CASE Working Papers
CASE 25th Anniversary Papers

The Future Development of EU Exports in a Global Context

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No 8 (132)

WARSAW BISHKEK KYIV TBILISI CHISINAU MINSK

CASE – Centrum Analiz Społeczno-Ekonomicznych
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This working paper is a part of the CASE 25th Anniversary Papers series which features papers from the CASE 25th Anniversary Conference "The Future of Europe" (November 17-18, 2016). CASE 25th Anniversary Papers are sponsored by Narodowy Bank Polski, the patron of the conference.

Keywords:
global trade patterns, gravity scenarios, EU industrial policy

JEL classification:
F14, F17, F63

Graphic Design:
Katarzyna Godyń-Skoczylas | grafo-mania

EAN: 9788371786648

Publisher:
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This paper is based on a background study for the European Competitiveness Report (ECR) 2015 financed by the European Commission within the Framework Service Contract No. ENTR/300/PP/FC-WIFO. Responsibility for the information and views expressed in the study lies entirely with the authors.

Abstract

Global trade patterns are changing rapidly. Emerging economies are increasing their share of exports overall and intensifying competition in nearly all sectors. Using a gravity-based approach, this report examines the future profile of European Union (EU) world market shares at the aggregate and sectoral level. It further points towards the changing patterns of trade within the EU. Based on the results, some conclusions on EU industrial policy are drawn.

1. Introduction and motivation

Global trade patterns are changing rapidly for various reasons. Emerging economies are increasing their share of gross domestic product (GDP) in the world economy and therefore also their share in world total exports, thus leading to an intensification of trade relations across the globe which might further lead to changes in patterns of specialization across world regions and countries. Further, due to the rising importance of global value chains, trade volumes are increasing as products are shipped across borders several times. This global trade integration might further intensify competition in higher value-added activities where European industries have traditionally had a comparative advantage.

This is the basis of which the recent Commission communication on industrial policy, *For a European industrial renaissance* (European Commission, 2014), refers to. In this communication, the basis on which the European Union (EU) needs to compete in global markets is described as: "With scarce natural and energy resources and ambitious social and environmental goals, the EU's comparative advantage in the world economy will continue to lie in high value-added goods and services, the effective management of value chains and access to markets throughout the world" (European Commission, 2014). In this rapidly changing context, it is important to know where EU industry will stand in global export markets in the future. A picture of how global trade patterns will evolve for the EU both at the aggregate and Member State level can inform the policy debate on future developments of EU external competitiveness and highlight areas where action might need to be taken to maintain a comparative advantage in high value-added sectors and activities.

In this paper, external competitiveness is defined as how successful a country is in third markets compared to other countries.[1] The most commonly used measures of external competitiveness are world market shares and revealed comparative advantage (RCA), both of which can be calculated from standard trade data. These world market shares and RCAs not only change because of domestic developments but also because of changes in

1 Note that a broader definition of "competitiveness" is stated in COM (2002): "...the ability of the economy to provide its population with high and rising standards of living and high rates of employment on a sustainable basis" (see COM(2002) 714 final).

the situation of all competitor countries. Therefore, a proper assessment of likely future developments of world market shares and RCAs requires considering global developments.

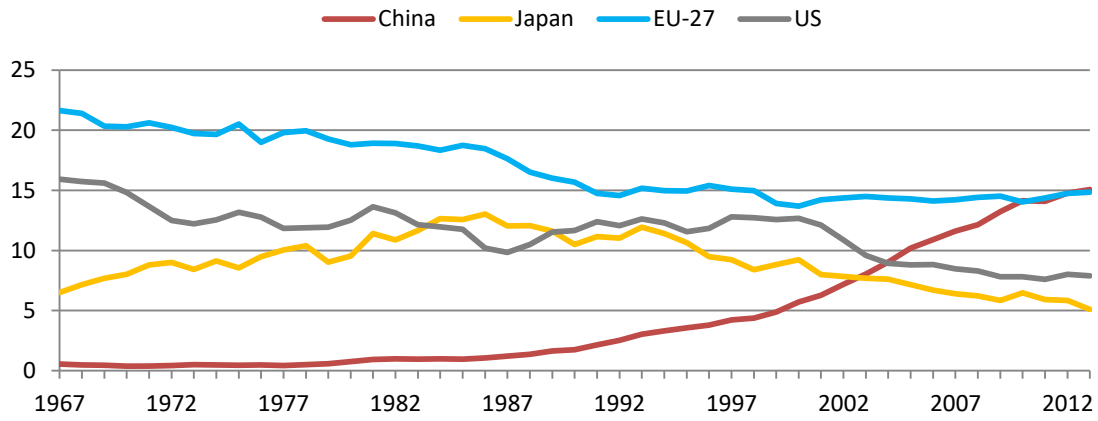
The overall objective of the paper is therefore to give an assessment of likely future developments of EU exports both at a broad macroeconomic level and also at a more detailed sectoral level, pinpointing potential future strengths and weaknesses in future EU exports patterns in a global perspective. The second section highlights some trends in global market shares, and the third section introduces a gravity model on which future developments are assessed. The fourth section then shows developments of intra-EU trends. Section five provides some important policy conclusions.

