



Cross border services in the internal market: an important contribution to economic and social cohesion

STUDY



European Economic and Social Committee



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Study

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Foreword

Cross-border services and posted workers are of vital importance for companies, customers and workers. There can be neither a well-functioning European single market nor proper convergence between Member States' economies without services and posting. In almost no other area are issues of the economy, employment, social justice and the single market so closely interlinked with one another.

Our request to commission the present study was the direct result of the debate on the revision of the Posted Workers Directive. Instead of relying on emotions and assumptions, the aim of this study is to provide information, figures and data on cross-border services and posted workers.

The European Union is facing protectionism not only from outside, but also from within the single market. Ever-harsher regulation of cross-border services would re-create national borders – which have fortunately been abolished in the process of European integration - and would endanger the integrity of the single market in the area of service provision.

The rationale for the new regulation is the assumption that even the slightest differences in wage or labour standards would be considered to be "social dumping". Instead, it is pure protectionism against fair competition. Of course, each and every illegal act of professional misconduct and real social dumping by exploitation must be strictly sanctioned..

This study shows that cross-border services – as observed before the new regulation regime came into force - are neither social dumping nor a danger to the economies of the Member States. Cross-border services create jobs and growth. They are a positive thing for all Member States and are good for different kinds of jobs, both labour- and knowledge-intensive jobs. Cross-border services also support social cohesion in the European Union.

As the positive economic and employment effects are crystal clear, we hope that this study will contribute to the political debate on the provision of services in the single market. Bearing in mind the positive economic effects, the recommendation not to regulate them too harshly makes even greater sense.

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Abstract

Over the years, European value chains have become increasingly relevant to employment in the EU. While research on industrial value chains is broadly covered in recent years, the effects of value-chains in European service sectors still needs to be quantified. Especially the impact of cross border services in the EU need further coverage. This study tries to fill this gap by quantifying the number of employees dependent on the exports of services to other member states. It especially examines the contribution of cross border services to a productive competition and to economic and social cohesion within the European Union using established statistic tools.

The findings show that the impact of cross border services in the European economy has greatly increased from 2000 to 2014. Cross border services play an important role in all the member states and in labor and knowledge intensive sectors alike. The study also shows the positive connection of cross border services with growth in employment, GDP and with social cohesion indicators. By describing the positive effects of cross border services in the EU the potential risks of overregulation of the European cross border service market can be examined.

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Executive Summary

The European single market has undoubtedly contributed to greater welfare and prosperity in all of Europe, by guaranteeing the free movement of goods, capital, services, and labor between the Member States. This study focuses on the last two aspects, especially the provision of cross border services. Cross border services do often include a person crossing the border between Member States in person. Such services can be provided on a short trip or by posting workers for a longer period of time. The posting of workers to provide services abroad on a temporary basis is regulated by the directives of the European Union. The rules aim at providing a clear framework to guarantee fair competition and respect for the posted workers' rights so that both businesses and workers can take full advantage of the internal market opportunities. However, too strict regulation could effectively work as a market barrier for companies with lower labor productivity.

To show possible impacts of overregulation of the European service market this study aims to quantify the value of cross border services for economic and social cohesion in Europe.

In 2014 around **10.9 million jobs** in the European Union were based on the export of cross border services to other European Member States. Since the year 2000 the total amount of employees dependent on cross border services has almost doubled. While total employment in the EU grew by 5.5 percent cross border service dependent employment has risen by 94 percent **clearly supporting employment growth** in the EU.

While smaller European countries and Member States in central and eastern Europe are – relative to their total labor force – more invested in the cross border services market, most cross border dependent jobs are actually located in the EU-15 states. Around 74 percent of cross border jobs are located in these countries with the United Kingdom, Germany and France hosting the most employees in cross border service jobs. This finding is consistent with former research on cross border services based on the number of Portable Documents A1. More than 38 percent of the postings of workers registered here occur from one high-wage Member State to another. These two results show that cross border services exports are an **important economic factor in all the Member States**. In total numbers the United Kingdom is the biggest gainer of the single market for services in the EU. 1.7 million cross border service jobs in the UK could be threatened by the Brexit.

While cross border services were often associated with labor intensive tasks the study shows that **jobs in knowledge intensive service sectors** dependent on the export of services cross border **have grown nearly in the same amount than labor intensive tasks**. Cross border dependent jobs in knowledge intensive service sectors have increased by 77 percent since the year 2000. Around 4.2 percent of the jobs in the knowledge intensive service sectors in the EU-28 depend on the export of cross border services. Also, the individual economic sector most dependent on the export of cross border services is the provision of professional, scientific and technical services. Around 13.6 percent of the jobs in the sector in the EU-28 are dependent on cross border service exports. This shows that cross border services are not limited to labor intensive jobs. They are also very important for knowledge intensive jobs in sectors with high wages.

For economic prosperity and employment growth the study finds a **clear positive connection between cross border services and economic and employment growth**. Countries with a higher share in cross border services have registered a much stronger growth in employment and GDP than countries who were less involved in the cross border service market. Especially employment growth is strongly connected with the share of cross border dependent jobs in the economy. If a country increases its share in cross border service employment by 1 percent, its total employment is expected to grow by 0.013 percent.

The **positive effect of cross border services** can be seen **in the total economy, but also in the knowledge intensive service sectors**. Countries with a higher share of knowledge intensive jobs dependent on the export of the services cross border have registered a stronger employment growth in the knowledge intensive service sector than other countries.

A statistical analysis further proves the positive connection between cross border service share and economic growth in the economy. A reduction of the share of cross border services by 1 percent could reduce the total GDP in the EU-28 by around 8 billion euro. This effect, however, relies on the assumption that jobs dependent on cross border service exports could be substituted with national demand for the employees currently working in exporting service industries and thus keeping total employment constant. With a total of 10.9 million employees dependent on cross border service exports, the economic effects of a harsher regulatory framework on the exports of cross border service is likely to be significantly higher. In 2014 the total **value added dependent on the exports of cross border services amounted to around 625 billion Euro in the EU-28**.

Since a positive effect of the cross border services share is still observed while keeping employment constant, it can be assumed that jobs in sectors that export their services cross border seem to have a higher positive impact on the national GDP than the average job in the total economy.

The study also finds a **positive connection of the cross border service share with social cohesion** indicators. Countries with a higher cross border service share have on average a lower ratio of people at risk of poverty and social exclusion. Also, the average happiness and satisfaction with life is positively connected with the share of jobs dependent on the export of cross border services. Thus, a higher share in cross border services dependent employment seems to **increase the happiness of the average person in the economy**.

The effects of the share of cross border services dependent employment on social cohesion are significant, but rather small in absolute numbers. A 1 percent increase in the cross border service share increases the “satisfaction index” on a scale from 1 to 4 points by 0.0086 points. However, as the results previously obtained show that cross border services are an important driver of total employment growth, the positive effects of job generation and job security need to be considered when assessing the value of cross border services for social cohesion.

As a result, a clear positive connection between the exports of cross border services and social cohesion, economic growth and especially employment growth can be observed. The implementation of cross border value chains in service industries can thus be described as an **important driver of the European economy**.

The harmonization of good living conditions in the EU is an important factor for society in the EU. To support this objective the European single market for services must be designed in such a way that differences between individual countries are not too great. Too harsh regulation on the ability to provide cross border services could, however, have a counterproductive effect on the harmonization of living conditions in the Member States by limiting economic and employment growth.

While the regulatory framework must guarantee the rights and working conditions of workers in cross border service jobs, excessive regulation that seriously hampers the provision of cross border services should be avoided. The Data used in this study shows that different economic sectors have different degrees of dependencies on cross-border services and thus, rules for the export of services in the EU may have different effects on economic activities. Effective regulation of cross-border services should take these differences into account. By **applying rules only to service sectors where appropriate regulation is needed**, the single market can be much more efficient.

1. Introduction

The European Union that started with the Treaty of Rome in 1957 has grown to one of the largest single markets in the world. It has not only established itself as a project of peace and a single internal market without borders but also as a driver of prosperity and growth in all the Member States. The termination of the collection of customs duties between Member States has led to a huge increase in cross border trade that enabled the emergence of interregional value chains and collaborations between different companies and regions throughout Europe. As a result, the European economy is much more interconnected than other advanced economies throughout the world. As Fritsch and Matthes (2017) have shown, around 14.6 percent of total intermediate goods in the European Union have been delivered from other regions abroad in the EU-28. This amounts to a much larger share than measured in other regional production networks like North America or Asia, where interregional trade for intermediate goods amounts to 4.5 percent and 2.6 percent respectively.

Growth of interregional value chains¹ in the European Union has surged during the last 15 years on account of the EU Single Market and the integration of central and eastern European (CEE) countries in the European value chains. Especially industrial value chains have expanded. Nearly 21 percent of the output and employment in the European manufacturing sector is dependent on the demand of intermediate goods from customers in other Member States. In 2000 cross border value chains in the EU were dependent for around 16.6 percent of the employees in manufacturing.

The steady integration of the European economy however also positively affected the service sector in the European Union. Service providers could either benefit from the increased demand for their services through general prosperity of the economy or by using the regional markets across the border in neighboring European countries themselves. Stehrer et al. (2014) also showed the increasing connection between the manufacturing sector and business services sector, indicating a mutually dependent and dynamic relationship between these two sectors. This already strong connection between sectors is likely further strengthened by the digital services associated with "the fourth industrial revolution".

Additionally, European citizens can use the open labor market to access the national job market that maximizes their income by participating in the national job market that pays best for their respective skillset. The job market abroad can be either used by permanent or seasonal migration to another Member State where the job opportunity is located or by daily or weekly cross border commuting. European Citizens have used these chances to a growing extent in the last decade. In 2006 around 2.4 percent of the employees in the EU-28 were born in another European Member State than where they were currently working. Those numbers rose to around 4.1 percent in 2018, showing the increased general mobility of European employees and also the growing importance of the cross border labor market for the economy in the different European countries.

¹ Interregional value chains describe the trade of intermediate goods between countries that can be aggregated as a geographical region. For example the different parts of an airplane assembled in France, that were produced in other Member States represent an interregional value chain in the EU.

Especially in the service sector, European workers often provide services to customers in other European Member States while still being employed in their respective company at home. The delivery of a cross border service is thus provided by posted workers.

2. Cross border services

A posting of workers takes place, when an employer, within the context of provision of services, sends its employees to carry out a service in another Member State for a temporary period. The European Union defines a posted worker as an employee “who is sent by his employer to carry out a service in another EU Member State on a temporary basis, in the context of a contract of services, an intra-group posting or a hiring out through a temporary agency”. Unlike mobile workers in the EU, a posted worker remains in the host Member State only temporarily and does not integrate into its labor market. The average duration of the posting of workers in the EU is less than 4 months (European Commission, 2018).

