

**A COMPARATIVE ANALYSIS OF PRODUCTIVITY AND PRODUCTIVITY FACTORS  
IN THE EU AND USA OVER THE PERIOD 1995 – 2015**

**Ville-Einari Utriainen**

**International Business**

**Bachelor's Thesis**

**Supervisor: Dr. Marta Zieba, University of Limerick**

**Date of approval: 26 April 2017**

**Aalto University**

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## ABSTRACT

This thesis will focus on comparative study of labor productivity growth and level in the United States and the European Union from 1995 until 2015. It aims find factors behind labor productivity growth differential between the US and the, especially from the European perspective, due to their lower level of productivity compared to the United States. The analysis will focus on comparing the effect of three major factors: ICT, labor regulation and general market characteristics (e.g. size and homogeneity of consumers).

These factors influence significantly productivity growth. Especially ICT has been one of the largest contributors in the US and relatively poorly managed in the EU. Therefore, looking how the amount of ICT investing (e.g. Fernandez and Palazuelos, 2009) and adaptation of ICT (e.g. Miller and Atkinson, 2014) explain partially the differential between the economies. Along with ICT, labor regulations are another reasons for the differential. European labor market is considered rigid and inflexible compared to the US labor market, which increases the differential through costs and restriction on firing, firing and reallocation (e.g. Henrekson, 2014). Therefore, this thesis focuses on explaining these productivity factors and presenting policy recommendations to overcome these rigidities.

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# 1. INTRODUCTION

Labor productivity is an important part of economic development in the European Union. It drives heavily the economic growth, affects the labor policies, and the level of employment. This thesis will focus on comparative study of labor productivity growth and level in the United States and the European Union from 1995 until 2015. It aims to synthesize arguments and clarify factors behind labor productivity growth differences in these economies, especially from the European perspective, due to the lower level of productivity compared to the United States. The analysis is conducted by comparing the effect of three major factors: ICT, labor regulation and general market characteristics (e.g. size and homogeneity of consumers).

These three important factors have a high impact on productivity. Especially ICT has changed the way of production because many companies and business models require a high level of technological knowledge in order to innovate and improve. Therefore, looking how the amount of ICT investing (e.g. Fernandez and Palazuelos, 2009) and adaptation of ICT (e.g. Miller and Atkinson, 2014) affect productivity growth is important. ICT is also heavily related to the other two factors because adaptation and use of ICT are dependent on market and labor regulations as well as the overall market. In a large and competitive market with the low level of regulation, technology and innovation become highly important contributors.

Because of scarcity, innovation and technology, labor productivity has become more and more important factor to study in the current world. It drives the economic growth, and in the world of scarce resources and high level of technology, productivity becomes a more important influencer of that growth. Therefore, the rational and motivation to study variations in the productivity gap rises more from the economic policy and well-being perspective. There is interest in the EU to find the reasons for the economic development, in order to find ways to close the differential and improve labor productivity. That would improve the competitiveness of the EU in the global markets, and increase the overall economic growth.

Especially alarming is the future of economic and social well-being. European population ages with increasing pace and the labor force decline rapidly (Gill et al., 2013). Miller and

Atkinson (2014) have estimated that at the current annual growth rate of less than 2 percent, the growth will be too small to account for the increasing expenses and consumption from the aging population. Especially for European countries can and will mean economic problems. One the greatest problems would be maintaining the welfare state model, which is especially strong in the central and northern Europe.

Therefore, it is important to find reasons especially for the lower performance of the European Union. By knowing the reasons behind lower productivity, the European economy can improve productivity, and therefore the well-being of the economy. Some of these answers may be found from the United States. For instance, the usage of ICT in the US is at higher and more efficient level than in the EU, which significantly contributes to the overall productivity growth (e.g. Miller and Atkinson, 2014). Therefore, it is useful to compare the two economies.

Because of the essentiality for economic well-being, there are numerous studies conducted to explain and analyze the productivity differential between the United States and the European Union. Many of these studies focus on explaining, why the European Union fell behind the United States in the mid-1990s (e.g. Baily and Kirkegaard, 2004; Fernandez and Palazuelos, 2009), and why have not the EU caught up the differential (e.g. Congress of the United States, 2007; Economic Department, 2016). These main arguments can be divided into information and communication technology (ICT) related, labor market regulation and market characteristics related differences.

However, even though the differential is a well-studied subject, this thesis will extend the analysis of the past, and try to introduce more discussion over the topic. Especially important part of the thesis are the trends of productivity growth. OECD (2017) and other statistics highlight that the differential has been decreasing from 2010. Because the trend is relatively new and not well discussed or researched, this thesis will contribute to an introduction to conducting further research.

Therefore, to gain a better understanding of the topic, the literature review will first focus on presenting the overall ideas of previous research from scholars and institutions. These findings will be used as a basis for the analysis and discussion of productivity factors. After that, the thesis will focus on presenting the productivity trends in the third chapter

by introducing two different productivity trend periods. The chapter will show that from 1995 until 2010 the United States outperformed the European Union, however, the financial crisis changed the phenomena. After the crisis of 2008-2009, productivity has grown more in the EU.

The third and fourth chapters will focus on the main part of the thesis, analysis of productivity factors. There are three main contributors to labor productivity growth: ICT, labor market regulations, and market characteristics. Analyzing the key contributors to the productivity trends and explaining through examples, the effects of productivity factors on labor productivity growth. Especially the use of ICT and labor regulations are more efficient in the US than in Europe, which will be discussed from the point of view of EU and the US. In the end, the thesis will present conclusions and give recommendations for further research to be conducted on the topic. The thesis will also give recommendations about possible policy changes for the European Union to conduct, in order to improve its productivity.

## 2. LITERATURE REVIEW

In this literature review, we will explore what kind of research there has been about the labor productivity differential between the United States and the European Union. There are numerous studies showing different reasons for the productivity differential between the two economies. Some studies highlight the importance of information and communication technology as the most affecting factor to the growing differential (Van Ark et al., 2008; Fernandez and Palazuelos, 2009; Timmer and Van Ark, 2005). However, other studies argue that market regulations, especially labor market regulations, are the reason for the phenomena (Vergeer and Kleinnecht, 2014; Congress of the United States, 2007). Other studies argue against the importance of ICT (Cette, 2015) or market regulations (e.g. Gill et al., 2013). However of the different views of the reason for the differential, almost all researchers agree that the productivity gap exists between the US and the EU.

To understand better, what factors contribute to the differential, we first need to examine the different definitions and measurements related to the labor productivity and labor



productivity growth. These definitions and measurements include the basics for the analysis of productivity determinants such as for example information and communication technology (ICT).

The main chapters of the literature review will explore the effect of information and communication technology to the growing gap between the two economies, the effect of market regulations to productivity and the differences in the economies of scale and market between the US and the EU. Therefore, the sections of this chapter will summarize the previous research and findings related to the differences in productivity growth in between the two economies.

### 2.1. Key measurements and determinants of labor productivity

Productivity has an important role in determining the economic well-being of the country in the long run (Miller and Atkinson, 2014) since it affects the economic growth (Baily and Kirkegaard, 2004). Especially in the modern world of scarce resources, high competition and aging population, productivity decisions become more important than they were 20<sup>th</sup> century (Miller and Atkinson, 2014). Therefore, the need for studying productivity is higher than ever.

For instance, Miller and Atkinson (2014) calculated that if the European Union's productivity had grown as fast as the productivity in the United States from 1995 to 2013, the overall level of GDP would be EUR 1.6 trillion higher as it is today. Furthermore, they argue that the only way to protect the economy against the aging population, which will consume even more in the future, is to increase productivity back to the level of 1985 to 1995 (2.3% annually). With the current productivity growth rate of less than 2 percent annually, the real output growth will stay too small even to sustain the effects of an aging population (Miller and Atkinson, 2014).

Therefore, the quest for finding ways to increase productivity is important for the future sustainability and economic well-being. However, as the thesis and literature review aims to show, the decisions and factors affecting productivity are not one-sided or unambiguous.

### 2.1.1. Measuring productivity factors

First, it is necessary to understand the basics of labor productivity. Labor productivity (often referred only as productivity) is measured as real output relative to the hours of work (Baily and Kirkegaard, 2004). The real output per hour worked is determined by five important factors of production: technological progress, the quantity of labor, physical capital, human capital and natural resources (Timmer and van Ark, 2005). All of the factors contribute to production and productivity, however, this thesis and literature review will focus on the most relevant factors: technological progress and human capital.

Technological progress and human capital are indirectly and directly affected by labor market regulation (e.g. Henrekson, 2014), technological solutions such as information and communication technology (e.g. Fernandez and Palazuelos, 2009) and market characteristics (e.g. World Bank, 2008). Therefore, this thesis and literature review will focus on studying the labor productivity decisions in the US and the EU, in order to find the reasons for the better productivity in the US relative to the EU. The discussion of these factors will be presented later in the literature review and thesis.

### 2.1.2. Problems with the measurement of effects on labor productivity

Even though the productivity theories aim to explain the determinants of productivity, the measurement of these factors is problematic (e.g. Spiezia, 2012; Batóg and Batóg, 2007; Byrne et al., 2016).

Batóg and Batóg (2007) argue that, for instance, the comparison of productivity levels require comparable data on output and coherent accounting methods across different nations. Therefore, the comparisons between different nations or economies may be offset, even in the situation where the numbers have been inflation and purchasing power adjusted (Batóg and Batóg, 2007). Spiezia (2012) and Byrne et al. (2016) support this by stating that the ICT investments differ from company to company, and nation to nation in terms of accounting. This makes estimating the effect of ICT in productivity growth ambiguous and inaccurate (Byrne et al., 2016).

Byrne et al. (2016) support this from another point of view by stating that increasingly cheapened technologies and increased number of global online services have made the

measurement harder through the complexity of comparison between information. Even though with the adjustments to same purchasing power or currency, especially the numbers of the 1990s may not be as accurate relative to older or newer statistics (Byrne et al., 2016). This may be because online services were introduced in masses and semiconductor prices drastically lowered in the 1990s relative to the newer or older statistics. Therefore, it is, for instance, hard to estimate, how much a specific dollar amount of ICT brought value in 1990s relative to 2010s.

Byrne et al. (2016) argue furthermore that because of these problems in the measurement of ICT, the ICT revolution in the late 1990s and early 2000s may have been an anomaly in the measurement. For instance, this argument is heavily in contrast to the general belief of many academics that argue for the importance of high ICT investments (e.g. Fernandez and Palazuelos, 2009).

However, Byrne et al. (2016), Spiezia (2012) and Batóg and Batóg (2007) agree that there is an effect caused by, for instance, market regulations or ICT but the magnitude of the effect can be easily debated and calculated differently. Therefore, most of the numbers concerning the effect of different factors used in the literature review and further in the thesis should be treated critically.

### 2.1.3. Different estimations of the differential and measurement

As stated earlier, all the academics agree that there is a differential in the productivity growth and level between the United States and the European Union (e.g Fernandez and Palazuelos, 2009; Congress of the United States, 2007). Also, the beginning of the differential is relatively agreed on and placed to the mid-1990s. However, the estimations of the differential and its growth are different and highly debated because of the reasons introduced in section 2.1.2. *Problems with the measurement of effects on labor productivity.*

For instance, Fernandez and Palazuelos (2009) argue that the productivity growth was slightly higher in the US than in the EU with 1.84% and 1.59% respectively in 1994-2007. Timmer and van Ark (2005) suggest that the productivity growth gap was even higher

than 1.84% relative to 1.59%. Especially in the late 1990s and early 2000s, the difference was 1.3% (EU) to 1.9% (US) (Timmer and van Ark, 2005).

Therefore, in general, the numbers differ relatively much because of the reasons explained in chapter 2.1.2. *Problems with the measurement of the effects on labor productivity*. The overall trend, however, is that no one argues that the EU is more productive than the US from 1995 until today (e.g. Fernandez and Palazuelos, 2009; Batóg and Batóg, 2007).