2. Trends in global market shares

2.1 Long-term trends in world market shares

Figure 1 shows the evolution of EU trade and specialization patterns over approximately the last 50 years using the CHELEM dataset[2] which includes global trade data for 70 sectors from 1967 onwards. The world market shares are calculated as the share of exports of a country in total manufacturing relative to the manufacturing exports of all countries. The figure presents evidence on the evolution of market shares for total manufacturing in four major economies, namely China, Japan, the EU-27 (EU-28 without Croatia), and the United States (US).

Figure 1. Evolution of world export market shares (in %)



Note: Excluding intra-EU trade; EU-27 is EU-28 without Croatia.
Source: CHELEM; authors' calculations.

2 These data are provided by CEPII (France); see http://www.cepii.fr/anglaisgraph/bdd/chelem.htm.

In the period considered, the EU-27 lost 5 percentage points between 1968 and 1990. From this year on, however, the EU-27 market share stagnated at around 15%. As one can see, the trends in market shares for the US and Japan are quite different. The US market shares dropped from 15.5% to 8% over the whole period, with a relatively stable share at around 13% in the 1990s followed by a dramatic decrease of around 6 percentage points in the 2000s. Gatto et al. (2011) provide an in-depth analysis of this decline pointing towards the general decline of the US share in world income and the relevance of several industries for explaining this downward trend. Mandel (2012) also points towards the changing composition of trade products and the diminished share of the US in global output. Both papers however point out that these factors should not be seen as a decline in this country's ability to compete in global exports. Japan's trend follows an inverted U-shape curve: after an increase from around 7% to 12% in the second half of the 1980s, Japanese exports in the last 15 years of observations experienced almost the same tendencies as their US counterparts. Again, the general decline of Japan in the global output plays a role, further aggravated by the long-term stagnation of the Japanese economy since the 1990s. Together, from the beginning of the 1990s, the US and Japan appear to have been losing a total of around 14 percentage points of the world markets, a figure consistent with the almost 13-point rise of the Chinese market share from 2% to 15% of the world share in the period 1990–2013. These changes were more significant from 2000 onwards. In that respect, for example, Bayoumi (2011) points towards the role of trade liberalization, increasing vertical specialization, and general income convergence. Particularly, the fact that emerging market economies have become major players in global trade is an important cause. Furthermore, the role of shifting patterns towards higher technology-intensive industries is mentioned as an important factor.

2.2 Trends in manufacturing gross exports since 1995

This section provides a detailed comparison of the world market shares of the EU and its major international competitors. It focuses on the developments of exports for the EU-28 (for extra-EU-28 exports) at NACE Rev. 1 two-digit industry levels since 1995. The data source for this analysis is the BACI dataset provided by CEPII, which is based on countries' customs data reported by UN-COMTRADE. It provides free-on-board (FOB or FOB equivalent) data on exports (imports) in values (thousands of US dollars) at the six digits of the Harmonized System Nomenclature (HS, 1992 version) from 1995 to 2013, for all pairs of countries/territories in the world aggregated to the industry level.