2.1 Regulatory framework in the European Union

The conditions under which workers may be posted to other European Member States were defined in the Directive 96/71/EC of the European Parliament and of the Council in December 1996 and had to be implemented in national laws and regulation by the end of 1999. The aim of this regulatory framework was to ensure fair competition between foreign and local companies and to safeguard the rights of posted workers. Thus, posting companies had to apply some of the employment conditions of the destination country to their posted workers. This includes the regulations of the country of destination concerning minimum wages, overtime rates, minimum annual leave, working time arrangements, health, safety and hygiene at work and equal treatment between men and women.

With the inclusion of the CEE-countries in 2004 and 2007, new labor markets with comparatively low labor costs compared to the average labor costs in the 15 original Member States (EU-15) were included in the European Single Market, resulting in an increasing relevance of the legislative framework for cross border services.

To impede abuse of the posting of workers framework – especially the complaints about social dumping of foreign workers – Directive 2014/67 was introduced in 2014. The purpose of the directive was to support particularly cooperation about national authorities and joint inspections against illegal practices. It sets out in detail the conditions under which a posting exists, by the setting of appropriate provisions, measures and control mechanisms necessary for better and more uniform implementation, application and enforcement of the Directive 96/71/EC in practice. It especially included measures for inspections and monitoring to prevent and sanction any abuse and circumvention of the applicable rules.

The directive also led to an increased cooperation between the national authorities of the individual Member States, for example by introducing time limits for mutual assistance and improving access to information. They also had to implement national websites, providing information on working and employment conditions and existing collective agreements applicable to secondments. Information on collective agreements were especially important for the construction sector, since the regulation includes compliance with the collective agreements of the national construction sector.

In Mid-2016 the European Commission adopted a revision of the rules on posting of workers with the Directive 2018/957. The revision targets a better remuneration of the posted workers, expands rules on temporary work agencies and includes the application of an extended set of terms and conditions of employment for long-term postings of workers.

The design of the new directive has caused criticism across Europe. Member States in eastern Europe fear that the directive infringes the principle of subsidiarity and hampers the business model of many local companies, whose competitive advantage lies in comparatively low wage and non-wage-related labor costs in particular. Criticism however is not limited to Member States from central and eastern Europe. Researchers from the Centre for European Policy (see Cep, 2016 and Dauner, 2018) expect the new legislation to have a negative impact on the total number of posting of workers and thus on the further integration of the European Market. They are afraid that this legislation may hinder cross border exports of companies in the new Member States by creating market entry barriers for national sectors with lower labor productivity. There are also fears of the bureaucratic burden, connected with the new regulation in the main receiving countries of posted workers in the European Union. As a result, the policy framework could end up limiting economic growth and the growth of employment in the EU.

2.2 Previous analysis of cross border services

The European Union measures the number of posted workers by the number of Portable Documents A1 (PD A1) issued by the EU Member States and EFTA countries (De Wispelaere and Pacolet, 2017). In 2016 around 2.3 million PDs A1 were issued. This is an increase of around 69 percent compared to the number of posted workers in 2010. De Wispelaere and Pacolet notice that the “number of PDs A1 issued or received provide only an indicative picture of the actual number of postings. Due to differences in the scope of posting between Directive 96/71/EC (Posting of Workers Directive) and Regulation (EC) No 883/2004”. Also, PDs A1 documents does not directly reflect the total number of people involved in the process. Several PDs may be issued to the same person for different jobs during the reference year. Additionally, a PD A1 is not a mandatory requirement for posting of a worker, since it is not a condition of the posting rules. PD A1 documents can also be awarded with retroactive effect, making the interpretation of the data even more complicated. However, the data provided by the report should create a good first view on the number of posted workers in the EU.

Of the 2.3 million PDs approximately 1.6 million were associated to the posting of a worker to one Member State. The other around 624,000 documents were issued to persons that were posted to two or more Member States according to the regulations in Article 13 (EC) No 883/2004. The biggest senders of posted workers in absolute dimensions were Poland (513,972 PDs) and Germany (260,068 PDs), while the relative share of PDs A1 in relatively small Member States like Luxemburg and Slovenia were the highest when compared with the total national employment in the respective countries. In total the number of posted workers accounts for around 0.7 percent of the total workforce in the European Union, while workers that were posted to one Member State account on average for 0.4 percent of the EU employment.

The posting of workers in the EU is not limited to the sending of workers from low wage countries to economies with high labor costs. More than 38 percent of the postings of workers occur from one high-wage Member State to another. Even though the number of posted workers from low or medium wage countries to economies with high labor cost account for 50.5 percent of the total number of posted workers there is also a potential geographical aspect to the distribution. Germany as the biggest economy in Europe with one of the highest international labor costs (Schröder, 2018) has the highest share of posted workers from the EU-13 Member States. The geographical location near the CEE states, may play an important role here, since Portugal and Spain have the lowest share of posted workers from Member States in central and eastern Europe.

Previous research on the effect of cross border services is mainly focused on data concerning the posting of workers measured by the Portable Documents A1 statistics. Especially research by De Wispelaere and Pacolet (2017, 2015) describes the development of cross border services in different aspects. They find that the posting of workers “could be considered as an interesting tool to stimulate intra-EU labor mobility, to stimulate intra-EU competition, to increase the income of posted workers, to create social convergence and finally to support adjustment to ‘asymmetric shocks’”. However, since the available data on posting of workers is limited in the timespan covered and in the number of countries reporting all necessary indicators, there is few statistical evidence for these findings.

Other research on cross border services is limited. Arentz et al. (2018) look at the regulatory effects on cross border services in the architectural sector. However, the study is focused on the effects that the origin of the national regulatory and legal framework has on exports rather than on total economic effects of regulation or service exports.

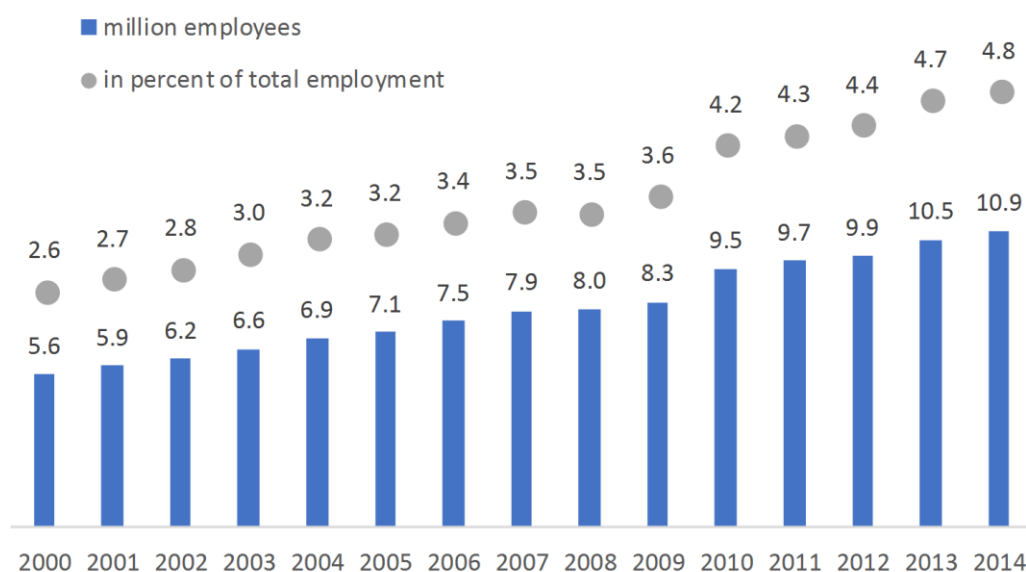
3. Development of cross border services in the EU

To analyze the effects of cross border services, especially in an economic context, detailed data on the sectoral level is needed to account not only for the direct effects of cross border services but also for effects that happens along its value chain. Thus, we define cross border services as the output of companies of the service sector that is sold to another country within the European Union. Services sectors in the Statistical Classification of Economic Activities in the European Community (NACE) corresponds to the Sectors G to U of the economy, covering economic activities like transportation, administrative and support service activities or professional, scientific and technical activities (see Table 7-1 in the Appendix for a broader overview).

Data on service exports and Intermediate economic networks in Europe is provided by the World Input Output Database (WIOD), covering output, value added and Intermediate-Network data for 43 countries and 56 individual economic sectors for the years 2000 to 2014. By using scientifically established mathematical calculations, the impact of cross border services in the European Union is calculated for each of the 56 sectors. This data is combined with recent data from Eurostat, measuring the number of employees in the different economic sectors. As a result, the number of employees that are directly (via export of the service) or indirectly (by providing the exporting sector with intermediate goods and services necessary for the competition of the exported service) dependent on the exports of cross border services in the EU-28 are calculated.

The results show that the importance of cross border services in the European Union has strongly increased in the last 15 years (Figure 3-1). In 2000 around 5.6 million jobs in the EU-28 were depended on the demand for cross border services in Europe. 15 years later that number has almost doubled (plus 94 percent). With 10.9 million employees cross border services accounted for around 4.8 percent of the jobs in the EU-28 compared to 2.6 percent in the year 2000. Even the global economic crisis in 2009 could not significantly slow down the total number of cross border service dependent jobs in the EU. From 2008 to 2009 the number of cross border service dependent jobs in the EU increased by around 300.000 jobs, while total employment in the EU decreased by around 4 million jobs. From 2009 to 2010 cross border service dependent jobs even increased strongly by around 1.2 million jobs while total employment in the EU still decreased based on the effects of the crisis. Looking at the 15 years covered by the available data importance of cross border service exports has steadily increased in relative and in absolute numbers of dependent employees.

