in the next 20-30

years. Central and eastern European countries need to help their most productive manufacturing industries and services to invest in R&D, while continuing to attract foreign investment and know-how to close the technology gap, and training and retaining human talent.

Chapter 7, *Europe's comparative advantage in low-carbon technology* by Robert Kalcik and Georg Zachmann, examines low-carbon technologies, which have exhibited high growth rates and are predicted to attract increasing investment. The potential of countries to excel in these emerging sectors, specifically photovoltaics, batteries, wind turbines and electric vehicle technology, is assessed based on their current export and technological specialisations. Even if a country is currently not good at exporting or patenting in a certain sector, it might acquire this capability if it is strong in proximate sectors. A regional analysis yields insights into the strength of spillover effects and the locations of technology clusters.

Chapter 8, *From big oil to big data? Perspectives on the European energy industry of the future* by Simone Tagliapietra and Georg Zachmann, examines the future prospects of the European energy sector, which is going through a profound transformation, driven by decarbonisation and digitalisation. European oil and gas companies are reacting differently to these new challenges and, in several cases, there seems to be a lack of vision about how to adapt to the transformation towards a low-carbon system. European utilities are also struggling to reinvent themselves to make the best of the transition. While some are decisively pushing for a shift in their business models from electricity producers to smart-energy services providers, others find it more difficult to reshape their traditional business models.

Chapter 9, *Fintech in Europe: challenges and opportunities* by Silvia Merler, examines the future prospects of technology-enabled finance (fintech) in Europe. The recent rise of fintech has spurred the interest of financial markets and policymakers, and has raised concerns about the impact on the traditional banking business. Globally, the balance between competitive and collaborate fintech is in favour of the latter

but in Europe, competitive fintech seems to prevail. EU countries have opted for different regulatory approaches. In the absence of internationally agreed regulatory standards for fintech, the distinction is between those national authorities that have acted within already existing frameworks, and those that have introduced new rules specifically for fintech. Dealing with fintech at EU level would help ensure that regulatory requirements are harmonised, which is important in light of fintech's potential financial stability risks.

Chapter 10, *Strengthening cross-border e-commerce in the European Union* by J. Scott Marcus, John Morales and Georgios Petropoulos, zooms in on the digital services sector in Europe, specifically online sales. The imperfect integration of the European market with regard to digital services and online sales represents a substantial lost opportunity for Europe. Online purchases are growing rapidly within the EU, but cross-border purchasing lags significantly behind domestic online purchasing. If e-commerce sales within the EU were as easy and cost-effective as domestic sales, retail prices would decrease both online and offline, while the consumer and producer surpluses associated with retail sales in the EU would increase. A coordinated cluster of measures will be needed to unlock the full potential of cross-border sales in the EU.

All the chapters illustrate how the European economy is taking advantage of new technological opportunities, is reshaping into international value chains to revitalise and refocus on high value-added activities,. However, this revitalisation process could take place much faster in Europe and could be spread more broadly across more countries, companies and sectors.