



*Department of Economics and Business, Thesis in
Macroeconomics*

*Can Gender Equality and Women's Empowerment Unlock Growth
Potential in Europe?*

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CAN GENDER EQUALITY AND WOMEN’S EMPOWERMENT UNLOCK GROWTH POTENTIAL IN EUROPE?

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Abstract

The topic of the thesis is whether improvements in gender equality and women's empowerment can unlock growth potential in Europe. In the first chapter I describe the critical situation of the European economy in the recent years, which has experienced one of the deepest recessions since the Great Depression of the 1930s, with potential output falling significantly and possibly permanently. The second section presents a summary of the economic literature on the relationship between gender inequality and economic growth. The literature review principally focuses on three measures of gender inequality: education, as a fundamental factor governing labour market equality; employment, from which gender inequality stems either in the form of segregation or barriers to entry; pay differentials. In the third and conclusive section, I present an econometric model, based on a panel data for 21 developed countries, that I use to test the following three hypotheses: 1) the gender gap in the labour force reduces the human capital available in an economy; 2) the gender gap in employment limits the labour input available for economic activities; 3) the wage gap discourages entrance in the labour market and provides disincentives to women. The empirical results support the theoretical literature, showing evidence of the negative effects of the labour force gap and the wage gap on long-term growth. A greater involvement of women in the labour market seems to be a necessary step to enhance Europe's economic growth prospects.

1. Introduction

The topic discussed in this thesis is whether improvements in gender equality and women's empowerment can unlock growth potential in Europe, countervailing the effects of declining total factor productivity and ageing population.

In the first chapter I describe the critical situation of the European economy in the recent years, which has experienced one of the deepest recessions since the Great Depression of the 1930s. According to a variety of estimations, potential output in the European Union fell significantly during this crisis and part of this reduction is likely to be permanent. In addition, in the long run, demographic trends will not sustain labour supply and employment. In this context, it is urgent for Europe to narrow the gender gaps in the labour market that still exist, despite the significant progress achieved in the last decades.

The second section presents a summary of the economic literature on the relationship between gender inequality and economic growth [at the macroeconomic level]. The literature review principally focuses on three measures of gender inequality: education, as a fundamental factor governing labour market equality; employment, from which gender inequality stems either in the form of segregation or barriers to entry; pay differentials. The studies made until now highlight the importance of both direct and indirect channels through which gender inequality negatively affects economic growth.

In the third and conclusive section, I present an econometric model, based on a panel data for 21 developed countries estimated on the 1960-2007 period, that I use to test the following three hypotheses: 1) the gender gap in the labour force reduces the human capital available in an economy; 2) the gender gap in employment limits the labour input available for economic activities; 3) the wage gap discourages entrance in the labour market and provides disincentives to women. The empirical results support the theoretical literature, showing evidence of the negative effects of the labour force gap and the wage gap on long-term growth.

A greater involvement of women in the labour market would support Europe's economic growth, justifying the importance attached to the elimination of gender inequality by the EU and the other international organisations.

2. Economic challenges and the Gender inequality in Europe.

2.1 Europe's economic challenges.

Over the recent years the European Economy has experienced one of the deepest recession since the Great Depression of the 1930s. The financial and economic crisis was the most global and synchronous across countries in the post war economic history.

According to a variety of estimates and researches, the euro-area potential output¹ (the level of output consistent with full utilisation of the available production factors: labour, capital and technology) has significantly fallen during this crisis - reflecting lower contributions from capital and labour, in addition to a decline in total factor productivity (TFP) - and part of this contraction might be a one-off permanent loss.

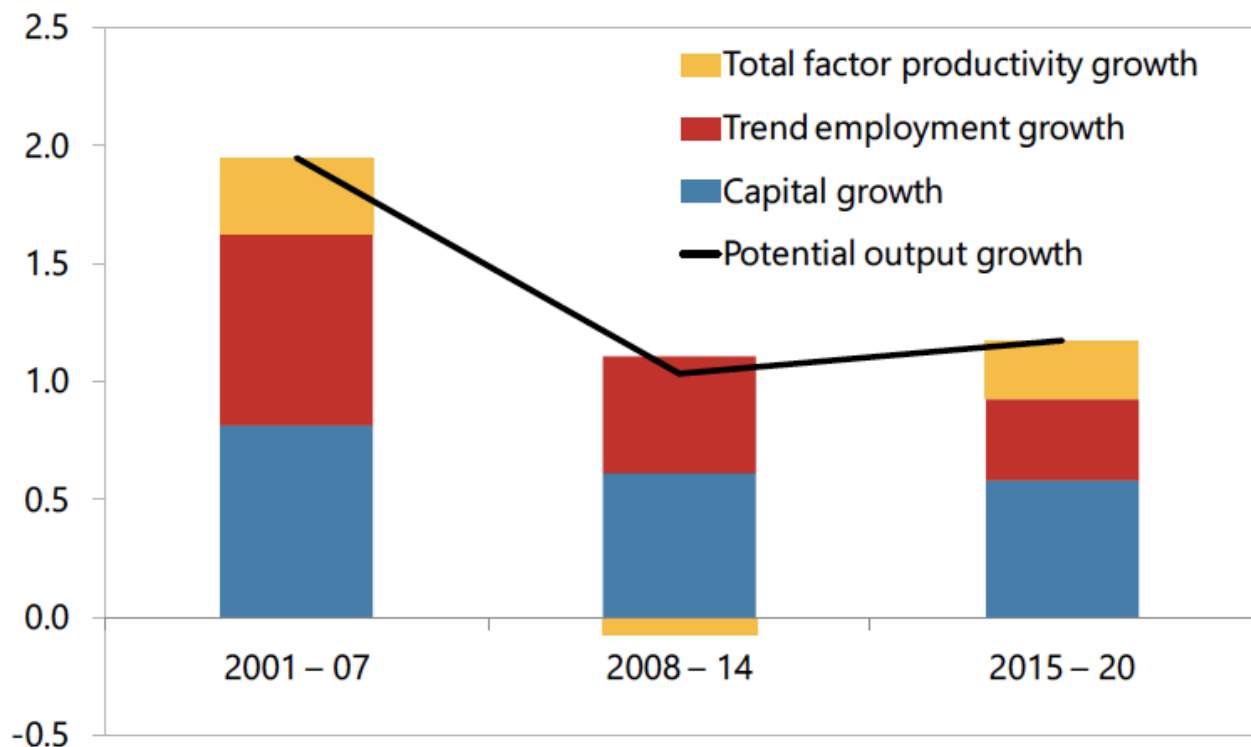
Even before the crisis, advanced economies were experiencing a decline in potential output growth, owing to a slowdown in TFP. The decline reflected the plunge in GDP economic growth that occurred after an extraordinary expansion in previous years due to the strong innovation in Information and Communication Technology (ICT), which fostered both capital and labour productivity.

Most of the estimates of international institutions (OECD, IMF and European Commission) of potential output are based on a production function, which relates output to the key components of labour, the capital stock and total factor productivity. The TFP contribution to potential output is usually used as a proxy of the technological progress of the economy, as its growth rate measures the increased efficiency with which capital and labour are combined; it is the main source affecting the long-run rate of potential output growth together with demographic factors.

The International Monetary Fund estimates a strong reduction of the Europe's potential output after the crisis (see Figure 1), which fell to around 1% in 2008-2014 from a level of 2% on average in 2001-2007. The EU Commission estimates instead a drop of 1.3 percentage points in potential output growth in the aftermath of the global financial crisis: it declined from 2.0% on average in 2000-2007 to 0.7% on average over the period 2008-2013 (European Commission, 2009). Even according to the ECB, *“for the period 2008-2013, there is evidence that...the recent crisis has reduced potential output growth, although to a lesser extent than actual output growth”* and *“that euro area countries with larger pre-crisis imbalances may have suffered a larger fall in their potential output growth”* (Anderton, et al., 2014).

¹ According to the ECB, *“Potential output is generally understood to provide an indication of the medium to long-term level of sustainable real output in the economy and its rate of growth. It also referred to as the level of output which can be achieved using available production factors without creating inflationary pressures”*. ECB, Monthly Bulletin, January 2011.

Figure 1. Europe: Potential output growth (percent)



Source: IMF, 2016, “The European and the Strategy, Policy, and Review Departmental paper series”, ISBN 978-1-51356-251-3.

As stated by the European Commission, the reduction in the potential output growth might reveal non temporary and “*potential GDP in the EU could fall to a permanently lower trajectory*”. Many factors might reduce long-run growth prospects in a permanent way:

- first, the protracted level of unemployment, which increased the share of long-term unemployment, could bring to a depreciation of the workforce’s skills and consequently, to a depreciation of human capital;
- second, the structural downsizing of some sectors, such as the financial and construction sectors, that expanded in a non-sustainable way during the boom years;
- third, the reduction and the obsolescence of the stock of capital due to lower investments;
- fourth, a possible negative influence of the crisis on innovation and technological progress, due to the cost-cutting policies adopted in response to the fall in economic activity, which usually sacrifice outlays for research and development.

Independently of the long-lasting effects of the current crisis on potential output growth, with an ageing population and a declining total factor productivity Europe faces serious challenges in increasing its economic performance. The European Central Bank in its Monthly Bulletin of January 2011 considered unlikely that potential output growth in the euro area might return to the pre-crisis level of 2% in the coming decades, unless significant structural reforms aimed at sustaining long-term growth are adopted (European Central Bank, 2011). These reforms would be necessary also to limit or to avoid the longer-

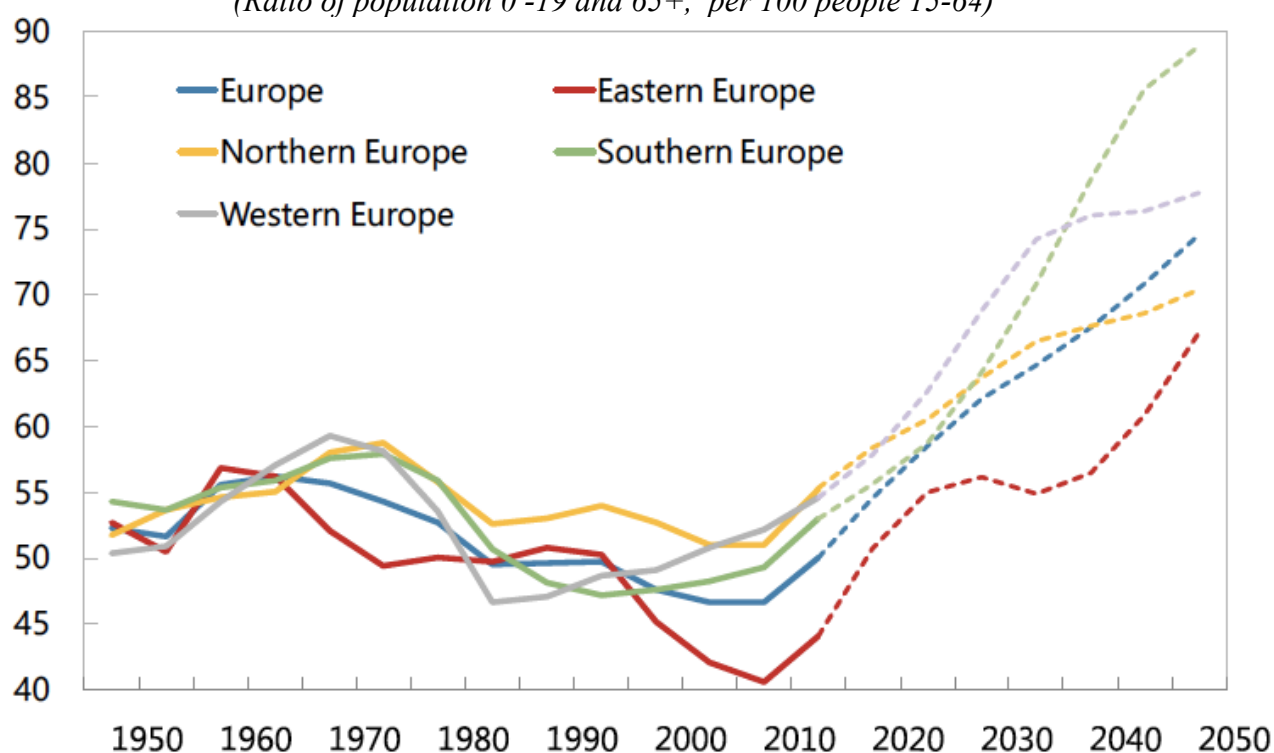
term impact of the crisis on potential output, which will depend very much on the flexibility of the economy in adjusting to shocks.