Figure 3-1: Number and share of employment dependent on cross border services
in million employees and percent of total employment; EU-28



Source: WIOD (2016), Eurostat (2019), authors' calculations

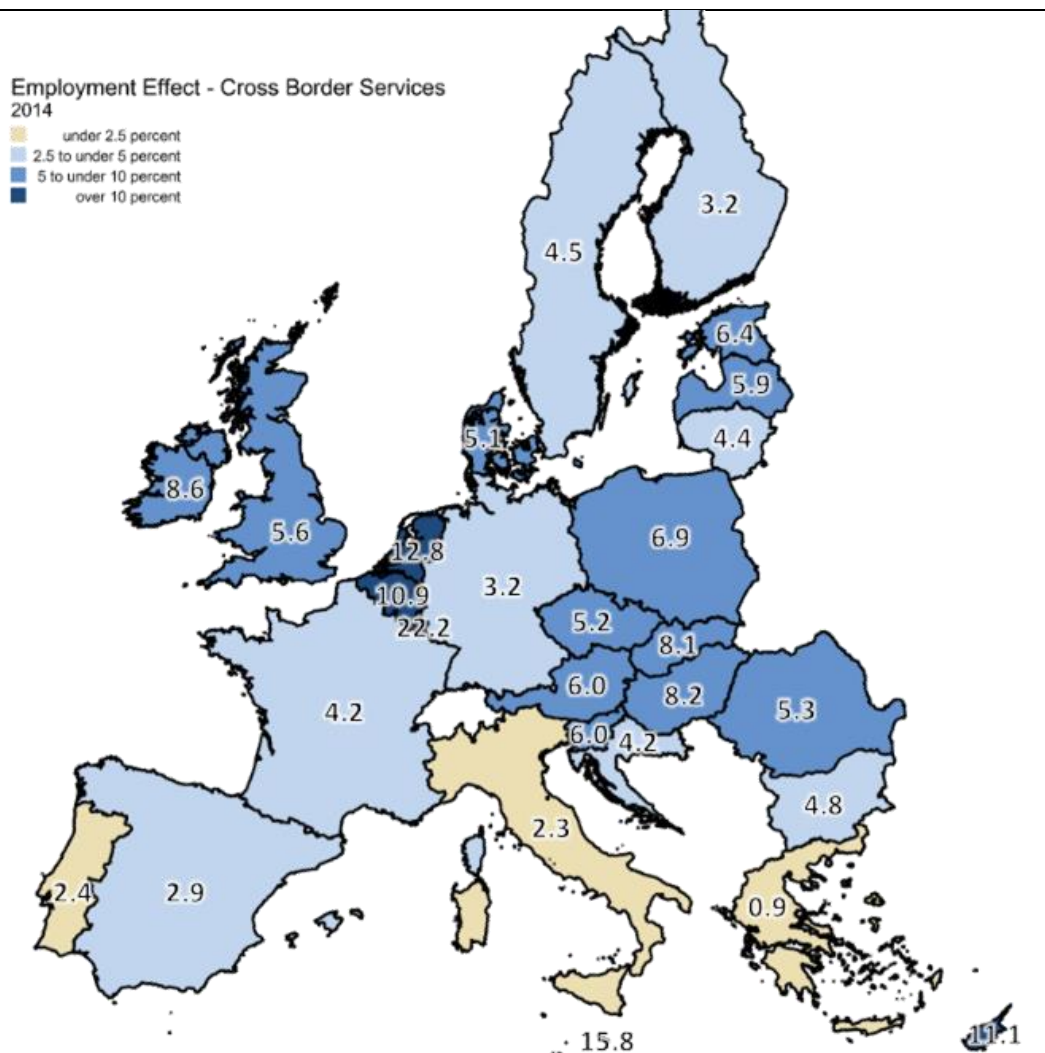
These numbers indicate an enormous growth in importance of cross border services for the labor market in the European Union. While cross border employment has risen by 94 percent total employment has only increased by around 5.5 percent. Thus, cross border services have contributed significantly to employment growth over the past 15 years.

The increasing number of cross border service dependent employment also contributed greatly to GDP growth in the EU-28. In 2000 a total of around 262 billion Euro of value added were generated by the exports of cross border services. This number increased to around 625 billion Euro in the year 2014. This means total GDP induced by cross border service exports increased by 139 percent in the 15 years covered.

The importance of cross border services for the national labor market differs between the individual Member States (Figure 3-2). Especially the labor market in smaller Member States depends strongly on the demand of their services in other Member States. In Luxembourg more than 22 percent of the jobs depend on the exports of services. Malta (15.8 percent), the Netherlands (12.8 percent), Cyprus (11.1 percent) and Belgium (10.9 percent) also profit to a great extent from the export of services in the EU. Their share of cross border service dependent employees more than doubles the EU-average. Also, most of the CEE states have above average cross border services shares.

Figure 3-2: National dependency on cross border services 2014 – relative share

Employment effect of cross border services in percent of total employment



Legend: In France 4.2 percent of total employment depend on the exports of services to other Member States

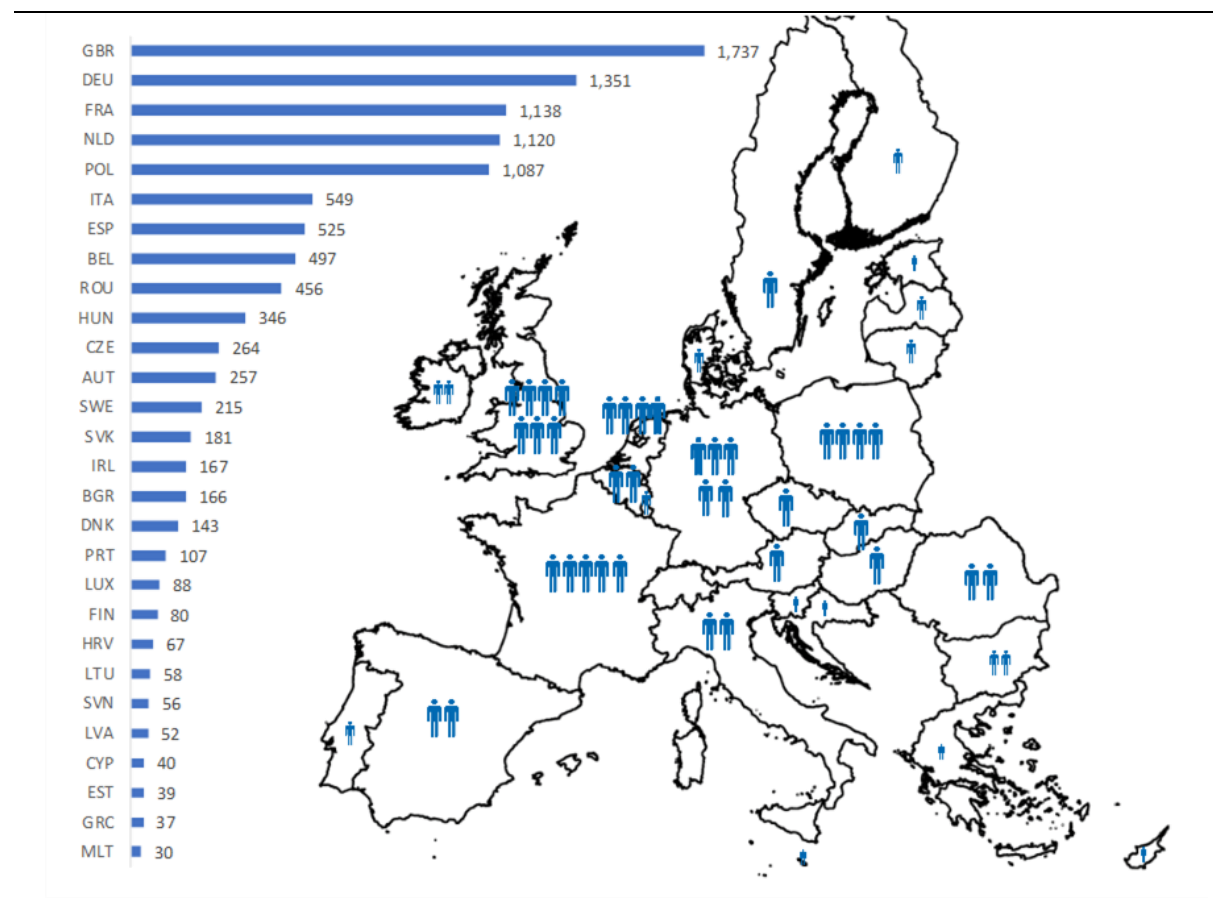
Source: WIOD (2016), Eurostat (2019), authors' calculations

Also, Ireland and the United Kingdom are above average gainers from the EU Single Market for services (Figure 3-3). 5.6 percent of the total employment in the United Kingdom depends on the cross border services to other European countries. This makes the UK the country with the biggest total number of employees dependent on cross border services. More than 1.7 million British jobs are generated by the export of services to other European countries. Especially administrative and support activities, financial and insurance activities and professional, scientific and technical jobs in the UK have a high share of their total employees exporting their services to other Member States. Germany and France come in second and third on total dependent jobs in cross border services. In total the EU-15 countries account for more than 8 million of the 10.9 million cross border service dependent jobs

in the European Union. This means nearly 74 percent of cross border dependent jobs are located in the EU-15 countries.

Figure 3-3: National dependency on cross border services 2014 – total numbers

Employment effects of cross border services in 1,000 employees



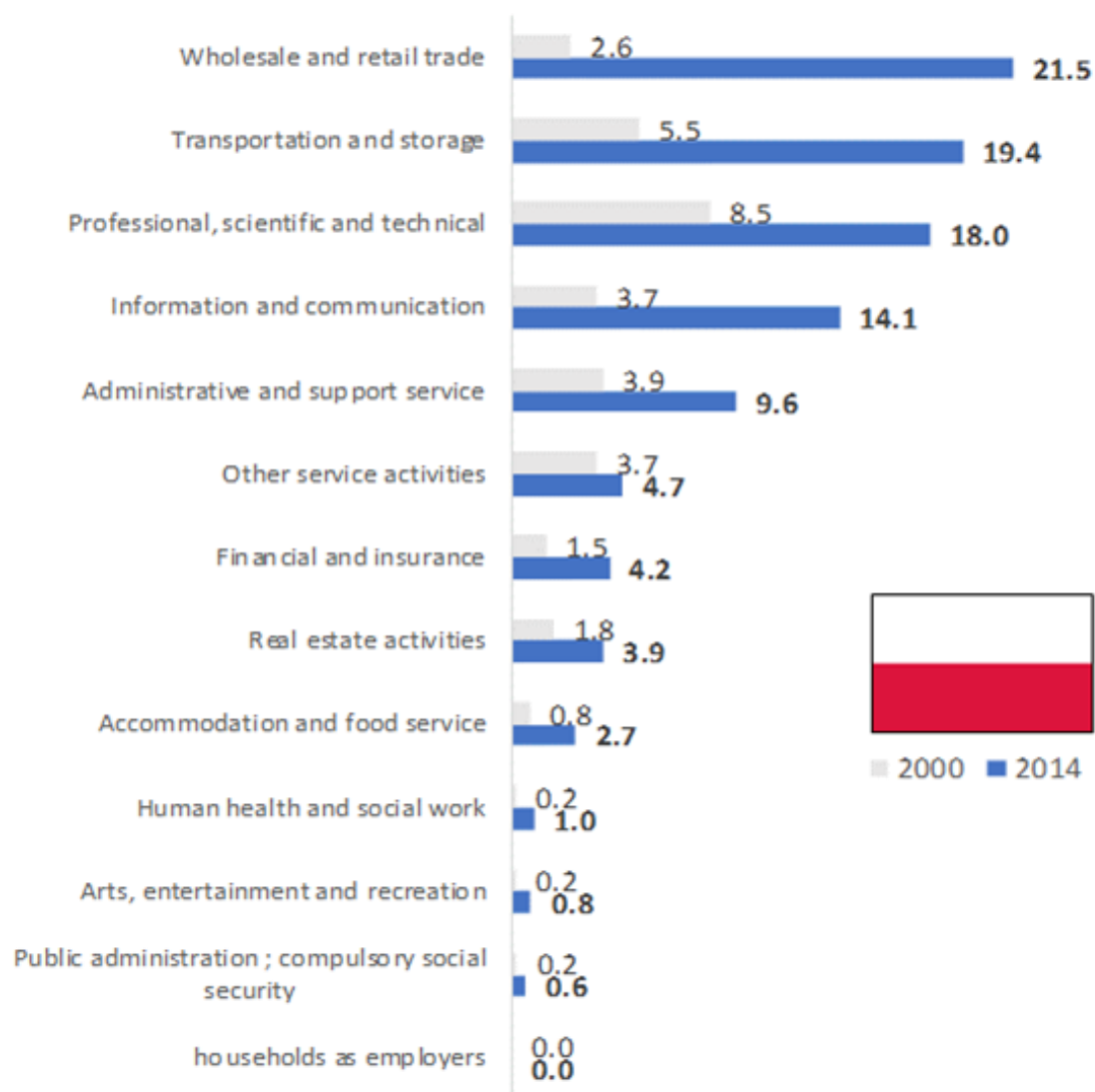
Source: WIOD (2016), Eurostat (2019), authors' calculations

