The Impact of Gender Inequality on Economic Growth: An Empirical Approach for OECD Countries

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Research Article

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Posted Date: January 11th, 2024

DOI: https://doi.org/10.21203/rs.3.rs-3846288/v1

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Additional Declarations: No competing interests reported.
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2024

Abstract

In this paper we explain how we used the generalized method of moments (GMM) analysis technique to estimate the relationship between the gender wage gap and economic performance for an unbalanced panel data for both OECD and European countries during the period 1980–2015. The results show that an increase of 1% in wage inequality between the two genders leads to a 0.002% decrease in the economic growth rate per capita in the case of OECD countries and a 0.003% decrease in the case of European countries. The relationship is statistically significant at 5% and 10% for each of the country groups respectively, which is consistent with previous studies.

Key words: gender wage gap, GMM, gender inequality

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I. Introduction

Gender inequality is pervasive among countries worldwide, according to the Economic World Forum 2015 report. No country in the world has fully closed the gender gap, the highest-ranking country has closed 88% of the gender gap, while the lowest-ranking country has closed 48% and the average global gender gap is 69.5%.

The Global Gender Gap Index includes indicators of economic participation, political empowerment and educational attainment, and health criteria.

The reduction of gender inequality is an important matter concerning economists and social scientists, not only due to its well-being dimensions but also because it has different economic impacts. Gender inequality not only deprives women of basic freedom but also adversely affects development outcomes for society. For instance, if women do not have proper access to education and employment and also do not receive equal wages, this will adversely affect the education of the next generation and their health as well, which in turn decreases economic growth through its effect on productivity (King, Klasen, and Porter, 2008; Klasen and Lamanna, 2008; Abu-Ghaida and Klasen, 2004; World Bank, 2001).

Figure 1

Gender Inequality in The World

![Gender Inequality in The World](image)
The relationship between economic growth and gender disparity is considered complex and not conclusive. Some studies have found a negative relationship between a gender gap in education and economic performance (Tansel and Gungor, 2013; World Bank, 2011; King and others, 2008; Forbes, 2000; Hill and King, 1995; Benavot, 1989); these studies argued that female education is useful to economic growth through reduction in fertility and the positive influence of mothers’ education on the later generation. By contrast, Barro (1995) and Barro and Lee (2001) found a positive relationship between gender inequality in education and economic growth.

To unveil the relationship between gender inequality and economic performance, a considerable amount of literature has been published. These studies have used various methods and techniques to estimate this relationship, and some of them have used microeconomic or macroeconomic models to explain the relationship between the two variables in the short run or long run. Most of the studies or papers in this field have concentrated only on exploring the impact of inequality in education and employment on economic growth, whereas far too little attention has been paid to investigating or to explaining the impact of gender pay inequality on economic growth; in addition, most of the existing studies in this field have used a single country to estimate this relationship. However, this study attempts to contribute to the literature by providing new evidence on the impact of gender inequality on economic growth by using the gender wage gap as a proxy for discrimination.

There are a few channels by which gender wage differentials can influence economic performance. The wage inequality between the two genders affects females’ income, which in turns discourages them from participating in the labour market, which can lead to decreased growth by decreasing labour force participation and productivity. In addition, due to the inequality in wages, parents will probably invest less in the education of girls relative to boys, which is likely to reduce female participation in the labour market in the future and as a result
lower income for families. Decreasing family income will adversely affect children’s well-being, health, educational attainment and productivity and hence reduces economic growth (Morrisson and Jütting, 2005).

Moreover, gender wage inequality might negatively affect the bargaining power of women in their families. Since women are culturally responsible for children’s education and well-being, future generations’ learning and abilities might suffer, leading to a decrease in economic growth (Pervaiz and others, 2011). Another argument traces the effect of the gender wage gap on fertility. Higher wages for females lead to an increase in the opportunity cost of having children, which reduces the number of children in the household (Galor and Weil, 1996). In addition, the gender wage gap may lower fertility by delaying marriage. Reduction in fertility lowers population growth, increases per capita worker and increases economic growth (Day, 2012; World Bank, 2011). Finally, females tend to spend more of their income on children’s health and education, which can contribute to development in the long run. Therefore, when the gender wage gap between males and females is reduced, one can expect more spending to be allocated to investment in human capital and other productivity-enhancement channels that increase economic growth in the long run (Pervaiz and others, 2011).

To estimate the relationship between the gender wage gap and economic growth, this study used the generalized method of moments (GMM) technique, which was proposed by Arellano and Bond in 1991, for an unbalanced panel data set for Organisation for Economic Co-operation and Development (OECD) countries during the period 1980–2015. The results show that an increase of 1% in the wage gap leads to a 0.002% decrease in economic growth rate per capita, and this relationship is statistically significant at 5%. In addition, the results of Arellano and Bond’s GMM technique for European countries are consistent with our results for OECD countries for the same analysis technique, in that the empirical work shows that in the European countries an increase of 1% in wage inequality between the two genders leads to a 0.003% decrease in economic growth rate per capita. This relationship is statistically significant at 10%. These results are

The rest of the paper is structured as follows:

The second section traces the existing literature related to the relationship between the gender pay gap and economic growth. Section three presents the importance of gender equality to economic growth. Section four discusses the reasons for the gender wage gap. Section five discusses the methodology. Data are presented in section six. Section seven presents the empirical estimations and the results and concludes the paper.

II. Related Literature

Numerous studies since the early 1970s have investigated the relationship between gender inequality and economic development. The relationship between the two variables is considered complex and inconclusive. For instance, some studies have shown a negative relationship between education gaps and economic growth (Tansel and Gungor, 2013; World Bank, 2011; King and others, 2008; Forbes, 2000; Hill and King, 1995; Benavot, 1989); these studies argued that female education is useful to economic growth through a reduction in fertility and the positive influence of mothers’ education on the later generation. However, Barro (1995) and Barro and Lee (2001) argued that gender disparity in education has a positive impact on economic growth.

In addition, researchers who have studied the relationship between inequality in labour force participation and economic growth have found a negative impact between the two variables (ILO, 2015; Thévenon and others, 2012; Klasen and Lamanna, 2008; Esteve- Volart, 2004).

