Contributions to the Political Debate by the Cologne Institute for Economic Research

Prosperity in a Changing World –
Structural change and economic growth

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Inhalt

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Abstract

Structural change is both a challenge and an opportunity for countries and companies. However, there is no silver bullet in terms of superior economic models. Instead, different economic models can deal with structural change in a successful way. Both economies with a focus on services and those with a high share of manufacturing are able to achieve a high degree of economic growth and prosperity. Success factors are related to a solid performance with regard to the key drivers of structural change: globalisation, interconnectedness, innovation and knowledge as well as the economic framework. Economic policy – also at the EU level – should support companies and economies in reaping these potential benefits: fostering open and flexible markets as well as supporting European value chains and an intensification of knowledge in the production of goods and services are key success factors in this respect.

1. Economic policy in a changing world

Structural change is a constant. The structure of an economy is perpetually evolving. This pattern of change is all-embracing, as it affects sectors, markets, companies, products and services. Against this backdrop, the question arises how to deal with structural change in an efficient and successful way. This is all the more important because economic growth has slowed down significantly in advanced economies in recent years. Economic policy needs to take the effects of structural change into account in order to be able to support better growth performance.

Structural change is a challenge because it requires adjustments at a macro- and on a micro-economic level. Consider the following example: From a micro-economic point of view, structural change might lead to bankruptcy for a company. If many companies are affected, this could result in changes at the macro-economic level, as lay-offs could lead to higher unemployment. However, structural change is also an enormous opportunity. It opens the door for the reallocation of production factors and for innovations that form the basis for future growth and prosperity.

Economic policy needs to allow for this reallocation while at the same time cushioning its impact on the affected economic actors, if the adjustment costs are considered too high. Moreover, policy makers should support firms in reaping the benefits of structural change. This paper sheds light on how economic policy can achieve these goals. Moreover, it shows how structural change and economic growth go hand in hand and how advanced economies perform with regard to both developments.[1]

We argue against an overly pessimistic growth outlook in line with Matthes (2016). It is true to say that after the crisis of 2008/2009, advanced economies have lost momentum. Many experts doubt that potential growth will be able to recover again. Instead, they expect growth perspectives to remain dull and secular stagnation to be in the offing (IMF, 2015; Matthes, 2016). However, there is also still cause for optimism. On the supply side, trends such as globalisation, digitisation and the increasing use of human capital support efficiency and growth potential. On the demand side, the need for high-quality goods, demography, urbanisation, climate change and security also offer opportunities for further growth.

The remainder of this paper is organised as follows. Chapter 2 answers the question whether there is a superior economic structure that makes dealing with structural

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[1] This paper is closely based on IW Köln/IW Köln Consult, 2015.

change easier and has proven to be a successful recipe for economic growth. Chapter 3 identifies the factors that influence growth in an advanced economy by means of a thorough econometric analysis. Chapter 4 looks at different advanced economies and compares how well they have been coping with structural change in recent years. Finally, Chapter 5 concludes by giving policy recommendations at a European level.

2. Is there a superior economic structure?

A country's long-term economic development depends on how well it is able to adapt its economic structure to the market environment. However, countries differ considerably with regard to their economic structure and the effects of structural change:

- While the service sector has gained in importance in almost all advanced economies over the past 20 years (and before), the service sector share differs considerably between countries. The same applies to the relative size of the manufacturing sector.
- In some countries, such as Germany, for example, the sectoral economic structure has hardly changed while in other countries, such as the UK, Luxembourg and Ireland, there have been major shifts.
- As opposed to the period from 1995 to the global financial crisis of 2008/2009, the speed of sectoral change has noticeably decreased across the board since 2010 (Figure 1).

Against this background, the question arises whether a superior economic structure exists that creates growth and prosperity (Grömling, 2014). A strong focus on either manufacturing or the service sector could theoretically be a reason why some countries perform better than others. In order to test this hypothesis, the performance of a country is measured using different indicators, such as income, unemployment or investment.

Figure 2 shows the service sector share in terms of total gross value added and the per capita income for 22 advanced economies. Averages over the period from 2005 to 2014 are used for this comparison. This period encompasses both the boom before 2008 and the crisis phase(s) after 2008/2009, and has been chosen to minimise distortion due to cyclicality.