Looking at the CEE countries, Poland is – in absolute numbers – the biggest gainer of cross border services of the central and eastern European Member States of the EU. Around 1.1 million employees depend on the export of services to other European countries. The focus of cross border services in Poland and other CEE states, however, is not simply on the selling of less knowledge intensive tasks and services. Figure 3-4 shows the relative share of cross border dependent employees by broad sectors in Poland. It can be seen that cross border services are very important for some labor intensive sectors like wholesale trade and the transport sector. 21.5 percent of the employees in the trade sector and 19.4 percent of the employees in the transport sector depend on the sale of cross border services. This share has strongly increased since the year 2000 driven by the integration in the EU Single Market. The effect of cross border services in Poland, however, is not limited to labor intensive tasks. Knowledge intensive sectors like the information and communication (ICT) sector and professional,

scientific and technical services also strongly benefit from the European cross border markets for their services. As a result, the share of cross border employees in these broad sectors have risen to 18 percent and 14.1 percent respectively.

Figure 3-4: Share of dependent employees 2000 / 2014 by broad sectors – Poland

Employment effects of cross border services in percent of total employment in the respective sector



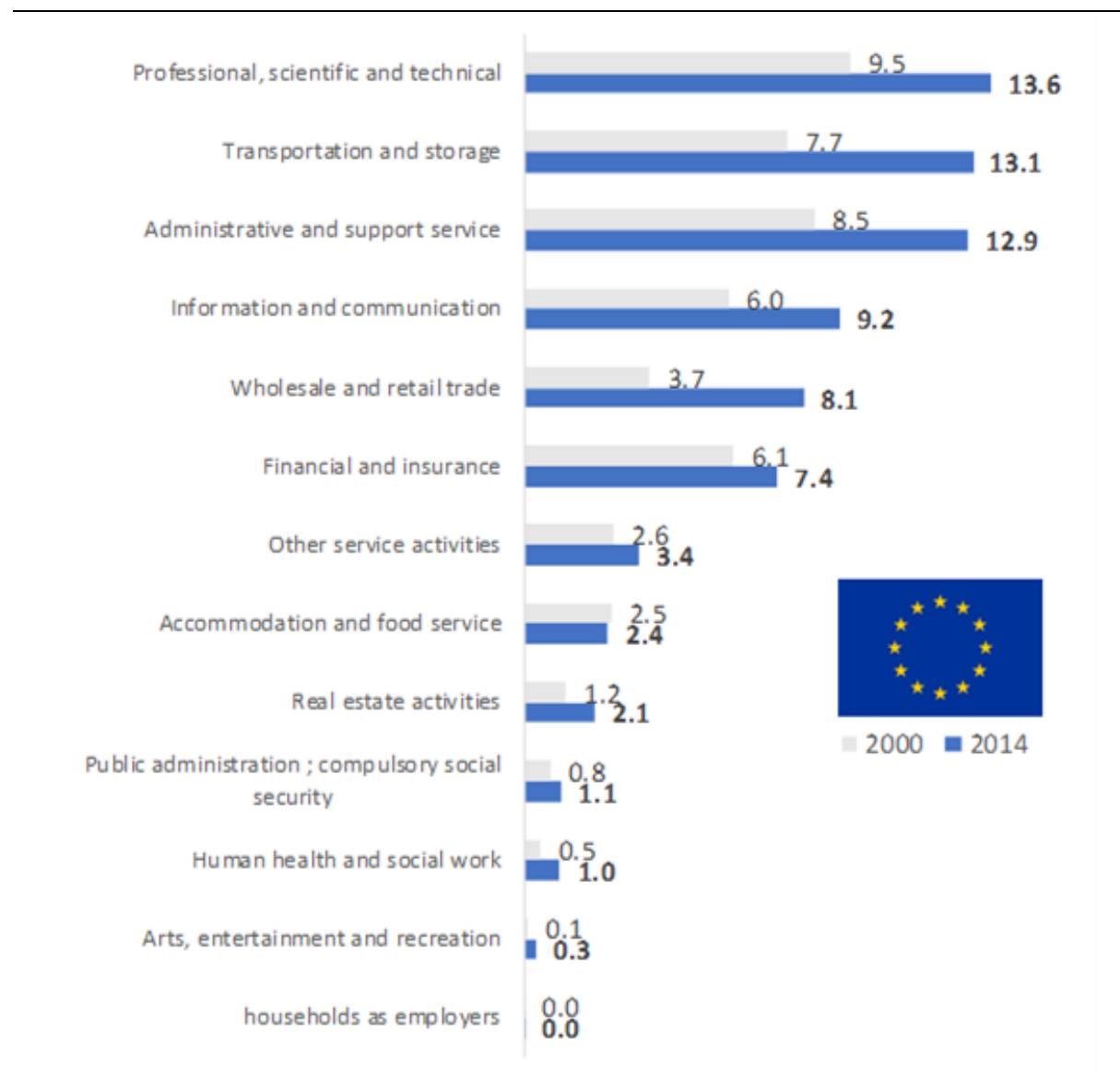
Source: WIOD (2016), Eurostat (2019), authors' calculations

Looking at the results for the European Union as one, the knowledge intensive sector of professional, scientific and technical activities is most dependent on the demand for cross border services abroad (Figure 3-5). Around 13.6 percent of the jobs in the sector can be attributed to cross border service trade. Also, cross border ICT-jobs represent 9.2 percent of the sector's employees in the EU-28.

Comparable to the results for Poland the labor intensive sectors like transportation and storage, or administrative and support services activities have an above average dependency on cross border services in the whole European Union. Around 13 percent of their respective employees depend on cross border services.

Figure 3-5: Share of dependent employees 2000 / 2014 by broad sectors – EU-28

Employment effects of cross border services in percent of total employment in the respective sector



Source: WIOD (2016), Eurostat (2019), authors' calculations

The results show that both labor and knowledge intensive sectors strongly benefit from cross border services in relative terms. In addition, there are differences in the dependence on cross border services between service sectors and economies, suggesting that when designing rules for the provision of

cross border services, the different sectors should be examined more closely. The next subchapters will take a deeper look on the development of knowledge and labor intensive cross border services in the European Union.

3.1 Knowledge intensive services

In recent years the public and political discussion on provision of cross border services has mainly focused on the labor intensive aspects of cross border services. The term “cross border service” is thus often connected with fears of the so-called social dumping or low skilled workers with a comparably low productivity. The previous analysis has shown that cross border services appear on a much broader scale throughout the economy. Knowledge intensive service sectors play a big role in the interconnected European economy. Thus, it is not surprising that knowledge intensive cross border services have also grown strongly over the last 15 years.

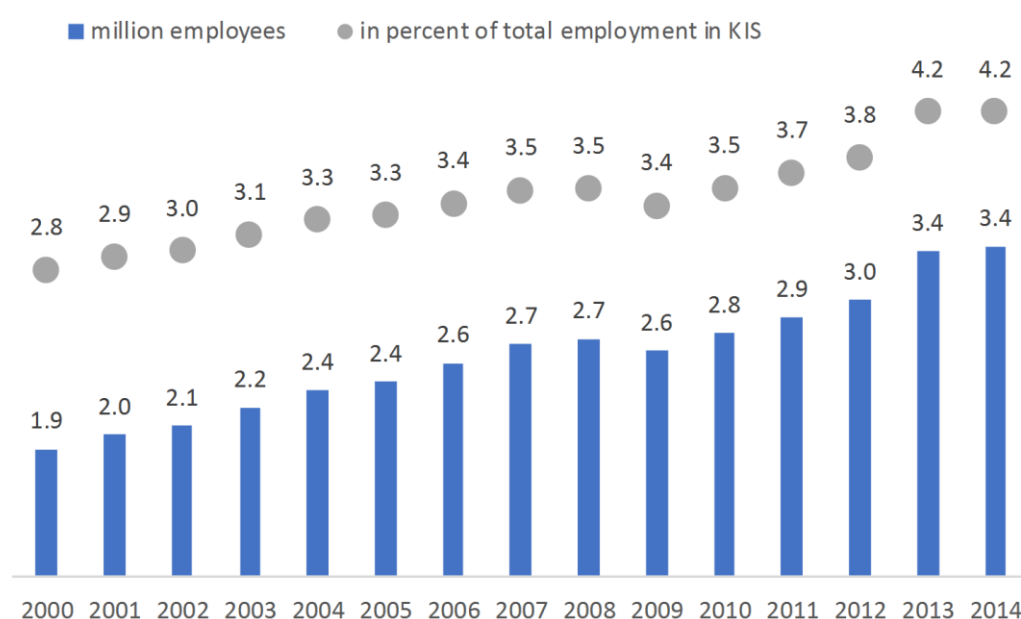
For the definition of the knowledge intensive service sectors a narrow delimitation was chosen based on the definition of knowledge intensive services on a 2-digit level by Eurostat and the available details on different sectors in the WIOD Database. As a result, the Sectors 78 and 80 (Employment activities, Security & Investigation) plus 90 to 93 (Arts, culture, gambling, sports) were left out of the analysis of knowledge intensive sectors because data for these sectors was only available as an aggregation of knowledge and labor intensive sectors in the WIOD Database². Thus, the following results shown for the cross border services in knowledge intensive service sectors can be seen as a lower estimate of the total employment in knowledge intensive cross border services.