While there are many studies that discuss gender inequality in education and labour force participation and its effect on economic performance, few studies have investigated the impact of the gender pay gap on economic growth (Cassells and others, 2009; Busse and Spielmann, 2006; Seguino, 2000a).
A study by Cassells and others (2009) used a growth model to estimate the impact of the gender pay gap on Australian economic performance for the period 1990–2008. They found that an increase of 1% in the gender wage gap is expected to reduce GDP by 0.5%. Similarly, Kennedy and others (2017) found that reducing the gender wage gap by 10% can increase per capita output by up to 3% in Australia. Cabegin (2012) reported that gender wage inequality is sensitive to economic performance. It decreases as economic growth increases, and it widens with a deceleration of growth. In contrast to Cassells and others (2009) and Kennedy and others (2017), Oginni and others (2014) found a positive relationship between the gender wage gap and economic performance in Nigeria.

Adopting a broader perspective, Seguino (2000a) argued that the relationship between gender pay inequality and economic growth would increase international competitiveness. She pointed out that gender wage inequality can stimulate economic growth through export expansion. The mechanism of this effect is as follows: if women work in the export production sector and this sector produces labour-intensive goods, then lower wages would stimulate competitiveness in this sector and lead to an expansion in exports. In a comparable way, the gender pay gap might increase investment. This view is supported by Busse and Spielmann (2006), who confirmed the positive relationship between gender disparity and trade openness in a sample consisting of 92 developing and developed countries. They showed that countries with a higher gender pay gap export more labour-intensive goods. Similarly, Erturk and Cagatay (1995) pointed out that a gender wage gap will result in lower labour unit costs and so stimulate investment. In the same vein, Standing (1999) indicated that globalization has induced companies to employ more female in order to become more competitive. Conversely, Schober and Winter-Ebmer (2011) reported that the relationship between the gender wage gap and economic growth is not positive.

In the same context, Oostendorp (2004) used a cross-country regression that included more than 80 countries during the period 1983–1999 to explore the impact of globalization on the gender wage gap. He found that occupational gender wage inequality decreased with higher GDP per capita. In addition, he
found that occupational gender wage inequality is negatively associated with trade and foreign direct investment (FDI) for low-skilled occupations in both poorer and richer countries. Moreover, the researcher found the same results when he reinvestigated the relationship between globalization and the gender wage gap (Oostendorp, 2009). Likewise, by using ordinary least squares (OLS) analysis for time series data for India for the period (1983–2004), Menon and Rodger (2009) found a negative relationship between trade openness and gender wage disparity. This view was supported by Villalobos and Grossman (2010) and Chen and others, (2013).

In the same vein, Rasekhi and Hosseinmardi (2012) examined the impact of globalization on gender wage inequality for 21 selected developing countries during 2000–2007; by using a panel data technique they found that globalization reduces the gender wage gap and also showed that the increase in education level and the Human Development Index (HDI) led to a decrease in gender wage inequality.

Furthermore, other researchers have traced the effect of the gender wage gap on fertility. Galor and Weil (1996) showed that reproductive decision-making depends on the relative wages of females and males. Higher wages for females mean an increase in the opportunity costs of having children, which reduces the number of children in the family. In addition, the World Bank (2011) and Day (2012) have stated that when women get higher wages, they will delay marriage and therefore fertility and population growth will go down. A reduction in population growth would increase output per capita and hence increase economic growth.

This brief review of empirical studies has explored the relationship between gender inequality and economic growth. These studies used various techniques to estimate this relationship; some used macroeconomic or microeconomic models to explain the impact of gender inequality on economic growth in the short run or long run. However, such studies remain narrow in focus, dealing only with gender inequality in education and employment, and its impact on economic performance. Also, there has been little quantitative analysis of the impact of the gender wage
gap on economic growth. Moreover, no previous study has investigated the influence of the gender wage gap on economic growth in OECD countries. In addition, most of the existing studies in this field have used a single country to estimate this relationship.

However, this study attempts to contribute to the literature by providing new evidence on the impact of gender inequality on economic growth by using gender pay inequality as a proxy for discrimination. This study used the GMM technique, which was proposed by Arellano and Bond in 1991, to explore the impact of the gender pay gap on economic growth, and to achieve this purpose this study used a panel data technique for OECD countries for the period 1980–2015.

III. Gender Inequality and Economic Growth

The relationship between gender inequality and economic growth is complicated and it has direct and indirect links. Many researchers have emphasized the importance of human capital as one of the key economic determinants, and the inclusion of human capital in economic models was achieved through the Solow model; moreover, human capital can be incorporated into the endogenous growth model (Mankiw, Romer, and Weil 1992).

Lucas (1988) introduced a definition of human capital as a general skill level; furthermore, human capital can contribute to production growth by increasing productivity and technological improvements. In addition, Romer (1990) pointed out that human capital contributes to improvements in technical progress through knowledge accumulation. Hence, many kinds of theoretical literature have started to point out that the inequality between the two genders will harm economic growth through misallocation of resources (Pervaiz and others, 2011).

Many studies have explained how gender inequality might influence economic performance. For instance, Klasen (1999) identified two pathways through which this effect could happen.
The first is premised on the assumption that women tend to spend more of their income on children’s health, nutrition and education, which can contribute to development in the long run by increasing the productivity of the next generation. Therefore, providing women with proper access to resources such as education and employment, and also equal wages, can increase economic growth in the long run.

The second is premised on the assumption that innate abilities and talents are randomly distributed between males and females, so equality in the distribution of resources between the two genders will maximize the productivity of the human capital available in the economy. But gender inequality in education, employment and wages means that males who are less able than their female counterpart’s have a better chance of being educated and employed or even getting higher wages than females and this would produce human capital with lower productivity in the economy and result in a reduction in economic growth.

Moreover, Klasen (2006; 2002; 1999) pointed out that inequality in education might increase fertility and mortality levels, and also decrease the education of next generation; each element has a negative effect on economic performance. The impact of gender inequality in education is not limited to its impact on economic growth through human capital; it also has an impact on investment. Female education might have an impact by increasing the returns on investments, which in turn would lead to an increased investment rate in the economy.

Adopting a broader perspective, Chen and others (2013) and Rasekhi and Hosseinmardi (2012) argued that the relationship between female education and international competitiveness would increase economic growth. They found that female education has a positive impact on economic growth through international competitiveness. In addition, they showed that many East Asian countries use a strategy that depends on intensive use of women’s labour in export manufacturing industries, and they have been able to compete in the world market.
Furthermore, other researchers have traced the effect of gender discrimination in employment. Esteve-Volart (2004) showed that reducing employment opportunities for females might distort the economy in the same way that gender discrimination in education does, by reducing the pool of talented workers that employers can select from, which results in reducing the average ability of the labour force. In addition, gender inequality in employment can affect economic growth through demographic effects, by increasing the fertility rate (Cavalcanti and Tavares, 2007).