Figure 1: Speed of structural change
Sum of the absolute changes in sector shares[1] in percentage points
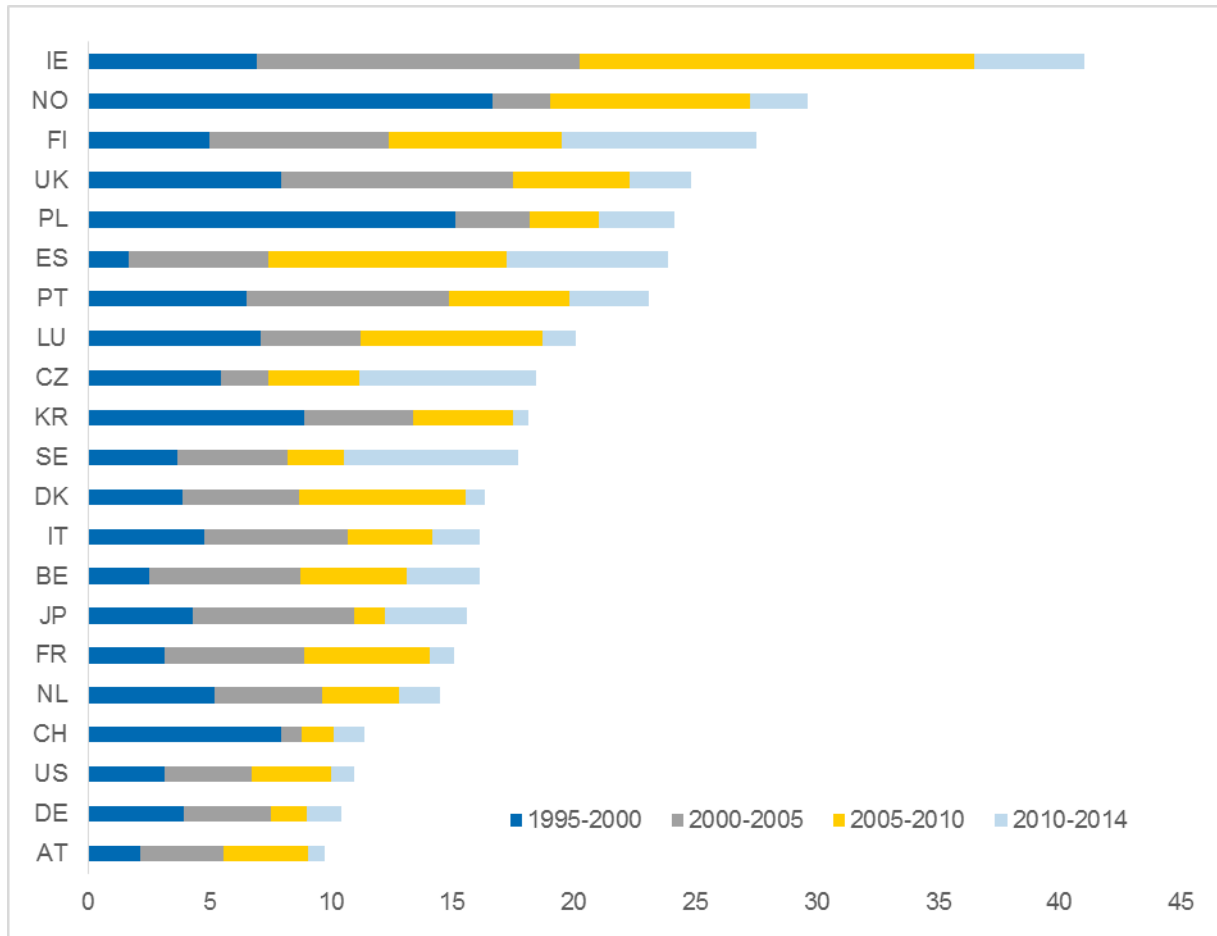