Figure 3-6 shows the evolution of knowledge intensive services (KIS) cross border in the EU-28. Except for the economic crisis in 2009 these cross border services have registered a steady growth from 2000 to 2014. With around 3.4 million jobs, cross border services amount for around 4.2 percent of total employment in the KIS sector. That amounts to total growth of 77 percent of cross border services in knowledge intensive service sectors in the last 15 years. Employment in the KIS-sector as a total has only grown by 16.8 percent. This shows that cross border services not only play a major role in the growth of total employment in the different European countries, but also strongly promotes the growth of the knowledge intensive service sector.

² For a detailed description of the selection of sectors for the analysis of cross border services in knowledge intensive sectors see Table 7-2 in the appendix.

Figure 3-6: Number and share of knowledge intensive cross border services

in million employees and percent of total employment in knowledge intensive service sectors; EU-28



Source: WIOD (2016), Eurostat (2019), authors' calculations

3.2 Labor intensive services

Concerning the total number of employees in the European Union, labor intensive services sectors amount for a higher share of total employment than knowledge intensive sectors. While the knowledge intensive service sector as defined in the previous chapter accounts for around 80 million employees, the other services sectors account for another 85 million employees total in the European Union. Cross border services in the other mostly labor intensive services sectors secure around 7.5 million jobs. However not all of the jobs dependent on cross border services result in the employee physically crossing the border themselves. Especially services in the ICT-sector can often be done via broadband networks without a person physically crossing the border between Member States. However, even in ICT-services a successful design of the service offered implies that one or several team members frequently meet with the contractor physically. Hence, they still cross the border physically, but for a much shorter duration than posted workers registered under der PD A1.

To take into account the difference in the posting of workers and the definition of cross border services used in this study, we take a deeper look into sectors where the deliverance of a service is most likely connected with the performing person physically crossing the border. A group of sectors that fits this criterion is aggregated in the economic section N – administrative and support services activities. Activities in this economic section include (extract):

- Activities of employment placement agencies,
- travel agency and tour operator activities,
- private security activities,

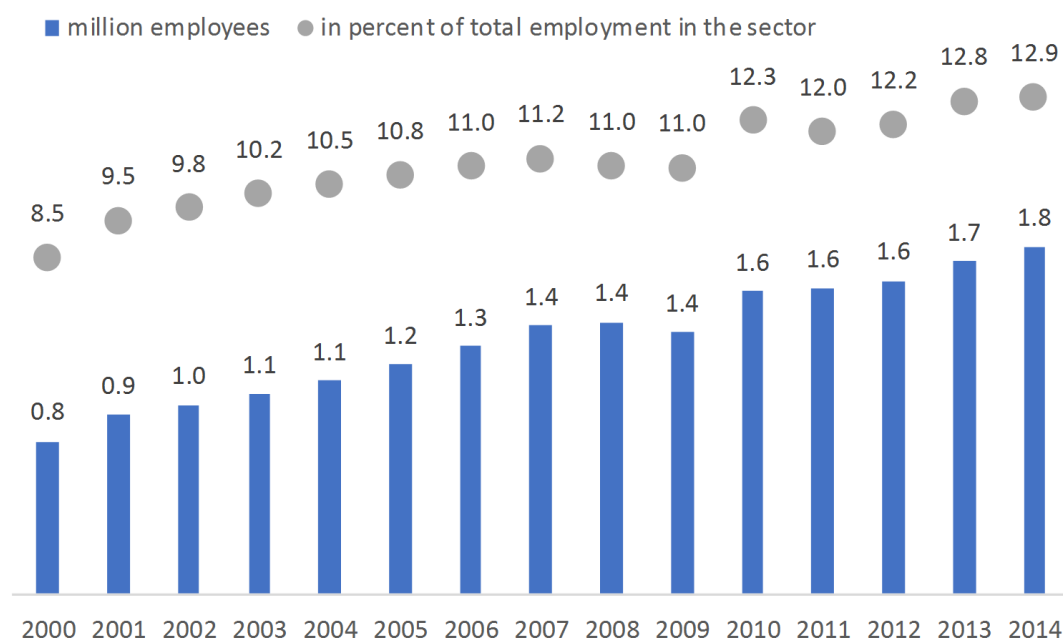
- facilities support activities (e.g. cleaning and other),
- landscape service activities,
- office administrative and support activities,
- and organization of conventions and trade shows.

All those services mentioned above most likely require a person carrying out the service cross border to physically cross the border between the Member States themselves while delivering the service. Figure 3-7 shows the development of cross border service employment in the sector. With a total of around 1.8 million employees dependent on cross border services this sector alone amounts for around 17 percent of the total cross border service induced employment in the European Union. The sector has also registered a particularly strong growth in the last 15 years, increasing the number of dependent employees by 127 percent. This number is significantly above average within the service sector, since cross border services employment only grew by 94 percent when considering all the jobs affected.

However total employment in the section N – administrative and support services activities has also developed very dynamically in the last couple of years. Since the year 2000 total employment in this sector has grown by 48.5 percent putting the growth of cross border services into perspective.

Figure 3-7: Number and share of cross border administrative and support services

in million employees and percent of total employment in the sector; EU-28



Source: WIOD (2016), Eurostat (2019), authors' calculations

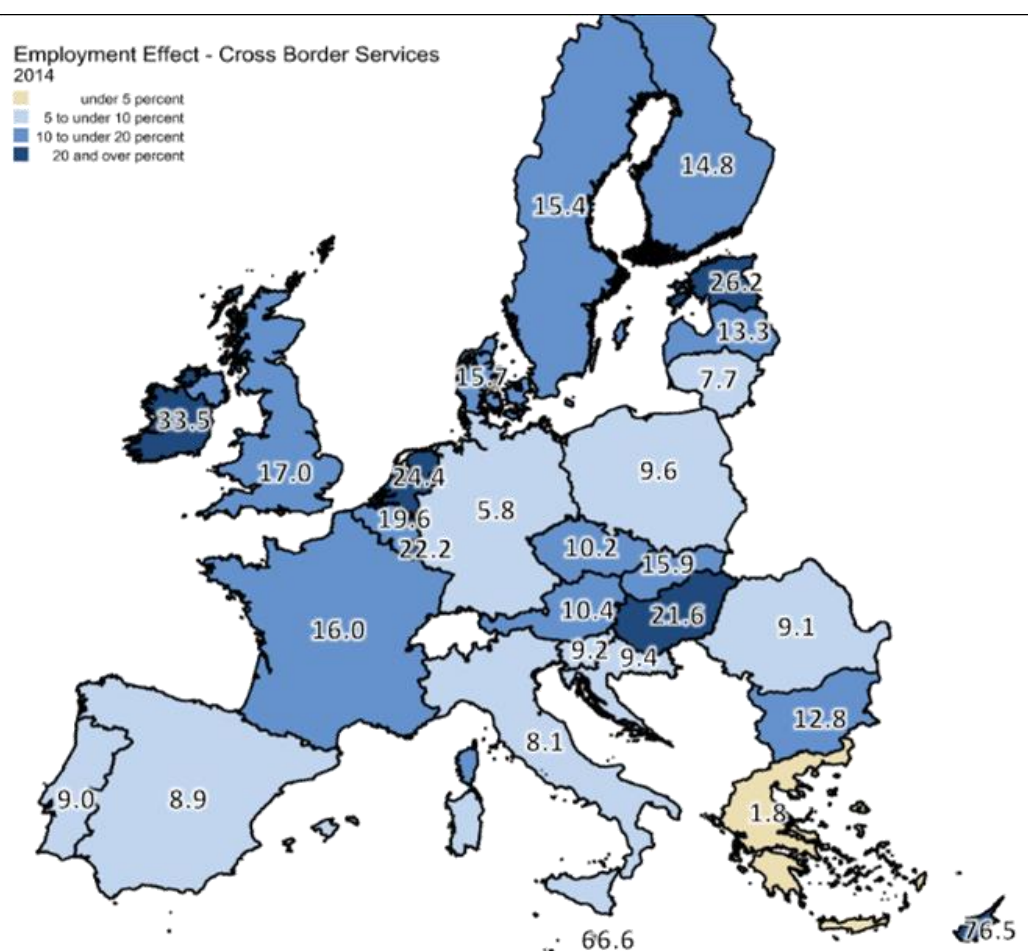
The share of employment dependent on the cross border delivery of services in section N also strongly differs across certain Member States (Figure 3-8). While companies working in small

southern Member States like Malta or Cyprus have a huge share of 76.5 percent and 66.6 percent respectively of their employees in the sector working for cross border projects, dependent employment in the CEE Member States is below average in most of the central and eastern European countries. Of these countries only Hungary has an above average share of their employees in the sector working on cross border projects.

The country whose biggest share of employees in the sector is dependent on cross border services is Ireland. Around every third employee in the sector is dependent on cross border services to other European countries. Of the biggest European economies France and the United Kingdom have registered above average share of cross border employment in the sector. By contrast, the sector in Poland is much less dependent on cross border services than in other European countries.

Figure 3-8: National dependency on cross border services 2014 – relative shares Section N

Employment Effects of cross border services in percent of employment in administrative and support service activities



Legend: In France 16 percent of total employment in section N (administrative and support service activities) depend on the exports of services to other Member States

Source: WIOD (2016), Eurostat (2019), authors' calculations

As a first result, the deeper analysis of the different service sectors shows a higher dependence on cross border services in the labor intensive sectors. However, the impact of the cross border demand for knowledge intensive services is not to be underestimated. Nearly one out three cross border service employees is working in knowledge intensive sectors. And while not every job dependent on the export of services in another European Member State is connected with the employee physically crossing the border, the proportion of these employees that at least once for delivery of the service have to cross the border is not to be underestimated. Taking only into account the economic service sectors with the highest probability of the employee physically crossing the border already accounts for 17 percent of total cross border service employment.