#### 2.1.4. Additional productivity determining factors

To bring clarity to some of the arguments presented by the academics, concepts associated with the ICT, market regulation and market characteristic arguments have to be briefly discussed.

One of the central arguments of the academics is the effect of information and communication technology (ICT) on the technological progress in the productivity function. Information and communication technology (ICT) refers to all available media that can be used to help communication and information flow (Fernandez and Palazuelos, 2009). This includes ICT software (e.g. inventory tracking platforms) and capital (e.g. tablets, barcode scanners). ICT is often also referred as general purpose technology (Persson, 2010).

In the labor regulation arguments, most of the discussion is conducted over social protection and insurance. They are being used to refer to different employment, unemployment benefits (e.g. unemployment insurance, insurance through employment) (Henrekson, 2014) or other legislation such as compensation for unlawful firing.

Market characteristics such as the size of the market, economies of scale and market competition have an effect on productivity (Baily and Kirkegaard, 2004; Economic Department, 2015). Especially economies of scale, which refers to seeking cost and productivity advantages through larger production output, is argued to influence productivity (Economic Department, 2016). Also related to the competition and economies of scale, the single market is an economic theory of free trade, in which the member countries form a borderless and unbarred market, where the factors of production (labor and capital) and services have a free flow from country to country (Miller and Atkinson, 2014). The United

States is often called a single market because of the connection between the states (Miller and Atkinson, 2014). For the European Union, academics argue that single market does not exist completely (Miller and Atkinson, 2014; Atkinson 2014; Economic Department, 2016).

## 2.2. Information and communication technology

A number of academics argue that information and communication technology is one of the main contributors to the productivity gap between the European Union and the United States (van Ark et al., 2008; Timmer and van Ark, 2005). They present, however, different views on the reasons, why the ICT did not bring the same results in the EU than in the US. First, we go through one of the most commonly used and most easily documented reason: the amount of investments. The second chapter will show literature over the reasons of failure in adapting ICT as part of the production in Europe. Lastly, we examine the effect of regulations and taxation on ICT and draw conclusions.

### 2.2.1. United States invested more in ICT increasing the capital deepening

Fernandez and Palazuelos (2009) present that the strongest reason for the productivity gap between the two economies, starting from 1995, is the amount of ICT investments. They argue that the European Union did not invest as much in ICT as the United States, which is one of the key reasons for the differential.

Many academics (e.g. Timmer and van Ark, 2005; Cette, 2015; Spiezia, 2012) agree with Fernandez and Palazuelos, however, they emphasize different aspects about the importance and size of the ICT investments. Timmer and van Ark (2005) introduce statistics showing that the ICT investments were half of the United States in the key countries such as Germany, France and Italy. They argue that because of these too minimal investments in the key member countries, Europe's labor productivity did not grow as much as the United States. Therefore, Timmer and van Ark (2005) highlight that the improvement in the US was mostly due to the size of the investments. In later studies van Ark et al. (2008) support that the overall investments in general purpose technology (includes ICT) were lower in Europe than in the US, which affected the overall productivity growth.

Other academics seem to support these arguments. For instance, Cette (2015) argues that the capital deepening was higher in the United States due to these larger investments in the ICT capital. Furthermore, Cette (2015) argues that lowering ICT investments would lead to a lower labor productivity growth. These arguments indicate strong believing in the connection between the size and the overall growth.

Spiezia (2012) seems to agree because he argues that the capital deepening was a reason for the high overall growth of productivity in the US. The argument is based on support from Anderson and Kliesen (2006), who found that capital deepening increased the potential computing and producing power by enabling more ICT equipment per hour worked, therefore, increasing the productivity growth. Furthermore, they argue that the introduction of ICT solely in the service sector accounted for 80 percent of the total contribution to economy-wide labor productivity growth in the United States in 1995-2001. In support, Filipetti and Peyrache (2013) state that 53% of the total labor productivity growth was due to the capital deepening.

In addition, these findings can be safely linked to the interesting findings of Timmer and van Ark (2005) and World Bank (2008) that explored the spillover reaction of ICT to other technological developments and investments. Timmer and van Ark (2005) argue that the ICT growth and investments in the EU were too limited in 1995-2000 to create spillover effect that would benefit the labor productivity in the general economy, indicating that the US gained more through larger investments, which also indicates a strong belief in the ICT investments.

There can be seen causality in the arguments of academics about the importance of ICT investment numbers (e.g. Timmer and van Ark, 2005; Fernandez and Palazuelos, 2009). These findings give valuable insight into the reasons of productivity growth differential, however, it is hard to believe that the main reason for the differential. Some business areas in Europe did invest as much in the ICT as the US and had a smaller effect on the productivity (Congress of the United States, 2007). Therefore, the argument about the size is believable to some extent, which is fair, because the argument is simplistic and does not answer to a whole lot of questions.

### 2.2.2. Europe's organizations too rigid to gain productivity growth from ICT

Even though ICT investments were larger in the United States, many academics claim that the magnitude of the investment is not the key (e.g. Baily and Kirkegaard 2004; Lovric, 2012). Baily and Kirkegaard (2004) found that the amount of ICT investments slowed down in the US in the beginning of 2000s but productivity growth did not. Therefore, they demonstrate that the size does not positively correlate with the growth or be the cause of the improvement in productivity. This supports their thinking that if the system is not innovative enough to adapt the new ICT innovations, the growth will stay smaller.

Baily and Kirkegaard (2004) claim that the European Union may not need more ICT investments. They suggest that it is more important to have a reformation of the economy in order to support the ICT development for higher improvement in the productivity. These reformations would include organizational structure and practice changes towards the more adaptive use of ICT (Baily and Kirkegaard, 2004). They also point out that the main industries that contributed heavily in the United States, such as retail and wholesale trade, failed to grasp the advantages of ICT in Europe despite the investments. This and their argument that the US may have overinvested in ICT demonstrate their point that the size may not be the issue for the worse productivity growth in Europe.

These views gather more support than the argument for the size of the ICT investments. Many academics argue that the US market system and organizations were more flexible and ready to adapt the high amount of new technology (e.g. Economic Department, 2016; Miller and Atkinson, 2014; Amiti and Stiroh, 2007; Aznar et al., 2014; Persson, 2010). Economic Department (2016) argues that the EU firms are slow to adapt and absorb new technological innovations, which may cost the European Union over EUR 90 billion per year.

Miller and Atkinson (2014) agree with the European Investment Bank and Baily and Kirkegaard (2004) by stating the importance of widespread adoption of ICT by different institutions. They argue that to achieve the maximum potential of technological investments, there have to be organizational and structural redesigns. They point out that the US organizations and firms have been better at introducing and facilitating needed reformations

and management techniques than the European companies, which has created the technological gap and the productivity gap between the two economies.

To give support to all of the arguments above O'Mahony and Vecchi (2009) present evidence from empirical research, that the EU have been insufficient in terms of investment and organizational changes, which are necessary to benefit from the ICT technologies. Furthermore, before the findings of O'Mahony and Vecchi (2009), Amiti and Stiroh (2007) concluded that the European Union has benefited less from the ICT due to the lack of needed changes. They add that the service industry in Europe performs worse than the counterpart in the US. Furthermore, Persson (2010) adds to the discussion by giving a reason, why there weren't organizational redesigns. He claims that the purpose of ICT was not recognized in Europe, which supports the reason, why the needed reformations were not executed in the EU as efficiently as in the US. Hence, the European service manufacturers performed worse than the competitors in the US (Persson, 2010).

To give support this claim made by Persson (2010), we come back to the earlier findings of Baily and Kirkegaard (2004). They found that the European companies did not use the general purpose technology (includes ICT) as innovatively as for instance Walmart in the US. Walmart used ICT to improve supply-chain management and consumer tracking to improve the productivity of the company. Many academics including Baily and Kirkegaard (2004) point out that this was not the case in Europe, which was too inflexible to introduce the innovations.

Baily and Kirkegaard (2004) set a reasonable and convincing argument about the effects of ICT. The effect of institutional and organizational efficiency and behavior has gathered a lot of support from many academics and institutions. It is more realistic to believe that organizational structures affect the adaptation of ICT, rather than the magnitude of investment. Even though many of the studies and examples are already ten or more years old (e.g. Baily and Kirkegaard, 2004 or Amiti and Stiroh, 2007), the new studies conducted by academics (e.g. Aznar et al., 2014) and institutions (e.g Economic Department, 2016) compliment and add to the earlier findings. Nowadays the European companies have followed the example of Walmart in terms of IT use which has shown improvement in productivity, but the rigidities still exist (Aznar et al., 2014; Economic Department, 2016).



Therefore it is relatively realistic and reasonable to believe the findings of different organizational and institutional factors contribute to the ICT adaptation. Thus it is also possible to believe the rigidities in the EU and the missed potential of ICT.

Most of the rigidities in the organizational structure are usually caused by regulations and taxation. Therefore it is only reasonable to study the arguments about the regulations and taxation affecting the efficient use of ICT. Miller and Atkinson (2014) indicate that regulations and taxation hinder back the adaptation of ICT in business use. They state that product, labor and land market limit the most efficient possible models and raise the cost of ICT investment, therefore, slowing down the possible productivity gains.

Miller and Atkinson (2014) give many examples of how labor and product market regulations affect the investments. For instance, strict labor market regulation affect the organizational changes negatively, making them more costly. Furthermore, they highlight that taxation and product market regulations make the use of ICT too expensive for consumers and institutions to benefit from the fully. One example of this is privacy regulation that reduces the effectiveness of online marketing, which is more open in the US.

Miller and Atkinson (2014) make convincing arguments that rely on the previous research. They give support to the question of organizational rigidities, shown by Baily and Kirkegaard (2004), which is a convincing explanation for the difference in the effectiveness of ICT between the US and the EU.

### 2.2.3. Conclusions on ICT affecting productivity growth

Interestingly, whether the main reason for smaller ICT gains in Europe is the invested amount, organizational differences or regulations, all academics agree that ICT is one of the main factors contributing to the productivity gap. They all give their perspective to the matter, some more realistic, such as organizational factors (e.g. Miller and Atkinson, 2014), and some too simple explanation, such as the size (e.g. Fernandez and Palazuelos, 2009). Nonetheless, the argument about the effect of ICT on productivity growth is strong, and something was not done right in Europe, which can be seen from the increasing gap.

## 2.3. Labor market regulations and differences

Labor market regulations are argued to be too strict and rigid in Europe compared to the United States (Amiti and Stiroh, 2007). Baily and Kirkegaard (2004) and van Reenen et al. (2010) state that badly designed regulations hinder productivity growth by limiting innovation and competition. Other academics (e.g. Fernandez and Palazuelos, 2009; Marrelli and Pastore, 2010; Gill et al., 2013; Henrekson, 2014) agree with Baily and Kirkegaard (2004) and plenty of research have been done after 2004. In the following chapters, we will go through three of the central arguments.

### 2.3.1. Strict regulations make the structural decisions harder in Europe

Strict labor regulations reduce the flexibility of corporations in their use of labor (Henrekson, 2014). By this Henrekson (2014) means laying off workers who underperform and discourage firms from growing, hiring new talents because the hiring costs are high and relocating or retraining employees. Furthermore, he argues that these strict regulations force European companies to use temporary contracts that are less regulated than permanent contracts to avoid the net of regulations. However, this gives the companies disadvantage if the required skill level is high because of the nature of the contract (Henrekson, 2014). Henrekson's argument (2014) get support from Vergeer and Kleinknecht (2014), who argue that high turnover, which can happen by using temporary contracts, is related to lower productivity growth.

Looking at the argument made by Henrekson (2014) and Vergeer and Kleinknecht (2014), it is relatively safe to suggest that the European labor market has strictness that affects the productivity growth. Both Henrekson (2014) and Vergeer and Kleinknecht (2014) demonstrate that the European labor market lacks flexibility and is forced to unnatural paths such as temporary contracts. Vergeer and Kleinknecht (2014) present that the European labor market does not have as much external and internal flexibility as the US labor market, which decreases the labor productivity growth. By external flexibility, Vergeer and Kleinknecht (2014) mean the firm's ability to adjust the size labor force through hiring and firing, and internal flexibility to reorganize or reallocate their labor force. Vergeer and Kleinknecht (2014) add furthermore that high internal flexibility may favor more innovation and productivity growth.