1) Share of agriculture, manufacturing, construction and the service sector.
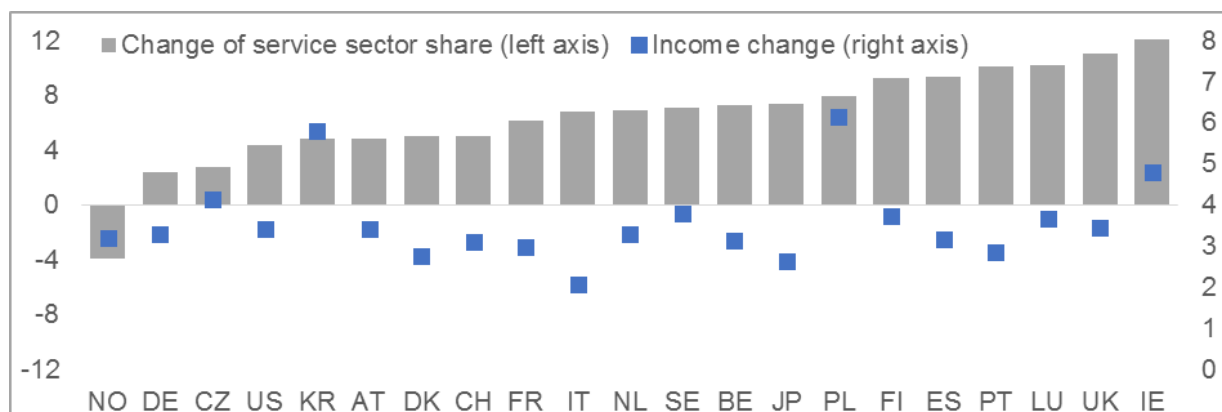Sources: OECD, 2015a und b; IW Köln/IW Köln Consult, 2015

Figure 2 provides evidence that there is no visible connection between the relative size of the service sector and the level of per capita income. This is supported by a low correlation between both of these measures. This general insight can be illustrated by looking at several examples: Norway and Luxembourg have an income well above average, but a very different service sector share. While Norway's service sector amounts to 57 per cent of total gross value added, this share is nearly 86 per cent in Luxembourg. Furthermore, Germany and Austria both have a relatively low service sector share, but a relatively high per capita income. In France, the income level is similar, but it is generated with a remarkably higher service sector share. Overall, there is no clear-cut link between the share of the service sector and per capita income. The same applies to the service sector share, the unemployment rate and to a weaker extent to the investment share of GDP.

Figure 2: Economic structure, structural change and prosperity

Service sector share of gross value added in per cent and per capita income in US dollars (adjusted for purchasing power), average 2005 to 2014
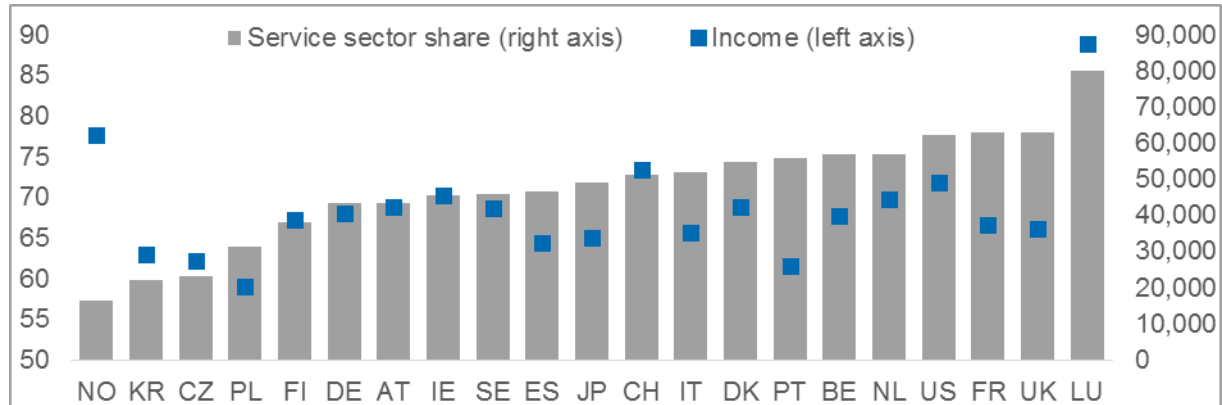
Change of the service sector share in percentage points and change of per capita income in percent from 2005 to 2014

Sources: IMF, 2015; OECD, 2015a; IW Köln/IW Köln Consult, 2015

A similar result is obtained when looking at changes over time (lower part of Figure 2). There is no robust relationship between sectoral structural change (measured by changes in the service sector share between 1995 and 2014) and the change in the relevant performance indicators, such as per capita income. This can also be confirmed by comparing the change in service sector share and the change in the unemployment rate or the investment ratio.