In addition, in the long run Europe's potential growth will be negatively affected by demographic trends, characterized by an increasing old-age dependency ratio (see Figure 2). A rapidly aging population will not be able to sustain labour supply². Even prior to the financial crisis, the European Commission potential expected output growth to drop from a level of 2% per year to around 1%, due to ageing population. Even these projections now look optimistic in the aftermath of the global financial crisis.

In this context, it is urgent for Europe to search for factors that can provide a boost to trend GDP growth. One such factor is the narrowing of the gender gap still present in labour market (rises in the share of women in the workforce could help mitigate the impact of a shrinking labour force), which could unlock the growth potential of the European economy.

Figure 2. Europe: Old – age dependency ratio

(Ratio of population 0 -19 and 65+, per 100 people 15-64)



Source: IMF, 2016, "The European and the Strategy, Policy, and Review Departmental paper series", ISBN 978-1-51356-251-3.

The IMF estimates that the closing of the gender participation gap, by increasing the number of women in the labour market, would raise the European workforce by 6 percent (International Monetary Fund, 2016). The impact would be higher (15 percent) if also the gap in hours worked were also eliminated. Similar but even stronger conclusions are reached by other international institutions: according to the

² In the long run, the labour force is determined mainly by demographic trends.

Organization for Economic Co-operation and Development (OECD), closing the gender participation gap would raise GDP by 12 percentage points over the next 15 years (OECD 2012).

For the European Union promoting gender equality – a fundamental EU value - is a key target, both for its ethical, social and economic relevance. The European Commission “Strategic engagement for gender equality 2016-2019” maintains the focus of gender-equality policies on five thematic priority areas (European Commission, 2016):

1. increasing female labour-market participation and the equal economic independence of women and men;
2. reducing the gender pay, earnings and pension gaps and thus fighting poverty among women;
3. promoting equality between women and men in decision-making;
4. combating gender-based violence and protecting and supporting victims;
5. promoting gender equality and women’s rights across the world.

Despite progress in recent years, the European Commissioner for Justice, Consumers and Gender Equality stated that *“gender equality still remains an unfinished business. We are far from reaching equality, in particular in areas such as participation in the labour market, economic independence, pay and pensions, equality in leadership positions”*.

2.2 The situation of Gender inequality in Europe.

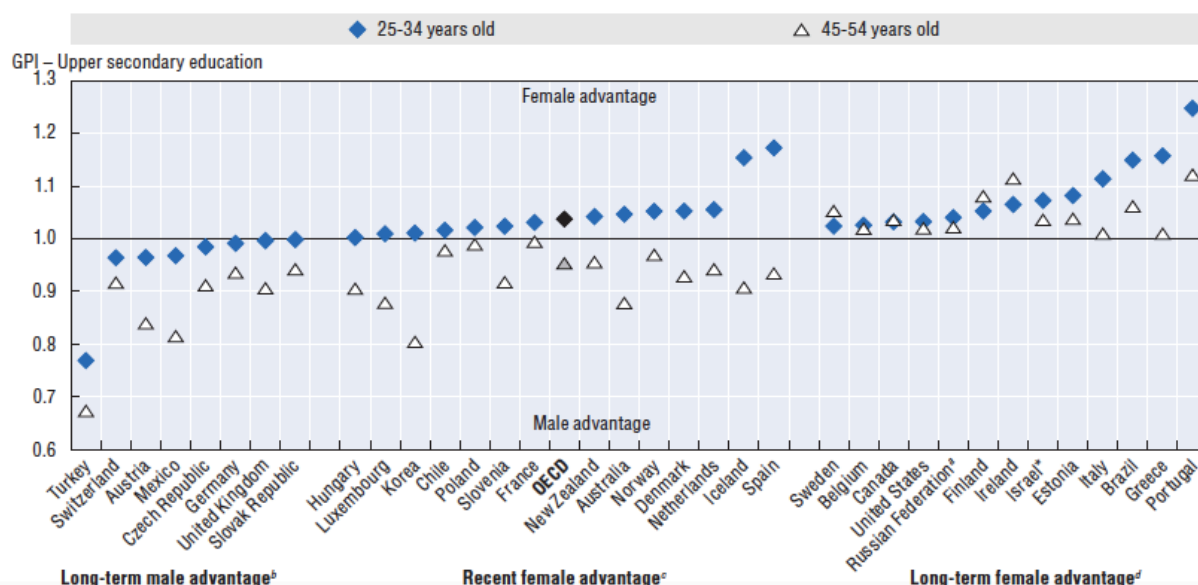
As we have seen, Europe has faced and is still facing some serious challenges. In addition, gender gaps, particularly in labour-market participation and in work remuneration, remain in most countries, although they have narrowed in the last decades. The reduction in these gaps was mostly due to the recognition that greater gender equality could lead to a higher level of social welfare.

In Europe, as in most developed countries, sex discrimination in education is non-existent. On the contrary, generally young women are more likely to complete upper secondary education and perform at least as well as young men. For example, in 2009, the share of women with at least upper secondary education was considerably higher than among men in Greece, Iceland, Italy, Portugal and Spain. Hence, it appears that at least in education, gender equality has been achieved.

Figure 3. Percentage of population with at least upper secondary education

In most OECD countries, young women are more likely to have completed upper secondary education than young men

Gender parity index^a (GPI) for the percentage of population that has attained at least upper secondary education by age, 2009

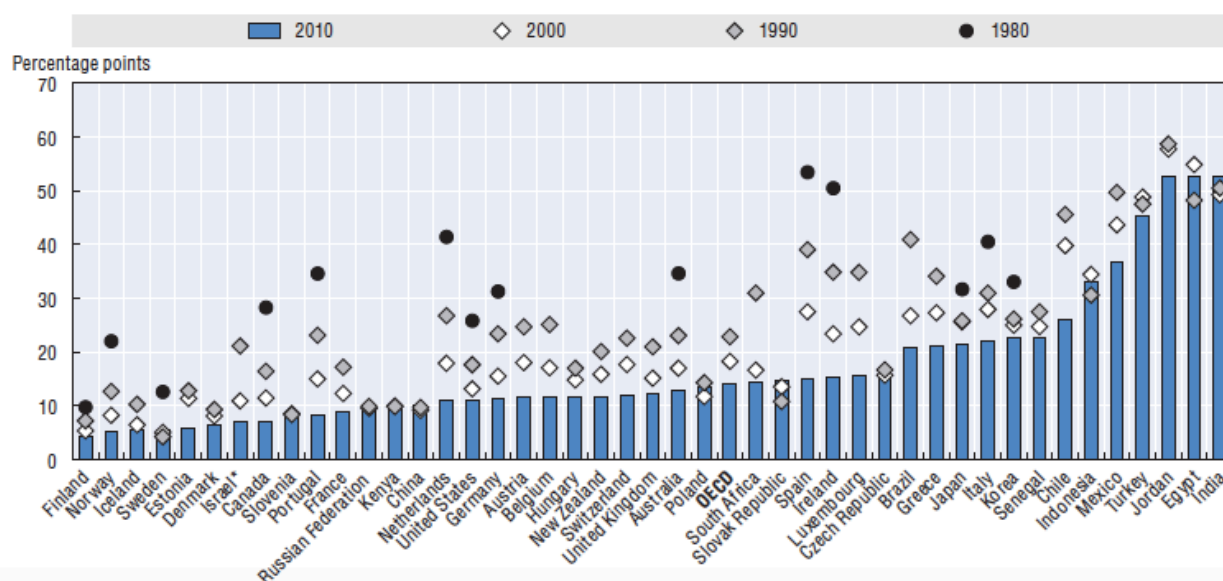


Source: OECD (2011), *Education at a Glance: OECD Indicators*, OECD Publishing, Paris.

Unfortunately, the same cannot be said for gender gaps in the labour market. As a matter of fact, women, relative to men, are less likely to be employed full-time, to occupy higher-paid positions and to progress in their career. Since the eighties, women's labour participation rate has increased substantially, even doubling in countries like the Netherlands, Spain and Ireland. This noticeable increase was probably closely correlated to the gains achieved in female educational attainments. Nowadays, the share of working women in the European Union is one of the highest in the world. However, there are significant differences across countries: for example, southern Europe is lagging considerably behind with respect to the northern countries (see Figure 4). Furthermore, the progress made until now is slowing down markedly and the rate at which gender gaps are closing is much lower than it used to be.

Figure 4. Gender gaps in labour force participation

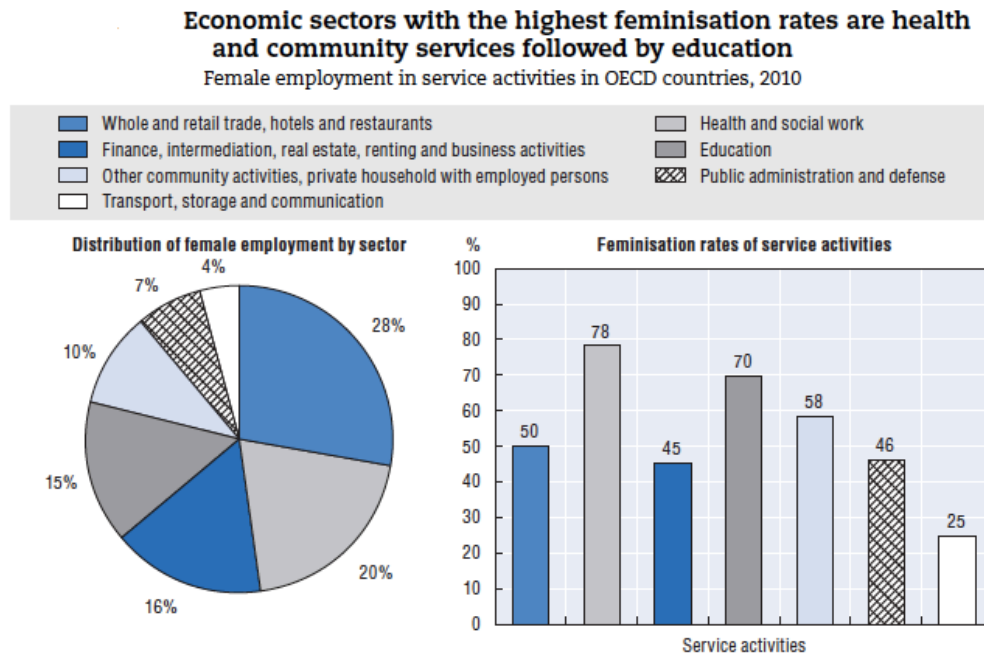
In the OECD, gender gaps in labour force participation vary widely across countries
 Gender gap in labour force participation (male rates minus female rates) in OECD, enhanced engagement countries, and selected developing countries,^a 15-64 years old, 1980-2010



Source: OECD Employment Database 2012 and ILO (2012), “Key Indicators of the Labour Market (KILM)”, 7th Edition, ILO Department of Economic and Labour Market Analysis, Geneva, available at www.kilm.ilo.org.