Congress of the United States (2007) and Aznar et al. (2014) agree with Vergeer and Kleinknecht (2014). Congress argues that the US firms have more flexibility than the European firms to hire and fire employees, increasing the labor productivity. Furthermore, Aznar et al. (2014) argue that rigid regulatory framework, such as Europe's, has been shown to lower total factor productivity growth, which is a useful argument since labor productivity is part of the total factor productivity. They also argue that regulations hinder R&D spillover, which would explain, why the spillover from the ICT was smaller in Europe than in the US.

Interestingly, Henrekson (2014), Vergeer and Kleinknecht (2014), Aznar et al. (2014) and even the Congress of the United States (2007) seem to support each other's arguments and explain each other's work. Even though the US congress may be somewhat biased source, the other academic sources give support to it. Therefore, it is reasonable to take into account and group with the other arguments.

However, in contrast to the more general view of regulations and productivity, Bjuggren (2015) argues that increased labor market flexibility has led to a non-negligible increase in productivity. He argues that due to the decreased risk of being reallocated or fired because of job security regulations, the workers may acquire more skills required by the firm, which would then increase the productivity of the firm through an increase in human capital.

Bjuggren (2015) interestingly continues the argument by stating that rigid labor market regulations may positively affect the innovation by increasing investments in R&D, human capital and skill-sets. He bases the argument on the logic that it is cheaper and easier to innovate and improve productivity through capital investments than with more labor. To some extent, the argument is plausible because the overall trend of jobless growth has been strong for a time being (Marelli and Pastore, 2010). However, Bjuggren (2015) comments that if the regulations are too rigid for the long term, there may be stagnation in the product development.

Vergeer and Kleinknecht (2014), who argued for the deregulation of the labor market to increase internal and external flexibility, agree with Bjuggren (2015) by stating that too heavy deregulation may lower the productivity instead of increasing it. They discuss that

deregulation will ultimately lead to more labor-intensive growth rather productivity-intensive growth, which may be a correct assumption based on their findings of the unemployment rates and hours worked (Vergeer and Kleinknecht, 2014).

Interestingly, despite all the disagreements and counter arguments, most of the academics and institutions agree to some extent that Europe has too rigid and strict labor market (e.g. Henrekson, 2014; Vergeer and Kleinknecht (2014), and that hinders productivity growth and innovation. Therefore, it is reasonable to conclude that to some extent, the EU has worse performing labor market in terms of flexibility and productivity growth than the US.

### 2.3.2. Social protection creates weaker incentives to work in the EU

Most countries in the European Union have labor protection acts, which give low incentives to work more productively (Gill et al., 2013; Marelli and Pastore, 2010). They argue that the European labor markets are designed to be more pro-work than pro-labor productive, by making the job security high, which creates the false incentive to work. Therefore, Gill et al. (2013) state that Europeans only work to live whereas American system makes them to live for the work.

Persson (2010) agrees about social protection. He claims that the Europeans have more preference for leisure than the Americans due to the possibilities created by the welfare system. To support his argument, Persson (2010) shows data from 1960 to 2010, which states that the overall hours per person fell by 35 percent in Europe, indicating preference towards leisure. This indicates the trend in Europe towards working, but meanwhile the productivity has not improved as well as in the US.

Henrekson (2014) and Vergeer and Kleinknecht (2014) take different approach than Persson (2010). They argue that by decoupling social insurance from employees the flexibility of labor would increase and the productivity would rise. The argument is based on the fact that fears of losing benefits that are part of the employment decrease flexibility. Vergeer and Kleinknecht (2014) add that well protected and high wage work force reduces the incentive to take innovative approaches.

To some extent social security and protection create false incentives to work, therefore the arguments presented by Person (2010) and Gill et al. (2013) are reasonable. However the arguments presented by Henrekson (2014) or Vergeer and Kleinknecht (2014) seem somewhat unreasonable because there are multiple arguments that social protection improves labor productivity. They may, however, be correct about the effect on the flexibility that social protection discourages the corporations innovate.

Therefore, even though Gill et al. (2013) argue for lower social protection, they also suggest that social protections such as minimum wage can motivate people to improve their productivity in order to improve the wages. They suggest that minimum wage can decrease the amount of turnover in the company, which improves the productivity through a higher level of human capital (e.g. training). Therefore, Gill et al. (2013) argue that the companies may gain more productivity from the minimum wage since they have more incentives to increase the human capital rather than just hiring more cheap labor. Therefore, Gill et al. (2013) suggest that social protection may increase the incentive to innovate instead of hiring low-cost labor to increase the production.

These claims and arguments suggest that there is not one answer to the question of social protection. Even the same academics do not take a stance between the benefits and disadvantages of social protection (e.g. Gill et al., 2013). They argue that there may be incentives to increase leisure because of the acts or companies to invest more in labor skill if the social protection is part of the employment (Gill et al., 2013). Both sides of the coin are compelling but the main finding may be the effect of efficiency. Badly designed regulations and protection system may do more harm than a strict or loose system, and that may be one of the main explanations for the difference in productivity between the EU and the US (Baily and Kirkegaard, 2004; Marelli and Pastore, 2010).

### 2.3.3. US productivity higher because of more mobile labor

European labor market integration has been developing slowly for the last 20 years, affecting the overall mobility of labor inside the European Union (Economic Department, 2016). Economic Department (2016) conducted a study in 2014, which showed that only 3.4% of the EU28 citizens had worked outside their home country. The same number as inter-state movement in the US was ten times as high as in Europe, which indicates that

the labor market in the US is more mobile and productive. Gill et al. (2013) also highlights the importance of labor mobility. They claim that without mobile labor force, the US productivity growth would be half of the current. That gives justice to the findings of Economic Department (2016).

Gill et al. (2013) state numerous reasons for the lower mobility in the EU. One of the main reasons for the differential is the difference in institutions and culture between the different EU nations. This difference does not exist as strongly in the US, which is culturally and institutionally more similar state to state than the EU28 countries.

Another reason suggested by Gill et al. (2013) is the difference in the unemployment level between the different nations, which discourages to move. They argue that the unemployment and labor shortage problems between the member countries drive wages up in certain areas leaving less prosperous areas dealing with unemployment. Furthermore they argue that in the US the government and local administration respond to the unemployment and wage differences in the states by reducing dissimilarities through policies. Interestingly, these arguments indicate that Gill et al. (2013) may want to argue that policies in the EU are not effective enough to increase the mobility.

In order to support this possible argument Gill et al. (2013) present reasons, why the EU has not been able to integrate the labor market and increase the mobility. Most important of the suggestions is the effect of social benefits and costs. Gill et al. (2013) demonstrate that the US works as one system. There the social benefits such as pension are more portable from state to state, whereas in the EU the transfer from one member country to another is more cumbersome. They argue that lack of EU-wide portable social benefits are a barrier to intra-Europe labor mobility, which in Europe is reasonable to believe due to the widespread social securities.

The importance of labor mobility to the labor productivity growth is high. Reasons, such as the more efficient use of available resources and better adjustability to economic shocks (Gill et al., 2013), make it a crucial part of the discussion about the labor productivity gap between the United States and the European Union. The arguments for lack of labor mobility are reasonable and easily documented, and relatively cohesive. Also, the portability of social protection can be easily studied from the laws of EU. Therefore, there

are not major arguments against the findings of Gill et al. (2013) and Economic Department (2016). They argue rather well that the US is more mobile in the labor market due to the cultural and institutional similarities between the states, which are more or less one of the reasons for the differential in productivity.

#### 2.3.4. Conclusions on labor market regulations and differences

Labor market differences and regulations are heavily debated and studied field of research. In terms of regulations and social protection, the final answer, whether heavily regulated or unregulated system is better, is inconclusive. Some academics argue that deregulation may be the way to improve the labor productivity in Europe and close the gap with the United States (e.g. Baily and Johnson, 2008; Persson, 2010), others give reason to believe that efficient labor regulations create incentives to improve productivity through less labor-intensive policies (e.g. Gill et al., 2013). The only conclusive argument is the lack of mobility causes lower productivity (Gill et al., 2013). And according to the statistics presented by Economic Department of European Investment Bank (2016), European Union is less mobile than the US.

However of the debate, the arguments for and against the different labor market factors are interesting and useful to finding summarizing factors to the differential between the EU and the US.

#### 2.4. Differences in the market characteristics between the US and the EU

European and US markets differ from each other in many aspects that influence the productivity growth (Miller and Atkinson, 2014). Some academics argue that the US market is more competitive, meaning that there is more rivalry between the companies in the market, aiming to improve their market share and revenue (e.g. Baily and Kirkegaard, 2004; Baily and Johnson, 2008; World Bank, 2008; Miller and Atkinson, 2014; Economic Department, 2016). Others suggest that the US has larger economies of scale, which refers to operations to minimize costs and improve productivity through larger production numbers (e.g. Miller and Atkinson, 2014; Persson, 2010). Therefore, the next two sections will study the effect of competition and size of the market on productivity.

### 2.4.1. Competition in the market contributes more in the US than in the EU

Evidence from industries and aggregate research demonstrate that a heavily competitive environment and technological opportunities improve productivity growth (Baily and Johnson, 2008). Baily and Kirkegaard (2004) argue that competition in the US enables more creative destruction in the market, which means the exit of less productive and competitive companies from the market.

Baily and Kirkegaard (2004) get support from numerous academics (e.g. Baily and Johnson, 2008; World Bank, 2008; Economic Department, 2016). Baily and Johnson (2008) argue that the US has deregulated and freed more of the competition with more benefits than the European Union. They add that the competition has been heavy especially in the productivity relevant industries such as wholesale trade, retail trade and business services that make larger contributions to the productivity growth than other industries. However, this kind of competition has not been the case in Europe (World Bank, 2008).

World Bank (2008) argue and add that weak competition in Europe does not pressure the companies to improve productivity, which results in a less competitive market with less needed creative destruction and productivity growth. They state that this is the case, especially with the state-owned companies. They give an example of Renault in France, which was state-owned company until it was privatized. The interesting essence of the story is that Renault had to layoff massively and improve its productivity in order to survive against the competitors after being released from the safe-net of state ownership (World Bank, 2008). In addition, World Bank (2008) state that the relatively strict and not openly competitive market discourages new entries, which lowers the productivity growth.

Economic Department (2016) support the argument of World Bank (2008). They state that the European Union has been more focused on the firms that are already in the market while neglecting the role of entry, exit and turnover. Economic Department (2016) suggest that higher entry costs and lower turnover in Europe relative to the United States are one explanation for the increasing productivity gap. However, in contrast to others who argue that single market is still a dream (e.g. Miller and Atkinson, 2014; World Bank, 2008), Economic Department (2016) add that the European Union has improved the productivity by trying to create a single market to enable more intra-Europe competition.



This is an interesting notion from Economic Department (2016) since if all the companies inside the European Union are exposed to the same free market, the competition rise improving productivity along with. Also, the economies of scale should rise because the firms no longer operate within one country but in a larger economy, which has the demand for larger and more productive output (Economic Department, 2016).

The arguments about the importance of competition and the free market are necessary. Especially the example of World Bank (2008) highlights the importance of open competition for productivity growth. Hardly anyone argues against the positive effect of competition on productivity if it is regulated efficiently, and that the US is still ahead of Europe (Baily and Johnson, 2009). For instance, Economic Department (2016) suggests that the single market initiative may increase competition through a higher number of rivaling companies in the market, and hence productivity. However, at the moment the overall competition is still higher in the US, and many stay skeptic about the current state of the single market in Europe (Miller and Atkinson, 2014).