4. Impact of cross border services

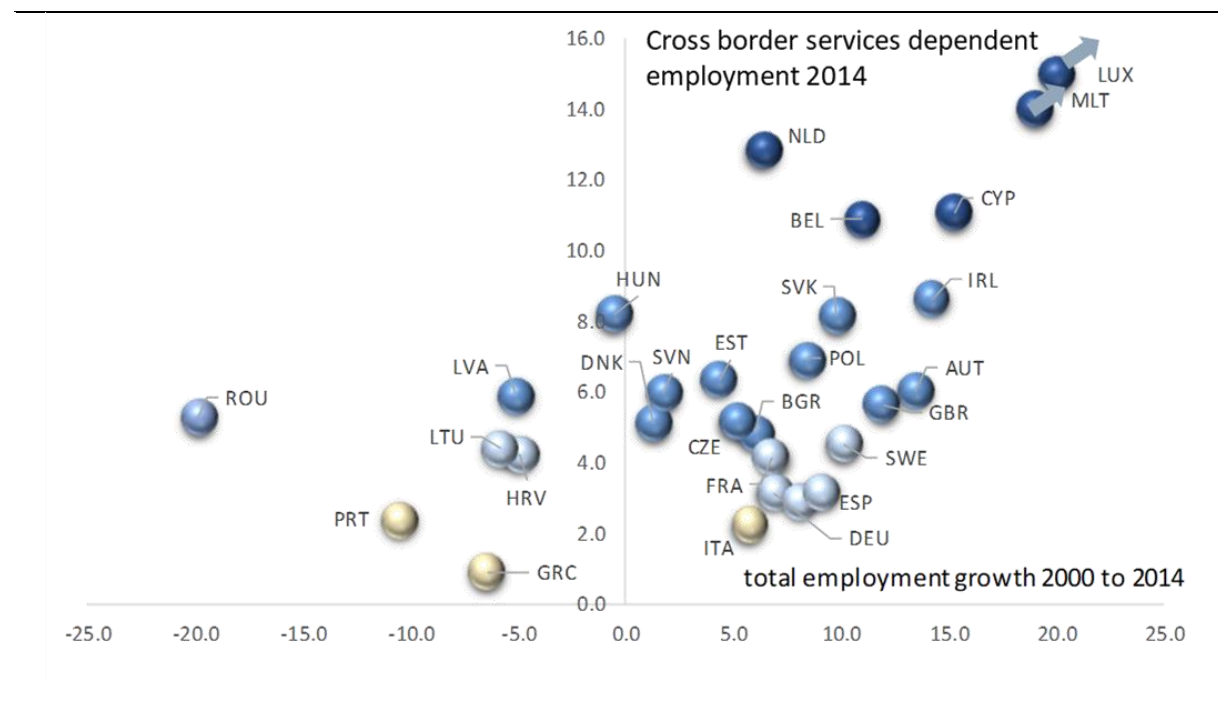
The growing share of cross border services relative to the total employment has been shown in the previous section of the study. This section looks at the results from a total economical perspective. We will try to answer the question if cross border services just represent a change of market area and thus substitutes local demand or increases the total output of the service sector. Thus, it is examined if the distribution of cross border services effectively support growth on a national economic level. We will also look at possible connections of cross border services with social cohesion in the different Member States.

4.1 Effects on employment and growth

The positive effect of cross border services on total national employment can easily be shown. Figure 4-1 shows the connection between cross border share and total employment growth for each of the Member States. Just looking at the visualization reveals the strong positive correlation between cross border service share in employment and total employment growth. Member States whose economy more actively supports cross border services have registered a much stronger total employment growth than economies with weaker cross border service shares.

Figure 4-1: Connection of cross border service share and employment growth

Cross border share in percentage points, total employment growth in percent



Numbers for Malta and Luxembourg adjusted for better visualization: LUX (growth: 50; CBS: 22.2), MLT (growth: 28.8; CBS: 15.8)
Source: WIOD (2016), Eurostat (2019), authors' calculations

To quantify the magnitude of the impact of cross border services on employment growth we use statistical tools established in the analysis of panel data³. For this analysis we examine the total employment and the cross border services shares for each of the Member States from 2000 to 2014, creating a total of 420 observations⁴. We then construct a random-effects model⁵ to analyze the observed connection. As a result, we find a highly significant connection between cross border service shares and employment growth. The differences in cross border services shares alone explain around 30 percent of the difference between the employment numbers measured in the different countries and points in time.

If a country increases its share in cross border service employment by 1 percent, its total employment is expected to grow by 0.013 percent. Looking at the 236 million employees in the current Member States⁶ this result means that if cross border services shares in the EU-28 would increase by one percent, total employment would increase by more than 30.600 people. On the other hand, if regulation would hinder the distribution of cross border services across Europe, so that the share of cross border services in total employment would decrease by just one percent, around 30.600 jobs could be at stake. As shown in chapter 3.1 these jobs would not only be in labor intensive sectors. The number of highly qualified jobs in the European Union would also be negatively affected to a significant amount. Figure 4-2 shows the connection of the growth of total employment in the knowledge intensive service sector since the year 2000 and the share of KIS-employment dependent on cross border services. It can clearly be observed that countries with a higher share of cross border dependent employment in the knowledge intensive sectors have registered a much higher employment growth in knowledge intensive jobs than Member States that had put a lesser focus on cross border services in the sector.

3 Panel data contains observations of multiple indicators obtained over multiple time periods for the same countries.

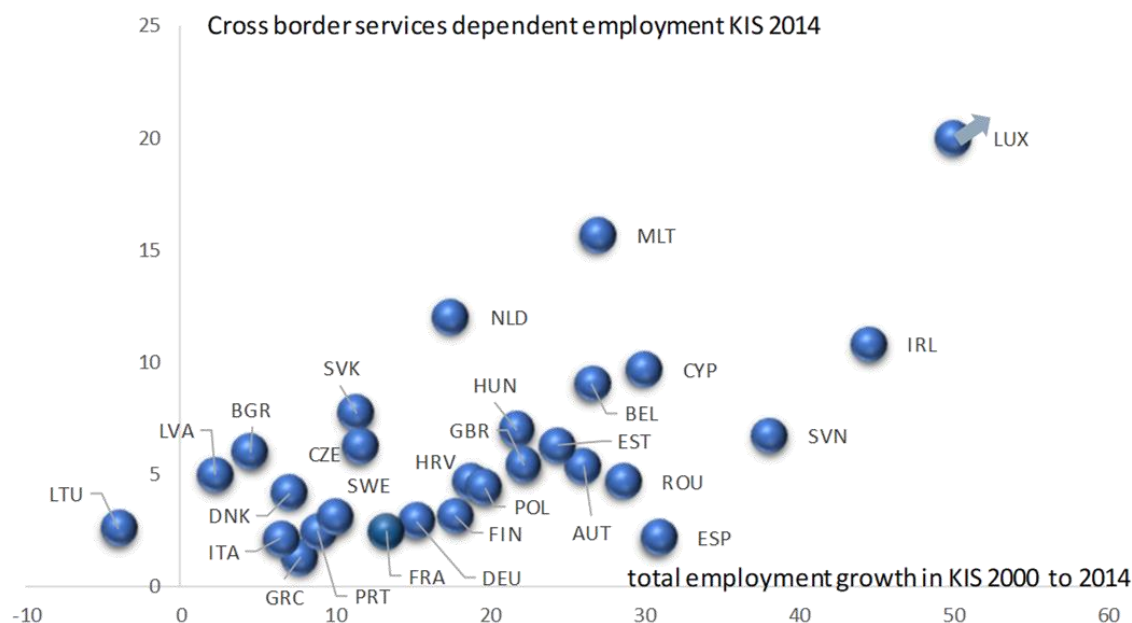
4 Data for 28 countries in the time span of 15 years

5 For all random effect models used in this paper, we control for cluster-robust standard errors.

6 Total employment in 2017 based on Data by Eurostat (2019)

Figure 4-2: Connection of cross border service share and employment growth in KIS

Cross border share in percentage points, employment growth in percent; Knowledge intensive service sectors



Numbers for Luxembourg adjusted for better visualization: LUX (growth: 79.5; CBS: 24.2)

Source: WIOD (2016), Eurostat (2019), authors' calculations

To measure the effect of cross border services on GDP-growth, the same statistical model that was used for employment growth can be constructed using GDP data for the European economies as the dependent variable. Effects of cross border service share register a highly significant effect on GDP, explaining around 9 percent of the differences between countries and points in time. Leaving all unobserved variables constant, an increase in the share of cross border service employment by one percent results in an increase of the GDP by 0.09 percent. Looking at the total GDP of the European Union that stands at around 15,870 billion euro that would mean an increase of around 14.3 billion euros.

Since the total GDP-numbers rely heavily on the input factors of production like capital and labor, calculated effects of an increase in cross border services shares should also take the input of these two main economic indicators into account. Doing this will create reliable results based on established economic theory for the total effect of cross border services shares on GDP. Thus, we included the classical production function in the random effects model⁷, controlling for labor and capital inputs in addition to cross border service shares (Figure 4-3).

⁷ For Details see Figure 7-1 in the Appendix.

Figure 4-3: Macroeconomic production function – Effects of cross border services on GDP

Random-effects model with robust standard errors; Data for the EU-28 countries from 2000 to 2014

GDP as a function of capital, labor and cross border services

$$\log GDP = A + \log L^\alpha + \log K^\beta + \log CBS$$



+0.25 percent per % labor
+0.84 percent per % capital
+0.05 percent per CBS-share



(Highly) Significant:
* Labor
*** Capital
*** Cross border services



98 percent of change explained

Source: WIOD (2016), Eurostat (2019), AMECO (2019), authors' calculations

The results again show a highly significant connection between GDP⁸ and cross border services shares. While keeping capital and labor inputs constant and increasing the share of cross border service induced employment by 1 percent the GDP can be increased by 0.05 percent. This can be interpreted in a way, that an increase in participation in the EU service market will improve economic growth in the different countries of the union. Jobs in sectors that export their services cross border seem to have a higher positive impact on the national GDP than the average job in the total economy. Thus, by providing a positive regulatory framework for cross border services not only employment in the European Union can be expanded but also economic growth can be supported. A reduction of the share of cross border services by 1 percent could reduce total GDP in the EU-28 by around 8 billion Euro. This effect, however, relies on national demand for the employees currently working on cross border projects to be high enough that total employment is not altered. With 10.9 million jobs dependent on the cross border demand of their services, the total economic effect of a harsher regulatory framework on economic growth is expected to be much higher.

⁸ Similar results can be obtained observing the effect of cross border service shares on gross national income (GNI). As expected, the impact of an increase in cross border service shares has a slightly higher effect on GNI than GDP, since GNI already includes income created by natives no matter their job location. Also, a slightly higher share of variance in GNI is explained by cross border service shares.