Moreover, gender inequality in employment and wages might negatively affect the bargaining power of women in their families (Klasen and others, 2008; World Bank, 2001). Since females are culturally responsible for children’s education and well-being, future generations’ learning and abilities might suffer, as a result of gender inequality leading to a decrease in economic growth (Pervaiz and others, 2011; Stotsky, 2006; Thomas, 1997).

Furthermore, there are a few channels by which gender wage inequality can influence economic performance. Wage inequality between the two genders affects females’ income, which in turns discourages them from participating in the labour market, which can lead to decreased growth through a decrease in labour force participation and productivity (Cavalcanti and Tavares, 2007). Another argument traces the effect of the gender wage gap on fertility. Higher wages for females lead to an increase in the opportunity cost of having children, which reduces the number of children in the household (Galor and Weil, 1996). In addition, the gender wage gap may lower fertility by delaying marriage. Reduction in fertility lowers population growth, increases capita per worker and increases economic growth (Day, 2012; World Bank, 2011). Finally, females tend to spend more of their income on children’s health and education, which can contribute to development in the long run. Therefore, when the gender wage gap between males and females is reduced, one can expect more spending to be allocated to investment in human capital and other productivity-enhancement channels that increase economic growth in the long run (Pervaiz and others, 2011).
However, it is important to indicate that is very difficult, theoretically, to separate the impact of gender inequality on employment, education and wages, because gender inequality in one dimension leads to gender inequality in other dimensions, for instance, gender inequality in education might lead to gender inequality in employment, particularly in sectors that prefer educated workers. Therefore, if there are barriers to women’s employment or even gender wage gaps, rational families might decide that girls’ education is not profitable, which results in lower demand for female education, which causes gender inequality in education. Hence, gender inequalities in employment, education and wages are closely related (Klasen and Lamanna, 2008).

IV. Reasons for the Gender Wage Gap

The literature has identified a number of factors that might cause a wage gap between the two genders; the studies try to explain the wage gap in terms of observable characteristics (such as experiences, education, marital status, age, hours worked and field of study) and non-observable characteristics. However, Blau and Khan (2000) pointed out that it is not only age, occupation and education but also childcare and college grades that might be included as explanatory variables for the gap between the two genders. However, the unexplained portion of the gender wage gap resulted from the impact of unobservable variables, including discrimination against females in the labour market. Blau and Kahn (2006) noted that while the gender wage gap has decreased over time, a portion of that gap is not explained by an increase in human capital factors. Moreover, Hanushek and Woessmann (2010) pointed out that while human capital factors explain a significant part of the gender wage gap, the analysis leaves a proportion of the gender wage gap unexplained.

We can summarize the main factors that have an influence on the gender wage gap, either positively or negatively, as follows:

V. Human Capital Factors
An early theory that tried to clarify the gender wage gap in the labour market was human capital theory, which assumed that the individual tends to invest in education and training to increase their skills, and that this depends on the returns they expect to receive from this investment. Since females received lower wages from these skills than their male counterpart did, females sought to catch up with men in the labour force. However, although they could catch up with males in educational attainment, they could not catch up in terms of wage equality. Blau and Kahn (2000) attributed this to the businesses that are less likely to employ females because employers expect to get fewer returns when they invest in female training because females have more breaks than their male counterparts. In addition, Becker and others (1990) pointed out that women are likely to expend some of their efforts on unpaid housework as well as their market work. Therefore, human capital theory attributed the gap between males and females to the lack of women participating in the labour market due to traditional family roles such as childbearing that impede women in participating in the labour market and benefiting from training and experience in the markets.

VI. Occupational Segregation

Occupational segregation refers to the concept that some occupations are dominated by males and others by females. Females tend to be concentrated in particular jobs and those jobs are identified as lower-paid jobs. Bratton and Gold (2012) argued that occupational segregation is more likely to occur for low-skilled workers and for females with children as well. In addition, Hanushek and Woessmann (2010) noted that workers with higher educational attainment are concentrated in a much larger number of jobs than workers with lower educational attainment, and mothers are more likely to work in sales jobs or service jobs than females without children. This might be a consequence of mothers’ self-selection into jobs that are more convenient for their family responsibilities or it might be related to employers’ not offering jobs or careers to females with children.

Furthermore, segregation in occupations is termed either vertical, where males always occupy higher managerial jobs with high wages, while females are under-
represented in these occupations and are also less likely to reach senior positions; or horizontal, where female are concentrated in low-paid jobs, for example, cleaning, caring, catering, sales jobs and clerical jobs. Blau and Kahn (2000) pointed out that wages in jobs dominated by females tend to be kept low by the prevalence of part-time opportunities and the existence of discrimination in the labour market, which might lead to an oversupply of female workers for these occupations.

VII. Workplace Flexibility

Females tend to choose lower-paying jobs because these kinds of jobs provide flexibility, which enables women to coordinate their job and family responsibilities. Therefore, females are less likely to choose a high-paying occupation because they are concerned about combining family’s responsibilities and their job (Solberg and Laughlin, 1995). However, some findings regarding to gender wages and workplace flexibility were different (Landes, 1977); these indicated that males have more access to occupations that have flexibility than do females, who need to choose these jobs to enable them to coordinate family and occupation. This viewpoint is supported by Witt and Nye (1992) and Weaver (1998).

VIII. Working Hours

The traditional division of the family hurts females in the labour market, because females devote more time and effort to housework than men do, and have less time for performing market work. Becker (1993) and Miranda (2011) pointed out that women work fewer paid hours than men because of their responsibilities in looking after their children; in addition, housework is still unequally distributed between partners. Therefore, part-time jobs can help women to balance their job responsibilities and their family's needs, but that might come at a cost. Jaumotte (2004) noted that part-time jobs are characterized by lower wages, poor benefits, variable hours, low job tenure, less training and low prospects promotion.
Furthermore, part-time employees usually face an earning penalty when we compare them with their counterpart employees who work full-time jobs (Joint Economic Committee, 2016). Moreover, less time in the job can make employers look at female workers as less committed to the job, and they are more likely to take leave from their jobs to care for their families than male workers do; this position means that females employees appear to be less valuable than their male counterparts, and therefore they receive lower wages for their work. In addition, females who work part-time are less likely to qualify for benefits such as health insurance and sponsored retirement plans (Joint Economic Committee, 2016).

IX. Direct Discrimination

Discrimination by employers refers to different treatment for two equally qualified individuals based on group membership such as gender, age, race, disability, religion, etc. However, discrimination takes two forms: ‘taste discrimination’ is based on the individuals, in case where employers prefer specific individuals or groups to others; and ‘statistical discrimination’ is when employers make their decisions about individuals based on imperfect information, and that might be through prior facts and perceived notions.