Table 1 presents more detailed figures concerning changes in world market shares by industry for the year 2013. The EU-28 is still the most important exporter in five industries, including chemicals (28.6%), machinery (32.0%), and transport equipment (30.5%). These market shares are well above that for the EU-28 as a whole (21.2%). This also applies to food, beverages, and tobacco (22.6%) and pulp and paper (29.8%). In all other industries – apart from the two exceptions of coke and petroleum and basic and fabricated metals – the second largest exporter is China, though differences in some industries are relatively small. Again, there are significant changes over time. China has been able to increase market shares in all industries (with the only exception in coke and petroleum), with impressive magnitudes between 9.7 percentage points in basic and fabricated metals to more than 20 percentage points in textiles, footwear, non-metallic mineral products, and electrical and optical equipment. Despite the decline in the overall market share, the EU-28 has been able to increase market shares in the wood and wood products industry (+8.3 percentage points), pulp and paper industry (+2.3 percentage points), and transport equipment (+5.2 percentage points). The most significant losses in market shares are observed for the textile industry (−6.0 percentage points), non-metallic mineral products (−16.9 percentage points), and basic and fabricated metals (−5.5 percentage points). It is further interesting to note that Japan lost significant market shares in medium-high to higher tech industries like machinery (−10.6 percentage points), electrical and optical equipment (−16.9 percentage points), and transport equipment (−14.1 percentage points). These losses have been less dramatic for the US, for which market shares declined in food, beverages, and tobacco (−4.3 percentage points), rubber and plastics (−7.5 percentage points), and electrical and optical equipment (−10.0 percentage points).

Table 1. World market shares by industry (in %)

	World market shares 2013 (in %)				Change in world market shares 1995-2013 (in percentage points)			
	EU-28	China	Japan	USA	EU-28	China	Japan	USA
Food, Beverages, and Tobacco	22.6	6.5	0.7	13.5	−3.6	1.9	−0.5	−4.3
Textiles and Textile Products	8.9	45.8	1.3	3.1	−6.0	20.2	−2.3	−3.5
Leather, Leather and Footwear	15.7	51.1	0.2	1.9	−6.9	21.5	−0.7	−1.9
Wood and Products of Wood and Cork	20.7	19.6	0.1	7.9	8.3	14.0	−0.2	−5.6
Pulp, Paper, Paper, Printing and Publishing	29.8	12.6	3.0	20.5	2.3	10.3	−1.1	−4.5
Coke, Refined Petroleum, and Nuclear Fuel	19.6	2.2	2.3	17.3	−2.5	−0.4	−1.4	6.4
Chemicals and Chemical Products	28.6	9.7	6.7	17.9	−4.6	6.6	−5.8	−4.0
Rubber and Plastics	18.6	26.1	10.0	13.6	−5.2	17.2	−6.1	−7.5
Other Non--Metallic Mineral	24.1	32.7	7.7	9.6	−16.9	24.4	−6.8	−2.6
Basic Metals and Fabricated Metal	16.4	15.0	7.1	9.1	−5.5	9.7	−5.3	−3.3
Machinery, Nec	32.0	20.6	12.1	14.2	−5.8	17.7	−10.6	−4.3
Electrical and Optical Equipment	12.7	33.2	7.6	10.3	−5.1	26.7	−16.9	−10.0
Transport Equipment	30.5	5.9	14.1	18.3	5.2	5.2	−14.1	−2.8
Manufacturing, Nec, Recycling	18.0	33.2	4.3	12.9	−2.1	11.9	−4.0	−5.3

Source: BACI, own calculations.

3. Assessing the future of Europe's export performance

In the next step, the main drivers of export performance are analyzed in a gravity framework and are then used in a scenario exercise. The strategy is to reveal the determinants of bilateral export levels and evaluate them with respect world market shares. Specifically, a gravity model of trade is tested which includes the most important determinants of trade flows: income, population, and endowments with human and physical capital in both the reporter and partner country. As one must bear in mind that the model will then further be used to calculate predictions, a requirement is to use a rather parsimonious model based on the variables for which forecast values are available or can easily be constructed. Methodologically, the parsimonious gravity model employed is specified as follows:

$$\begin{aligned} \ln Exp_{REPPARjt} = {} & \alpha_0 + \beta_1 \ln GDP_{REPjt} + \beta_2 \ln POP_{REPt} + \beta_3 \ln GDP_{PARt} + \beta_4 \ln POP_{PARt} \\ & + \beta_5 \ln HC_{REPt} + \beta_6 \ln HC_{PARt} + \beta_z \ln K_{REPt} + \beta_8 \ln K_{PARt} \\ & + \beta_{10} \ln CS_{REPt} + \beta_{10} \ln CS_{PARt} + Dummies + \epsilon_{REPPARjt} \end{aligned}$$