Overall, there is no reliable evidence that a higher service sector share or a more rapid trend to tertiarisation (i.e. an increase in the service sector share) leads to a higher level of prosperity or a faster improvement in prosperity. However, our results depend on the design of the analysis with regard to the selected countries, for example. Nevertheless, economic success with regard to income, employment and

investment does not appear to depend significantly on sectoral economic structures and their change over time.

3. Structural change and growth

Despite the result that a certain economic structure does not seem to determine prosperity in a country, there could still be a link between the drivers of structural change and growth. These drivers influence structural change and propel it forward. Structural change, in turn, could then affect per capita growth by reallocating resources to their most effective use. The main drivers of structural change identified are the three supply-side factors globalisation, interconnectedness as well as innovation and knowledge (see Figure 3). In addition to this, the economic framework affects the ability to cope with structural change. Figure 3 illustrates this in a simplified way. Relationships between the different drivers are neglected; as are the demand-side drivers (such as demographic change).

Figure 3: Drivers of Structural Change
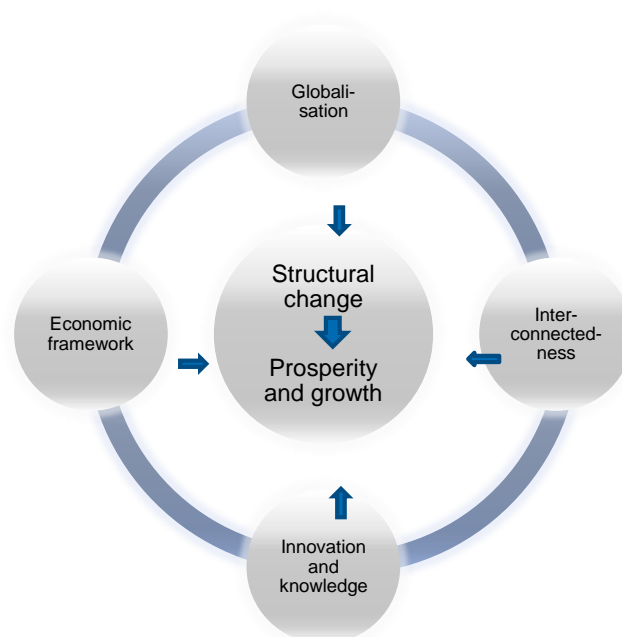
Source: Own illustration

The relationship between the different drivers of structural change and economic growth has extensively been analysed in the theoretical as well as the empirical literature (IW Köln/IW Köln Consult, 2015). In order to extend this literature with regard to the relationship between structural change and growth, this paper provides

a thorough econometric analysis. Each of the drivers is represented by a subset of indicators whose effect on per capita growth is then estimated.

Methodology and data used in the econometric analysis

The econometric analysis investigates the effect of more than 100 indicators in a panel data framework with 60 countries over the period from 1950 to 2010 (for a detailed explanation of methodology and data, refer to IW Köln/IW Köln Consult, 2015). The exact period for each indicator depends on data availability. The dependent variable is real GDP growth per capita. The basic model uses three control variables: initial level of GDP per capita, a human capital index, and gross investment share of GDP. A system GMM estimator is applied in order to account for possible endogeneity.

Generally speaking, the results confirm the link between economic growth and the drivers of structural change. Often, this effect is positive, but non-linear (Table 1). Take the KOF Index of Globalisation, for example: Its relationship to growth per capita GDP is positive, but non-linear. This means that the correlation of the KOF Index and GDP per capita is overall positive, but decreases at higher values of per capita GDP. In other words, globalisation in a broad sense is relevant for economic growth in all countries, but more relevant in poorer than in richer countries.

Summing up, the drivers of structural change (i.e. the indicators associated with them) are in many cases positively correlated with economic growth. In other words, the better a country deals with structural change, the more likely it is to experience per capita GDP growth that leads to higher prosperity. However, the country's economic structure per se does not play a significant role (Chapter 2). Econometric analyses within the framework described above show that there is no robust positive relationship between the share of services in GDP and growth of GDP per capita. The results point toward a non-linear U-inverted relationship: In economies where more than half of GDP can be ascribed to the service sector, there is no further evidence of a positive effect of increasing service share on growth of GDP per capita.