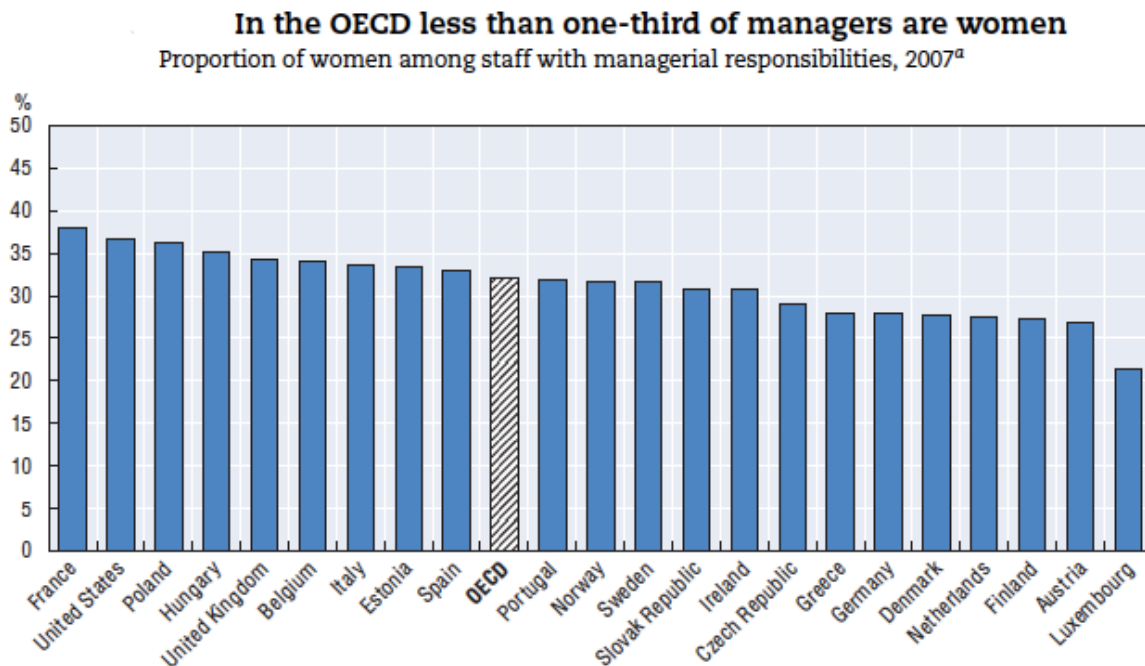
Occupational segregation also continues to be an issue, and no improvement has been made since the turn of the century. As a matter of fact, there is a large concentration of women in a limited set of occupations and fields. For example, there is a strong female presence in the services sector: according to a recent publication by the OECD, “an average of almost one in three women employed in the services sector works in sales, hotels and restaurants; the highest proportions of women are observed in health and community services (78%), followed by education (70%)” (see Figure 5). Female employment in Europe is crowded in fewer occupation than it is for men and since the middle of the 1990s very little progress has been made regarding the horizontal segregation of women. In addition, OECD countries also suffer from the so-called “glass ceiling” or “vertical segregation” issue, meaning that opportunities for career advancement for women are restricted. According to data gathered from these countries, less than one-third of managers are women (see Figure 6). The highest presence of female managers can be found in countries such as France, Poland and the United States (around 35%), while the lowest proportion of women in managerial position is in Luxembourg (21%) (OECD, 2012).

Figure 5. Female employment in service activities



Source: OECD Employment Database 2012, www.oecd.org/employment/database, excluding France, Luxembourg and the United States.

Figure 6. Percentage of women in managerial positions



Source: OECD Family Database 2012.

Another persisting form of gender inequality is the wage gap, i.e. the percentage difference in pay between men and women. Although they have narrowed in the last decades, thanks to legislation ensuring equal pay for equal work, they continue to be an issue. On average, across the European

Union for every euro men get paid, women get paid only 84 cents, which means that currently the unadjusted gender pay gap amounts to 16%. This seems to be the case even when men and women are in the same occupation and possess the same educational attainment (De la Rica, et al., 2008). Furthermore, there is evidence that the gap tends to be higher at the top of the earnings distribution (e.g. females in the top of the distribution earn 21% less than men), confirming the existence of an actual “glass ceiling”, independent of differences in occupation and field choice. Southern Europe is an exception to this phenomenon and reflects the “selection effect”, by which in countries where female labour participation is low, only the most qualified and motivated women gain access to highly paid “men’s jobs” (Olivetti & Petrongolo, 2008).

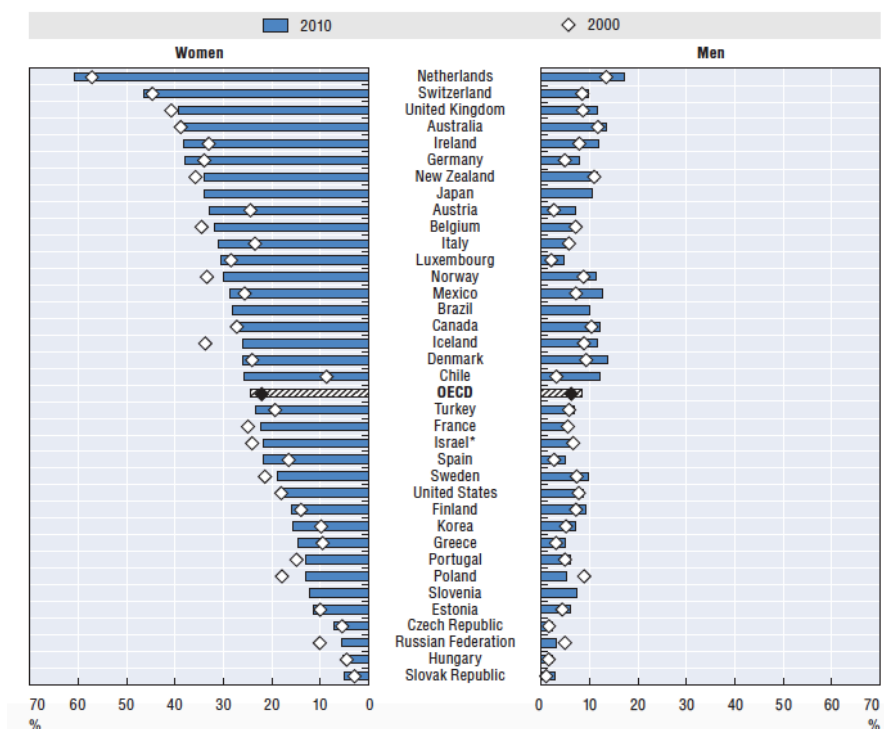
In addition, women are more hindered in their career by age and children relative to men. The difficulties in accessing the labour market, reaching highest positions and earning the same wage as men is mostly due to the inability to reconcile family life with work. In 2010 data gathered from 16 OECD countries highlighted that the pay gap for young women between 25-29 years old was 9%, while the one for women in their fifties (55-59 to be precise) was 24% (OECD, 2012). This increase seems to suggest a “motherhood penalty”, meaning that full-time working women with children earn considerably less than men. To reconcile work with family duties, women often resort to work part-time.

One thing to consider is that the wage gap does not only reflect discrimination, but also different career choices and personal traits between men and women. For example, the differences in hours worked generally accounts for one-third of the wage gap. Also, the choice of occupation or field affects the wage gap and, according to Flabbi and Tejada, are the most significant drivers of the gap (Flabbi & Tejada, 2012), while human capital, age and demographic factors do not seem to explain much of the wage differential.

In most industrialized countries, as briefly mentioned above, “part-time work is a women’s affair”. Part-time work widens remarkably the gender pay gap, which doubles in most OECD countries and even triples in countries such as the Netherlands and Ireland. In the Netherlands, between 1975 and 2010, the participation rate rose from 30% to 70%, mainly thanks to part-time work. Part-time was, and still is, a very popular choice because it allows women, especially those with children, to remain active in the labour force while attending to their family. In some cases, the choice was forced by poor or expensive childcare and out-of-school care. Working in part-time jobs, however, has many disadvantages, such as lower hourly wage, fewer career opportunities and less security, among other things. Even so, eight women out of ten are satisfied to work part-time, because they value leisure time and less stress more than the above-mentioned drawbacks; the remaining two out of ten are forced to work in part-time positions for lack of access to affordable and quality childcare. Hence, it comes

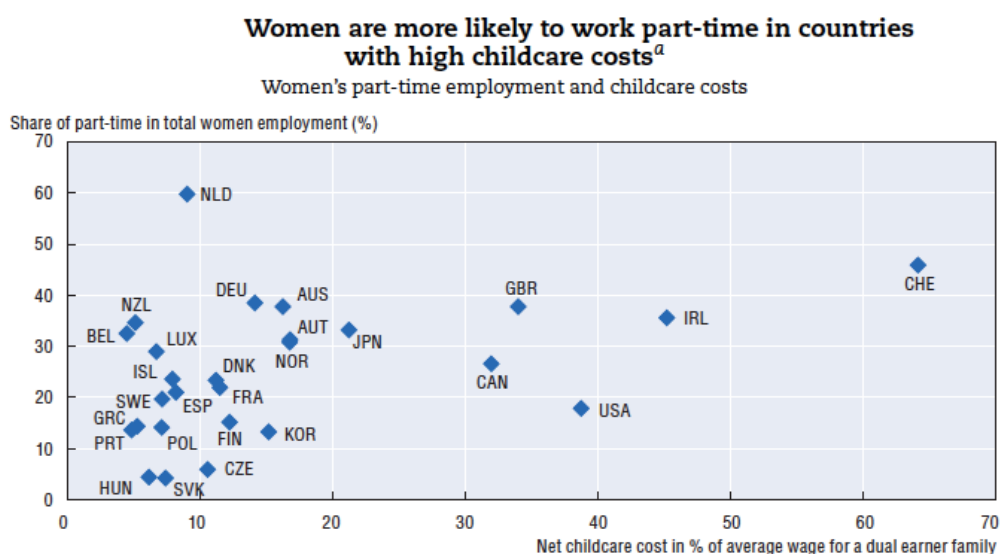
as no surprise that the proportion of women in part-time work is greater in those countries with higher childcare costs (see Figure 8). The combination of more flexible working hours thanks to childcare policies is likely to support an increase in working hours among mothers, thus reinforcing their pension rights while at the same time helping to address the labour force shortages projected in some countries (OECD, 2012).

Figure 7. Percentage of men and women in part-time employment in 2000 and 2010



Source: OECD Employment Database 2012.

Figure 8. Women part-time employment and childcare costs



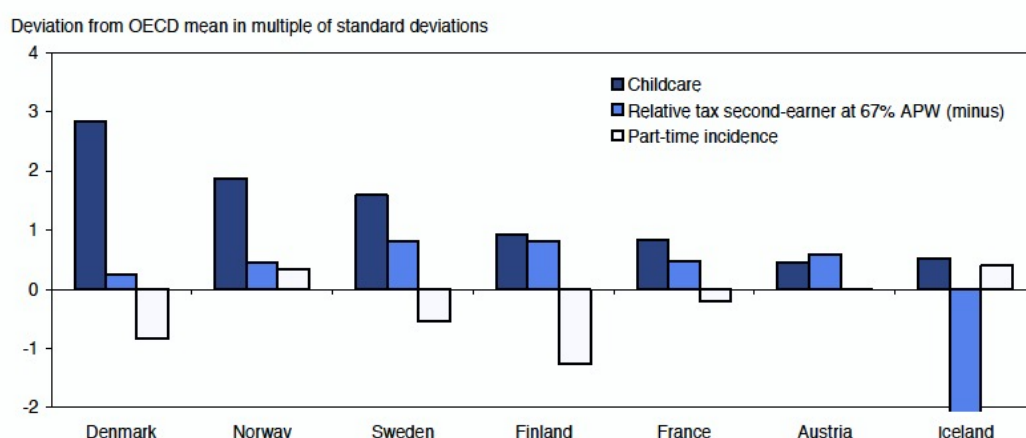
Source: OECD (2011), *Doing Better for Families and Benefits and Wages: OECD Indicators*, OECD Publishing, Paris.

2.3 Policies and drivers of female employment

In this paragraph I'm going to analyse the principal drivers of female employment, which can be gathered in two different groups: policies and structural characteristics.

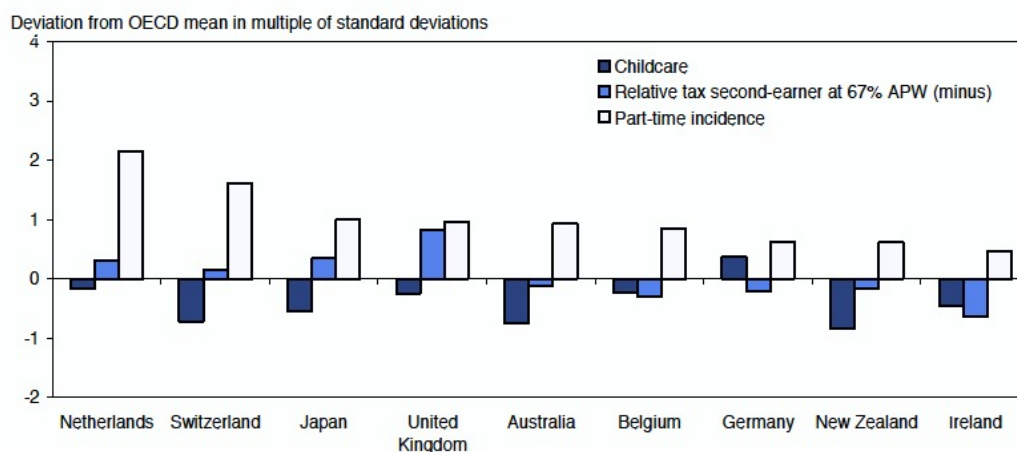
To present how policies affect women's decision to work, I make use of an analysis made in 2003 by Florence Jaumotte of the correlation of different policies, such as tax treatment of second earners or childcare support, with female participation (Jaumotte, 2003).