where $\ln Exp_{REPPAR_{jt}}$ denotes the log of the gross exports from the reporter to the partner country in industry *j* at year *t* based on the data as reported in the previous section. The set of explanatory variables includes GDP and total population at the country level, $\ln GDP_{ct}$ and, respectively, for both reporter and partner countries. This gravity model is extended by including additional reporter and partner specific characteristics. Specifically, the model includes an indicator of human capital endowment ($\ln HC_{ct}$) and of capital-intensity ($\ln K_{ct}$), calculated from the capital stock data and GDP taken from the Penn World Tables (PWT 8.0). Furthermore, an interaction term between human capital endowment and capital-intensity is included capturing the effects of capital-skill complementarities. The model also includes country-pair-industry fixed effects capturing time-invariant effects (like geographical distance, common language, and common borders, among others). When estimating the model at the industry level – namely, only considering bilateral export flows for each individual industry thus allowing for industry specific coefficients – only country-pair fixed effects are used.

The results indicate that, as expected, trade flows are increasing with the size of the regions measured both as total GDP or total population both for reporter (exporter) and partner (importer) countries. Human capital endowment has a positive effect on the exports of reporters; however, no significant effect is found for partners. Capital intensity shows up negatively for both reporters and partners whereas the interaction terms capturing capital-skill complementarities are significantly positive for reporters but negative for partners. Across industries, the results are fairly consistent though with a few exceptions. For an evaluation of the predictive power of the model outcome, world market shares derived from the actual flows are compared with those from the fitted export flows which shows that there is a rather close relationship, with the correlation between the actual and fitted indicator of world market shares larger than 0.95.[3]

This gravity approach is finally used to predict future developments in export performance and external competitiveness for world market shares. An out-of-sample prediction of export flows is calculated up to 2025. From the results of this model and the predicted values of population, GDP, human capital index, and capital endowment in these regions, associated trade flows can then be calculated. For these predictions, trend growth rates over the period 1995–2011 have been calculated, using the PWT 8.0. These assumed growth rates are reported in Table 2.

Table 2. Trend growth rates of determinants

	GDP	Population	Human capital	Capital intensity
EU-28	2.2	0.3	0.5	1.5
China	9.4	0.7	1.1	2.4
Japan	0.7	0.1	0.4	1.4
USA	2.4	1.0	0.2	1.0
Other EU	5.7	0.1	0.0	0.0
North America	3.6	1.4	0.7	0.0
South America	3.2	1.3	0.8	1.6
Asia	4.5	1.5	1.0	2.6
Oceania	3.1	1.3	0.2	0.1
Africa	4.6	2.4	0.4	0.6

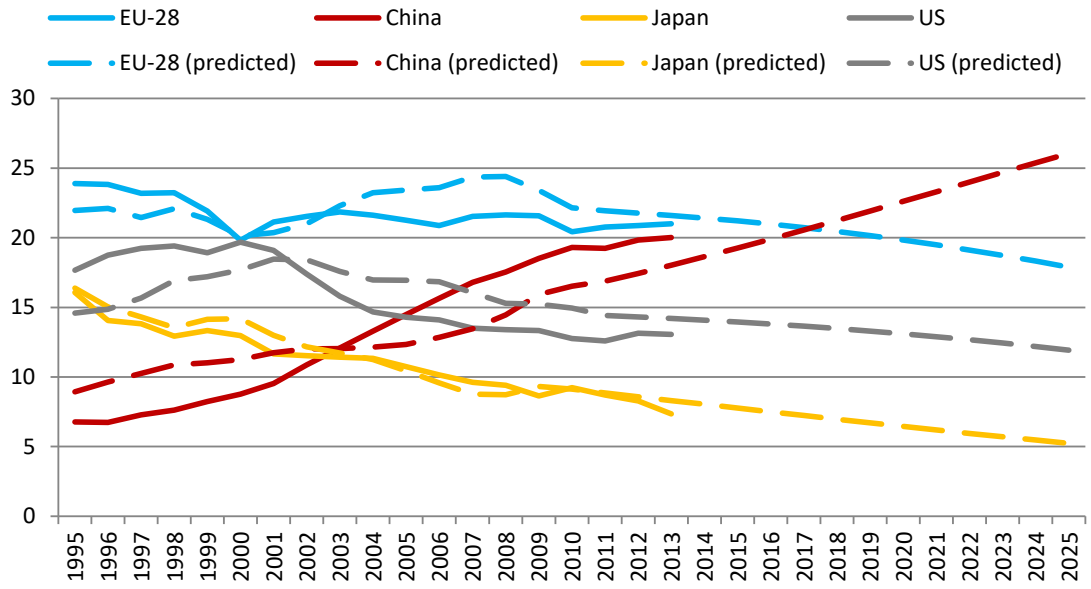
Note: Trend growth rates of human capital for Other EU and North America and for capital intensity in the case of Other EU are negative and have been set to 0.