In a nutshell: It does not matter what a nation produces in terms of sectoral output, but it is more important how this production is organised and whether it is supported by the economic framework.

The econometric analysis indicates the following paths to success with regard to structural change-induced growth:

Table 1: The relationship between structural change indicators and growth
Stylised summary of the main results of a two-stage system GMM estimator, different model specifications, correlations

Driver of structural change	Indicator	Relationship with GDP per capita		
		Positive, non-linear effect	Positive effect	No relation-ship found
Globalisation	KOF Index of Globalisation	X		
	KOF Index of Economic Globalisation	X		
	KOF Restrictions on Trade and Capital	X		
	Heritage Index of Economic Freedom		X	
	Fraser Freedom to Trade Internationally Index		X	
	Exports and imports as share of GDP	X		
	Outward and inward foreign direct investment stock as share of GDP	X		
	Inward foreign direct investment as share of GDP	X		
	Outward foreign direct investment as share of GDP			X
Inter-connected-ness	Share of intermediates in production	X		
	Foreign value added share of gross exports	X		
	Imported services as share of gross exports	X		
	Imported intermediates as share of overall imports	X		
	Re-exported intermediates as share of all intermediates' imported	X		
	Share of domestic value added embodied in foreign final demand	X		
	Share of foreign value added embo–died in domestic final demand relative to total foreign domestic demand	X		
Innovation and knowledge	Human Capital Index	X		
	Average years of total schooling		X	
	Highest education level: Secondary		X	
	Highest education level: Tertiary			X
	Number of patent applications relative to population			X
	Number of scientific and technical journal articles relative to population			X
Economic framework	Fraser Economic Freedom of the World Index		X	
	Fraser Legal System and Property Rights Index	X		
	Fraser Regulation Index	X		
	Heritage Freedom from Corruption Index		X	
	Fraser Starting a Business Index	X		
	Internet users per 100 population			X
	Airfreight transport relative to GDP	X		

Source: IW Köln/IW Köln Consult, 2015; own illustration

- **Internationalisation and Openness.** Open economies are better positioned to exploit efficiency gains from the division of labour and can realise comparative advantages of production.
- **Networks and Extension of Value Chains.** Utilising the opportunities of outsourcing, offshoring and value chain integration contributes to economic success, as additional specialisation gains can be realised.
- **Knowledge Intensification.** Making products and production processes more knowledge-intensive can create competitive advantages and lay the groundwork for the prosperity of firms and economies. The prerequisite for using structural change to a country's advantage is employing suitable personnel, which in turn presents challenges for the country's education system.

4. How countries deal with structural change

How a country deals with structural change makes all the difference. Based on this insight, this section compares how 23 advanced economies are positioned with regard to selected important drivers of structural change. This provides an illustration of how these countries exploit their economic potential based on their economic structure and their specific advantages. In order to provide an overview of these countries' performances, a set of 43 indicators is aggregated into four separate scores covering the drivers of structural change: globalisation, interconnectedness, innovation and knowledge, and economic framework (see methodology). The higher the score, the better is the performance of the country with regard to the relevant indicator. Values above 100 signify an above-average performance, whereas scores below 100 indicate a below-average performance in a cross-country comparison.

Methodology and data

The ranking makes use of 43 individual indicators for 22 advanced economies (IW Köln/IW Köln Consult, 2015). The indicators used represent the latest available version of the data. Overall, the data originate between 2011 and 2015. The indicators are grouped according to the four previously identified drivers of structural change: globalisation, interconnectedness, innovation and knowledge, and economic framework. For the first three, all indicators are directly transformed into a score for the driver itself, whereas for the driver economic framework, the indicators are aggregated into six subcategories. These are converted into one score for the economic framework. Generally, all indicators are weighted equally. All indicators undergo a Z-transformation. They are then standardised to a range of values from 0 to 200 with a mean of 100. Higher scores compared to lower scores indicate a better performance. The derived rankings are meant to be a tentative illustration and are obviously sensitive to the method of aggregation.