X. Gender Stereotypes

Gender stereotypes are important, especially in occupational segregation, because they have an impact on male and female education and career decisions Fapohunda (2013). Sorsa and others (2015) and the OECD (2012) affirmed that women’s behaviour in the labour market is influenced by culture and social values, in which might abound arguments for discriminating against women by stereotyping different types of work or determining lifestyles for males or females. Educational choices for women are determined partly by job opportunities, because not all jobs are available to them, and also partly by the gender stereotypes that prevail in the community.

V. Estimation Framework
The model to estimate the relationship between the gender wage gap and economic growth has been elaborated on the basis of the existing literature, in particular Naguib (2015), who estimated the relationship between inequality and economic growth as follows:

\[ \ln(GDP_t) = \alpha_0 + \alpha_1 \ln(gdp_{t-1}) + \alpha_2 GINI_{t-1} + \alpha_3 FDI + \alpha_4 School_t + \alpha_5 Open_t + \alpha_6 Life_t + \alpha_7 Ocse_t + \alpha_8 d_{1,t} + \alpha_9 d_{2,t} + \alpha_{10} d_{3,t} + \varepsilon_t \]  
(1)

Where GDP\_t stands for the annual per capita GDP growth rate, and this variable is computed using the following equation:

\[ \ln GPD_t = \ln \left( \frac{GDP_t}{GDP_{t-1}} \right) = \ln(GDP_t) - \ln(GDP_{t-1}) \]

\( \ln(GDP_{t-1}) \) stands for annual per capita GDP in the lagged value. GINI\_t-1 is the value of the GINI coefficient in the lagged period. FDI stands for the net influx of foreign direct investment in a given year as a percentage of the country’s GDP. School measures the level of education of the population; this indicator is calculated using total enrolment in secondary education. Open stands for economic openness, which has been computed by adding the exports and imports of a country and dividing by its GDP. Life\_t represents life expectancy at birth. Ocse\_t is a dummy variable that takes the value 0 if the country in year t was not an OCSE member and the value 1 otherwise. \( d_{1,t}, d_{2,t} \) and \( d_{3,t} \) represent dummy variables, which take the value 1 if the observation refers to the 1970s, 1980s, or 1990s, and take the value 0 otherwise.

However, the main objective of this is to investigate the relationship between the gender wage gap and economic growth; therefore, to achieve the study’s purpose, we rewrote the previous equation, and in addition we added other explanatory variables to the model in order to avoid omitted variable bias (Barro, 2000), as follows:

\[ \ln(GDP_t) = \alpha_0 + \alpha_1 \ln(gdp_{t-1}) + \alpha_2 GWG_{t-1} + \alpha_3 FDI + \alpha_4 School_t + \alpha_5 Open_t + \alpha_6 Life_t + \alpha_7 INF_t + \alpha_8 I_t + \varepsilon_t \]  
(2)
Where $GW_{G_{t-1}}$ represents the gender wage gap in the lagged period, and the lagged value is used in order to avoid the endogeneity problem. FDI represents foreign direct investment. School measures the level of education for the population. Open stands for economic openness. Life$_t$ represents life expectancy at birth. $I_t$ stands for investment, and $INF_t$ represents the inflation rate. However, this study used a panel data approach for OECD countries. Each variable has two parts i and t, where i represents country and t represents time.

The panel data estimation technique has many advantages, as outlined by Hsiao (2007). It has the ability to capture the complication of human behaviour better than a time series or cross-sectional data. Therefore, it allows researchers to control for individual heterogeneity and unobservable or unmeasured variables. These variables include differences in cultural aspects and factors that change over time; for example, international agreements and national regulations are factors that are considered for individual heterogeneity. In addition, it can produce more precise expectations for individual outcomes by pooling the data rather than producing expectations of individual outcomes by using ‘individuals’’ data. Furthermore, panel data techniques provide a large number of data and large degrees of freedom, and reduce the problem of collinearity between independent variable, which has an important impact on improving the effectiveness of economic estimates.

There are several possible techniques for estimating the panel data. The first is the fixed effects least square. It pools all variables with a separate intercept term for each cross section. The second is random effects. This technique deals with individual effects by including them in the error term (Naguib, 2015). The third method of estimation is pooled least square, which ignores the structure of the panel data.

However, this paper uses a dynamic model, as it includes a variable in period t-1 among its explanatory variables, and therefore the estimation with panel data methodology will make both fixed effects and random effects techniques give a
biased estimate (as a result of the so-called Nickell bias), due to the correlation between the error term and explanatory variables. Moreover, Grijalva (2011) indicated that neither the random effects nor the fixed effects technique is consistent in the case of the existence of a lagged period in the dependent variable.

To remove the bias in the estimation, we used the GMM technique, which was proposed by Arellano and Bond in 1991, and that was done through choosing an instrumental variable with a lagged value of more than one for the endogenous variable, such as ln(\(gdp_{t-2}\)), ln(\(gdp_{t-3}\)), etc. In addition, we used the first difference of the exogenous variables. The problem we want to solve lies in the endogenous lagged variable. As ln(\(gdp_{t-1}\)) has the error term, which is \(\epsilon_{i,t-1} = u_i + v_{i,t-1}\), and is correlated with it, and because the error term at time t is defined as \(\epsilon_{i,t} = u_i + v_{i,t}\), so ln(\(gdp_{t-1}\)) is correlated with \(\epsilon_{i,t}\), as both of them contain \(u_i\).