Source: PWT; authors' calculations.

3 For a detailed discussion of the results see Stehrer et al. (2016).

Results are graphically presented in Figure 2. Concerning market shares, the EU-28 is expected to face a decrease of its market share to about 18% in 2025. The rise of China is predicted to about 26% (here one however has to note that the gravity model for 2013 predicts the share of China at about 18%, as compared to 20%, based on observed exports flows). Market shares for the US and Japan are predicted to be at about 12% and 5%, respectively.[4]

Figure 2. Scenario of world market shares (based on gravity model)



Source: Authors' calculations.

4 Considering various scenarios for different dynamics of GDP and human and physical capital endowment growth, market shares for the EU-28 vary by about 1–2 percentage points. The most important changes are found once growth rates in China are reduced by 20%, which, in turn, results in an increase of EU-28 market shares of about 1.8 percentage points. There are however only little changes in the structure of exports and specialization measured by RCAs observed across these scenarios.

Table 3. Changes in world market shares based on gravity (in percentage points)

	Market shares			
	EU-28	China	Japan	USA
Food, Beverages, and Tobacco	−0.2	2.1	0.1	−1.7
Textiles and Textile Products	−0.3	6.6	−0.4	−0.8
Leather, Leather and Footwear	−0.8	6.3	−0.1	−0.5
Wood and Products of Wood and Cork	3.9	7.8	0.0	−1.4
Pulp, Paper, Paper, Printing and Publishing	0.5	7.6	−0.2	−4.9
Coke, Refined Petroleum, and Nuclear Fuel	−4.2	−0.7	0.3	−2.4
Chemicals and Chemical Products	−4.7	7.6	−2.1	−3.1
Rubber and Plastics	−2.7	12.5	−3.2	−2.9
Other Non−Metallic Mineral	−2.3	10.4	−2.1	−1.7
Basic Metals and Fabricated Metal	−1.7	7.4	−1.8	−1.9
Machinery, Nec	−5.5	16.7	−5.1	−3.4
Electrical and Optical Equipment	−3.3	17.5	−4.5	−2.9
Transport Equipment	−1.6	6.7	−5.5	−1.3
Manufacturing, Nec, Recycling	−0.1	3.4	−1.1	0.0
Total manufacturing	−3.7	8.0	−3.1	−2.3

Source: Own calculations.

Concerning individual industries and the EU-28, these market share losses are particularly significant in machinery, with −5.5 percentage points (see Table 3). Market share losses are also pronounced in chemicals (4.7 percentage points) and electrical and optical equipment (3.3 percentage points). The wood and wood products industries would be expected to increase their world market share by about 3.9 percentage points. These changes in market shares are again to a large extent driven by Chinese export dynamics. The Chinese share in world manufacturing exports is expected to increase to about 26%. Chinese market shares in machinery and electrical and optical equipment would increase by 16.7 percentage points (compared to 30.9 percentage points in the trend scenario) and 17.5 percentage points (compared to 29 percentage points in the trend scenario), respectively. Nonetheless, the market shares in these two industries are expected to be 33.9% in machinery and about 46.3% in electrical and optical equipment. According to these calculations, Chinese market shares will also increase strongly in most other industries.

4. Intra-EU trends: Regional concentration of manufacturing exports

Patterns of trade not only changed at the global level, but also important shifts within the EU manufacturing landscape took place. Particularly, manufacturing production has become more agglomerated in the now "EU manufacturing core" including Germany, Austria, and Central and Eastern European countries. These are characterized by a stable or even increasing share of manufacturing in GDP, a specialization in higher-tech manufacturing, and a strong integration of production networks (see Stehrer et al., 2015).

An analogous pattern is also found when looking at EU Member States' exports. Table 4 presents the share of each country in total EU exports (now including intra-EU trade) in 1995 and 2013. It shows that Germany accounts for about 25% of total EU exports, followed by Italy and France with around 10%, and slightly less than 10% in the case of the Netherlands, Belgium, and the UK. All other countries account for less than 5% of EU exports each. However, there have been some important shifts in this geographic structure of exports over time. A set of countries – Poland, the Czech Republic, Hungary, and the Slovak Republic, as well as Spain and Romania – increased their shares by between 1 and 2.5 percentage points. Other countries – and, in particular Italy, the UK, and France – lost shares by between 1 and 3%. This confirms other results which focus on the geography of manufacturing production patterns (see Stehrer et al. 2015) and demonstrate that there has been an agglomeration tendency of manufacturing production—accompanied by an agglomeration of manufacturing exports – across Europe.