#### 2.4.2. US has larger scale of economy to support the productivity growth

Because of free trade between the different states and access to large homogenous customer base, US companies often operate at larger economies of scale and level of utilization capacity than European companies (Baily and Kirkegaard, 2004). World Bank (2008) and many other academics (e.g. Persson, 2010; Miller and Atkinson, 2014; Economic Department, 2016) agree that larger economies of scale improves productivity better than smaller scale.

Miller and Atkinson (2014) state that one of the obstacles in the productivity growth in Europe has been the size of the market. Many products and services are often limited to the nation it is produced in, which is not the case between the states in the US. Therefore, the European Union has a smaller market even though the population is larger than in the US (Miller and Atkinson, 2014). The argument is in many ways correct. Persson (2010) agrees with Miller and Atkinson (2014) and gives support by stating that the US market is more homogenous than the European market, which is more important than the size. This is based on the argument that large homogenous market creates more economies of scale through higher free trade and larger customer base with similar habits. Especially

the production decisions made because of this homogenous customer base increase the productivity growth more in the US relative to Europe (Persson, 2010).

As noted earlier in the competition section, Economic Department (2016) offers support by stating that a single market increases labor productivity growth through competition and economies of scale, and according to Persson (2010) the US is a single market. However, the EU is not a functional single market according to academics such as Atkinson (2014) and Miller and Atkinson (2014) because most of the production is still done by medium and small sized companies in nation-wide markets. This reduces the economies of scale (Atkinson, 2014) due to the fact that the Europe's customer base has more variety through cultural and political differences, leading countries to prefer intra-nation companies (Persson, 2010; Miller and Atkinson, 2014; Economic Department, 2016).

Therefore, Miller and Atkinson (2014) also argue that size of the company matters to the productivity growth since larger market generates larger firms with more productive operations. They state that larger companies that have more resources to improve the productivity through scale are one of the reasons to the better productivity growth relative to the European Union. World Bank (2008) agrees that larger US firms, such as Walmart, contribute more to productivity than smaller medium sized European companies because the larger economies of scale enable the firms to grow more productive through their size.

However, Economic Department (2016) disagrees, and states that the size of the company per se is not linked to greater dynamism and therefore productivity growth. This is in contrast to World Bank (2008), Miller and Atkinson (2014) and Persson (2010), which makes it rather hard to believe.

#### 2.4.3. Conclusions on the market characteristics

The argument for different market characteristics such as the level of competition and size of the market is important. Academics agree that without high level of competition, the level of technological progress or investments in the human capital stay small (e.g. Baily and Johnson, 2008; Aznar et al., 2014). Therefore, the effect of market characteristics on productivity should be further researched.

## 2.5. Summary of the literature review

The discussion shows the effect of information and communication technology, market regulations and market characteristics on labor productivity growth. Most of the studies conducted to research the different factors and their effect seem to be in relatively strong coherence (e.g. World Bank, 2008; Economic Department, 2016; Miller and Atkinson, 2014) but minor arguments, such as whether the size of ICT investments or the adoption of the investment matters, are debated heavily.

The review demonstrates that factors of productivity and productivity growth are well-researched and debated topic. The challenge in the research is the measurement of these factors. As Byrne et al. (2016) or Batóg and Batóg (2007) demonstrate the estimations and results are not unarguable and differ from one another.

Therefore, some of the arguments such as size of ICT investment as one of the main reasons may be harder to believe than the effect of regulations on the adoption. However of the debate, it is relatively proofer that ICT, market regulations and market characteristics (e.g. competition and size) affect productivity growth through technological progress and human capital (e.g. Baily and Johnson, 2008; Gill et al., 2013).

## 3. PRODUCTIVITY TRENDS IN THE US AND THE EU FROM 1995 TO 2015

When compared to each other, there are two noticeable productivity trend periods in labor productivity growth of the United States and the European Union (EU28). The first era is from 1995 until 2010, when the United States clearly outperformed the European Union. As seen in the previous literature, many of the scholars have found evidence of this phenomena (e.g. Fernandez and Palazuelos, 2009). Furthermore, the statistics of Organization of Economic Co-operation and Development support the finding (OECD, 2017).

The second trend period is the catching-up of the European Union from 2010 until today. The annual reports and statistics from different economic institutions show that the productivity growth has been higher from 2010 in the EU28 countries (e.g. OECD, 2017). However, there are still many skeptics of European labor productivity growth (e.g. Economic Department, 2016), which argue that the productivity growth and overall productivity level is still lower than in the US. Therefore, further research over the post-2010 would

be in order. These two periods will be presented in the next two sections and the factors related to productivity growth in these two economies will be furthermore discussed in the third and fourth chapter.

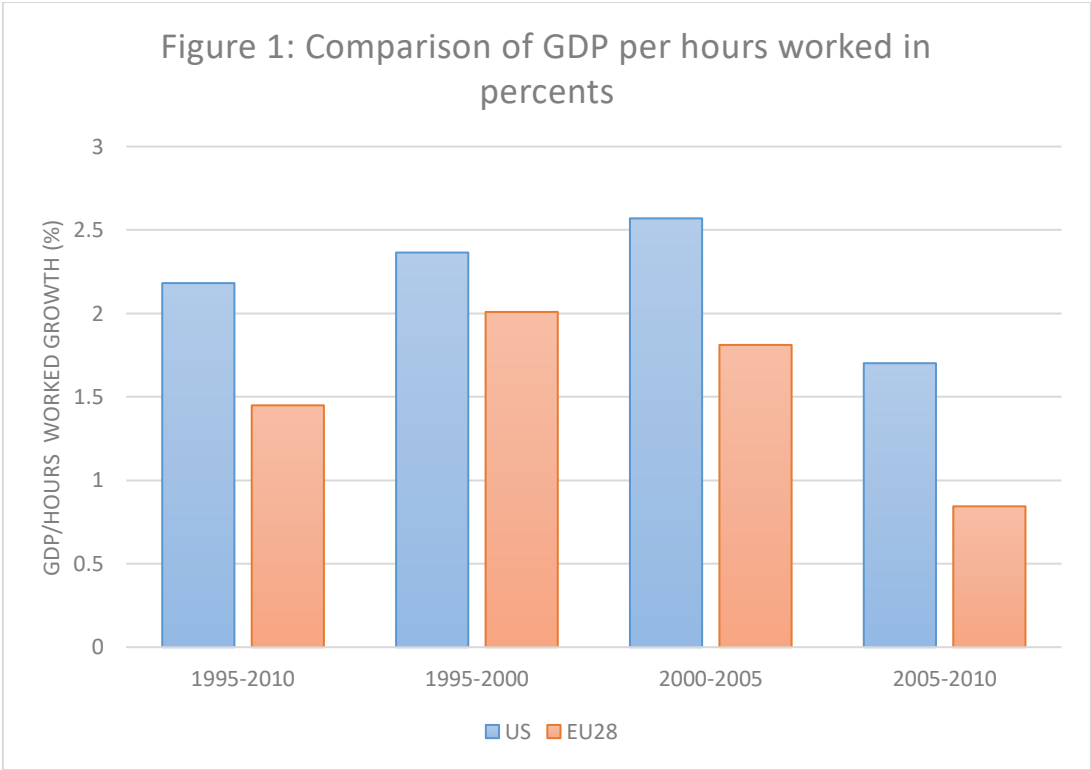
### 3.1. Productivity trend from 1995 until 2010 – the United States outperforming

Prior to the financial crisis of 2008-2009, the United States had higher GDP per hour worked growth than the European Union (OECD, 2017). Academics (e.g Miller and Atkinson, 2014; Economic Department, 2016) and statistics (The Conference Board Statistics, 2016; OECD, 2017; Bureau of Labor Statistics, 2017) show that the overall productivity growth was stronger in the United States than in the European Union for almost 15 years.

According to Organization for Economic Co-operation and Development (OECD) in *Figure 1*, productivity grew on average 2.18 percent in the United States and 1.45 percent in EU28 countries during that period from 1995 to 2010 (OECD, 2017). Other statistical institutions such as The Conference Board agree on the trend. They state that productivity grew on average 2.80 percent in the United States and 1.90 percent in the EU28 countries from 1999-2006, and 1.30 percent and 0.70 percent respectively from 2007-2013 (The Conference Board, 2016). The calculations of The Conference Board are optimistic for productivity in the US and more pessimistic for the EU28 countries. This can be explained to some extent with different adjusting methods. Also, possible bias towards the United States must be considered as an option because for instance Byrne et al. (2016) argued that there might have been measurement errors in the productivity calculations in the United States.

As seen in *Figure 1*, especially from 2000 to 2005, which is often referred to as the era of high ICT growth and benefits, productivity grew significantly more in the United States than in the European Union. During that period productivity in the United States grew on average 2.57 percent annually, whereas the European Union's productivity was on average 1.81 percent annually (OECD, 2017). Also, the next five years from 2005 to 2010 were more productive in the United States than in the EU28 (OECD, 2017).

**Figure 1**



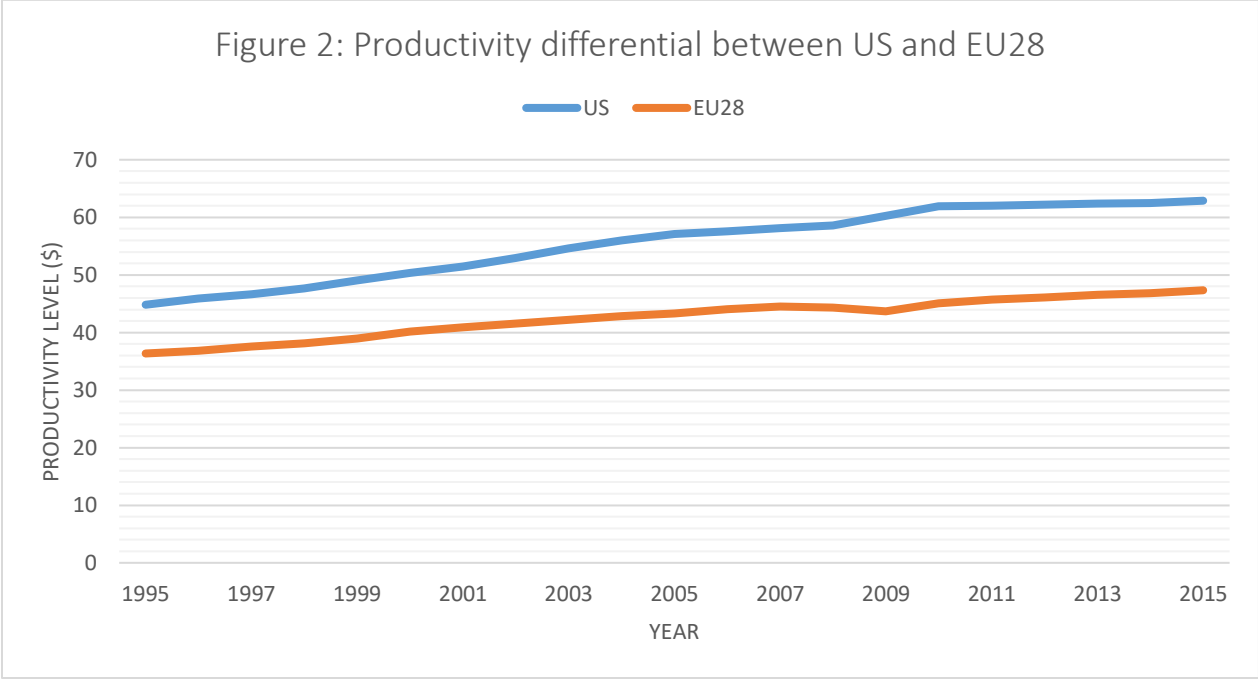
Source: OECD (2017) and own calculations

The years highlight a problem for the European Union in terms of productivity growth. On average productivity grew 0.73 percent more in the US than in the EU from 1995 to 2010 (OECD, 2017). Because of the large difference in productivity growth, a massive productivity gap has been generated between the two economies.