In order to obtain an unbiased estimation for the studied variables, the GMM technique, requires the equation to be rewritten in a first difference form, which in turn cancels out the correlation between the errors and lagged endogenous variable, as follows:

\[
\Delta Ln(GDP_{i,t}) = \alpha_1 \Delta \ln(gdp_{i,t-1}) + \alpha_2 \Delta GWG_{i,t-1} + \alpha_3 \Delta FD_{i,t} + \alpha_4 \Delta School_{i,t} + \\
\alpha_5 \Delta \text{Open}_{i,t} + \alpha_6 \Delta Life_{i,t} + \alpha_7 \Delta F_{i,t} + \Delta \epsilon_{i,t} \tag{3}
\]

Where is \(\Delta Ln(GDP_{i,t}) = Ln(GDP_{i,t}) - Ln(GDP_{i,t-1})\) and the same thing for the rest of the variables in the equation 3, the error term will be equal to

\[
\Delta \epsilon_{i,t} = u_i + v_{i,t} - u_i - v_{i,t-1}
\]

\[
\Delta \epsilon_{i,t} = v_{i,t} - v_{i,t-1}
\]

However, when the lagged variable is used as \(\Delta \ln(gdp_{i,t-1})\), this variable will be included within the error term \(\epsilon_{i,t-1}\); it means that \(v_{i,t-1}\) is correlated with \(\Delta \epsilon_{i,t}\), and the hypothesis of non-correlation between error terms and explanatory variables is violated. Therefore, it is necessary to use instrumental variables of an order of more than one (Naguib, 2015).
VI. Data

This study used unbalanced panel data for OECD countries which include; Australia, Austria, Belgium, Canada, Chile, Czech Republic, Denmark, Estonia, Finland, France, Germany, Greece, Hungary, Iceland, Ireland, Israel, Italy, Japan, Korea, Rep., Latvia, Luxembourg, Mexico, Netherlands, New Zealand, Norway, Poland, Portugal, Slovak Republic, Slovenia, Spain, Sweden, Switzerland, Turkey, United Kingdom, and United States. The data covers the period 1980–2015. This study could not find data farther than this period; in addition, some of the variables include one or two distracted observations which decreased our sample from 35 to 27 countries. However, the main sources of our data are world development indicators which published by World Bank and the OECD website. The data that were extracted from the World Bank website includes GDP per capita, Trade openness; it has been computed by adding the exports and imports of a country and dividing by its GDP. Also, FDI represents foreign direct investments. In addition, School, which measures the level of education in the country, is calculated using the total enrolment in secondary education. $\text{Life}_t$ represents life expectancy at birth, and $I_t$ is investment, for which we used capital formation as a proxy, $\text{INF}_t$ stands for the inflation rate. Finally, the gender wage gap (GWG) was extracted from OECD website, and it is computed as the difference between males and females wages divided by male’s wages. A detailed overview about all data sources is available in Table 1.A.1 and 1.A.2 in the Appendix 1.A.
VII. Empirical Results

In this section, we introduce the results of the random effects and fixed effects estimates, and the results of the GMM technique for OECD countries for the period 1980–2015.

Table 1
Panel Fixed Effects (FE), Random Effects (RE) and Generalized Method of Moments (GMM) for OECD Countries

<table>
<thead>
<tr>
<th>Variables</th>
<th>Fixed Effects (1)</th>
<th>Random Effects (2)</th>
<th>Fixed Effects (3)</th>
<th>Random Effects (4)</th>
<th>GMM (5)</th>
</tr>
</thead>
<tbody>
<tr>
<td>GDP_1</td>
<td></td>
<td>-0.1143***</td>
<td>-0.0160***</td>
<td>0.0160***</td>
<td>0.0008</td>
</tr>
<tr>
<td></td>
<td>(0.00)</td>
<td>(0.00)</td>
<td>(0.00)</td>
<td>(0.00)</td>
<td>(0.00)</td>
</tr>
<tr>
<td>Gender wage gap</td>
<td>-0.0011***</td>
<td>0.0007</td>
<td>-0.0017***</td>
<td>0.00008</td>
<td>-0.002***</td>
</tr>
<tr>
<td></td>
<td>(0.70)</td>
<td>(0.00)</td>
<td>(0.00)</td>
<td>(0.69)</td>
<td>(0.00)</td>
</tr>
<tr>
<td>Foreign direct investment</td>
<td>0.0027***</td>
<td>0.00255***</td>
<td>0.0037***</td>
<td>0.0024***</td>
<td>0.001***</td>
</tr>
<tr>
<td></td>
<td>(0.00)</td>
<td>(0.01)</td>
<td>(0.00)</td>
<td>(0.02)</td>
<td>(0.00)</td>
</tr>
<tr>
<td>Life expectancy</td>
<td>-0.0057***</td>
<td>-0.00318***</td>
<td>0.0023</td>
<td>-0.0013</td>
<td>0.017***</td>
</tr>
<tr>
<td></td>
<td>(0.00)</td>
<td>(0.00)</td>
<td>(0.101)</td>
<td>(0.00)</td>
<td>(0.00)</td>
</tr>
<tr>
<td>Secondary schools</td>
<td>0.0577</td>
<td>0.0353***</td>
<td>0.0425***</td>
<td>0.0369***</td>
<td>0.003</td>
</tr>
<tr>
<td></td>
<td>(0.00)</td>
<td>(0.00)</td>
<td>(0.00)</td>
<td>(0.00)</td>
<td>(0.88)</td>
</tr>
<tr>
<td>Trade openness</td>
<td>0.00048***</td>
<td>0.00003</td>
<td>0.0005***</td>
<td>0.0005</td>
<td>0.006***</td>
</tr>
<tr>
<td></td>
<td>(0.00)</td>
<td>(0.00)</td>
<td>(0.244)</td>
<td>(0.00)</td>
<td>(0.00)</td>
</tr>
<tr>
<td>Inflation rate</td>
<td>-0.0003***</td>
<td>-0.00066***</td>
<td>-0.0007***</td>
<td>-0.0007***</td>
<td>-0.0022***</td>
</tr>
<tr>
<td></td>
<td>(0.00)</td>
<td>(0.032)</td>
<td>(0.01)</td>
<td>(0.01)</td>
<td>(0.00)</td>
</tr>
<tr>
<td>Gross capital formation</td>
<td>0.0667***</td>
<td>0.0583</td>
<td>0.0966***</td>
<td>0.0621***</td>
<td>0.2021***</td>
</tr>
<tr>
<td></td>
<td>(0.00)</td>
<td>(0.00)</td>
<td>(0.00)</td>
<td>(0.00)</td>
<td>(0.00)</td>
</tr>
<tr>
<td>Constant</td>
<td>0.3830***</td>
<td>0.1661***</td>
<td>0.8099***</td>
<td>0.177***</td>
<td>2.210***</td>
</tr>
<tr>
<td></td>
<td>(0.00)</td>
<td>(0.00)</td>
<td>(0.00)</td>
<td>(0.00)</td>
<td>(0.00)</td>
</tr>
<tr>
<td>Hausman test</td>
<td>37.38***</td>
<td>74.00***</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td>(0.00)</td>
<td>(0.00)</td>
<td></td>
<td></td>
<td>(0.80)</td>
</tr>
<tr>
<td>Sargan test</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td>25.09</td>
</tr>
</tbody>
</table>

Note: ***, **, * represent 1%, 5%, 10% levels of significance respectively.
Table 1 presents the results obtained from estimating the relationship between gender wage inequality and economic performance. The first and second columns in table 1 report the results of the random effects and fixed effects analysis without the dynamic condition, while the third and fourth columns report the same kind of analysis with a dynamic condition. Moreover, table 1 shows the results of the GMM technique. However, we find a non-significant positive relationship between the gender wage gap and economic growth in the random effect analysis with a dynamic condition or without it, while in the fixed effects analysis, whether there is a dynamic or non-dynamic condition, gender wage inequality has a negative significant impact on economic growth. Furthermore, random effects and fixed effects analysis present information of the explanatory power ($R^2$), which means the percentage of variance or changes in the dependent variable that can be explained by the independent variables that are included in the model. There are three types of $R^2$: within, between and overall. In the case of random effects, the values of these variables are 0.22, 0.66 and 0.30 respectively, and in the same case for the fixed effects the values of $R^2$ are 0.26, 0.25 and 0.13 respectively.