To provide forecasts, the gravity approach has been undertaken considering the analysis of manufacturing exports at the EU Member State level (including intra-EU trade). The model is calculated including trade among individual EU Member States (including intra-EU trade), however, intra-regional trade flows in other world regions are not considered because scenarios including countries with rather small trade volumes and volatile developments (e.g. like some of the African or South American countries) could make the predictions less robust. The sign and correlation tests reported are again quite good with the correlation coefficient again at about 0.95. A scenario is calculated based on the results of the gravity model including individual EU Member States (and therefore intra-EU-28 trade) based on the trend growth rates of explanatory variables. Table 4 (last column) presents the devel-

opments of the contributions of EU Member States' exports to total EU exports (including intra-EU trade) in percentage points. The scenario suggests that the ongoing agglomeration continues with countries like Germany, Poland, Ireland, the Baltics, and Eastern European countries gaining shares. A number of other countries, particularly Italy and France, however, lose shares.

Table 4 – Contributions to EU exports and changes over time

	Shares (in %)		Change in shares (in percentage points)	
	1995	2013	1995–2013	2013–2025
Germany	25.8	25.5	–0.3	1.1
Poland	1.1	3.5	2.4	0.8
Ireland	2.2	2.5	0.3	0.5
Lithuania	0.2	0.5	0.3	0.3
Hungary	0.7	1.8	1.1	0.3
Slovak Republic	0.5	1.4	1.0	0.3
Estonia	0.1	0.3	0.2	0.2
Czech Republic	1.0	2.8	1.8	0.2
Latvia	0.1	0.2	0.1	0.1
Romania	0.4	1.2	0.7	0.1
Bulgaria	0.2	0.5	0.3	0.1
Greece	0.5	0.6	0.1	0.1
Finland	2.0	1.4	–0.6	0.1
Croatia	0.2	0.2	0.0	0.1
Malta	0.1	0.1	0.1	0.0
Sweden	3.9	3.0	–0.9	0.0
Slovenia	0.4	0.5	0.1	0.0
Cyprus	0.1	0.1	0.0	0.0
United Kingdom	10.7	7.9	–2.9	–0.1
Portugal	1.2	1.2	0.0	–0.2
Austria	2.7	3.0	0.4	–0.3
Denmark	2.1	1.7	–0.4	–0.3
Spain	4.3	5.1	0.8	–0.3
Netherlands	8.3	8.6	0.4	–0.4
Belgium	7.0	6.6	–0.4	–0.6
France	13.2	10.2	–3.0	–0.8
Italy	11.1	9.3	–1.8	–1.3

Source: BACI, own calculations.

5. Conclusions and policy implications

This paper provides evidence concerning the development of the EU's world market shares. The long-term analysis presented in Section 2 indicates that the EU-28 has successfully defended its global market share since the 1990s despite the increasing importance of emerging countries, particularly China. This is particularly the case for industries that are characterized as "high tech" and which perform better than others in terms of research and development (R&D) intensity, productivity growth, and above average wages per employed person. These industries comprise machinery, transport equipment, and chemicals. In these industries, the EU-28 also managed to keep or even increase its strong position in world markets and specialization. The only exception is the electrical and optical equipment industry. Taken together, the four industries account for about two-thirds of EU-28 extra-EU exports. Other industries that perform well in international markets are pulp, paper, printing, and publishing and wood and wood products, where the EU-28 has gained revealed comparative advantages, though their contributions to overall exports is rather low.

With respect to future developments, the world market share of the EU-28 is expected to decrease to about 18% from about 21% in 1995 based on the gravity model. However, the results suggest that the EU-28 export structure further shifts towards high-tech industries in general. Specifically, a further increase in specialization is expected for machinery and transport equipment along with other smaller industries like pulp, paper and publishing and wood and wood products. The chemical industry is expected to keep its revealed comparative advantage position at a rather constant level. Finally, it is expected that the ongoing trends of the agglomeration of manufacturing activities and exports within Europe will continue. The results in particular suggest that countries of the EU manufacturing core countries – and particularly the Central and Eastern European Member States – will gain in importance for EU manufacturing exports.