Figures 2 and 3 show the level of productivity gap and the changes between the economies in two different ways. Figure 2 shows, how much one labor hour contributed to GDP in dollars. From the graph, we can see that the United States already had higher GDP per hour worked ratio in 1995. Back then the United States generated over 40 dollars to an hour worked, whereas the European Union stayed well below \$40/hour worked. However, through time the difference between the two economies grew from less than \$10/hour worked to over \$15/hour worked, peaking at \$16.85/hour worked in 2010

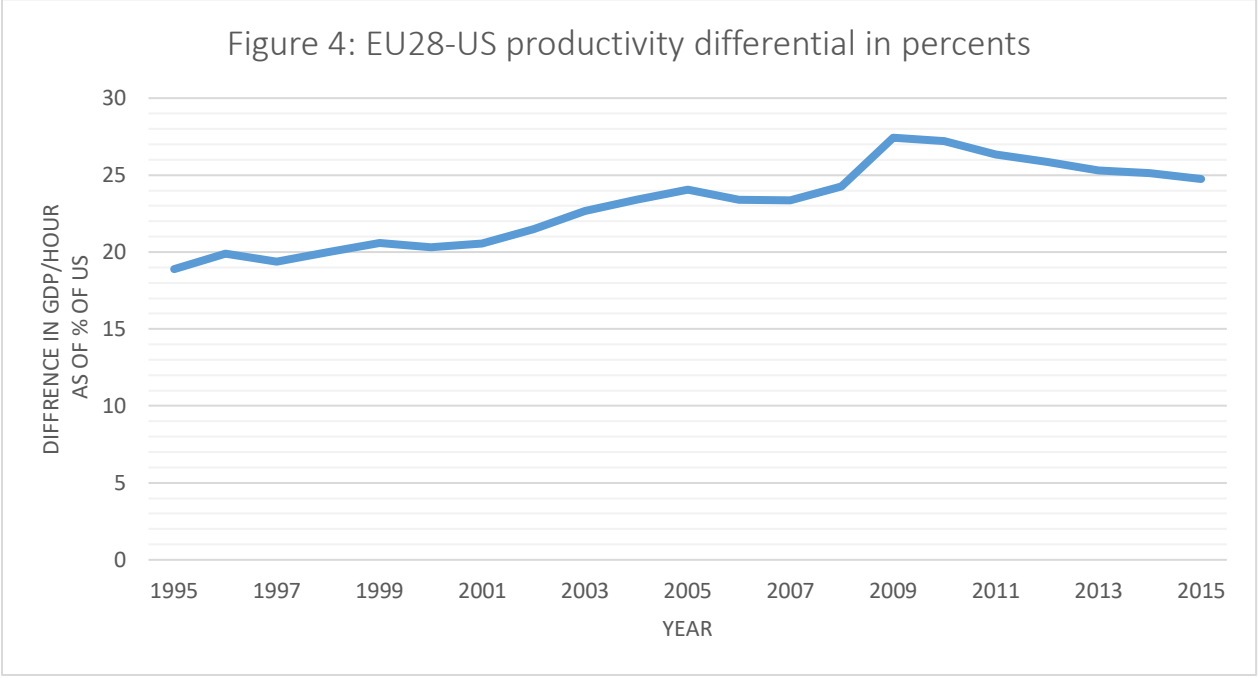
(OECD, 2017). Therefore, *Figure 2* highlight well the creation of the gap between the economies.

**Figure 2**



Source: OECD (2017) and own calculations

**Figure 3**



Source: OECD (2017) and own calculations

*Figure 3* highlights from a different point of view the difference in productivity by using percentage points, where the United States serves as the benchmarking point. For example, as in *Figure 2*, in 2009-2010 when the differential was at its highest at 27.7 percent, the average GDP per an hour worked was only 72.3 percent of the US level in the EU28 countries. This is an alarmingly low level of productivity. Especially alarming is that the trend continued for almost 15 years, and has a direct impact on the well-being and economic growth of EU28 countries. For instance, if the EU15 countries had continued to increase their productivity on 1980-1995 rate, the total annual GDP of these countries would have been 1.6 trillion US dollars higher in 2013 (Atkinson, 2014). Therefore, it is important to know, what contributed to this phenomena.

The reasons for the higher productivity growth are numerous but it is relatively safe to state that most of the productivity differential can be explained by the difference in the market regulations and use of ICT in industries. These factors have been discussed in Literature review and will be further analyzed in the coming chapters and sections.

### 3.2. Productivity trend from 2010 until 2015 – the catch-up period of EU28

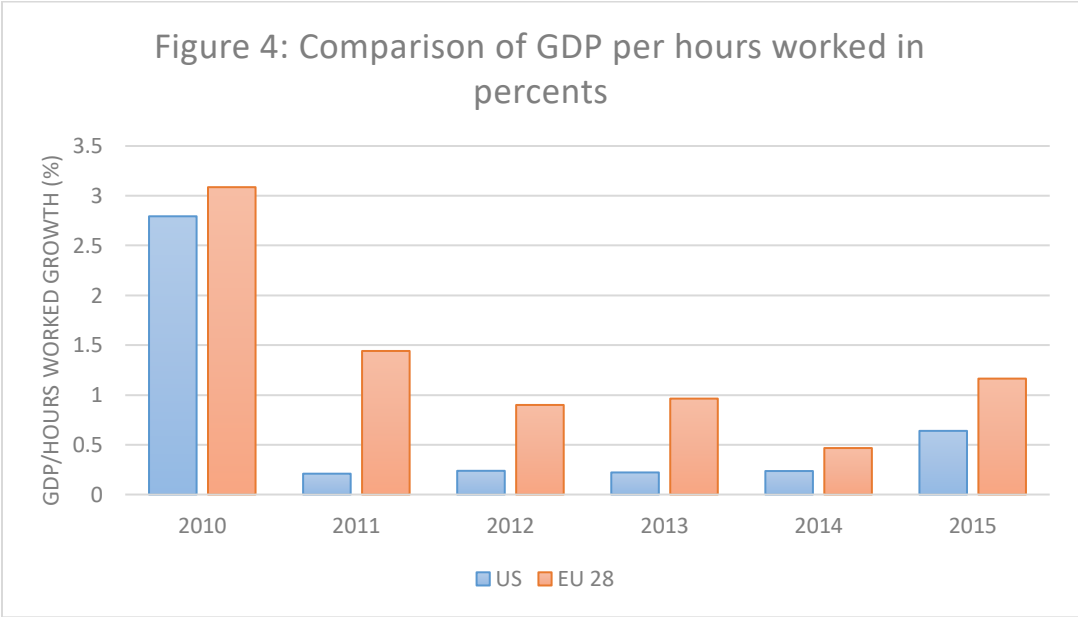
The time period from 1995 to 2010 is relatively agreed on in terms of the level of productivity growth between the two economies. Academics such as Fernandez and Palazuelos (2009) or World Bank (2008) agree with the support of statistics (OECD, April 3 2017) that the United States had higher growth in productivity than the EU28 countries. Only the estimations and calculations differ but the overall trend is for the United States. Interestingly, however, after the financial crisis of 2008-2009, the European Union outperformed the United States in productivity growth.

OECD (2017) shows that EU's productivity grew on average 1.33 percent every year, whereas the United States' productivity managed to grow only 0.77 percent annually (OECD, 2017). According to them, especially in 2011, 2012 and 2013, productivity growth was stagnated in the United States with less than 0.25 percent annually (OECD, 2017). However, the evidence is mixed.

For instance, as reported by the Conferences Board, EU28 countries did not outperform the United States as clearly as OECD (2017). The Conference Board (2016) state that on average the EU28 were only 0.17 percent more productive than the United States through 2013-2015, whereas according to OECD (2017) for the same time period the EU28 outperformed the United States by 0.5 percent. Nevertheless, both sources agree that productivity grew less in the United States than in the EU during this time period.

However, there might be bias in the data of The Conference Board, hence the Bureau of Labor Statistics (United States) agree with OECD (2017). The Bureau of Labor Statistics (2017) state that productivity grew on average only 0.70 percent in the United States from 2010 to 2015, which is relatively close to the calculations of OECD (2017) (~0.77 percent). This gives more reason to believe the OECD (2017) and The Bureau of Labor Statistics (2017). However, as said earlier all of the sources agree on that the United States did not perform as well as the EU28 countries, which gives support to the trend finding of 2010-2015.

**Figure 4**



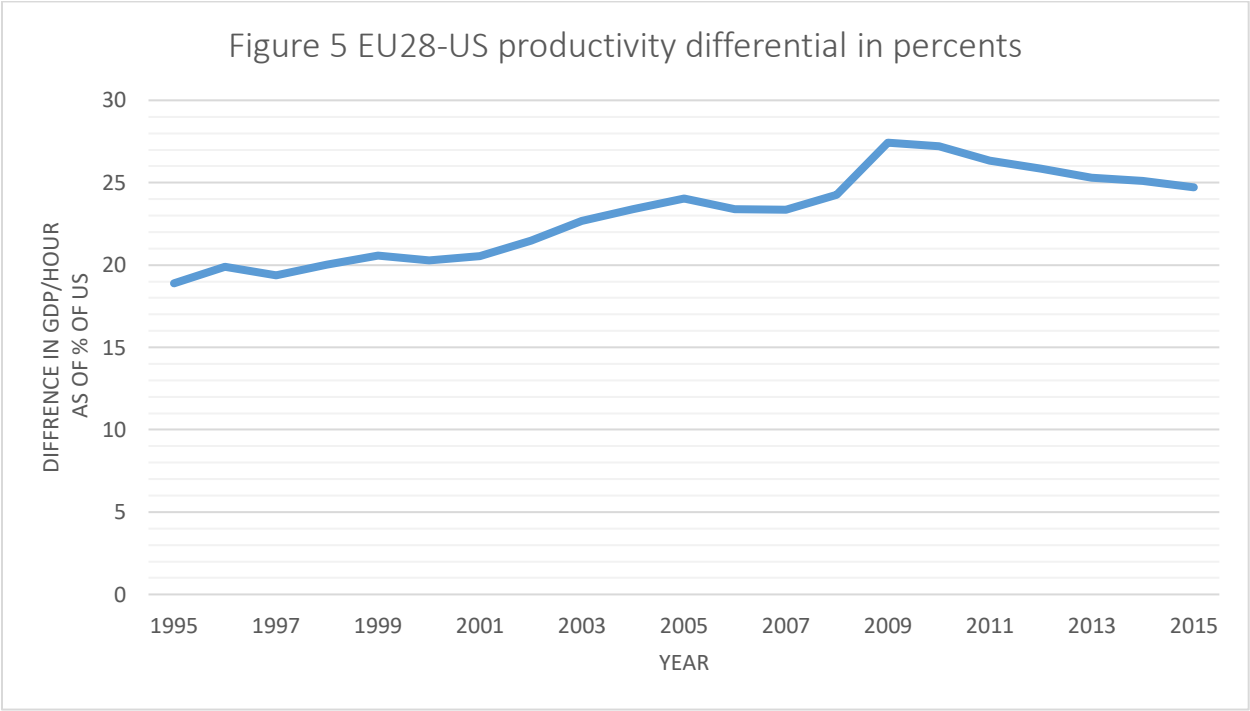
Source: OECD (2017) and own calculations

However, as seen in *Figure 4*, it is relatively clear that both economies suffered in the global crisis of 2008-2009. Productivity decreased in both countries after the crisis but the



decrease was higher in the United States than in the European Union. It is hard to say specific reasons, why this happened but since 2009, the EU has had better productivity growth than the US. As seen in *Figure 4*, the difference in productivity growth for EU's benefit has been over 0.5 percentage points. This means that there is a trend caused by some kind of phenomena, which indicates that European Union is catching up the US.

**Figure 5**



Source: OECD (2017) and own calculations

To support that claim OECD (2017) also show in their data that the productivity gap between the two economies has shrunk due to the change in the productivity trend (*Figure 5 above*). As stated in the previous section, the productivity differential peaked at 29.1 percent in 2005. However, the differential for 2015 was only 22.7 percent (OECD, 2017), which shows that the EU28 countries have been improving their productivity the last five years from 2010. However, the productivity level is still lower in the EU than in the US regardless of the growth in the EU.