4.2 Effects on social cohesion

The previous analysis has shown that cross border services have not only strongly grown since the year 2000, but also had a significant positive impact on employment and economic growth in the European Union. This section will look at the effects of cross border services on social cohesion in the Member States. To measure social cohesion, we will look at two dimensions often used in social analysis:

- Poverty and inequality
- Life satisfaction and happiness

4.2.1 Poverty and inequality

To measure poverty and inequality in the Member States two indicators were used. The share of people at risk of poverty or social exclusion⁹ and the Gini Coefficient¹⁰, as a measure for equality in personal income. Data for these two indicators was extracted from the Eurostat Database in February 2019. Data availability for these two indicators is limited in comparison with cross border service shares. While cross border service data is available for all 28 Member States from 2000 to 2014, poverty and social exclusion numbers mostly start in 2005. Especially for newer Member States like Croatia or Romania data for this indicator is only available for the last couple of years.

Figure 4-4 exemplary shows the connection between cross border service shares and the share of people at risk of poverty and social exclusion. Looking only at the individual combinations for all the countries and years a strong statistical correlation¹¹ can be observed, meaning the higher the share of cross border services in a country, the lesser was the share of people in risk of poverty and social exclusion.

⁹ People at risk of poverty or social exclusion corresponds to the sum of persons who are either at risk of poverty, or severely materially deprived or living in a household with a very low work intensity. Persons are only counted once even if they are present in several sub-indicators.

The “at-risk-of-poverty rate” is the share of people with an equivalized disposable income (after social transfer) below the at-risk-of-poverty threshold, which is set at 60 percent of the national median equivalized disposable income after social transfers.

Material deprivation refers to a state of economic strain and durables, defined as the enforced inability (rather than the choice not to do so) to pay unexpected expenses, afford a one-week annual holiday away from home, a meal involving meat, chicken or fish every second day, the adequate heating of a dwelling, durable goods like a washing machine, color television, telephone or car, being confronted with payment arrears (mortgage or rent, utility bills, hire purchase instalments or other loan payments).

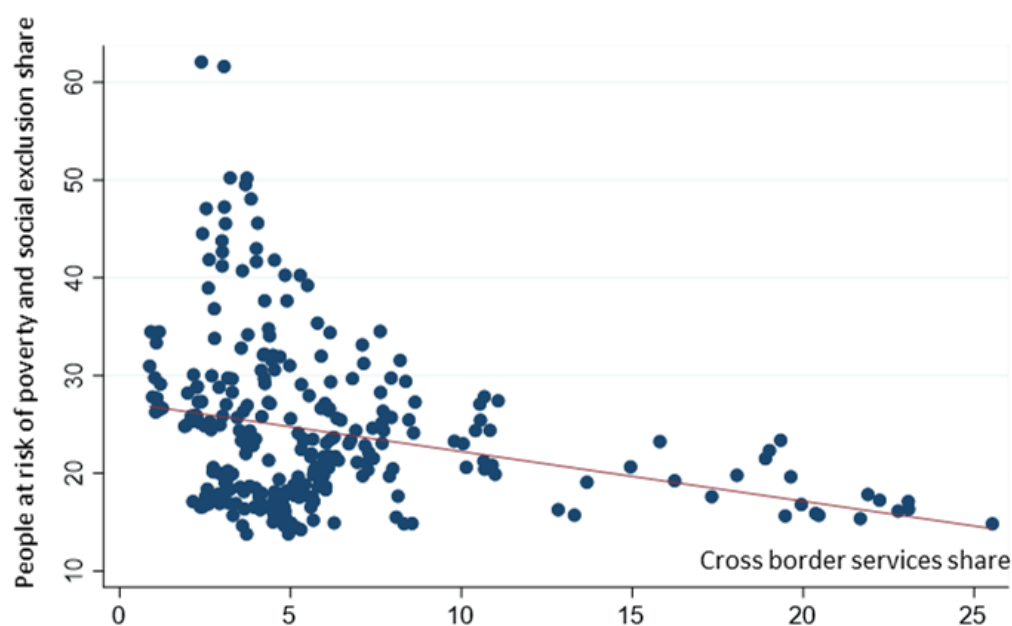
The indicator persons living in households with very low work intensity is defined as the number of persons living in a household, where the members of working age worked less than 20 percent of their total potential during the previous 12 months.

¹⁰ The Gini Coefficient has a value between 0 and 1. While 0 means that personal income is completely even distributed (everybody has the same income), a value of 1 means that income is concentrated on one person (one person has the entire income, others have none).

¹¹ Significant at the 0.1 percentage level ***

Figure 4-4: Correlation: cross border services and people at risk of poverty or social exclusion

Scatterplot with trend line; Cross border share in percentage points; Poverty and social exclusion share in percentage points



People at risk of poverty or social exclusion corresponds to the sum of persons who are either at risk of poverty, or severely materially deprived or living in a household with a very low work intensity. Persons are only counted once even if they are present in several sub-indicators. The indicator does not measure poverty but people at a higher risk of poverty due to their living conditions.

Source: WIOD (2016), Eurostat (2019), authors' calculations

This significant correlation is still there when random effects between the observed countries are taken into account.¹²

Similar results can be calculated looking at the connection between the Gini-Inequality Index and cross border services shares. Individual data shows a highly significant negative connection between cross border services and income inequality, meaning the higher the share of cross border services the lower the observed income inequality¹³.

These findings can possibly be explained by the strength of the connection of cross border service shares with poverty and inequality measures. While jobs generated with the export of cross border services can certainly help with inequality and social exclusion other factors play a big role as well. This includes among others social security systems that will help unemployed or handicapped people stay a part of social life, fiscal and monetary policies concerning the redistribution in society, a potent education sector with low barriers for people with lower income, or tax fairness. Cross border services

¹² Significant at the 1 percentage level **. While also controlling equicorrelated errors by using robust standard errors in the regression a statistically significant connection can no longer be proven.

¹³ However random effects statistical models can prove no significant connection between income equality and cross border service shares, meaning the previously observed connection could also be due to unobservable random effects in the data.

may however still help with poverty and inequality problems. As the results in chapter 4.1 have shown, cross border services help generate employment in the different Member States. Being an active part of the labor market is still a proven way to prevent poverty and social exclusion.

4.2.2 Life satisfaction and happiness

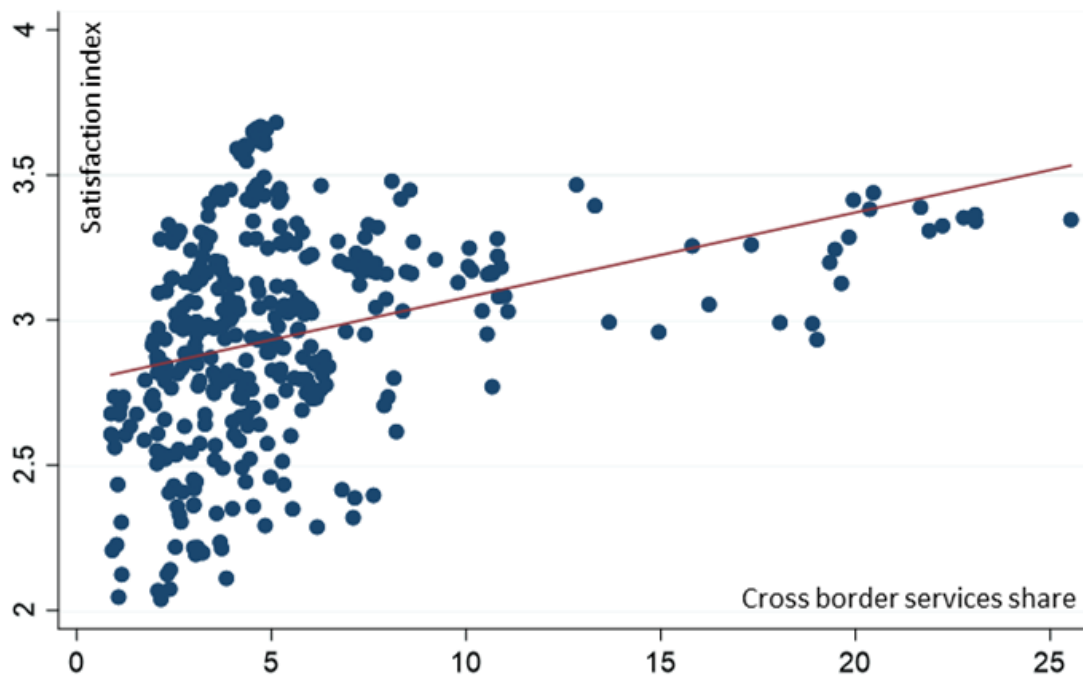
To measure life satisfaction and happiness in the individual Member States we used data provided by the Eurobarometer polls (European Commission, 2019). Eurobarometer is a survey established in 1974 that twice a year completes approximately 1,000 face-to-face interviews per country in Europe. A question regularly asked is about the life satisfaction of the participants¹⁴. To aggregate the answers into a “satisfaction index” the answers were appointed with an ordinal score: 4 points for “very satisfied”, 3 points for “fairly satisfied”, 2 points for “not very satisfied” and 1 point for “not at all satisfied”. Based on this classification an average country score for every country was calculated. The annual value used in further calculations was calculated as the average survey score of the two surveys in the respective year.

Figure 4-5 shows the positive connection of cross border service shares with the satisfaction index. Countries with a higher share of cross border service employment have on average registered a higher satisfaction in life of its residents. Thus, it can be assumed that the provision of cross border services plays a positive role in the happiness of the average person in the economy.

¹⁴ The question asked is: “On the whole are you very satisfied, fairly satisfied, not very satisfied or not at all satisfied with the life you lead?”

Figure 4-5: Correlation: cross border services and happiness index

Scatterplot with trend line; Cross border share in percentage points; Satisfaction Index in Index points



Source: WIOD (2016), Eurostat (2019), European Commission (2019), authors' calculations

The results on an individual level of datapoints are highly significant. The positive connection between the two indicators remain on a significant level after controlling for random effects in the data and equicorrelated errors by using robust standard errors for the fixed effects regression. This means that even after controlling for unobservable effects in the individual Member States, like Danish citizens being on average much more satisfied with life, an increase in cross border service shares relates to a higher average life satisfaction in the respective countries.

Figure 4-6: Effects of cross border services on Life satisfaction index

Random-effects model with robust standard errors; Data for the EU-28 countries from 2000 to 2014



0.0086 points higher index per cross border service share



Significance: 0.024*



12 percent of change explained

Source: WIOD (2016), Eurostat (2019), European Commission (2019), authors' calculations

Figure 4-6 shows the details of the connection between cross border service shares and life satisfaction in the European Union. An increase in the employment share dependent on cross border services increases the average satisfaction index by 0.0086 points. This number alone does not seem that high. But it would be presumptuous to expect that cross border services as a single factor could drastically change the total happiness of the whole population of a country. Happiness is a complex factor influenced by many inputs. To have cross border services alter the total happiness of the population in a positive way, providing job opportunities or foster economic prosperity should suffice to set cross border services in the right context.