Concerning policy conclusions, one must recognize that a disaggregated view of the manufacturing sector and the focus on individual industries is of key importance given that past and future trends as well as the EU's relative position vary considerably across these industries. This sectoral perspective has the advantage that more specific policy

recommendations can be derived given that the requirements of industries are typically very heterogeneous. Hausmann and Rodrik (2006) argue that the overwhelming majority of public inputs needed by firms are highly specific to their activity. The large number of specialized agencies and institutions in charge of regulating, advising, or otherwise supporting firms is evidence of these specific needs. There may be complementary measures of a truly horizontal nature, such as an endowment with appropriate skills and a respective educational and vocational training system, R&D policies, the exchange rate policy, or the completion of the Single Market that may be considered as key policy instruments to support the competitiveness of European industry. However, it is very doubtful that these measures alone are sufficient to meet the main challenges posed by an intensifying economic integration and the emergence of new players in the global trade arena (see e.g. Aghion et al., 2011). The broad findings of this report indicate that the major long-term challenges that were identified in the European Competitiveness Report 2013 (European Commission, 2013) are still relevant. The challenges identified in this previous report were: *(i)* defending current technological leadership positions (and therefore industrial leadership); *(ii)* the competitive pressure from emerging economies (which evolves differently across industries); *(iii)* the development of Europe's "industrial commons" (Pisano and Shih, 2009); and *(iv)* responding to the growing agglomeration tendencies in manufacturing within the EU.

Support policies need to be tailored to the specific needs of an industry

Neither the Single Market nor any other horizontal measure will satisfy the needs of individual industries. There are industries which may be termed "sunset industries" in which the EU clearly is not revealing comparative advantages. These industries include, for example, the textile or the leather industry. In these circumstances, policy needs to focus on niches in which European firms may still be successful in international markets. Typically, such niches can be occupied by technological leadership and quality advantages. Examples include protective clothing within the textile industry.

A particularly special case is the electrical and optical equipment industry where the EU historically lacks comparative advantage. As shown in the report, the revealed comparative disadvantage in this industry deepened between 1995 and 2013 and the situation is projected to further deteriorate until 2025. As one of the advanced manufacturing industries, the relatively weak position of the EU in this industry in comparison to the US or also Japan should give reason for some concern. As one of the most technology intensive industries, the electrical and optical equipment industry is a source of major innovation and technological progress. The digital revolution, also termed

the "fourth industrial revolution" (or "industry 4.0") is likely to emerge primarily from this industry. Therefore, neglecting this promising industry – that is, not only being a user but also a competitive producer – based on the argument of a lack of comparative advantage would be risky to say the least. It would clearly imply a lot of missed opportunities because the EU has the technological potential to excel in this domain and there are a number of firms that excel in the development and production of electrical products.

Therefore, the European Electronics Strategy set up in 2013 can be considered as a key initiative to support an important branch of the European electrical industry. However, as often with EU initiatives, there is a risk that the funding will be largely insufficient in order to have a noticeable impact. While broad in scope with almost all Member States participating, the public impetus will be relatively small: the EU is expected to contribute EUR 1.2 billion hoping that Member States will match this amount. Clearly, a more determined policy would be warranted in this respect. Moreover, any supply-side measures in this area need to be supplemented with demand-side support for new and innovative products. This support could come in the form of public procurement measures in which governments and European institutions act as lead users (von Hippel, 1986; Edler and Georghiou, 2007).

Finally, for a large number of industries, the analysis suggests substantial comparative advantages. These are the well-known strongholds of European manufacturing, including the machinery, transport equipment, and chemical industries. For these industries, the supporting innovation systems as well as the educational systems in many Member States seem to be well-functioning. Here, the issue is mainly to ensure the quality of existing innovation support from the public domain but also to transfer successful institutional arrangements to other Member States. Moreover, what has been said regarding demand--side policies and public procurement also applies here as these industries are also high technology-intensive and, therefore, also dependent on continuing demand.