This is an interesting finding. Many of the academics do not discuss in length that the European Union has performed better than the US in productivity growth (e.g. Miller and

Atkinson, 2014; Economic Department, 2016). Therefore, there is need to discuss the possible reasons and changes behind this phenomena, especially because, the institutions providing productivity statistics have estimated that this trend may continue for at least in 2016 and 2017 (The Conference Board, 2016; OECD, 2017; The Bureau of Labor Statistics, 2017). This creates a need to conduct further research, in order to find the reasons behind this phenomenon and its possible repercussions in near future.

### 3.3. Conclusions on the two productivity growth trend periods

United States surpassed the European Union in the productivity growth in the mid-1990s (OECD, 2017; Fernandez and Palazuelos, 2009). From 1995 until 2010 productivity of the United States grew on average 0.77 percentage points more than in the European Union (OECD, 2017). However, it seems that the trend of US dominance in productivity over the European Union lasted until the economic crisis of 2008-2009, which hit hard especially in the United States. After the crisis, based on the statistics (e.g. OECD, 2017; The Bureau of Labor Statistics, 2017), the European Union's productivity has grown more than in the United States.

This assumed catching-up period creates an interesting contrast and need for discussion. Academics and institutions suggest that the United States still outperforms the European Union (Economic Department, 2016), however the statistics of Organization for Economic Co-operation and Development (2017), The Bureau of Labor Statistics (2017) and The Conference Board (2016) show that the overall productivity growth adjusted to the purchasing power has been higher in the EU28 countries from 2010 to 2015. Also, the overall productivity differential has come down from the high numbers of 2005 (29.1 percent) to 22.7 percent in 2015 (OECD, 2017). Therefore, it is reasonable to believe that the productivity differential has stopped to grow, and the European Union has become more productive during the last five years.

However, another reason for the productivity trend change may be problems with measurement (Byrne et al., 2016). Byrne et al. (2016) argue that the United States may suffer from productivity measurement problem. The problem may lie in the adjustments of ICT investments or be plainly productivity slowdown, which could be explained by the high pro-employment trend of Barack Obama. A similar situation happened in Europe early

2000s when governments drove for minimizing unemployment at the cost of productivity growth (Baily and Kirkegaard, 2004). However, it is hard to say, whether the problem is in the measurement or overall slowdown of productivity growth. Byrne et al. (2016) suggest, however, that it may be only a measurement problem but in order to find more explanations for the phenomena, more research should be done.

Therefore, because of the possibility of incorrect data and measurement, it is important to remember, as stated in section 2.1.2. *Problems with the measurement of effects on labor productivity*, estimating and calculating the productivity growth levels is not without challenges. As said, it is reasonable to expect differences in the data sources. For instance, some of the difference in the data between OECD and The Conference Board can be explained by the difference in the adjusting methods. OECD uses PPP of 2010 as a reference in their data and The Conference Board uses nominal purchasing power parity.

However, for this study, the trend is still relatively same, even though The Conference Board (2016) shows higher productivity growth in the United States than OECD (2017). If the sources did not agree on the trend at any level, there would be more need to discuss the statistical differences or possible gaps in the data. Interestingly, the three statistical sources agree that the United States has slowed down relative to the European Union.

## 4. ANALYSIS OF PRODUCTIVITY FACTORS IN EUROPE

In many aspects, the European Union has fallen behind the United States in productivity. Even though statistics (e.g. OECD, 2017) suggest that the European Union has decreased the gap to the United States, there are still many different areas of business, where improvements and reformations are needed in order to improve productivity even further. The following sections will discuss and analyze the impact of ICT, labor market regulations and market characteristics into productivity growth.

### 4.1. ICT adaptation and re-engineering are too low

Essentially the argument for Europe's bad performance in productivity, especially, in the era of internet boom in the early 2000s is two sided. Many academics argue for the amount of investment (e.g. Fernandez and Palazuelos, 2009) and others for the lack of

adaptation (e.g. Amiti and Stiroh, 2007; Miller and Atkinson, 2014). However, the argument for adaptation is much stronger and can explain more of the mitigated improvement from ICT investments than the amount.

One of the most important arguments come from the findings of Baily and Kirkegaard from 2004. Baily and Kirkegaard (2004) found that even though investing into ICT slowed down in the United States, productivity growth continued at the same level. They argue that Europe does not need more ICT investing but reformation to adapt the technology. Other academics support this since it is more reasonable to believe that, for instance, yearly investments in hardware and software do not increase productivity. This is based on the theory that workers do not necessarily need faster or newer machinery to improve productivity noticeably (Baily and Kirkegaard, 2004). Therefore, the amount invested in technology does not necessarily relate to productivity improvement after a certain level of technological capital has been acquired. Hence, the question is not about the amount of software or hardware, it is about the adaptation and business models (Baily and Kirkegaard, 2004).

Therefore, in terms of productivity, it is more important to adapt the technology as a core function of the business. In the US, companies were more ready and flexible to take technology as part of the core functions (e.g. Amiti and Stiroh, 2007; Miller and Atkinson, 2014; Economic Department, 2016), whereas companies in the European Union were more hesitant to re-engineer their businesses to adapt technology into their supply chain and processes (Miller and Atkinson, 2014). European Investment Bank has estimated that the EU firms are almost EUR 90 billion per year behind in technological progress to the United States in terms of technology as part of the business process and innovation (Economic Department, 2016).

This is quite reasonable calculation about the US dominance in technological adaptation. For instance, Walmart and Apple are great examples of how companies adapted technology. Especially Walmart invested heavily in inventory tracking by using radio frequency identification (RFID) in order to improve the supply chain efficiency and therefore productivity (Lu, 2014). They also reengineered their supply chain to fit the new investments by using distribution centers, instead of only taking the technology (Lu, 2014). In other words,

Walmart created a process, which was built with the technology in mind, rather than by using technology as an 'outside' tool.

As said, flexibility, re-engineering and full adaptation of ICT, was not as strong in Europe, since many of the companies did not understand the purpose or the benefits of ICT, and because of this, the US companies outperformed the European counterparts (Persson, 2010). Another factor that affects the adaptation of ICT in Europe relates to the size and purpose of technology. Many different regulations from high taxation of ICT equipment to online marketing restrictions hinder technological investments in Europe (e.g. Van Reenen et al., 2010; Miller and Atkinson, 2014). For instance, EU Privacy directive decreases online advertising effect by 65 percent (Atkinson, 2014), which is a significant drawback in marketing business innovation for the European companies, even though the directive is placed to protect consumers. Also, the technology product legislation affects productivity negatively, especially with smaller companies or new entries to the market. For example, for UBER the market to entry was 16% less efficient in Europe than other parts of the world because of the strictness in legislation and outdatedness in technology (Atkinson, 2014).

Also, the research and development costs are relatively higher in Europe than in any other parts of the world (Aznar et al., 2014). They suggest that in order to improve and encourage the adaptation of ICT, the legislation should give the incentive to perform R&D. Aznar et al. (2014) suggest that by, for example, giving tax reductions and benefits for R&D expenses, the adaptation and use of ICT in Europe would increase and therefore productivity would rise. Many of the companies in Europe are in size too small to acquire or develop expensive technology such as RFID without reasonable support from the government, which affects their productivity (Miller and Atkinson, 2014).

#### 4.2. Labor markets too inflexible and immobile

As seen in the Literature review, labor market regulations in Europe are designed to be protective and pro-labor rather than pro-productive. The purpose of labor market regulations in Europe is to create job security in the labor markets in order to improve the well-being of the workers and economy. As imagined, this creates inflexibility and immobility, which are the main reasons for the worse labor market performance. By inflexibility, the

academics usually refer to labor regulations that complicate labor decisions such as hiring, firing and reallocation of labor (e.g. Gill et al., 2013; Henrekson, 2014). Especially, hiring and firing, in general, are more regulated in Europe than in the United States, which lowers the number of options the firm have with its workforce (Gill et al., 2013). It also gives more bargaining power for the workers in the labor market, which can create weak incentives to work productively. Therefore, social insurance and employment protection needs to be discussed along with inflexibility and mobility

Social insurance and other benefits are one of the reasons for the productivity differential, relating to inflexibility. Politicians highlight the importance of getting rid of benefits and entitlements that come with employment. Some academics agree that the benefits and securities related to the employment increase the bargaining power of employees over employers. One of these regulations is the social insurance related to the job (Henrekson, 2014). Henrekson (2014) argue that by removing the social insurance, the overall flexibility of labor would increase since the people would not be tied to the profession in order to get the social insurance. Also, bargaining power of the employees would lower, possibly increasing incentives to work more productively in order to get the benefits, rather than treating them self-evident. However, some academics such as Gill et al. (2013) argued that some benefits such as social insurance may be a positive force in keeping the workforce motivated. They work in order to get the benefits that come along with the employment. The argument is more psychological because it assumes that happy and secure worker is more productive.

Both of the arguments are valid but it is relatively hard to absolutely claim, which model is more productive. Some may argue that it is easier to support disadvantages of employment security. This is based on a theory that workers, who do not get the benefits self-evidently, need to work harder to get them or to retain them. However, this can be countered by an argument about job security increasing worker motivation (e.g. Gill et al., 2013). Because of the controversy, it is hard to say, whether the more secure European model is less productive or not compared to the more flexible US model. Therefore, the thesis will focus on studying effects of labor mobility and inflexibility.

Regulation that controls workforce turnover per se does not decrease productivity because lower turnover usually increases investing in human capital and therefore productivity (Gill et al., 2013). However, the companies prefer to have more flexibility, which has led the European firms to prefer different ways that evade the regulation over hiring, firing and reallocation. For instance, companies have begun to prefer temporary contracts to avoid the regulation (Gill et al., 2013). Temporary contracts can create significant drawbacks, especially, in terms of investments in their training (Gill et al., 2013). This can lead to less educated and high turnover workforce, which have the benefit of flexibility, but drawbacks of lower productivity. This analysis is based on a psychological theory that temporary workers are from the start seen as temporary and therefore less trained by the company to their tasks, compared to a worker with a continuing contract. Furthermore, people with continuing contracts can be more motivated to work since their employment is more stable and they may have more career opportunities in the company, along with the possibility of more training. Therefore, it is possible that more flexible regulation with more full-time workers would be better since the idea and use of temporary workers, in all simplicity, may be a disservice to the company and the economy (Gill et al., 2013).

Another important factor along with inflexibility is the immobility of workforce in Europe. Labor mobility is significantly lower than in the United States. Only 21 percent of the EU citizens had lived in a territory or country other than where they were born, compared to the 31 percent, who had lived outside their birth state in the United States (Gill et al., 2013). The OECD (2012) also states that annual mobility within EU15 countries between regions stands at an average annual rate of 1 percent, but cross-border mobility is only 0.35 percent. Both within and between countries mobility rates are far below the rates within Australia (1.5%) and the United States (2.4%). Some of this can be explained by cultural (e.g. habits, language) and institutional differences (e.g. rule of law, marital laws), which discourage people from moving from one place to another after employment (Gill et al., 2013).

One of these discouraging factors is the transfer of employment benefits and gains. For instance, it is easier and more convenient in the United States to work in a different state in terms of pension or health care. In Europe, the pension and health care benefits may

not be as conveniently transferable from country to country as in the United States from state to state (Gill et al., 2013). In some cases, it may be totally impossible. This discourages people from going after work, where it is available. In extreme cases, this would mean that some areas would suffer from the high supply of labor and other areas of the high demand for labor. In Europe, the factors affecting the mobility to transfer labor from area to area would not balance this out as well as in the United States, since the people would have more barriers to change the environment (Gill et al., 2013). The immobility of labor is, therefore, a crucial problem for the well-being of the EU.