Figure 9. Nordic countries, France and Austria



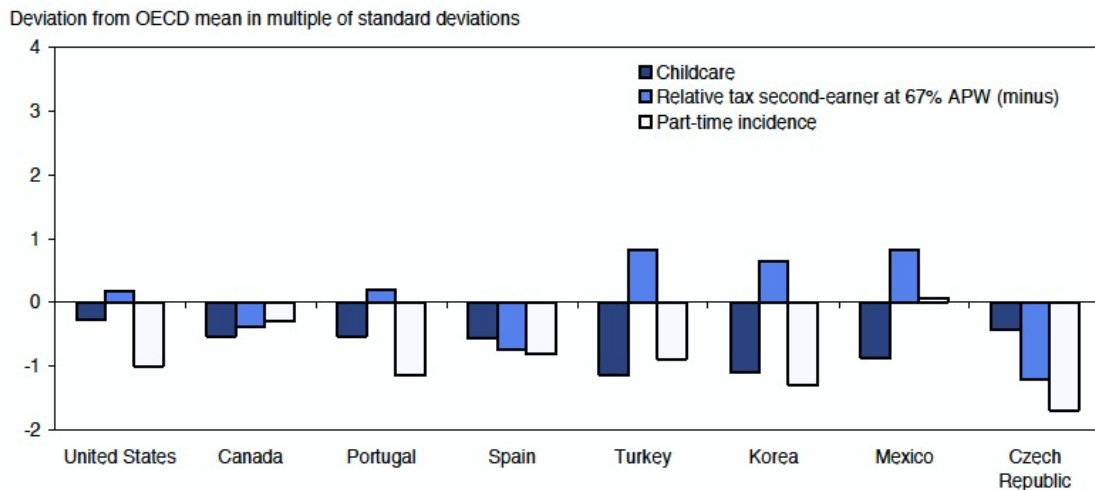
1. The first group includes the Nordic countries, France and Austria and is characterized by a reasonably favourable tax treatment of second earners, high public childcare spending and generally low level of part-time work. These countries provide incentives for full-time employment and the participation rate is around 80%, if not higher, even for prime-age women.

Figure 10. Northern Europe and Pacific countries



2. The second group comprises a few European and Pacific countries. Tax treatment of second earner is close to average, with the exception of the UK, and public childcare spending is quite low. Here part-time employment is more diffused and the participation rates ranges from 60% to 70% depending on the country taken in consideration.

Figure 11. United States, Canada, and lower-income per capita countries



3. The third group is composed by lower-income countries, but also by the US and Canada. In this group public childcare spending is low and the rate of part-time work is also low. Female participation rate varies remarkably from country to country, reaching a maximum of 76-82% in countries such as the US, Canada and Portugal, and a minimum of 60% in countries like Mexico, Spain and Turkey.

Hence, from the evidence reported above and also from a series of other empirical studies is possible to conclude that women's labour supply is quite sensitive to taxation and targeted social spending (Keane, 2011). A more neutral taxation of the second earner reduces the disincentive to work and enhances female participation in the labour market. In an empirical study made by Olivier Thévenon this negative effect on women's employment is significant at the 1 percent interval (Thévenon, 2013). Policies that provide adequate childcare services, particularly for children younger than three-year-old, have an unmistakable positive association with full-time employment, but a negative influence on part-time work, suggesting that women move from part-time to full-time work if affordable quality childcare is provided. On the other hand, child benefits and transfers have an ambiguous effect on employment. Benefits of these types, generally in the form of lump-sum transfers, tend to lower female labour supply, according to some (Jaumotte, 2003), or foster it, according to others (Dao, et al., 2014). Parental leave is a major element in influencing the participation rate of women, because

it helps women in reconciling family life and work. However, if the paid leave exceeds a certain amount of time, 20 weeks approximately (Jaumotte, 2003), the effect is likely to become negative. Finally, part-time work also helps boosting female participation rate, although preferences for part-time employment change across countries.

However, not only policies affect women's labour force participation rate, but also a number of other factors, which mainly relates to structural characteristics, namely:

- Structure of the economy. The demand for female employment obviously contributes to a higher presence of women in the work force. For example, the growth of the services sector, in which the share of women is highest with respect to all others, has remarkably increased the participation rate. In 2008, the expansion of the tertiary sector has relied particularly on part-time workers, which helped foster participation of women in the labour market. In addition, economic conditions as well as economic development seem to affect particularly young women between 15-24: as a matter of fact, young women's participation is notably higher when the unemployment rate is low. High unemployment rates also discourage prime age women to enter the labour market.
- Education. The increase in school attainment in the last decades significantly contributed to the increase in women's participation rate and employment. According to an empirical paper of Eckstein and Lifshitz, the level of schooling explains 33 percent of the increase in female employment experienced in the United States between 1964 and 2007. In Europe as well female employment greatly depends on the educational level. Better educated women face a far higher chance of being employed. Even in the Mediterranean countries, which generally experience a greater gender employment gap, women with higher education have an employment rate close to 70 percent. Portugal actually reaches an employment rate of 90 percent for highly educated women. In 2005, women between 35-55 represented 52.1 percent of the population with a higher educational attainment, and women between 25-34 represented 54.1 percent. Therefore, a decade ago, there were already signs of significant educational achievement for women, which helps in reducing the gender gap in the workforce (Eckstein & Lifshitz, 2011).

However, it is important to remember that staying in the education system to graduate from high school and college has a negative influence on the participation of young women between the age 15-24. The decision to continue studying can either be explained by the higher probability of better job opportunities in the future (as we have previously seen) or by the fear of being unemployed. Some other thinks that young women prefer to stay in school

because of government subsidies or grants in education, which are more substantial in Europe than in the United States (Genre, et al., 2005).

- **Demographics.** The marital status and the number of children greatly influence a woman's decision to work, but where married women have experience a remarkable increase in labour participation, the number of children still affects negatively female employment. The gender gap widens significantly for women with children. This is because taking care of children is still seen as a women's responsibility, which explains why female employment declines when there are children in the household, while on the contrary males' job opportunities increase. Evidence of this phenomenon is consistent throughout all European countries: in Nordic countries, the gender gap widens from 3.3 to 14.4 percent, while in Mediterranean ones, from 17.8 to 48 percent (Pissarides, et al., 2005).
- **Availability of part-time work.** Another important driver of female participation is the opportunity to be employed on a part-time basis, allowing mothers to remain in the labour force while taking care of their children. Evidence of this connection can be found in the empirical data gathered across Europe. Since the 1980s, part-time jobs are responsible for around 12 percent of the increase in prime age participation in Ireland, and for around 30 percent in the Netherlands. Part-time work is also beneficial for young women, who have difficulties in finding a full-time job, and it has also contributed substantially to lessen the decline in female participation in that age category in the last decades (Genre, et al., 2005).
- **Social norms and attitudes.** Such characteristics always had an impact on female employment and participation rates and to this day this influence remains. Beliefs about the negative impact on the welfare of the family, and especially of children, of the choice of women of working rather than being a stay-at-home mom do not play a minor role in explaining the gender gap in employment. The traditional views identify the woman as the homemaker and caretaker, while the man plays the role of the breadwinner. More modern views believe that both men and women should provide for the family's income and men should take more care of their children relative to past times. The shift in beliefs was mostly due to increase in labour force participation: at first only single and divorced mothers entered the labour market, having no other alternative, but then it became more common even for married women. Although most people in developed countries now have a more egalitarian view of gender roles, many still think that women should spend less time in the labour market and more time at home when there are children involved. It is no surprise that differences in gender roles attitudes have an impact on women's labour market outcomes. Different studies found that female participation is positively related to egalitarian views of gender roles (Bolzendahl &

Myers, 2004) (Chuang & Lee, 2003). A previous study, made in 1986, found that wives' education, employment status and income, as well as husbands' education, were positively associated with both wives' and husbands' support for non-traditional gender role beliefs, but the presence of children was negatively correlated to it (Schaninger & Buss, 1986). Furthermore, women in the labour force also encourage other women to change their attitudes to a more egalitarian standard (Cassidy & Warren, 1996). The positive effect on breaking gender stereotypes of exposure to working women or women in top positions is also confirmed by a more recent strand of literature (De Paola, et al., 2010) (Bonomi, et al., 2013).

- Wage gap. Earnings gaps also influence the participation rate of women because if the gap is large enough it can function as a disincentive to enter the labour market.

After this analysis of the main Europe's economic challenges and the gender inequalities still present, the next section is going to present the literature on the relationship between GDP growth and gender inequality.

3. A review of the economic literature.

3.1 Overview

Gender discrimination is defined by The Convention of the Elimination of All Forms of Discrimination Against Women (CEDAW) as “any distinction, exclusion or restriction made on the basis of sex [...] in the political, economic, social, cultural, civil or any other field”. Hence, lack of discrimination, seen as equal status between men and women, is multidimensional. Different gender equality indexes exist, but the most frequently used are the Gender-related Development Index (GDI) and the Global Gender Gap Index (GGG). The former is based on (i) life expectancy at birth, (ii) literacy and completed school education and (iii) earned income, while the latter measures differences between the sexes on the basis of (i) economic activity and pay, (ii) literacy and level of education, (iii) health and survival and (iv) political activity.

The literature presented here principally focuses on three facets or measures of gender inequality:

1. **Education**, as a fundamental factor governing labour market equality.
2. **Employment**, from which gender inequality stems either in the form of segregation or barriers to entry.
3. **Pay differentials** between men and women.

There is now substantial evidence of the negative effects of gender inequality on economic growth. Lately in particular, the economic case for gender equality and female empowerment has become a topic at the centre of attention. Gender issues may have not been as directly visible in the past as some other issues affecting growth, since a substantial portion of the economic contribution of women, the so-called unpaid work, is not included in national income aggregates (Blackden, et al., 2007). As a matter of fact, most of the unpaid work concerning the domestic environment is carried out by women. Therefore, the economic contribution of women to wellbeing is understated in conventional national income.

Its relevance nowadays is such that gender equality is one of the Millennium Development Goals, an agenda created by United Nations to foster sustainable development, and a top priority in most OECD countries. Therefore, apart from its high intrinsic value and its importance for well-being, the rationales for this specific goal are economical in nature, as proved by the by mounting empirical evidence of the costs of gender inequality for development (see e.g., World Bank 2001).

In this section, a summary of the literature is presented and a few of the most influential studies on the topic will be discussed. The main channels, direct and indirect, through which gender discrimination in human resources is likely to affect growth, were identified in the research made by

Klasen in 2002. The primary channel works directly through labour markets: as long as women's ability is not exploited to the same extent as men, a distortion in the market will arise, leading to lower human capital and average productivity (the "selection-distortion" effect).

A second channel includes all the positive externalities produced by greater gender equality on household decisions relating to human capital determinants of growth. Greater access of women to education and labour market translates into improvements in the productivity of the next generation of workers because of larger investment in human capital of children. Higher levels of education and labour participation also cause a decline in fertility, which in turns reduces the dependency rate in the economy and increases savings. Several of these effects are possible thanks to a greater bargaining power correlated with women's education and employment.

Conversely, some authors have showed that gender inequalities can sometimes contribute positively to growth. As a matter of fact, developing countries which are more export-oriented might benefit from gender discrimination in wages: if cheap, but productive, female labour can increase their price competitiveness by lowering labour cost and attracting investments (Seguino, 2000b).