Moreover, in order to determine whether the most suitable estimation approach is fixed effects or random effects, the Hausman test results are reported in table 1. We found that the Hausman test results are 37.38 and 74.00 for dynamic and non-dynamic conditions respectively, and they are significant at 5%. Since we can reject the null hypothesis, the fixed effects approach seems to be appropriate for both dynamic and non-dynamic models. However, the results of random effects and fixed effects analysis and the Hausman test have to be interpreted with care in the context of a dynamic model, because it might be inconsistent and biased (Naguib, 2015).

The fifth column in table 1 reports the results of using Arellano and Bond’s GMM technique for OECD countries. This study finds a negative impact of gender wage inequality on economic growth. The empirical work shows that an increase of 1% in the wage gap leads to a 0.002% decrease in economic growth rate per capita. This relationship is statistically significant at the 5% level. This is consistent with

However, this study predicted a negative relationship between gender wage inequality and economic growth, which means that an increase in the gender wage gap in OECD countries will decrease the economic growth rate. The increase in the gender wage gap will discourage women from participating in the labour market and hence decrease growth by decreasing labour force participation and productivity in the economy as a whole. In addition, reducing the wage gap between males and females will reduce fertility by increasing the opportunity cost of having children (Galor and Weil, 1996). Moreover, the gender wage gap will probably delay marriage, which lowers fertility and population growth even more and increases the potential for economic growth (Day, 2012; World Bank, 2011).

Furthermore, the fifth column reports positive relationship between explanatory variables such as FDI, life expectancy, trade openness, secondary schools, gross capital formation and economic growth. The relationships for these variables are statistically significant at 5%, except for secondary schools, for which relationships were not significant. In addition, there is a negative significant relationship between inflation and economic growth.

However, FDI can increase the economic growth by increasing the variety and quality of goods available and also the physical amount of capital stock (Neuhaus, 2006), in addition FDI might contribute in creation new jobs and investments which affect in economic growth positively. Our findings are consistent with Brooks and Sumulong (2003). Trade openness ensures a better allocation of resources and enhances investments as a result of economies of scale, technology and knowledge spillover, which, in turn, increase the economic growth. The positive relationship between trade openness and economic growth was also reported by Hasan (2021). In terms of the positive impact of life expectancy on economic growth, an important group of literature dealing with life expectancy as an indicator of health which is considered an important factor in
economic development, however our result is consistent with Barro (1996) and Aghion et al. (2010). Finally, school enrolment might enhance the human capital accumulation rate which increases labour productivity and thus increase economic growth.

However, the Sargan test indicates that the instruments are valid and the model formulation is correct, based on the failure to reject the null hypothesis. The tests are stated in table 1.

However, we conducted the same estimation for the European countries for the same period 1980–2015, to verify whether the economic mechanisms that link the gender wage gap and economic growth vary from one group of countries to another. We find the same results as for OECD countries, where the results show a non-significant positive relationship between the gender wage gap and economic growth in the random effects analysis with a dynamic condition or without it, while the fixed effects analysis shows that the gender wage gap has a negative significant impact on economic growth in the case of the non-dynamic condition only. Moreover, the Hausman test results are 37.91 and 52.62 for dynamic and non-dynamic conditions respectively, as reported in table 2, and they are significant at 5%. Since we can reject the null hypothesis, the fixed effects approach seems to be appropriate for both dynamic and non-dynamic models.
What is interesting in table 2 is that the results of Arellano and Bond’s GMM technique for European countries are consistent with our results for OECD countries using the same analysis technique, in that the empirical work shows that in the European countries an increase of 1% in wage inequality between the two genders leads to a 0.003% decrease in economic growth rate per capita. This relationship is statistically significant at 10%. In addition, the Sargan test points
out that the instruments are valid and the model formulation is correct based on the failure to reject the null hypothesis. The tests are stated in table 2.

Finally, this study reports a positive relationship between these explanatory variables such as FDI, trade openness, secondary schools, life expectancy and gross capital formation. The relationships for these variables are statistically significant at 5%, except for secondary schools and FDI, for which relationships were not significant. In addition, there is a negative significant relationship between inflation and economic growth: the relationship is statistically significant at 1%.

VIII. Robustness Check

In order to check whether the results obtained in this study are sensitive to change in the model formulation, this study used two approaches, the first approach conducted estimation by including additional explanatory variables, including growth rate of population, public expenditure as a percentage of GDP and enrolment rates of tertiary schools, in the OECD countries model. Growth rate of population and public expenditure as a percentage of GDP are expected to be negative, while the coefficient sign for tertiary school enrolment is positive (Naguib, 2015; Barro, 2008).

The first and second columns in table 3 report the results of the fixed effects and random effects techniques in a dynamic model. We find a significant negative relationship between the gender wage gap and economic growth in the fixed effects analysis only. However, the Hausman test has been conducted. Since we can reject the null hypothesis, the fixed effects approach seems to be appropriate. The tests are stated in table 3.

The third column in table 3 reports the results of Arellano and Bond’s GMM technique for OECD countries. We find that all additional explanatory variables have the expected signs for their coefficients. However, the relationship between the gender wage gap and economic growth is still statistically significant. The empirical work shows that an increase of 1% in the wage gap leads to a 0.002%
decrease in economic growth rate per capita. This relationship is statistically significant at the 5% level. In addition, the Sargan tests still provide adequacy of the instruments, and the model formulation is correct, based on the failure to reject the null hypothesis. The tests are stated in table 3.

The signs for the coefficients of the rest of the variables remain the same as in the previous regression analysis; the variables are FDI, life expectancy, secondary schools, trade openness, inflation rate and gross capital formation, and their coefficients are 0.00015, 0.0133, 0.00265, 0.00018, -0.00188 and 0.1792 respectively.