### 4.3. Smaller and less competitive European market

Production and therefore productivity is contributed by companies in different industries. There are two important factors that influence the productivity of these companies in Europe: competition and size of the market. Especially competition is argued by many academics to be a significant contributor to the lower level of productivity growth in Europe (e.g. Baily and Kirkegaard, 2004; World Bank, 2008; Economic Department, 2016). Also, the size of market seems to contribute to productivity through economies of scale and homogeneity of consumers.

One of the problems with European competition legislation is the wrong focus. Rather than focusing on pressuring the companies to improve productivity through higher competition, the focus is on controlling competition, either through state-ownership or rigid legislation. For instance, state-owned companies are usually protected from the toughest competition, (Baily and Kirkegaard, 2004), which supports weak incentives to improve productivity, and lowers the amount of creative destruction in the market (World Bank, 2008). The example of Renault mentioned *in section 2.4.1.* shows the effect of state-ownership on productivity. Once the company was released from the safety net of government, it needed immediately to re-engineer its business processes and improve productivity through drastic actions such as laying off workers (World Bank, 2008). This shows well that control and protection of consumers through government subsidized companies may not be the most efficient way, especially from productivity's point of view.

State-ownership also brings along other productivity diminishing problems along with less productive companies in the market. State-ownership with rigid competition legislation



affects enter and exit of firms. State owning and current legislation focuses on companies that have already matured in the market rather than establishing optimal conditions for churning in the market (Baily and Kirkegaard, 2004; Economic Department, 2016). This creates higher barriers to entry and lower number of exits (Economic Department, 2016), which affects indirectly productivity through lowered need to innovate and improve production (Economic Department, 2016). For instance, strongly inefficient companies stay on the market instead of exiting because the legislation and possible government ownership do not create enough competition, which would increase the drive towards more productive solutions (Economic Department, 2016).

Another factor affecting, how companies perform in the market is the size of the market. Whereas in the United States the market is relatively homogenous (Persson, 2010), in Europe the market is a mix of different countries, cultures, and economies. Even though the market in terms of consumers is larger than the US market (Persson, 2010), the borders between countries divide the market into multiple blocks. Therefore, instead of having one large homogenous market, European companies need to operate in a mix of different cultures and consumers. This means that the production cannot be homogenous since the consumers differentiate from country to country.

This leads to one essential phenomenon. Because of the largely fragmented customer base, the production needs to take into account varieties. Some academics have argued that this has forced the European Union to prefer smaller producers, which decreases the economies of scale (e.g. Baily and Kirkegaard, 2004; Economic Department, 2016). Even though smaller companies have more flexibility than large companies, large companies have a higher level of utilization and a higher scale of operation (Baily and Kirkegaard, 2004), which has an effect on the productivity of these firm (Economic Department, 2016). Some of it can be explained by access to a larger pool of resources (e.g. ICT in e-commerce) due to the size of the operations. Because of that, larger production amounts increase the level of utilization and through economies of scale more than smaller operations (Economic Department, 2016). This is especially true with retail and wholesale industries, which contribute over 70 percent to the GDP (Baily and Kirkegaard, 2004; van Ark et al., 2008).

#### 4.4. Conclusions on European productivity factors

As discussed, most of the problems relate to EU's inflexibility and immobility. For instance, most of the problems in the adaptation of ICT can be explained by inflexible legislation and old-mindedness in the executive board in the European firms. Many of the academics argue for lower regulations in labor and product markets (e.g. Atkinson, 2014; Economic Department, 2016) to increase the effect of ICT. For instance, by removing EU Privacy directive the effect of advertising would rise by 65 percent (Atkinson, 2014). However, many of the laws and directives have other purposes than only improving productivity. Many of them, such as EU Privacy directive, protect customers and improve the quality of life. Therefore, the decision to improve productivity through reducing consumer protection may not be an ideal case. The fact, however, is that in order to improve productivity, there have to be improvements to existing legislation and corporate culture to increase the use of ICT and therefore productivity.

As a conclusion of the different labor market factors affecting productivity, it is relatively hard to say, whether the minimum wage or social protection are the reasons for worse productivity compared to the United States. It is, however, rather fair to draw a conclusion that the inflexibility and immobility affect productivity. Especially immobility inside the union may affect significantly productivity and employment levels. This is mostly because many of the benefits associated with employment do not transfer easily from country to country or because the cultural and social barriers may be too high to seek employment outside the home country.

These barriers also extend to other aspects such as economies of scale. The European Union consists of multiple countries, which are different from each other. This decreases the economies of scale since the consumer base varies from country to country. One company cannot produce to the whole society because the demand is different in every country. Therefore, the economies of scale are lost in production. Also because of the fragmented union, competition is not as high as in the US. Companies can stay within one country without having to compete against countries in the neighboring market. Both of these lower productivity.

Some academics and institutions (e.g. van Ark et al., 2008; Economic Department, 2016) believe that Europe needs to function better as a single market in order to increase productivity. This is not a false belief since most of the hindrances relate to mobility, flexibility and competition. With the single market, many of these problems could be solved or at least improved.

## 5. ANALYSIS OF PRODUCTIVITY FACTORS IN THE UNITED STATES

In terms of productivity factors, the United States has performed better than the European Union for the last 20 years. Especially from 1995 until 2010, productivity growth was significantly higher in the US, which created a large differential in the overall level of productivity between the two economies. In this chapter, we will focus on discussing and analyzing the factors that contributed the most to the high growth of productivity. The chapter will use examples and scholarly findings in order to explain, how information and communication technology (ICT), labor market regulations and overall market characteristics supported and added to productivity.

### 5.1. US businesses use technology more innovatively

As explained in *section 3.1*. ICT adaptation and reengineering is too low the amount of ICT investing has a relatively minimal impact on productivity growth (Baily and Kirkegaard, 2004). Therefore, as in Europe, the growth in productivity cannot be explained solely by the investment numbers but through the capability to adapt and use the technology in the business processes. In general level, an adaptation of ICT is affected by many different factors but the four most important factors are legislation, organizational structures and management, and innovation (e.g. Lovric, 2012; Cette, 2015). Especially important is to analyze these different factors in the service and retail industries, which contribute over 70 percent in productivity growth, employ nearly 80 percent of the workforce and contribute more than 75 percent to annual GDP in the United States (Fernandez and Palazuelos, 2009).

As already discussed in the analysis of productivity factors in Europe, legislation is the basis for many of the other productivity factors such as organizational structure and innovation (e.g. Anderson and Kliesen, 2006; Fernandez and Palazuelos, 2009; Cette,

2015). In order to show, how the US legislation performs more efficiently and freely from the perspective of businesses and innovation, we need to look what kind of legislation is in the EU that hinders productivity. Two of these legislations that affected significantly the use of ICT in the late-1990s and early 2000s is the taxation on consumer technology and import tariffs on ICT (Miller and Atkinson, 2014). The problem of taxation and tariffs on ICT is two sided. First, it costs businesses more to acquire and use, which may reduce the willingness to innovate the business model (Miller and Atkinson, 2014). The second issue may be that consumers do not want to use technology due to the high price (Miller Atkinson, 2014). This may not be relevant anymore, since consumer technology has decreased in price for decades, and is more affordable to consumers. However, this may have been one of the issues, and reason why the United States took a technological lead over Europe in the mid-1990s. The US legislation did not penalize the use of ICT but rather supported the transition from labor-intensive production to more profit maximizing production through the use of machinery and ICT (Anderson and Kliesen, 2006).

Another example of freer use of technology is the use of consumer data, which also affects productivity growth indirectly (Miller and Atkinson, 2014). In the United States companies can use data relatively freely and without taxation, which is important for many modern day business models (Miller and Atkinson, 2014). For example, in Europe, there are directives such as EU Privacy Directive that prohibit using certain kind of information about consumers to conduct business (Atkinson, 2014). In some countries, the legislation goes even further. For instance, in France, the government collects tax on business data, which significantly increases the costs of using data in a business process (Miller and Atkinson, 2014), which can affect the use of more productive ways such as e-commerce negatively. Therefore, the two examples highlight that the United States is in many aspects a freer marketplace to use technology and innovation, which has a significant contribution to productivity, especially, because service and retail industries are relatively dependent on the collection of data and use of ICT in the modern days.

Strict and rigid legislation on technology can affect innovation and technological progress. Because the legislation is freer in the United States, innovation and organizational structures have better conditions to grow. For instance, the use of ICT in retailing and services

rose from the United States because the competition was high and businesses required new processes in order to differentiate and improve productivity (Baily and Kirkegaard, 2004). In retailing and service industry, the use of ICT decreased the labor hours and improved productivity through the introduction of enterprise resource planning (ERP) and other supply chain solutions (Baily and Kirkegaard, 2004). Furthermore, in order to support all the adaptation of ICT, the organizations were willing to re-engineer their structures and business models to support the introduction of technology, whereas, in Europe, many businesses did not seem to recognize the purpose or possibilities of ICT (Persson, 2010). This may have been due to the fact that the European regulation was not as free and competition was lower, which decreased the incentives to re-engineer or apply ICT into the business. Especially service and retail industries did not fully integrate ICT as part of their day-to-day operations, such as inventory management, as quickly as in the United States (Persson, 2010). Even today ICT is more widespread in the United States across different industries (Persson, 2010; Economic Department, 2016).

## 5.2. Productivity growth only half without labor mobility and jobless growth

The labor market in the United States has many differences compared to the European Union, but there are two important advantages over the European Union: mobility and flexibility, which drive towards jobless growth (Marelli and Pastore, 2010; Gill et al., 2013). Other factors such as social protection (e.g. minimum wage, pension) are relatively arguable, since there are arguments for both, whether the high or low level of protection is better for productivity growth (e.g. Gill et al., 2013; Henrekson, 2014). However, mobility and flexibility can be more easily rationed. Some academics even argue that without mobility the US productivity growth would be half of the present and past growth (Gill et al., 2013).

Because of the homogeneity of US labor market, the workforce has more incentives and fewer barriers to move from one area to other after employment (Gill et al., 2013). The problems, which the European Union is facing, are not present in the United States. For instance, the question of language barriers and cultural differences are low in the United States. Many of the states have relatively similar Anglo-Saxon culture and institutional differences are low, even though states have their own legislation along with federal rule

(Gill et al., 2013). Also, social security, insurances and pension are more transferable in the United States compared to the EU because of the unity inside the country (Gill et al., 2013). Therefore, because there are fewer barriers to moving from one state to the other, the workforce in the United States have more mobility and options to find employment.

Mobility also helps with areal employment problems, which can significantly impact productivity growth. In the United States, it is relatively easy to go after employment into areas, where there is a need for certain types of workers, because of the explained low barriers to moving (Gill et al., 2013). However, in Europe, the problem of areal surpluses and shortages of workers can be a real problem since there are many more reasons not to move after employment (Gill et al., 2013). For instance, moving from Texas to Nebraska is easier because of the similarities in language and institutions if not in weather and local culture, than for instance moving from Romania to United Kingdom (UK). The differences between Romania and UK extend over culture and climate to institutional and legal differences, which may affect pension, wages, social security, housing and other factors related to living (Gill et al., 2013). Numbers reinforce the argument by stating that 3 percent of the working-age population in the United States had lived in another state between 2004 and 2007, whereas in the European Union the number of only 1 percent (Gill et al., 2013). Therefore, it is clear that labor mobility is much higher in the United States, which may attract many people to work in the United States.

Another reason for higher productivity growth in the US can be explained by the tendency to drive toward jobless growth (Marelli and Pastore, 2010). Before getting into the difference between the US labor trend and the European labor trend, it is important to note that these trends have changed during the last 5 years towards more pro-employment, especially in the United States during Obama's and Trump's presidencies. This may be one of the reasons behind the US productivity slowdown showed by OECD (2017) and discussed in more detail by Byrne et al., (2016), because the same happened in Europe 1995-2006 through a higher focus on employing people (van Ark et al., 2008). To clarify, this thesis will not focus on explaining the possible slowdown but encourages to do further research on the effect of more pro-employment policies in the United States.