3.2 Gender gaps in education

The primary focus of most literature is how gender discrimination in education, which might also implicitly measure the impact of gender gaps in wages and employment, affects economic growth. Furthermore, its effects on growth, are more widely discussed relative to discrimination in wage or employment both empirically and theoretically. The studies made until now quite unanimously agree that gender inequality in education discourages economic growth. The literature on the topic unmistakably points out that human capital is one of the most important determinant of the growth prospects of an economy (Klasen, 2002) (Knowles, et al., 2002): in an economy where the preference is not to educate girls, a distortion that prevents the efficient accumulation of capital is created, resulting in lower returns to investment and growth. Sure enough, if girls are likely to be discriminated in the labour market, through either lesser salaries or barriers to entry, parents may decide not to invest in girls' education simply because it is not profitable for them to do so.

Initially, a study made by Robert Barro and John-Wha Lee in 1994 yielded contradicting results. Using a panel data covering the period for 1965-1975 and 1975-1985 for 138 countries, they found that gender equality in education discouraged economic growth and that the coefficient on female education was negative, whereas the coefficient for male education was positive. However, they interpreted this result as a reflection of a large gap in schooling between males and females, which consecutively was viewed as a sign of backwardness and greater potential for improvement. Later

findings by Barro and Sala-i-Martin and Perotti seemed to support the negative association between female education and growth (Barro & Sala-i-Martin, 1995) (Perotti, 1996).

These early studies were then challenged on methodological grounds: some claimed that their findings were biased due to omitted dummy variables, since including regional dummies eliminated the negative coefficient (Dollar & Gatti, 1999); others suggested a problem of multicollinearity, as female and male schooling are closely correlated (Klasen, 2002). Later research confirmed that, not only discriminating young girls in education has a negative impact on growth but also that, girls tend to have higher marginal returns to education with respect to their male counterparts (World Bank, 2001) (Knowles, et al., 2002). As a matter of fact, according to a study made in 1999 by Dollar and Gatti, inequality in education has a direct impact on growth through a reduction of the average amount of human capital available, by restricting the pool of talents which will be available in the labour force. Moreover, female educational levels have a positive and significant effect on output per capita, while gender inequality has a negative impact. Their results similarly suggested that a better access to education by females is more relevant for the growth of middle-income countries. The authors though admitted one limitation concerning their analysis: the possibility of reverse causality. While they presented evidence for how gender equality could benefit growth, they also found strong and consistent evidence that increases in per capita income lead to improvements in different measures of gender inequality. Hence, the direction of causality was uncertain; however, they claimed that the direction of causality for countries with a low income runs from growth to gender inequality and only when a certain stage of development is reached, gender inequalities start to have an impact on growth. Klasen, another influential author in the literature, quantified the impact of inequality in education on growth. As the previous study suggested, more equal opportunities in education has a positive significant impact on growth, but, in contrast to Dollar and Gatti's theory, this positive impact worked in both developed and developing countries. His model also showed that part of the impact of female education on growth could have also operated through its impact on fertility rates. Furthermore, controlling for potential simultaneity bias, the direction of causality seemed to run more from gender inequality to economic growth rather than the opposite, even in lower income countries. These findings were later updated and confirmed by Klasen and Lamanna.

Esteve-Volart, in another study, estimated the effect of the ratio of female-to-male primary enrolment rates, using data from 87 countries for the period 1965-1989, and found that both an increase in overall education and a reduction of gender inequalities stimulated growth. On the other hand, male education only favoured an increase in growth if accompanied by an equivalent increase in female education. Contrary to Klasen's findings but consistent with those of Dollar and Gatti, she discovered a weak quadratic relation between gender equality and growth. Sure enough, she established that "increases

in income lead to less education inequality, that these reductions in inequality are more important as countries get richer, and that this in turn, leads to larger increases in income” (Esteve-Volart, 2000). An alternative strand of literature focuses on the indirect benefits and positive externalities associated with gender equality and their impact on growth. One of the instrumental effects, seems to be a reduction in fertility, caused by a higher level of equality, which in turn means higher GDP per capita. Sure enough, Bloom and Williamson showed that reducing gender educational gaps may lead, with some lag, to the so-called “demographic gift”, a demographically favourable transition in which the working age population is high, with respect to the declining young and elderly people. This demographic gift should also lead to higher savings and investment rates, which will increase per capita GDP (Bloom & Williamson, 1998).

In addition, other significant externalities of female education are:

- the promotion of education of the next generation, since educated mothers tend to care more about the education of their daughters, as suggested by a study made by Schultz;
- the decline in child mortality and undernutrition.

Discrimination in education is more commonly associated with developing countries than with industrialized ones. As a matter of fact, in most developed countries, there are no gender barriers in education and balance between the gender is reached. Indeed, gender gaps in education have been declining more or less everywhere: in primary education they have been largely closed even in the least developed countries; in secondary education, the ratio of female to male enrollment averages 97 percent and now is more likely for women with respect to men to be enrolled in higher education. However, literacy rates are still higher for men than for women, particularly in South Asia and East and North Africa regions (Elborgh-Woytek, et al., 2013).

3.3 Gender gaps in employment

The considerably smaller literature around sex discrimination in employment is more diverse and it often presents different approaches and different conclusions. There are fewer studies on the impact of gender inequality in labour market on economic growth and less consistency. As in education, the most compelling argument is that inequality in labour participation harms the economy, reducing the availability of talent in it. Berta Esteve-Volart, in 2004, analysed three possible scenarios of gender discrimination in the labour market: one without discrimination, another with exclusion of females from managerial positions, and the last one with a complete exclusion of females from the market. It appears that partial discrimination, the second scenario analysed, contributes to lower wages for both female and male workers and, moreover, reduces investment in human capital by workers (females

and males). The average talent of managers is smaller too, which leads to a decrease in innovation and productivity in the economy. With complete discrimination, on the other hand, equilibrium wage rate, average talent and productivity are the same as with no discrimination. This type of inequality though, is inefficient as it lowers per capita GDP and economic growth since females decide not to invest in human capital at all. Her conclusions are supported by empirical results, gathered from India for the period 1961-1991, which showed that an increase of 10 percent in the female-to-male ratio of managers or in the female-to-male ratio of total workers would respectively rise per capital total output by 2 and 8 percent. Furthermore, she discovered that while lower ratios of female-to-male workers significantly discouraged total output, the female-to-male ratio among managers was not particularly relevant for the agricultural sector. Hence, equality in labour force participation is significant in all sectors, meanwhile misallocation of managerial talent is only significant outside the agricultural sector (Esteve-Volart, 2004).

A different approach was followed by Åsa Löfström who focused her analysis on the potential gains for the European Union in terms of increased GDP if gender equality was achieved through an equal participation and productivity rate between men and women for all member states. This would imply three changes in each country:

1. Women's activity rate catches up with the one of men.
2. The number of hours worked in part-time jobs by female decreases until it reaches the same amount of those worked by men.
3. Women's and men's productivity, measured in current wages, becomes equal.

The magnitude of the potential economic gains found is remarkable: the increase in GDP for the European Union would be of approximately 30 percent and member states could boost their GDP by between 14 and 45 percent. In most countries, the most significant effect on growth is achieving an equal participation rate between men and women. For example, countries as Malta, Italy and Spain, are the ones that could gain the most in terms of output from a higher activity rate among women, while the Nordic countries along with Germany, Ireland the Netherlands and the UK would benefit more by longer working time. The effect of achieving the same productivity level between men and women on growth is more diverse depending on the country: it seems that in those countries which would benefit most from less part-time work, this effect is more pronounced, while in some other countries like France and Austria, is the most significant between all three. Since the possible economic gains are sizable, Löfström emphasized the need for gender equality policy actions in order to reap the benefits previously mentioned (Löfström, 2009).

A second solid argument suggests that gender inequality in employment may reduce growth through demographic effects. In 1996, a very influential article by Galor and Weil found a link between

inequality and growth through the fertility channel: reducing gender gaps raises women's relative wage, thereby increasing the cost of having children (Galor & Weil, 1996). Another model by Cavalcanti and Tavares in 2007 found that the number of children increases along with gender discrimination in the form of barriers to female labour force participation, since women tend to spend more time in home activities. Therefore, greater fertility is associated with a greater amount of time spent at home instead that in the labour market and, indirectly, to lower economic growth (Cavalcanti & Tavares, 2015). A different finding was instead reached in the same year by Kevin Daly, who found a positive correlation between fertility and high female employment. He found that *“faced with punitive tax rates and expensive childcare, women in many countries effectively have the choice of either working or having children. [...] Faced with such a choice, fertility and employment rates both suffer. By contrast, in the countries where it is relatively easy to work and have children, female employment and fertility both tend to be higher.”* This phenomenon is particularly evident in countries like Italy and Japan, where the problem of ageing and pension sustainability is most severe, and it causes female employment to be at its lowest point. On the other hand, in those countries where policies, such as equal tax treatment and subsidised childcare, facilitate the reconciliation between the two, female employment and fertility rate both tend to be higher. Thus, closing the employment gap between men and women would help to improve the problem of pension sustainability: directly, by boosting female employment and thereby reducing the retiree-to-employee dependency ratio, and, indirectly, by raising fertility rates. Increasing female employment rates has already been an important driver of growth in Europe, encouraging more women to access the labour market through policy action would further boost the Eurozone GDP by 13%. Similar results can be reached also in the United States and in Japan, with an increase in GDP of 9% and 16% respectively (Daly, 2007).

Another strand of literature focuses on the positive externalities related to women's employment. These externalities are generally associated with family relations. For example, increasing women's bargaining power within the family translates into a larger share of resources being devoted to children's human capital. As a matter of fact, additional resources in the hands of women are more devoted toward the next generation, in the form of education, health, and nutrition, compared to men. Inequalities within the family directly influence women's welfare, as they weaken women's bargaining power in the household. As long as the gender division of labour in the family means that women undertake household work at the expense of income-generating activities, their bargaining power and decision-making capacity in the home are limited. Thus, distribution of resources within a household matters and policies that alter it, shift the balance of power between household members, affecting both gender equality and family welfare.

Greater bargaining power has also growth-enhancing effects, which have been studied by a stream of

literature that focuses on how gender-based differences in behaviour may impact key macroeconomic outcomes. Household composition can influence many economic variables of choice to the household, such as consumption, savings, investment, risk-taking behaviour and labour supply. Hence, gender-based differences in behaviour and household composition may emerge at the macroeconomic level, if they influence behaviour in a systematic and pervasive manner. Women's consumption behaviour, briefly discussed above, contributes more to the human capital of their children. Regarding savings within the family, there also seem to be gender-based differences, although saving behaviour differs markedly according to economic and social environments facing men and women. In developing countries, it appears that women generally tend to have a higher propensity to save and invest productively, for several reasons, including a longer life expectancy relative to men. Furthermore, differential access to financial markets and financial instruments can play a part in gender-based differences too. As long as women face greater constraints in participating in formal financial markets, there are ambiguous effects on saving since they tend to save outside the formal markets (Stotsky, 2006). Nevertheless, Seguino and Floro, in 2003, found that raising women's share employment by one percentage increase aggregate saving by roughly a quarter percentage point (Seguino & Floro, 2003). Another interesting difference is that women exhibit more risk aversion than single men in their investments. The effects of such conduct on the aggregate investment in developing countries are limited by the lack of good data available. Empirical work taking account all these gender-based differences in consumption, saving, investment behaviour as well as attitude toward risk, are few but the evidence suggests that, at least in developing countries, increasing women's wage share increases the savings rate (Stotsky, 2006).

Furthermore, greater gender equality also seems to be associated with better governance: where the influence of women in public life is greater, the level of corruption is lower. It appears that women tend to be less prone to corruption through bribes and nepotism. A study made in the Republic of Georgia showed that firms owned or managed by men are 10% more likely to make unofficial payments to government officials, a result which seems to be independent of the firm's characteristics, its size, the sector it operates in and the characteristics of the owner or manager. Without controlling for these elements, the result is even larger, with men twice as likely to pay bribes. Hence, having more women in the labour force and in politics seem to be beneficial for the society also from this point of view (World Bank, 2001).