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Table 2: Country strengths and weaknesses

Position[1] of countries based on 43 indicators in four categories[2]

	Globalisation	Inter-connectedness	Innovation & Knowledge	Economic Framework
Austria	Strong	Weak	Strong	Weak
Belgium	Very strong	Strong	Medium	Weak
Canada	Weak	Weak	Strong	Very strong
Czech Republic	Very strong	Very strong	Weak	Very weak
Denmark	Medium	Medium	Strong	Strong
Finland	Medium	Very strong	Strong	Medium
France	Very weak	Weak	Weak	Weak
Germany	Weak	Strong	Very strong	Strong
Ireland	Very strong	Very strong	Medium	Medium
Italy	Very weak	Very weak	Very weak	Very weak
Japan	Very weak	Very weak	Very strong	Medium
Korea	Weak	Very strong	Strong	Very weak
Luxembourg	Very strong	Medium	Very weak	Strong
Netherlands	Very strong	Medium	Medium	Very strong
Norway	Weak	Weak	Very weak	Medium
Poland	Strong	Strong	Strong	Very weak
Portugal	Medium	Medium	Very weak	Weak
Spain	Medium	Very weak	Very weak	Very weak
Sweden	Strong	Very strong	Medium	Strong
Switzerland	Strong	Strong	Very strong	Very strong
UK	Very weak	Very weak	Weak	Very strong
USA	Very weak	Very weak	Weak	Very strong

1) Positions represented by the following colour spectrum:

Position 1 to 5:   Very strong
Position 6 to 9:   Strong
Position 10 to 13:   Medium
Position 14 to 17:   Weak
Position 18 to 22:   Very weak

2) Latest available data 2011 – 2015.
Source: Acc. to own calculations based on the sources in Table A-1

Table 2 shows the strengths and weaknesses of individual countries with regard to the four drivers of structural change and attempts to answer the question: How do the depicted countries cope with and make use of structural change? However, to make these countries comparable, their economic size has to be taken into account – thus, many indicators are expressed in relation to GDP or to population. In this respect, some caution is required when interpreting our results:

- Indicators for openness and some trade-related indicators of interconnectedness should be compared only for countries of similar size. This is due to the fact that smaller countries trade more in relation to their economic size than bigger

countries which have a larger internal market. A good example for this is Germany. The moderate position of Germany with regard to globalisation seems surprising, considering that Germany is very export-oriented and successful in this respect (Marin et al., 2015; Matthes, 2015).[2] However, other large economies, such as France, the United States or Japan, score considerably worse.

- Regarding patents and some other innovation indicators, there are also reasons to consider absolute figures. This can be illustrated by looking at the United States – one of the most innovative countries which is reflected in the large absolute number of patents and other innovation indicators. However, based on this measure, smaller countries would be structurally disadvantaged. In order to evaluate the relative innovation performance of each country, the indicators have to be expressed in relation to the economic size. On this measure, the relatively weak position of the US according to Table 2 implies that the country could make even more out of its opportunities.

From the results in Table 2, some aspects shall be highlighted. Hardly any country exhibits strengths in all four categories. Ireland, for example, displays clear strengths with regard to globalisation and interconnectedness, but not with regard to innovation and knowledge as well as the economic framework. This is also true for Korea, which displays a very strong position in many innovation and knowledge indicators, but scores worse regarding globalisation and the economic framework. Looking at weaknesses, it is striking that several big European countries, such as Italy, France and Spain, consistently score badly regarding all drivers. These countries do not seem to handle structural change in an adequate way.

5. Policy recommendations for the European Union

In order to deal with structural change successfully, policy makers must set the right framework of conditions on the basis of historically shaped economic structures. Economic policy is largely conducted on a national level, especially in non-European countries. However, the policy framework within Europe is being shaped more and more at the European level, with new EU regulation being transferred later into national regulations. The following policy recommendations derived from our study are targeted at the EU level. They represent just a selection:

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[2] This can also be explained by the fact that the globalisation indicator also includes foreign direct investment, where Germany scores relatively poorly in international comparison.

Build a reliable institutional framework

The bottom line for policy makers is that it is companies that mainly have to deal with structural change. They need reliable institutions to be able to cope effectively with this challenge. These institutions should primarily provide a reliable legal system and competitive markets. Only within a competitive environment will companies have sufficient incentives to be innovative, cost-efficient and customer-oriented. The EU has an important role to play in this respect in terms of guaranteeing undistorted competition and a level playing field in Europe and in terms of prohibiting distortive subsidies and tax incentives. It also needs to continuously monitor the reliability and efficiency of member states' legal systems.