Table 3
Panel Fixed Effects (FE), Random Effects (RE) and Generalized Method of Moments (GMM) for OECD Countries

<table>
<thead>
<tr>
<th>Variables</th>
<th>Fixed Effects (1)</th>
<th>Random Effects (2)</th>
<th>GMM (5)</th>
</tr>
</thead>
<tbody>
<tr>
<td>GDP_1</td>
<td>-0.1430***</td>
<td>-0.01202**</td>
<td>0.6450***</td>
</tr>
<tr>
<td></td>
<td>(0.00)</td>
<td>(0.02)</td>
<td>(0.00)</td>
</tr>
<tr>
<td>Gender wage gap</td>
<td>-0.0015***</td>
<td>-0.00038</td>
<td>-0.00222***</td>
</tr>
<tr>
<td></td>
<td>(0.00)</td>
<td>(0.53)</td>
<td>(0.00)</td>
</tr>
<tr>
<td>Foreign direct investment</td>
<td>0.00011</td>
<td>0.00024</td>
<td>0.00015</td>
</tr>
<tr>
<td></td>
<td>(0.51)</td>
<td>(0.15)</td>
<td>(0.20)</td>
</tr>
<tr>
<td>Life expectancy</td>
<td>0.00426***</td>
<td>-0.0012</td>
<td>0.0133***</td>
</tr>
<tr>
<td></td>
<td>(0.00)</td>
<td>(0.21)</td>
<td>(0.00)</td>
</tr>
<tr>
<td>Secondary schools</td>
<td>0.01859*</td>
<td>0.0432***</td>
<td>0.00265</td>
</tr>
<tr>
<td></td>
<td>(0.08)</td>
<td>(0.00)</td>
<td>(0.85)</td>
</tr>
<tr>
<td>Trade openness</td>
<td>0.00016</td>
<td>0.00005</td>
<td>0.00018</td>
</tr>
<tr>
<td></td>
<td>(0.14)</td>
<td>(0.32)</td>
<td>(0.37)</td>
</tr>
<tr>
<td>Inflation rate</td>
<td>-0.00006</td>
<td>-0.000038</td>
<td>-0.00188***</td>
</tr>
<tr>
<td></td>
<td>(0.82)</td>
<td>(0.24)</td>
<td>(0.00)</td>
</tr>
<tr>
<td>Gross capital formation</td>
<td>0.10711***</td>
<td>0.06942***</td>
<td>0.1792***</td>
</tr>
<tr>
<td></td>
<td>(0.00)</td>
<td>(0.00)</td>
<td>(0.00)</td>
</tr>
<tr>
<td>Growth rate in population</td>
<td>-0.01266***</td>
<td>-0.0097***</td>
<td>-0.0118**</td>
</tr>
<tr>
<td></td>
<td>(0.00)</td>
<td>(0.00)</td>
<td>(0.02)</td>
</tr>
<tr>
<td>Tertiary education</td>
<td>0.00066***</td>
<td>0.00011</td>
<td>0.00086***</td>
</tr>
<tr>
<td></td>
<td>(0.00)</td>
<td>(0.28)</td>
<td>(0.00)</td>
</tr>
<tr>
<td>Government consumption</td>
<td>-0.00579***</td>
<td>-0.0022***</td>
<td>-0.00924***</td>
</tr>
<tr>
<td></td>
<td>(0.00)</td>
<td>(0.00)</td>
<td>(0.00)</td>
</tr>
<tr>
<td>Constant</td>
<td>0.96308***</td>
<td>0.1695**</td>
<td>2.2302***</td>
</tr>
<tr>
<td></td>
<td>(0.00)</td>
<td>(0.019)</td>
<td>(0.00)</td>
</tr>
<tr>
<td>Hausman test</td>
<td></td>
<td>93.71***</td>
<td></td>
</tr>
<tr>
<td></td>
<td></td>
<td>(0.00)</td>
<td></td>
</tr>
<tr>
<td>Sargan test</td>
<td></td>
<td>23.26</td>
<td></td>
</tr>
<tr>
<td></td>
<td></td>
<td>(0.86)</td>
<td></td>
</tr>
<tr>
<td>Chi2</td>
<td></td>
<td></td>
<td></td>
</tr>
</tbody>
</table>
Furthermore, we conducted estimation by including the additional explanatory variables, including growth rate of population, public expenditure as a percentage of GDP and enrolment rates of tertiary schools, in the European countries model. We found a significant negative relationship between the gender wage gap and economic growth by using Arellano and Bond’s GMM estimation technique. In addition, the Sargan test still indicated that the instruments are adequate and that the model formulation is correct, based on the failure to reject the null hypothesis. In conclusion, adding the three dependent variables did not change the coefficient sign for gender wage inequality for either the OECD or the European countries for the period 1980–2015. However, the values of the explanatory variables indicate various degrees of sensitivity to the model formation.

The second approach used two step difference GMM by using XTABOND2 commands, where we used the instruments in level and in the first difference to investigate the impact of the gender wage gap on economic growth, the results showed a significant negative relationship between the two variables at the 1% level, and the coefficient was (.007%) in case of using the instruments in the first difference and (.006%) in case of using the instruments in the level. To check the validity of the model specification, we used Hansen over identification test and the second ordered serial correlation (AR2) test. Both of the two tests indicated that the instruments are valid and that the model formulation is correct, based on the failure to reject the null hypothesis for the two tests. However, the signs for the coefficients of the rest of the variables remain the same as in the previous regression analysis.
IX. Conclusion

This paper examines the relationship between the gender pay gap and economic growth for OECD and European countries. An unbalanced panel data analysis for both countries was used for the period 1980–2015. We used different estimation techniques such as fixed effects and random effects in addition, and Arellano and Bond’s GMM technique to investigate the relationship between gender wage inequality and economic performance. Moreover, in order to determine whether the most suitable estimation approach is fixed effects or random effects, Hausman testing was conducted. We found the Hausman test results for both dynamic and non-dynamic condition are significant at 5% for both OECD and European countries. Since we can reject the null hypothesis, the fixed effects approach seems to be appropriate for both dynamic and non-dynamic models for both groups of countries. However, the results of random effects and fixed effects analysis and Hausman testing have to be interpreted with care in the context of a dynamic model, because it might be inconsistent and biased (Naguiib, 2015).