A final argument is that representation of women in corporate boards appear to have a positive impact on corporate performance, which in turn stimulate growth. The literature on the topic is large but the consequence of gender diversity in the boardroom are not clear. A study made in 2007, "Women Matter" by McKinsey & Company suggests that companies in which women occupy positions in the

board or the top-management fares better than those who don't. From the analysis of 101 private and public companies and the answers of 58,240 people surveyed across Europe, America and Asia, it appears that firm's organizational excellence is positively correlated with women's participation in management bodies. The performance though, increase significantly only when a certain threshold is reached (three women out of ten members of a committee), otherwise the effect is irrelevant (McKinsey & Company, 2007). Other studies find similar positive effects on financial performance among U.S. firms, through a panel data, (Dezso & Ross, 2012), or among public firms in a cross-country study (Terjesen, et al., 2015). The main problems with these analyses is reverse causality: it's not clear whether women's participation in decision-making bodies improves corporate performance or better performing firms attract more women. Studies made to address this problem present different conclusion on the impact of women's representation in top-management positions. Although an analysis worth mentioning is the one presented by Christiansen et al., which differs from others for its focus on more than two million companies across 34 European countries. The larger sample allows to make a more accurate estimate of the association between women in corporate positions and corporate performance. There seem to be a strong positive association between the share of women in senior positions and firms' returns on assets: one more female in senior management, keeping the same board size, is correlated with an increase in ROA of 8 to 13 basis point. These results are robust to various alternative specifications and highlight that gender diversity is better for financial performance in two different types of sectors: the ones that employ significantly more women in the labour force and high-tech or knowledge intensive sector. While it's still problematic to identify the causal effect of gender diversity due to the cross-sectional nature of the data, the mechanisms through which greater female presence at the top might improve firms' performance are clearly presented in this study (Christiansen, et al., 2016).

3.4 Gender gaps in wages

A recent cluster of studies focused on whether gender differential in wages contributes or inhibits economic growth. The literature on gender wage gaps started more or less in 1957, when Becker emphasized that there were no differences in productivity between males and females, hence the only explanation for wage differentials between them was discrimination (Becker, 1957). Although his analysis was not very accurate and ignored some important points, it represented the starting point for all the successive studies.

With no discrimination, the differential in pay can be attributed to: job or individual characteristics, labour market histories, different patterns of human capital accumulation and career interruptions due to childbirth and care. Gender pay gaps generally refer only to "*differences between the wages earned*

by women and by men that are not explained by different patterns of human capital accumulation and depreciation or by differences in individual and job characteristics (occupation, sector, industry, firm, workplace and job characteristics)” (European Commission, 2009). In other words, the difference in pay which is unexplained is generally believed to be the result of gender discrimination by employers.

In European countries, as well as in most developed countries, only a relatively small fraction of the wage differentials is due to discrimination. Generally, the most meaningful reason for women's lower salaries is the segregation of the job market. As a matter of fact, women tend to be crowded in those occupations where salaries are lower, such as jobs in the service sector or healthcare.

The literature concerning gender discrimination in pay is divided:

- a strand of literature argues that high gender pay gaps and low female wages increase the competitiveness of export-oriented industrializing economies, thus, boosting growth.
- another stream of literature, more focused on developed countries, is less consistent on whether pay gaps are actually a form of discrimination or simply a result of different choices and preferences; hence the impact on growth is unclear.

The main supporters of the first theory are Stephanie Seguino and Robert Blecker. The former used 1975-1995 data for 20 semi-industrialized to explore this idea and found that male and female education as well as gender wage gap in manufacturing positively affected growth. This positive relationship held both across countries and over different time periods (Seguino, 2000a). In the same year, she focused, using the same methodology, on nine Asian economies, confirming that countries with greater gender wage inequalities grew more rapidly with respect to others, thanks to the positive impact of these gaps on profits and investments (Seguino, 2000b). As a matter of fact, trade companies make heavy use of female labour, which is seen as a potential driver of growth: if the low wages of female workers are also accompanied by high human capital potential, industries would prefer to use female labour increasingly. This was particularly the case in the Asian countries where female education was rapidly improving, advancing employment and fostering the development of female intensive industries.

Blecker and Seguino two years later confirmed the existence of large gender gaps in earnings but small gaps in education in the East Asia region, and claimed that such differential between productivity and remuneration was one of the major causes in the region's rapid growth in context of export-oriented industrialisation. Given women's relatively high levels of educational achievements, the gender gap in wages could not be explained away in terms of low productivity of female labour, but was mostly the reflection of discriminatory attitudes and practices. Running a regression for more

than thirty semi-industrial economies, they found a positive convex relationship between gender wage gaps and growth for all countries, except the Asian tigers, for which the coefficient on the quadratic form was negative. Thus, the study showed that wage inequality could promote growth by reducing production costs and supporting exports in a positive convex relationship. This effect however, only seemed to operate in the early stages of an export-led growth strategy. Furthermore, as markets developed and as countries became more skilled in export manufacturing, the level of wage inequality decreased: higher wage inequality could become more and more detrimental to growth (Blecker & Seguino, 2002).

A contrary view suggests that income inequality, which comprises gender inequality, hinders growth by producing social conflict. For example, higher differences in wages between men and women may discourage women from entering in the labour market, with consequence on their fertility decisions. With lower wages, the opportunity cost of having children decreases, leading women to have a greater number of children. This lead to an increase in population growth and a reduction in capital per worker and economic growth (Cuberes & Teignier-Baqué, 2011).

A paper by Joanna Wolszczak-Derlacz studies the impact of gender pay gap on productivity growth in 18 OECD countries at the sectoral level. The analysis covers 34 different industries, of which 14 are manufacturing, in a span of time between 1970 and 2005 through a production function where skill-specific gender wage gap could be a possible determinant of detrimental growth. The evidence suggests a negative relationship between gender wage gap and sectoral growth: other things being equal, the higher the differential in female and male wages, the slower is the rate of productivity growth. These results seem to be robust across different specifications and variations, such as the use of a different measure of human capital, the country composition in our analysis, industry heterogeneity and estimation techniques (Wolszczak-Derlacz, 2013). Cavalcanti and Tavares also developed a model in which they estimated the cost of gender discrimination, which in their model drove a wedge between women's labour productivity and female wages. They found that gender discrimination reduced output per capita in two ways: by discouraging women's entrance to the labour market and by increasing fertility and hence population in the steady state. Quantitatively, they found that the impact of reduced labour force participation on growth was slightly more relevant opposed to the effect of increased fertility. Furthermore, from a sample of 118 developing and developed countries, they discovered that a large portion of country differences in output per capita could be explained through gender inequality. They concluded that many countries could improve their economic performance by making a better use of the female workforce and by improving women's access to the labour market (Cavalcanti & Tavares, 2015).

3.5 Summing up

The studies made until now highlight the importance of both direct and indirect channels through which gender inequality affects economic growth. Direct effects mostly relate to human capital, as gender equality can contribute to growth by expanding the stock of human capital and raising labour productivity. On the other hand, indirect effects usually revolve around positive externalities generated by greater gender equality, such as fertility, mortality or even improved corporate financial performance.

The importance on focusing on both types of impacts is stressed by Appiah and McMahon, who proved that taking into account only direct effects would mean to severely underestimate the influence of gender equality on growth. According to them, indirect effects seems to carry more weight in developing countries, while in developed ones, direct effects are more significant (Appiah & McMahon, 2002).

In the studies reported here, multiple measures of gender inequality were used, but the more reliable results appear to be related to the positive impact of female education. Indeed, findings related to education are robust in a variety of econometric specifications, data and time periods. Convincing but less robust evidence is found in the influence that women's employment rate has on growth. Nevertheless, it appears that a larger share of women employed is more significant to growth than women's presence in managerial positions. On the other hand, the literature on gender wage gap is far more divided, since it is difficult to quantify the discriminatory fraction of wage differentials that is not associated to differences in productivity, ability or preference. Furthermore, findings seem to differ on the basis of the choice of countries analysed. Unfortunately, the scarceness of qualitative and internationally comparable data make it more difficult to draw more accurate conclusions.

It is important to also point out that is difficult to separate the effects between gender gap in education, employment and remuneration, as gender gaps in one aspect are most likely to lead to gender gaps in another aspect. For example, inequality between sexes in education or even in wages is most likely to result in increased gender gaps in employment, by discouraging women's access in the labour market. However, their effects on growth and their magnitude vary according to the measure of inequality chosen, thus is important to not confuse them.

One of the biggest concern common to most studies in the literature is reverse causality: in some of the empirical studies the direction of causality is unclear, with economic growth leading to greater gender equality and gender equality in turn contributing to economic growth. For example, reductions in gender gaps are believed to be correlated with industrialization, as the process of economic growth is expected to undercut discrimination, since discrimination causes additional costs for those agents pursuing it (Forsynthe, et al., 2000). Other authors, such as Boserup, believe that in the initial stages

of economic growth the gaps are more pronounced and improvements begin only when a certain threshold is reached (Boserup, 1970). On the other hand, the conclusions of *Gender and Development*, a journal which focuses on international gender and development issues, suggest that development alone is not enough to make progress in gender equality and should be supported by policy action (Cuberes & Teignier-Baqué, 2011).

It is easy to see why these findings may undermine the argument that gender equality fosters economic growth. However, based on fairly robust evidence, causality seems to be stronger in one direction: greater gender equality, particularly in education and employment, contributes to economic growth and not the other way around. Also, numerous studies address this problem through the use of instrumental variables, by generally incorporating the initial values of the endogenous variables and other socioeconomic indicators. It is unlikely that this technique fully eliminates the issue but it certainly helps providing more reliable results.

4. Empirical model

In this section, I present an econometric model based on a panel data for 21 developed countries for the period 1960-2007. The sample period is set on the basis of data availability and accuracy for the countries selected; the sample period is not split into sub-samples, as this study is interested in capturing the long-run effects of gender gap inequalities and not in detecting whether its importance changes through time. The different hypotheses to be tested here are the following:

- i. the gender gap in the labour force reduces the human capital available in an economy and hinder long-run growth;
- ii. the gender gap in employment limits the labour input available for economic activities;
- iii. the wage gap discourages entrance in the labour market and provides disincentives to women, regardless of whether they are employed or unemployed, affecting negatively growth.

Table 1. Descriptive statistics

<i>Country</i>	<i>Labour Force gap</i>	<i>Employment gap</i>	<i>Wage gap</i>
Australia	0.1705	0.1608	17.0522
Austria	0.1240	0.1203	22.4403
Belgium	0.1282	0.1265	12.4721
Canada	0.0820	0.0726	23.1068
Denmark	0.0863	0.0889	/
Finland	0.0788	0.0693	22.5783
France	0.0923	0.0948	14.7543
Germany	0.1431	0.1348	20.7212
Greece	0.1662	0.1870	13.5127
Ireland	0.1607	0.1472	18.8399
Italy	0.2221	0.2271	10.3943
Japan	0.2051	0.1984	38.0998
Luxembourg	0.1755	0.1780	15.5010
Mexico	0.2041	0.1985	15.9240
Netherlands	0.1239	0.1240	18.4975
New Zealand	0.1118	0.1048	12.2173
Norway	0.0743	0.0697	10.0183
Spain	0.1694	0.1780	11.0830
Sweden	0.0659	0.0602	16.4679
United Kingdom	0.1340	0.1152	28.4438
United States	0.1232	0.1163	28.9002

Accordingly, three different regressions are estimated, each of them assessing the impact of the gender indicators described above.

This model makes use of the dataset assembled and used in Barro and Lee (1994), which contains observations from more than 90 different countries, though I restrict the sample to developed countries only. The gender indicators, as well as the human capital indicators, are drawn from the Organisation for Economic Co-operation and Development (OECD) Statistics; indicators on the terms of trade are taken from the World Bank database.

4.1 Model specifications

To estimate the impact of gender inequality on an economy's per-capita GDP growth, I use a regression that includes both economic variables and human capital indicators that past literature have found significant for growth (see Table 2).