Defining a common cause for industrial support measures

Despite the tailor-made policies for individual industries, it is equally important that the EU develops a unified industrial strategy with a clear priority. Such a strategy, for example, exists in the US where large parts of manufacturing activities are part of (or depend directly on) the industrial-military complex. In the US, for a long time, the provision of a public good – defense – was directly linked to a felt societal challenge, which was a confrontation with Russia. For the EU, another public good may be more appropriate. Given the strong political commitment of the EU to environmental protection, a long-term industrial policy centered on the development of green technologies resulting in "clean" products would be a logical candidate, for example. Again, this industrial policy should not only include a long-term funding commitment for research, but also needs a reliable source of demand that should be provided by public procurement or other supporting initiatives of EU Member States. Several initiatives already go in this direction. One exam-

ple would be the EU's ZeEUS project, a demonstration project for zero emission city buses in eight European cities. Initiatives like this clearly support the development of new technologies. What misses in Europe, however, is then a roll-out of such initiatives on a bigger scale.

Keeping value added generation within the European Union

Employment generation in the industrial sector will likely be a very difficult task given that competitive pressure will force European firms to continue increasing productivity. Therefore, the labor intensity of European manufacturing must be expected to continue to decline. In order not to aggravate this trend, the framework conditions must be set with a view to maximizing value added generation in European manufacturing within the boundaries of the EU. The EU is in some form well positioned in this respect as the international mobility of firms with regard to production location could be fostered across Member States. This would give firms a chance to benefit from efficiency gains related to offshoring. In contrast, the shift of existing production and other value added generation activities to countries outside Europe should be kept to a minimum by supporting measures strengthening EU's competitiveness, like the Single Market or the Services Directive.

Another important aspect in this respect is training and vocational training, in particular. The cross-country analysis of export performance and other studies researching the performance of the manufacturing industries in Europe in general clearly indicate that the availability of both the high-skilled and the medium-skilled is an important factor. For many firms, employees and their skills are their most valuable asset because part of its technological and innovation capacity is embodied not in machinery and processes but in their workforce. This is important because workers are less mobile than companies, and if technological capabilities are embodied in the workforce, this represents a unique locational advantage. Moreover, it implies that a firm's technology is not fully transferable to other locations. If production strongly depends on the specific skills of workers, a move to a low-cost destination will not only imply cost-savings, but also a decline in productivity.

This argument obviously calls upon Member States to implement the appropriate education and training policies which ensure that the required skills are available among European workers. In the context of manufacturing, it is worth mentioning that such policies should not only target the high-skill segment of the workforce such as technicians. For manufacturing, it is also the medium-skilled workers that are of crucial importance. Therefore, particular attention should be paid to vocational training. A successful model of initial vocational training (IVT) is the dual system which is common in Germany and

Austria. In this system, young people (after having completed nine years of schooling) can enter a private-law vocational training contract with a company which typically has duration of three years. Actual training takes place mainly within the company but is supplemented with training at (part-time) vocational schools. Binding requirements in the training directives ensure a uniform standard concerning the training quality (Hippach-Schneider et al., 2007). Moreover, in-house training taking place at firms implies that apprentices gain highly--specialized skills for which there is actual demand in industries. Therefore, the set-up or expansion of such dual IVT systems in EU Member States would support European industry in global competition. After all, a well-trained workforce can be seen as a key element of the industrial commons which are a country's collective R&D, engineering, and manufacturing capabilities. As such, it is also justified that both the government and the private sector together contribute to investment in skills.

Coordination of (specific) activities within a Smart Specialization Concept

The concept of smart specialization offers a promising route for improving current productive assets and potentially also to create a new one (Foray et al., 2009). This concept is basically a bottom-up approach for regions to discover – in cooperation with existing industry representatives – which industries may be most promising. The value added of the smart specialization strategy is the discovery of areas with latent comparative advantage. This approach also suggests focusing resources on a few activities within a region. In a way, smart specialization may be seen as the regional variant of the kind of industry-specific policies suggested above. One thing that should be mentioned in this context is that there needs to be well-organized coordination of support activities in order to avoid a situation where all regions "jump on" the same industry/technology within their smart specialization efforts.

It should also be mentioned that to some extent, even in the smart specialization concept, the picking winners problem remains. This is an unavoidable feature of any active innovation and industrial policy that the most promising areas or industries have to be selected. However, this is not much different from other policy areas because politics is always about setting priorities and a decision in favor of supporting one thing often implies a decision against the alternatives.

However, it might important that these smart specialization efforts could help to overcome the existing tendency of a clustering of manufacturing activities in a few core countries or regions, helping to spread manufacturing activities and maybe the value added-intensive activities of these and sectors related to these again more evenly across Europe. This is enabled by the rising importance of European Value Chains (EVCs) – as a part of the global value chains—allowing for finer-grained specialization within specific value chains by coun.

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