Avoid regulatory overreach

When companies face up to the challenges of structural change, they have to muster up flexibility and repeatedly scrutinise their business models. In order to support them in their effort, the EU should refrain from over-regulating and from imposing unnecessary burdens with regard to regulatory and administrative costs.

Beware of preserving outdated economic structures

Currently, a fixed target of 20 per cent for the manufacturing share of GDP is set as an EU priority in 2020 (EU Commission, 2012). This stems from the fact that the importance of manufacturing in Europe has declined in recent years and Europe has steered towards a crisis with regard to growth. The analysis in this paper demonstrates clearly, however, that a reliable link between a certain economic structure and the growth performance or prosperity cannot be established. Against this background, trying to preserve established economic structures in the face of structural change could very well backfire. The same applies to forcing a certain economic model onto countries irrespective of their comparative advantage and of the path dependency of their economic structure.

Secure flexible markets

Instead, economic policy should allow for flexible labour and product markets that facilitate the reallocation of production factors when economic structures prove to be outdated. Manufacturing firms will thrive if they face a competitive cost level and if they can adapt flexibly to the economic cycle. This is mainly a task of national economic policy. However, the EU should use the country-specific recommendations in the European Semester to highlight weaknesses and push structural reforms.

Create open markets

Open markets are a prerequisite for more competition, for higher consumer welfare as well as for reliable access for EU companies to export destinations all over the globe (Matthes, 2015). The analysis has highlighted that there is a solid link between

openness and economic growth. Therefore, companies rely on a solid framework for trade and investment. At the EU level, this includes trying to bring forward the post-Doha agenda in the WTO. Additionally, the EU should strive to conclude an ambitious TTIP agreement with the United States and also further trade agreements in the ASEAN region.

Improve cross-border infrastructure in Europe

Specialisation and the division of labour are essential for efficiency of resource allocation on the level of the economy and for cost savings on the business level. EU companies need to be able to benefit from outsourcing and offshoring as well as from the integration in cross border value chains and innovation networks. Therefore, EU policy should particularly focus on enhancing cross-border infrastructure. The Single Market should continue to be a priority and should be fostered. This includes the energy sector.

Fostering the Digital Single Market

Currently, mainly digitisation is driving innovation. In order to be able to compete with the United States and Asia, the Digital Single Market in Europe is crucial. The EU should continue to promote it and ensure that it adheres to the set timetable. Important aspects include issues such as data protection legislation and the free flow of data and products across borders. On top of this, a regulatory framework that supports the coexistence of traditional and new business models is urgently needed.

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Annex

Table A-1: Data Sources
Data used for the index of structural change in Chapter 4

Driver of structural change	Name of indicator	Source	Latest year
Globalisation	Index of Economic Freedom	Heritage Foundation	2015
	Exports and imports as share of GDP	IWF, WTO	2014
	Outward and inward foreign direct investment flows as share of GDP	UNCTAD	2014
	KOF Index of Intensity of International Economic Transactions	Dreher	2012
	Export performance	OECD	2014
Interconnectedness	Value added share of production	OECD	2011
	Intermediate product intensity	OECD	2011
	Manufacturing share of value added	OECD	2011
	Joint production	OECD	2011
	Imports of intermediates	OECD	2011
	Foreign value added share of gross exports	OECD	2011
	Digitisation Index	IW Köln	2015
Innovation and Knowledge	Performance of 15-year-olds in science	OECD	2012
	Performance of 15-year-olds in mathematics	OECD	2012
	STEM graduates in tertiary education as share of total employment	OECD	2012
	Percentage of 25- to 34-year-olds who have attained at least upper secondary education	OECD	2012
	Industry-financed gross domestic expenditure on R&D as share of GDP	OECD	2012
	Total researchers per thousand total employment	OECD	2012
	Triadic patent families per million population	OECD	2012
Economic Framework[1]	25 different indicators		2011 – 2015

1) The driver "Economic Framework" consists of six subcategories that are each comprised of several indicators. The sources for these can be found in IW Köln/IW Köln Consult, 2015.