The labour force gap in each country is the difference between the activity rate of women and that of men:

$$labour\ force\ gap = \left(\frac{active_{males}}{population_{male}} - \frac{active_{females}}{population_{female}} \right)$$

The activity rate of men (women) is in turn defined as the number of men (women) in the labour force over the male (female) population. The employment gap is constructed as the difference between the employment rate of men and women, where the employment rate is given by the number of people employed (males or females) over the (male or female) population.

$$employment\ gap = \left(\frac{employed_{male}}{population_{male}} - \frac{employed_{female}}{population_{female}} \right)$$

The wage gap is taken from the OECD database; it is unadjusted, i.e. does not take into account all the aspects that affect the gap existence (education, job position etc.), refers to full-time workers and is measured by the difference between male and female median wages divided by the male median wage:

$$wage\ gap = \frac{(median\ wage_{male} - median\ wage_{female})}{median\ wage_{male}}$$

Data on the wage gap is only available for 20 countries (Denmark was excluded because of insufficiency of information available) for the period 1970-2007. The control regressors are both economic variables and human capital measures that have been often used in the empirical literature. They include:

- *fertility*, defined as the average number of children. I expect this coefficient to be negative, since when population rises, per capita GDP shrinks. The choice to have more children per adult comes at the expense of human and non-human capital, as fertility is negatively correlated with the investment ratio and education: the offspring is a form of savings that is a substitute of investment in capital goods; education is on average lower the higher the number of children in a household. The negative effect of fertility on growth is consistent with the literature (Galor & Weil, 1996) (Cavalcanti & Tavares, 2015).
- *inv*, which stands for the ratio of investment to GDP. In this case, I expect a positive relation with growth: higher investment rates generally lead to higher capital accumulation, promoting growth.
- *govexp*, which stands for the ratio of government expenditure to GDP. This coefficient is most likely to be negative, as found by Barro and Lee (1994)³ and Barro (2001).⁴
- *ed*, which measures the average years of education in each country. The level of education of the adult population is a measure of human capital, since instruction is essential in forming more high-skilled and efficient workers (Barro, 2001) (Knowles, et al., 2002) (Brummet, 2008). Education is expected to be positively associated with growth, as explained above.
- *life*, which stands for life expectancy, measured in years, is another measure of human capital. It gauges the overall health of the population and is expected to have a positive impact on growth (Brummet, 2008) (Klasen & Lamanna, 2009).
- *ln(GDP)*, which accounts for conditional convergence and represents the relation between per capita growth and the initial level of per capita GDP. The coefficient is expected to be negative, since there is a vast literature that agrees on the inverse relation of these two variables (Brummet, 2008) (Klasen & Lamanna, 2009).
- *grtrade*, which is the percentage change of the terms of trade, i.e. the growth rate of the ratio of export prices to import price, and represents an economic variable. Improvements in the terms of trade reflecting increases in factor employments or productivity are usually found to be positively associated with growth in the empirical literature (Barro, 2001)(Brummet, 2008).

The panel growth regression is accordingly formulated as follows:

³ Barro, R. and J.W. Lee. 1994, "Sources of Economic Growth," Carnegie Conference Series on Public Policy, 40: 1

⁴ Robert J. Barro, 2001, "Human Capital and Growth," American Economic Review, American Economic Association, vol. 91(2), pages 12-17, May.

$$g_{it} = \alpha + \beta_1 gap_{it} + \beta_2 fertility_{it} + \beta_3 inv_{it} + \beta_4 govexp_{it} + \beta_5 ed_{it} + \beta_6 life_{it} + \beta_7 \ln(GDP)_{it} + \beta_8 grtrade_{it} + \lambda_t + c_i + \epsilon_{it}$$

where $i = 1, \dots, 21$ and $t = 1, \dots, 47$. The regression includes fixed effects for the each country (c_i) and time dummies (λ_t). Fixed effects control for heterogeneity between countries, and time effects control for common trends and business cycle effects. The error ϵ is assumed to be uncorrelated with the dependent variable. The variable *gap* has different meaning depending on which equation it appears in: it stands for the labour force gap in the first regression, for the employment gap in the second, and for the wage gap in the third.

Table 2: Summary Statistics

Variable	Source	Mean	Standard Deviation
GDP growth	Barro and Lee	2.418866	2.506816
Fertility	Barro and Lee	1.764955	.3553859
Investment share	Barro and Lee	28.2314	4.968437
Government share	Barro and Lee	14.28467	3.523011
Years of schooling	Barro and Lee	9.354516	1.733807
Life expectancy	OECD Statistics	76.5136	2.566937
Ln(GDP)	Barro and Lee	10.04009	.3346538
Growth rate of terms of trade	World Bank	.0006249	.0417494
Labour force gap	OECD Statistics	.1675514	.070522
Employment gap	OECD Statistics	.1625949	.0707118
Wage gap	OECD Statistics	21.59966	9.157485

4.2 Empirical results

The econometric model presented here seems to be sound enough, with a goodness of fit that is satisfactory for a growth model: the R^2 for the first two regressions is 0.47; the R^2 for the third is even higher, reaching 0.68. The estimates are consistent with the theories proposed above, with the coefficients for the labour force gap and the wage differential negative and statistically significant. The negative relation between gender inequality and growth, presented in the empirical literature, is confirmed by the regression results presented in Table 1, which refer to three different equations, connecting GDP growth to the three different gender indicators I want to test.

In the first column, I report the impact of the labour force gap on long run growth (measured as a percentage). The coefficient is negative and significant at the 5% percent level. The estimated effect is of -9.65, which means that if gender gaps in the labour force were reduced by 0.01 (i.e. by 1 percentage point) the rate of growth would increase by a tenth of a percentage point. The magnitude of the impact is not negligible, especially considering how most of the countries in the sample actually have a rate of growth rate of 1% or less.

In column 2, the gender indicator used in the regression is the employment gap. The coefficient in this case is negative, as expected, but not significant. This may be because in the short run the employment gap exhibits a positive correlation with GDP growth, as shown for instance in Razzu and Singleton (2013): business cycles are not gender neutral, as during downturns women's employment decreases less than men's and the opposite occurs in upturns, leading to procyclical fluctuations in the gender gap. For example, in the Great Recession, between 2008 and 2009, the male employment rate decreased by 3.5 percentage points while the female one fell by 1.2 percentage points. For this reason, it is likely that the coefficient on the employment gap is downward biased, understating the impact of this facet of gender inequality on economic activity.

Procyclicality is strong for the employment gap but less pronounced for the labour force gap, even taking into account the encouraged/discouraged worker effect: when recessions occur, the number of employed people is more likely to bear the brunt of the downturn rather than the number of labour force participants. Participation rates are affected more by structural factors – e.g. educational attainment; social attitudes to working women; provision for the care of children and the elderly – than by cyclical ones. This feature might explain why in the estimated regressions the coefficient on the labour force gap is significant while that on the employment gap is not.

Column 3 shows the estimates of the coefficients on the wage gap for the 20 countries in the sample (data for Denmark was unavailable). Once again, the coefficient is negative and statistically significant at the 5% level (its p-value is 1.2%): compared with the other two cases, the impact of the wage gap seems to be estimated more accurately. On the basis of the econometric evidence presented in Table 1 one can infer that a 1 percentage point reduction of the wage gap leads to an increase in the GDP growth rate of around 0.10 percentage points.

With a few exceptions, almost all of the control regressors have the anticipated sign consistent with the literature. The significance of certain variables - fertility, government expenditure, investment share - is confirmed in all the specifications, indicating the indeed there seems to be a well-established relation between GDP growth and the control variables. The coefficient for fertility, for example, is significant in all the regressions, although with some differences: in the first two regressions is significant at the 1% level but in the last only at the 10% level. The sign of the coefficient, as

predicted, is negative and consistent with a rather large empirical literature (Bloom & Williamson, 1998). The coefficient on the (lagged) level of GDP is negative and significant at the 1% level in all three regressions: this is no surprise since this coefficient accounts for the conditional convergence effect, meaning that lower-income countries tend to grow at a higher rate than developed ones, and vice versa. The investment and government shares also appear to be significant at the 1% level in all cases. These results are in line with the empirical models of Barro and Lee (1994) and Barro (2001) reviewed in chapter 3. The rate of growth of the terms of trade, on the other hand, appears to be non-significant and its sign in the regressions varies.

The measures of human capital that I use in the specifications, namely average school years and overall health of the population, turn out not to be statistically different from zero.

One interesting result is that life expectancy, insignificant and with a negative sign in the first two specifications, become significant at the 1% level and exhibits a positive sign in the wage gap regression. Education instead appears to be uncorrelated with GDP growth, which seem to support the hypothesis, first formulated by Bils and Klenow (1998)⁵ and then by Pritchett (1999),⁶ that education does not contribute to the growth performance of a developed economy.

Finally, one relevant finding is that unlike other studies all the economic variables in the model, except the growth rate of the terms of trade, seem to be significant regardless of the specification. In a similar growth model Brummet (2008) found that most of the economic variables he used were insignificant, probably because its model was estimated on a cross section of observations; he suggested that a panel data framework would be more appropriate to gauge the true relevance of these type of variables (Brummet, 2008). The results presented in Table 3 seems to validate this presumption, as all economic control variables (except the terms of trade) are indeed statistically significant in the panel regressions estimated in this work.

⁵ Bils, Mark and Peter J. Klenow. "Does Schooling Cause Growth or the Other Way Around?" *NBER Working Paper* 6393, 1998.

⁶ Pritchett, Lant. "Where Has All the Education Gone?" *The World Bank Economic Review*, 1999, 15 (3), pp. 367-391.

Table 3. Regression results

Dependent variable	Growth (1)	Growth (2)	Growth (3)
Labour force gap	-9.648971** (4.627946)		
Employment gap		-.962744 (4.691096)	
Wage gap			-.094427** (.039077)
Fertility	-1.573103*** (.487769)	-1.723659*** (.4980959)	-2.88229** (1.375858)
Government share	-.3247022*** (.0886317)	-.2909127*** (.0862069)	-.9527289*** (.1527461)
Investment share	.1809887*** (.033653)	.1970823*** (.0326756)	.2247879*** (.0454937)
Education	-.042792 (.1356924)	.0360314 (.1346506)	-.0667037 (.2514873)
Life expectancy	-.1397995 (.1654527)	-.2557363 (.1600329)	1.199497*** (.2952049)
Ln(GDP)	-6.613463*** (1.408435)	-6.293883*** (1.433294)	-17.98839*** (4.552003)
Growth rate terms of trade	3.254129 (2.199531)	3.528701 (2.227347)	-2.890603 (2.252242)
Country dummies	Yes	Yes	Yes
Year dummies	Yes	Yes	Yes
Number of countries	21	21	20
Period	1960-2007	1960-2007	1970-2007
R ²	0.47	0.47	0.68
Ov test	Passed	Passed	Passed
Observations	648	648	302