The results of Arellano and Bond’s GMM technique for both OECD and European countries indicate that inflation has a significant negative impact on GDP, while FDI, trade openness, secondary schools, life expectancy and gross capital formation have a positive impact on GDP. The relationships for most of these variables are statistically significant at 5%. FDI is not significant for European countries, and in addition secondary schools enrolment is not significant for either group of countries. Moreover, we found a significant negative relationship between the gender wage gap and economic growth for the two groups of countries for the period 1980–2015. The empirical work shows that an increase of
1% in the wage gap leads to a 0.002% decrease in economic growth rate per capita for OECD countries. This relationship is statistically significant at the 5% level. Likewise, we find that the results of Arellano and Bond’s GMM technique for European countries are consistent with our results for OECD countries, in that the empirical work shows that in the European countries an increase of 1% in wage inequality between the two genders leads to a 0.003% decrease in economic growth rate per capita. This relationship is statistically significant at 10%. The Sargan test for both groups of countries points out that the instruments are valid and the model formulation is correct based on the failure to reject the null hypothesis. Furthermore, the results of Arellano and Bond’s GMM technique for the relationship between the gender wage gap and economic performance are consistent with those of Day (2012), Pervaiz and others (2011), the World Bank (2011) and Cassells and others (2009).

To check for robustness, this study used two approaches, the first one included additional explanatory variables in the OECD countries model and the European countries model: the population growth rate, public expenditure as a percentage of GDP and enrolment rates of tertiary schools. The signs for variable coefficients remain the same for fixed effects and random effects techniques and also in addition Arellano and Bond’s GMM analysis technique. However, the quantitative impact of gender wage inequality on economic growth rate per capita indicates a small degree of sensitivity in the model. The second approach used two step difference GMM by using XTABOND2 commands, where we used the instruments in level and in the first difference to investigate the impact of the gender wage gap on economic growth, the results showed a significant negative relationship between the two variables at the 1% level, and the coefficient was (.007%) in case of using the instruments in the first difference and (.006%) in case of using the instruments in the level. Future work might consider other groups of countries divided by income or regions.
Reference List


Appendix

A.1 descriptive statistics for the data set of OECD countries

<table>
<thead>
<tr>
<th>Variable</th>
<th>Obs</th>
<th>Mean</th>
<th>Std. Dev.</th>
<th>Min</th>
<th>Max</th>
</tr>
</thead>
<tbody>
<tr>
<td>GDP</td>
<td>1,172</td>
<td>32349.33</td>
<td>19066.76</td>
<td>3910.77</td>
<td>110001.1</td>
</tr>
<tr>
<td>Gross Capital formation</td>
<td>1,172</td>
<td>23.68</td>
<td>4.21</td>
<td>9.83</td>
<td>41.54</td>
</tr>
<tr>
<td>Inflation</td>
<td>1,173</td>
<td>9.32</td>
<td>28.02</td>
<td>-4.48</td>
<td>555.38</td>
</tr>
<tr>
<td>Life Expectancy</td>
<td>1,225</td>
<td>76.19</td>
<td>3.92</td>
<td>58.69</td>
<td>83.59</td>
</tr>
<tr>
<td>Gender wage gap</td>
<td>575</td>
<td>19.17</td>
<td>9.28</td>
<td>.384</td>
<td>52.78</td>
</tr>
<tr>
<td>Trade Openness</td>
<td>1,172</td>
<td>78.73</td>
<td>48.46</td>
<td>15.92</td>
<td>391.49</td>
</tr>
<tr>
<td>Foreign Direct investment</td>
<td>1,120</td>
<td>3.64</td>
<td>10.58</td>
<td>-58.98</td>
<td>255.42</td>
</tr>
<tr>
<td>Secondary school</td>
<td>1,100</td>
<td>2784971</td>
<td>4226835</td>
<td>20817</td>
<td>2.47</td>
</tr>
<tr>
<td>Government consumption</td>
<td>1,172</td>
<td>18.72</td>
<td>4.50</td>
<td>7.52</td>
<td>41.48</td>
</tr>
<tr>
<td>Tertiary Schools</td>
<td>1,103</td>
<td>46.00</td>
<td>22.99</td>
<td>1.44</td>
<td>110.26</td>
</tr>
<tr>
<td>Growth rate of population</td>
<td>1,259</td>
<td>.62</td>
<td>.736</td>
<td>-2.57</td>
<td>6.02</td>
</tr>
</tbody>
</table>

Data source: The data abstracted from World Development Indicators, published by the World Bank include: GDP per capita, Trade openness, foreign direct investments, secondary school, life expectancy at birth, and capital formation and the inflation rate while gender wage gap abstracted from OECD website.
## A.2 definition of the data

<table>
<thead>
<tr>
<th>variable</th>
<th>definition</th>
</tr>
</thead>
<tbody>
<tr>
<td>GDP</td>
<td>GDP per capita is gross domestic product divided by midyear population. GDP is the sum of gross value added by all resident producers in the economy plus any product taxes and minus any subsidies not included in the value of the products. It is calculated without making deductions for depreciation of fabricated assets or for depletion and degradation of natural resources. Data are in constant 2010 U.S. dollars.</td>
</tr>
<tr>
<td>Gross Capital formation</td>
<td>Gross capital formation (% of GDP)</td>
</tr>
<tr>
<td>Inflation</td>
<td>Inflation as measured by the consumer price index reflects the annual percentage change in the cost to the average consumer of acquiring a basket of goods and services that may be fixed or changed at specified intervals, such as yearly. The Laspeyres formula is generally used.</td>
</tr>
<tr>
<td>Life expectancy</td>
<td>Life expectancy at birth indicates the number of years a new-born infant would live if prevailing patterns of mortality at the time of its birth were to stay the same throughout its life.</td>
</tr>
<tr>
<td>Gender wage gap</td>
<td>The gender wage gap is defined as the difference between average earnings of men and women relative to average earnings of men. Data refer to full-time employees.</td>
</tr>
<tr>
<td>Trade openness</td>
<td>Trade is the sum of exports and imports of goods and services measured as a share of gross domestic product.</td>
</tr>
<tr>
<td>Foreign direct investment</td>
<td>Foreign direct investment (% of GDP)</td>
</tr>
<tr>
<td>Secondary school</td>
<td>the total number of pupils enrolled at secondary level in public and private schools</td>
</tr>
<tr>
<td>Government consumption expenditure</td>
<td>Final consumption expenditure (% of GDP)</td>
</tr>
<tr>
<td>Tertiary Schools</td>
<td>the total number of pupils enrolled at tertiary level in public and private schools</td>
</tr>
<tr>
<td>population</td>
<td>Population growth (annual %)</td>
</tr>
</tbody>
</table>