As Marelli and Pastore (2010) suggested, the overall trend for the United States until the crisis was more pro-productivity. Many of the companies in the United States became to improve productivity through the higher use of information and communication technology in order to improve productivity growth (Marelli and Pastore, 2010). This was possible because the legislation allowed companies to pursue heavily profit-maximizing solutions, even at the expense of laying off labor force (Marelli and Pastore, 2010).

Therefore, because of the flexibility of labor legislation, companies in the United States are quicker adapt to economic changes, such as a crisis or new innovation (Amiti and Stiroh, 2007). The introduction of ICT and internet boom of the early 2000s can be included in the economic changes, in which the US companies adapted more quickly than the European companies. The companies were able to adjust their workforce more easily when new technology was introduced as a replacement to manual labor. Vergeer and Kleinknecht (2014) found that high functional flexibility in labor markets back productivity growth, especially in the case of innovation, which the internet boom and ICT were back in the days.

### 5.3. The US has higher productivity through larger economies of scale and competition

As discussed earlier, Europe is a mix of multiple different nations, cultures and levels of competition, whereas the United States is a relatively homogenous market with lower restrictions on competition (e.g. Persson, 2010). Homogeneity among consumers and high level of competition through loose regulation give a large benefit for companies operating inside the United States. One of the most essential benefits is the economies of scale, which support productivity growth through a focus on saving on costs with producing goods in larger quantities (see 2.1.4. *Additional productivity determining factors*)

The key for higher productivity in terms of market characteristics is the combination of homogeneity, legislation and competition. In terms of legislation the US market support economies of scale through regulations that allow high competition. As for economies of scale supporting legislation, the use of land is less regulated in the United States that allows big-box markets (e.g. Walmart, Home Depot) to succeed in the market (Congress of the United States, 2007). This allows large retailers and service industries to focus on

the economies of scale and improve productivity through a large scale supply chain (Congress of the United States, 2007; World Bank, 2008). This makes a really big difference in terms of GDP contribution because retail and service industry account for roughly 70 percent of productivity growth in the United States (van Ark, 2010).

More flexible and pro-business focused legislation also allows more business practices and use of business models (Baily and Kirkegaard, 2004; Congress of the United States, 2007). One great example, which has already been mentioned in the previous chapter (see 4.1. ICT adaptation and reengineering are too low) is UBER. A combination of high competition and freer regulation on taxi services made the business model of UBER possible (Atkinson, 2014). Inside the United States, the company could relatively easily expand from state to state because of the similarities in the competition and legislation but when introduced to Europe the company faced problems (Atkinson, 2014). In Europe, the expansion was 16 percent less effective per dollar invested as in the United States because of the competition and regulation (Atkinson, 2014). This is an important example because it highlights the difference, how much regulation and competition can affect the overall efficiency and productivity.

Therefore, in order to have new and innovative business models, the legislation must support entry, exit and turnover in the market. Because product markets are less regulated than in Europe, the entry for new businesses is easier (Congress of the United States, 2007). Higher entry is important for competition, since if the barrier to entry is high in most of the industries, the turnover or creative destruction within the industry is higher, which influences the companies to improve their operation continuously (World Bank, 2008). That creates higher competition, in which the most productive companies remain in the market. That contributes more to productivity growth in the United States than in Europe (World Bank, 2008; Miller and Atkinson, 2014).

#### 5.4. Conclusions on productivity factors in the US

In summary, the main advantages of the United States come from more flexible and less rigid regulations. Therefore, overall, the US has adopted ICT better as part of their industries. The legislation allows a higher level of competition and innovation, which forces the companies to use productivity-enhancing solutions such as ICT. Also, it is relatively safe



to conclude that US businesses are more flexible and willing to introduce ICT as part of their core functions, and even build the business around technology (e.g. UBER from Atkinson, 2014).

Also because of the legislation, mobility and flexibility of hiring, firing and reallocating are the main drivers of productivity growth in terms of the labor market in the United States. Mobility allows the economy to perform better on macro-level because the workforce can move more freely to areas, where there is employment available. Also, the companies have more flexibility in labor planning to optimize their business processes. However, some scholars (e.g. Fernandez and Palazuelos, 2009; Persson, 2010) argue that less protected labor force is more motivated to work productively in fear of losing their job, but as seen in the analysis of European labor market, many of the social benefits do not necessarily reduce productivity (Henrekson, 2014).

Less rigid legislation contributes high competition, economies of scale and low barriers to entry, which contribute to productivity. For instance, high competition with low barriers and homogenous consumer base are important for the service and retail industries in the United States, since these industries account for over 70 percent of productivity growth (van Ark, 2010). Because of the market and legislation companies need to focus on staying ahead in the market by contributing resources to productivity growth and innovation, therefore, driving the macro-level productivity growth.

Because of these factors, the United States has created a productivity differential in between the European Union. Especially the use of ICT has become vital in the modern world of social media marketing and e-commerce. In the United States, legislation and competition increase pressure on companies to innovate around technology, something which has not been as massive in Europe (Economic Department, 2016). Therefore, legislation along with market characteristics create more productivity focused environment.

## 6. CONCLUSIONS

From the discussion above we can conclude that there is a large productivity differential between the United States and the European Union. Previous literature focuses mostly on explaining the beginning of the productivity gap prior to the financial crisis. This thesis

follows the ideas and finding of previous research. It also aims to provoke new research, especially, from the European point of view.

### 6.1. Summary of findings

The above findings show that the European Union is significantly behind the United States in many of the contributing productivity factors. One of the most important problems for the EU relies on the adaptation and use of ICT. Whereas the United States adapts ICT as part of their organizations and build businesses around technology (e.g. Atkinson, 2014), companies in the European Union have relatively low level of ICT usage (e.g. Baily and Kirkegaard, 2004; Economic Department, 2016).

The problems behind the low level of ICT use can be explained by strict and rigid regulations that hinder back innovation and use of technology in the European Union. Most of these regulations relate to labor protection and product regulations. For instance, privacy regulations decrease the effect of online advertising, which decreases the productivity of online services (Atkinson, 2014). Also, labor regulations decrease productivity because companies have not enough flexibility to make labor decisions, which would increase the use of technology and improve productivity (Persson, 2010).

Labor market regulations are also more pro-employment than pro-productive in the EU than in the US (Baily and Kirkegaard, 2004). Many of the laws and regulations are aimed to secure the employment and improve the level of employment, however, this restricts companies. Companies have fewer options to hire, fire and reallocated workers, they are forced to use temporary workers to increase flexibility (Henrekson, 2014). All these have a significant effect on productivity through motivation, training and education (Henrekson, 2014).

Another side of the regulation are the incentives, which also affect flexibility of the workforce. For instance, social insurances that comes along with employment reduces the flexibility of the workers to choose employment (Gill et al., 2013). They also reduce the options of the firm in terms of cost management (Gill et al., 2013). These affect productivity because the flexibility of both parties is weakened. However, it is hard to say whether

the social insurance or minimum wage have a high or low impact on productivity compared to the United States. It is, however, rather safe to draw a conclusion that the inflexibility and immobility affect productivity.

Especially immobility of the labor force affects productivity and employment levels. Workers have barriers and low incentives to move inside the European Union after work or education, which is mostly a fault of problems with transferring pension, employment benefits and other social gains from country to country or because the cultural and social barriers may be too high to seek employment outside the home country (Gill et al., 2013). These barriers reduce significantly the allocation of the workforce in the EU. For instance, the annual cross-border labor mobility has been around 0.35 percent among EU15 countries, whereas within and between mobility has been 2.4 percent annually in the United States (OECD, 2012).

Also because of the many cultural barriers and lack of unity, many scholars agree that the problem for Europe is the differences between markets, which influences productivity growth essentially. Whereas the US market is homogenous, highly competitive and less regulated, the European market is fragmented, less competed and possesses stricter competition regulation, which decreases the amount of creative destruction (Baily and Kirkegaard, 2004; World Bank, 2008; Economic Department, 2016). Therefore, there are problems with the European market. Therefore, the economies of scale, which bring productivity is lower in the European Union because of the lack of unity.

Many scholars suggest that in order Europe to improve its productivity, the regulation should be made more flexible and the single market made more unified (Congress of the United States, 2007; Atkinson, 2014). Single market would mean that EU countries would become closer to each other in terms of regulations, which would reduce barriers to conduct business or work in another country. This would reduce, for instance, problems with transferability of employment benefits, different product regulations and competition regulations still have an impact on productivity, even though the European Union has become more united during the years. However, the current situation is leading to controversial direction. Whereas the union needs to become more united, the United Kingdom is going to exit the union (Brexit). This may deteriorate the current progress and single

market may begin to fracture instead of becoming more unified. This should be taken into account in the future research.

Along with the single market the European Union should focus more on improving productivity through technological innovations. Especially important is to unify the online markets even more, increase the amount of ICT investing and adaptation in the low productivity sectors such as retail and services, which contribute highly to GDP growth (Miller and Atkinson, 2014). EU Privacy Directives and other online regulations along with high cost of ICT hinder the use of technology as a business platform (Atkinson, 2014). High cost and regulations create barriers to entry, for instance, as seen in the case of UBER, the market entry was 16 cents per dollar less effective in the EU than in the US (Atkinson, 2014). Also because technology has become a necessity in the modern world, its usage should be supported. Aznar et al. (2014) introduce that the EU should give tax benefits and other incentives to conduct more R&D and ICT investing.

From the labor regulation point of view, it is hard to say, whether regulations should be relaxed or modified. Many of the regulations have noble reasons and purposes such as increasing employment and securing employees from corporate terror. Even though some of the regulations may increase leverage for the employees and decrease productivity, they may still be otherwise highly important for the social welfare. Therefore, this thesis will not take a firm stance on the matter.

## 6.2. Limitations of the study and future research

Even though there are multiple different points of improvement, the European Union seem to have been catching the United States from 2010. This can be seen as some kind of progress if the reasons behind the better growth can be justified in that way. One of the limitations of this study is that there is not enough research already done about the reasons behind this phenomena.

However, one of the biggest limitations of this study is the generality and preciseness of the data. The thesis is based mainly on previous research and statistics, which give relatively general data. Therefore, it is extremely hard to estimate the magnitude, how much these factors influence productivity growth. Because the narrative and studies are mainly

descriptive, we cannot conclude precisely, whether the impact from ICT adaptation is larger than, for instance, the effect of social protection. Only we can do is give assumptions and estimations of the general trend and magnitude. We can also safely state that the findings can be justified by previous research and statistics.

Another limitation, along with preciseness, is the scope. This thesis only focuses on studying three major factors: ICT, labor market mobility and flexibility, and market characteristics in terms of competition and unity of the market. There are, however, other factors that have an effect on productivity. For instance, trade openness and foreign direct investments (FDI) have an effect, which are not included in the study. In order to gain larger knowledge of productivity affecting factors, more research should be conducted from other points of view.

As for the statistics, OECD (2017) along with other statistics such as The Conference Board (2016) seem to show that the European Union has surpassed the United States in productivity growth since 2010. There is little or no studies conducting research from the point of view of European success. Therefore, I recommend conducting further research on the subject from the European point of view post-2010. This is highly important in order to understand, whether the changes are European success or American failure in order to improve productivity. Byrne et al. (2016) suggest that the low level of productivity growth may be a measurement error in the US, but in order to confirm that there must be more research.

Also, more research should be conducted from the practical point of view. As stated in the beginning, workforce and population ages fast in the European Union. In order to answer to the increasing costs and consumption by these population, research should be conducted to find productivity increasing solutions without increasing the amount of employment. This is due to the fact that the population ages faster than the working force pool increases. Therefore, in order to increase productivity and to keep the gross domestic product growth stable, productivity needs to be increased without pro-employment and labor agenda. And the answer to that problem may come from comparing productivity with the United States, especially from 2010 until today. Since we have found reasonable

answers to the better labor productivity in the US until 2010, we can try to find solutions to the current situation in Europe by using these answers.

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