5. Conclusion

The Single Market for services in the European Union has been a success story. In the last 15 years employment dependent on cross border services has increased by 94 percent, while total employment registered a growth of 5.5 percent. Thus, cross border services have significantly contributed to employment growth in the European Union. In 2014 around 10.9 million jobs in the EU-28 depended on the export of services to other Member States representing around 4.8 percent of total employment in the EU.

While smaller Member States and the central and eastern European Member States do register a higher share of cross border service jobs, cross border exports of services play an important role in all of the European economies. Countries like the United Kingdom, Germany and France do have a total of more than 4 million cross border service dependent employees themselves, with the UK being the biggest total gainer of the Single Market for services in the European Union. This also means that the service industry in the United Kingdom may be strongly affected by potential trade barriers related to Brexit. In total, more than 8 million or 74 percent of cross border service jobs are in the EU-15 Member States, making cross border services an important economic contribution across all of Europe.

This finding is consistent with previous research on cross border services measured by the number of PDs A1 documents. Cross border services in the EU are not limited to the inclusion of workers from low wage countries to economies with high labor costs. More than 38 percent of the postings of workers occur from one high-wage Member State to another.

Looking at the European Union as one, employment dependent on the export of services to other Member States is found in labor and knowledge intensive economic sectors alike. 4.2 percent of the employment in knowledge intensive sectors depends on the export of services cross border, which is comparable to the total share of cross border service dependent jobs. Cross border services do not only promote labor intensive activities in the economic sectors, but also play a big role in fulfilling the demand for knowledge intensive services across Europe. Looking at the individual broad sectors in the EU, the highest share of cross border dependent employment is found in the professional, scientific and technical services sector. Around 13.6 percent of the employees in the sector depend on cross border services. Since employment in knowledge intensive sectors is typically connected with an above average wage, these findings can be interpreted as proof that cross border services often have nothing to do with low-wage jobs.

The dependence on cross border services varies between economic sectors. This means that general rules for the export of services in the EU may have varying degrees of impact in the economic sectors. A rule which only weakly affects firms in one sector may constitute a strong barrier to entry for firms in other service sectors. Effective regulation on cross border services must take account of these differences. By applying rules only to service sectors where adequate regulation is needed, the potential of the single market can be used much more efficiently.

Cross border services play a vital role in all the Member States and across a broad coverage of labor and knowledge intensive service sectors. Since cross border service dependent employment has

increased much more dynamically than the total employment in all Member States, it represents an important growth engine in the European economy. This is especially true for Member States that are more actively engaged in the export of services cross border. Member States whose economy more actively support cross border services have seen their total employment numbers increase much more dynamically than countries that are less engaged in the European cross border service market.

Statistical analysis confirms the positive effect of cross border services on employment growth. By providing job opportunities, cross border services also have a highly significant effect on economic growth. Cross border services do not only drive economic growth by creating additional job opportunities. The jobs created by the export of cross border services seem to have a higher impact on GDP growth than the average employment. The results of a statistical regression, based on established economic models, find that GDP in the EU-28 could increase by 0.05 percent, if cross border service shares increase by one percent even while labor and capital inputs remain constant.

Thus, by providing a positive regulatory framework for cross border services not only employment in the European Union can be expanded, but also economic growth can be supported. A regulatory framework hampering cross border service activities could therefore lead to negative effects in labor markets and a reduction in economic growth. A reduction of the share of cross border services by 1 percent could reduce total GDP in the EU-28 by around 8 billion Euro. This effect, however, relies on national demand for the employees currently working on cross border projects to be high enough that total employment is not altered. With a total of 10.9 million jobs dependent on the cross border demand for their services, the total economic effect of a harsher regulatory framework on economic growth is expected to be much higher. In 2014 the value added in the EU-28, created by the exports of cross border services, amounted to around 265 billion Euro.

A similar connection of the cross border service dependent employment can be observed with social cohesion indicators. Increasing employment rates and opportunities have historically resulted in a reduction of people in risk of poverty or social exclusion. Thus, it is not surprising that countries with a higher share in cross border service employment have a lower rate of people at risk of poverty than other countries. Cross border service opportunities also seem to have a significant positive effect on average life satisfaction in the different economies. A higher cross border service share resulted in a small but significant increase in the average life satisfaction in the different Member States.

The relative effects of cross border services on social cohesion may probably be small compared with other effects like social security systems or the provision of public services. However, in line with the effects on economic growth, the positive indirect effects of cross border services on social cohesion through employment growth and job security should be much higher. The Worldbank (2012) describes “having or not having a job” as a “key elements of social cohesion”. By securing some 10.9 million jobs in the Member States, cross border services play an important role in sustaining and improving social cohesion in the EU.

Cross border service shares can be supported just by the prevention of an overly harsh regulation on the provision of services abroad, while other measures like improving the social security systems can be very expensive and connected with unexpected side effects. As a conclusion, cross border services can be used as an efficient way to improve economic and labor growth, and even has a positive

connection with the average life satisfaction in the population while being effectively free of charge. Thus, overly harsh regulation of cross border services may end up limiting economic growth and growth of employment in the EU. Since the harmonization of living conditions in the EU is an important factor for society, the European single market for services must be designed in such a way that differences between individual countries are not too great. Too harsh regulation on the ability to provide such services could, however, have a counterproductive effect on the harmonization of living conditions in the Member States by limiting economic and employment growth.

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7. Appendix

Table 7-1: Statistical Classification of Services Activities in the European Community

Rev. 2 (2008): Level 1 Codes

Section	Title
G	Wholesale and retail trade; repair of motor vehicles and motorcycles
H	Transportation and storage
I	Accommodation and food service activities
J	Information and communication
K	Financial and insurance activities
L	Real estate activities
M	Professional, scientific and technical activities
N	Administrative and support service activities
O	Public administration and defence; compulsory social security
P	Education
Q	Human health and social work activities
R	Arts, entertainment and recreation
S	Other service activities
T	Activities of households as employers; undifferentiated goods- and services-producing activities of households for own use
U	Activities of extraterritorial organisations and bodies

Source: Eurostat (2008)

Table 7-2: Selection of sectors for analysis of knowledge intensive services

WIOD: economic Sectors classified as knowledge intensive service sectors by Eurostat and in the Analysis

Code	Title	KIS Eurostat	KIS analysis
G45	Wholesale and retail trade and repair of motor vehicles	no	no
G46	Wholesale trade, except of motor vehicles and motorcycles	no	no
G47	Retail trade, except of motor vehicles and motorcycles	no	no
H49	Land transport and transport via pipelines	no	no
H50	Water transport	yes	yes
H51	Air transport	yes	yes
H52	Warehousing and support activities for transportation	no	no
H53	Postal and courier activities	no	no
I	Accommodation and food service activities	no	no
J58	Publishing activities	yes	yes
J59-60	Motion picture, video and television programme production, sound recording and music publishing activities; programming and broadcasting activities	yes	yes
J61	Telecommunications	yes	yes
J62-63	Computer programming, consultancy and related activities; information service activities	yes	yes
K64	Financial service activities, except insurance and pension funding	yes	yes
K65	Insurance, reinsurance and pension funding, except compulsory social security	yes	yes
K66	Activities auxiliary to financial services and insurance activities	yes	yes
L68	Real estate activities	no	no
M69-70	Legal and accounting activities; activities of head offices; management consultancy activities	yes	yes
M71	Architectural and engineering activities; technical testing and analysis	yes	yes
M72	Scientific research and development	yes	yes
M73	Advertising and market research	yes	yes
M74-75	Other professional, scientific and technical activities; veterinary	yes	yes
N	Administrative and support service activities	partly	no
O84	Public administration and defence; compulsory social security	yes	yes
P85	Education	yes	yes
Q	Human health and social work activities	yes	yes
R_S	Other service activities	partly	no
T	Activities of households as employers;	no	no
U	Activities of extraterritorial organizations and bodies	no	no

Source: Eurostat (2008)

Figure 7-1: Random effects regression of cross border services share on GDP

The starting point for our statistical models is a macroeconomic production function that describes the relationship between the economic performance of an economy (measured as gross domestic product) and the production factors labor and capital.

$$GDP = A * L^{\alpha} * K^{\beta} * e^{Trend}$$

The gross domestic product (GDP) is thus produced using labor L and capital K. In the following, capital is measured by investments, as data on the entire capital stock are only available to a limited extent. Measuring capital via investment is methodologically justifiable, especially since the capital stock at a given point in time is nothing other than cumulated previous net investment. The parameters α and β are the so-called partial output elasticities. They indicate the percentage by which the gross domestic product increases when the use of the relevant production factor is increased by 1 percent, while all other production factors remain unchanged. The constant A represents the so-called efficiency parameter. It mainly takes into account the production technology, i.e. the way in which the production factors are used.

To measure the effects of cross border services, the shares in cross border service employment is employed as an additional production factor. In a panel data model, the impact of growing cross border service shares on the economic performance of the countries under consideration can be estimated using the regression model described above. As the labor and capital inputs are also included in the model, it is taken into account that GDP is not only and not predominantly dependent on cross border services alone.

Data on GDP, employment and investment are taken from the European Commission's AMECO database (2019) while cross border service shares are generated by our calculations using the WIOD Database combined with Data on sectoral employment by Eurostat (2019).

In the following regression analyses, not only the labor and capital inputs (in the individual countries and years) are considered, but also so-called unobserved effects. That means that fundamental characteristics of the countries, such as geographical location or cultural background, are controlled for in the estimation. In the methodological nomenclature, this is referred to as fixed or random effects estimation.

In a slightly simplified form, the methodology can be summarized as follows: In order to estimate the effect of cross border services on GDP, several countries and years are considered. To isolate the effect, both observed factors (labor and capital input) and unobserved factors (via fixed/random effects estimation) are controlled for. This approach is also used to bring the econometric results closer to a causality conclusion, i.e. a cause-and-effect relationship, by controlling for other relevant factors. However, it should be emphasized that causality can never be fully proven.

The R^2 corresponds to the proportion of the variance of the dependent variable explained by the model – it is a measure for the goodness-of-fit of the model. At 98 percent, the proportion of the explained variance is very high. Accordingly, the entire model is highly statistically significant.

The inclusion of Random Effects serves to reflect the heterogeneity of countries: GDP, for example, can also depend on geographical location or social factors. By including Random Effects, country characteristics that are unobserved (i.e. not included in the model) are statistically taken into account without having to specify these characteristics. This is possible because individual time series are available for each country.



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