* Denotes significance at 10% level

** Denotes significance at 5% level

*** Denotes significance at 1% level

Values in parentheses are robust standard errors

Figure 12. Model predictions: labour force gap and GDP per capita

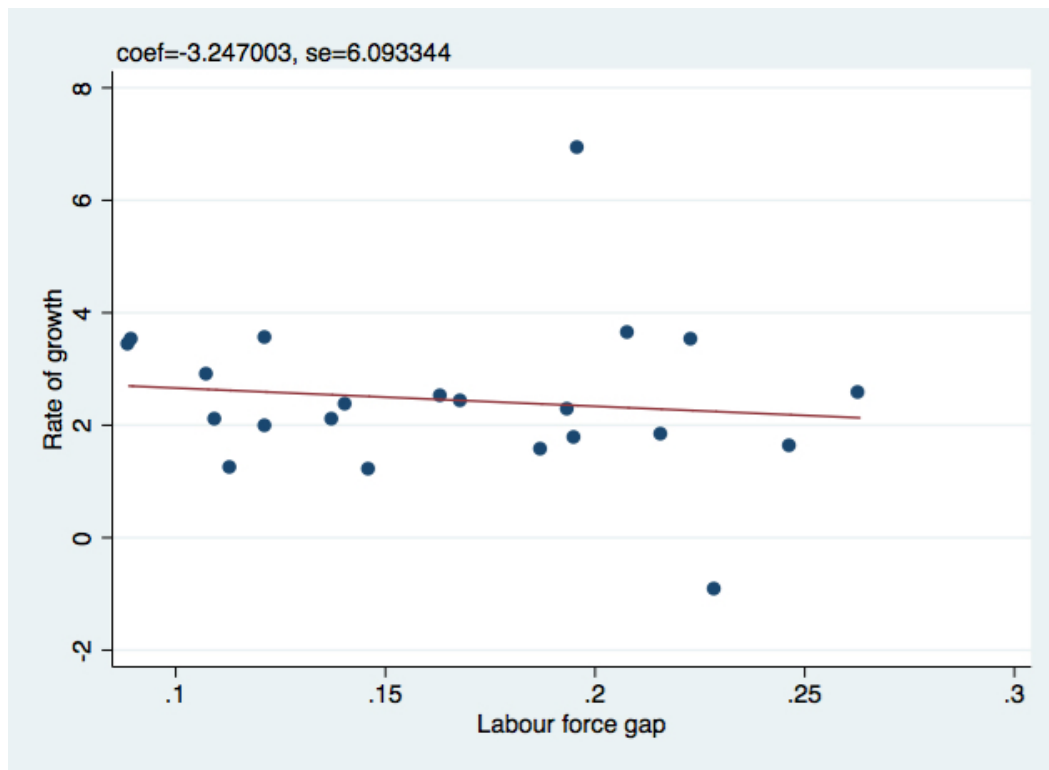


Figure 13. Model predictions: employment gap and GDP per capita

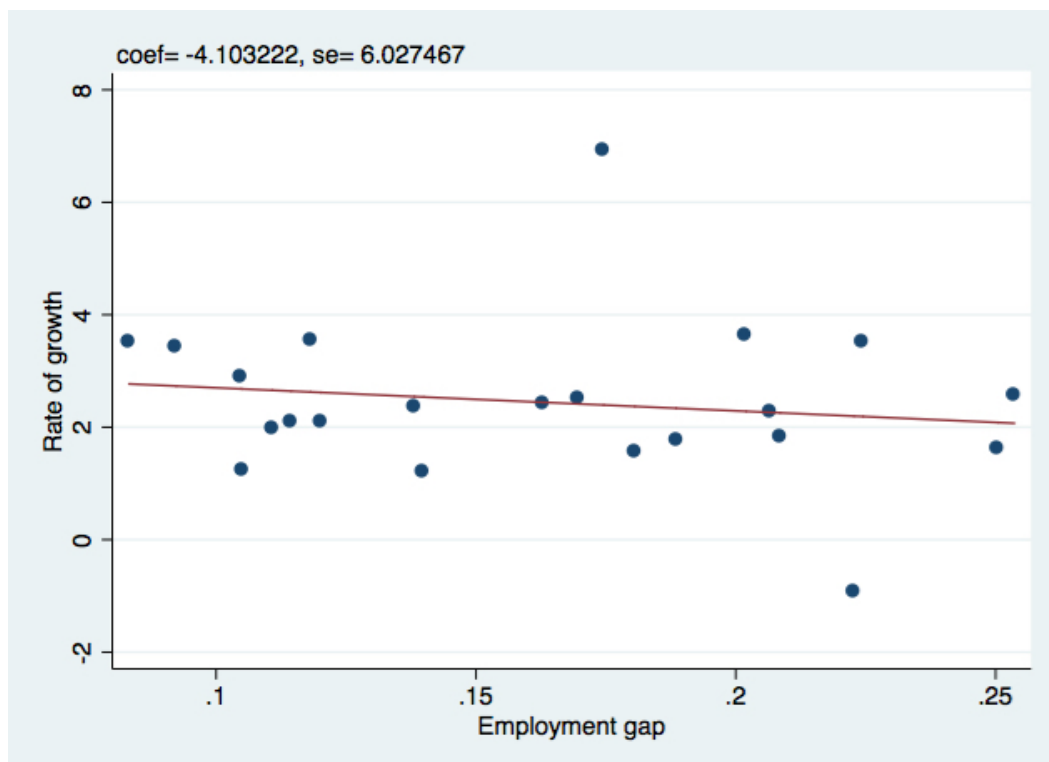
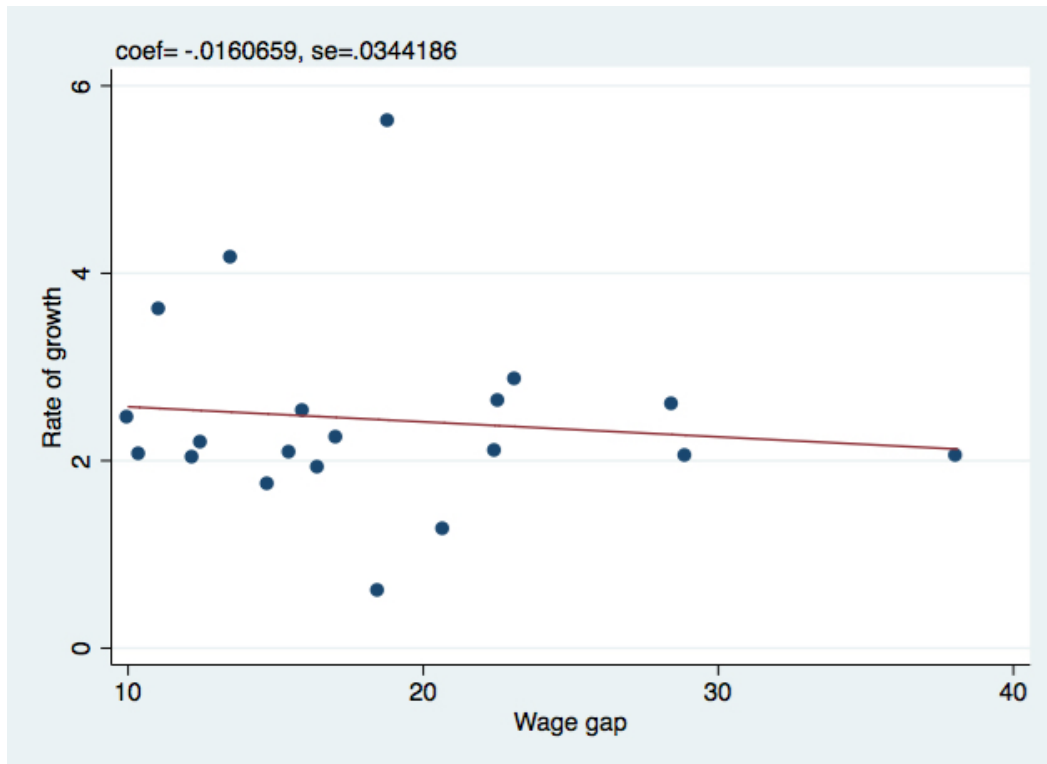


Figure 14. Model predictions: wage gap and GDP per capita



4.3 Could Europe improve economic performance by reducing gender gaps?

The results of the empirical model confirm the existence of a negative correlation between gender inequality and GDP growth. The question left unanswered is then: how much Europe economic performance could benefit from reducing gender gaps? For this purpose, I present an exercise aimed at estimating the increase in European GDP growth (based on the aggregation of the results for the countries in the sample) that would occur if gaps in labour force and in earnings were reduced to a level close to that observed in the Nordic countries. The Nordic countries are chosen as a benchmark because gender inequality is remarkably lower there than in any other country in my sample. The focus is mostly on Norway, as it presents a low gap in both wage and labour force, while Sweden and Finland present significantly higher pay differentials.

Table 4 presents the results of the experiment. Column 2 and 3 show by how much the labour force and wage gaps ought to fall in order for EU countries to converge to the levels of gender equality observed in Norway; column 4 shows the weights used to aggregate EU countries' results; column 5 shows by how much GDP growth in the sampled EU countries and in the EU itself would increase were those gender gaps to be eliminated. To estimate the rise in EU GDP growth I computed a

weighted average of the effects of these improvements on the growth performance of each country. The weights are calculated on the basis of each country's share in total population and gross domestic product of the European Union (i.e. on the basis of the two equally-weighted indicators used for computing the EU central banks' contributions to the ECB's capital); the weights of the EU countries not in the sample are reallocated proportionally so that weights sum to 1. Using the estimates shown in chapter 3, I find that EU GDP growth could increase by 1.17 percentage points if gaps in all the countries in the sample shrank to the levels observed in Norway.

Table 4. Model prediction on European growth

Countries	Labour force gap (% reduction)	Wage gap (% reduction)	Weights % (normalized)	Growth (% increase)
Austria	5.30	12.38	2.38	1.68
Belgium	5.70	1.96	3.01	0.74
Finland	/	10.24	1.53	0.97
France	1.80	4.72	17.22	0.62
Germany	5.20	9.33	21.86	1.38
Greece	9.80	3.55	2.46	1.28
Ireland	7.90	6.86	1.41	1.41
Italy	11.90	/	14.95	1.15
Luxembourg	10.80	5.54	0.24	1.57
Netherlands	5.60	8.54	4.86	1.35
Spain	10.10	1.12	10.73	1.08
Sweden	/	5.63	2.76	0.53
United Kingdom	3.40	13.31	13.67	1.58
Europe	5.82	6.46	1.00	1.17

/ Implies that no further improvement can be made and the country has already reached the target.

The entries in column 2 (3) represent the labour force gap (wage gap) in the countries listed in column 1 and in Norway.

Denmark is not included because wage gap data were unavailable.

5. Conclusions

Over the recent years the European Economy has experienced one of the deepest recession since the Great Depression of the 1930s. According to a variety of estimates and researches, potential output in the European Union has significantly fallen during this crisis - reflecting a lower contribution from capital and labour, in addition to a decline in TFP - and part of this contraction might be permanent. As the European Commission stated, “potential GDP in the EU could fall to a permanently lower trajectory”. According to the ECB, the drop in potential output was more pronounced in euro area countries with larger pre-crisis imbalances. Even before the crisis, advanced economies were experiencing a decline in potential output growth, owing to a slowdown in TFP after the extraordinary expansion in the 1990s due to the strong innovation in ICT.

Moreover, in the long run Europe’s potential growth will be negatively affected by demographic trends, which will trigger a substantial increase in the old-age dependency ratio. A rapidly aging population will not be able to maintain a sustained expansion of potential labour force. In this context, it is urgent for Europe to search for factors that can provide a boost to trend GDP growth, like the narrowing of the gender gap that is still present in the labour market and that could unlock, if removed, the growth potential of the European economy.

The International Monetary Fund explicitly stated that *“In the context of a rapidly aging population, increasing the share of women in the workforce could help mitigate the impact of a shrinking labour force”*. The Fund estimates that the closing of the gender participation gap in Europe could raise GDP by 12 percent over the next 15 years.

The relevance nowadays of pursuing gender equality is witnessed by its inclusion in the Millennium Development Goals, an agenda created by the United Nations to foster sustainable development, and a top priority in most OECD countries. Therefore, apart from its high intrinsic value and its importance for social welfare, the main rationale for this specific goal is economic, as proved by the by mounting empirical evidence on the costs of gender inequality for development (see e.g., World Bank 2001). Also for the European Union promoting gender equality – a fundamental EU value – is a key target in the EU agenda, because it is an important driver for economic growth.

As reviewed in chapter 3, the economic literature highlights the importance of both direct and indirect channels through which gender inequality negatively affects economic growth.

Direct effects mostly relate to human capital accumulation, as gender equality can contribute to growth by expanding the stock of human capital and raising labour productivity (the selection-distortion effect). Indirect effects usually revolve around positive externalities generated by greater gender equality, such as fertility, mortality or improved corporate financial performance.

Empirical evidence is presented in this thesis to support the hypothesis that closing gender gaps can contribute to fostering the rate at which a country grows. Using a panel data technique, I studied the impact of three different measures of gender inequality on growth: pay differentials, labour force and employment gap. As predicted by the theoretical and empirical literature, the coefficients for all three gender-gap indicators are negative, with the first two statistically significant at the 5% level. The employment gap on the other hand is insignificant. This result is probably due to short-run dynamics that leads to underestimate the magnitude of the coefficient. The employment gap is positively correlated with growth in the short term: for example, economic downturns cause the gap to shrink, since the number of male employed falls rather steeply with respect to their female counterparts. This short-run positive correlation clouds the long-term negative relationship and hence may make the coefficient on the employment gap statistically insignificant.

According to the model, both wage differentials and the participation gap have a substantial effect on growth. On the basis of my estimate, reducing the gender gap in Italy, where participation is low, to a value closer to that of Sweden, where participation is among the highest, would significantly increase growth in Italy: shifting from a 0.19 gap to a 0.05 would increase the long run growth rate of Italy by 1.27 percentage points, a remarkable improvement for a country currently growing at a rate below 1%. Regarding pay differentials, Italy during the period 2000-2007 did better than most European countries, recording a wage gap lower than in Nordic countries.

Could Europe improve economic performance by reducing the gender gaps? To answer this question, I estimated for the European countries included in the sample what might be the effects on growth of reducing inequality in the labour force and in wages to a level similar to that observed in Norway, the best performing country in terms of gender equality. According to predictions based upon the model, there is evidence that Europe could increase its rate of growth by 1.17 percentage points. The impact estimated is economically significant and could really help Europe, particularly after the tribulations caused by the Great Recession.

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