THE IMPACT OF GENDER AND GENDER COMPOSITION ON OCCUPATIONAL WAGE INEQUALITY IN PALESTINE: A MULTILEVEL MODELING APPROACH

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by

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LIST OF ABBREVIATIONS

AIC	Akaike Information Criterion
ANOVA	Analysis of Variance
BIC	Bayesian Information Criterion
EB	Empirical-Bayes
EM	Expectations-Maximization
GLS	Generalized Least-Squares
HDI	Highest Density Interval
ICC	Intra-Class Correlation Coefficient
IGO	International Government Organization
IGLS	Iterative Generalized Least-Squares
ILO	International Labor Organization
ISCO-08	International Standard Classification of Occupations
MCMC	Monte Carlo Markov Chain
ML	Maximum Likelihood
NGO	Nongovernmental Organization
NIS	New Israeli Shekels
OLS	Ordinary Least Square
PCBS	Palestinian Central Bureau of Statistics
PLFS	Palestinian Labor Force Survey
RML	Restricted Maximum Likelihood
U.K.	United Kingdom
U.S.	United States

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KESAN JANTINA DAN KOMPOSISI JANTINA TERHADAP KETIDAKSEIMBANGAN UPAH PEKERJAAN DI PALESTIN: PENDEKATAN PEMODELAN BERTINGKAT

ABSTRAK

Ketidakseimbangan dalam pembayaran upah di antara lelaki dan wanita adalah fenomena global yang dihadapi oleh dunia. Masalah ini lebih ketara terutamanya di negara-negara sedang membangun disebabkan oleh faktor sosial-budayanya. Palestin adalah salah satu negara yang mengalami nisbah kadar ketidakseimbangan penyertaan jantina yang tinggi dalam pasaran buruh di mana penyertaan wanita adalah di antara yang terendah di dunia. Selain itu, diskriminasi pekerjaan dan ketidakseimbangan gaji masih wujud antara lelaki dan wanita. Dengan menggabungkan kedua-dua isu tersebut, tesis ini bertujuan untuk mengkaji kesan komposisi jantina dan pekerjaan terhadap tahap upah di pasaran buruh Palestin dan menyumbang dalam tiga cara: pertama, ini adalah kajian pertama yang menganalisis jurang upah pekerjaan jantina di Palestin menggunakan model linear bertingkat-multi kerana nisbah jurang gaji jantina yang tinggi. Ia tidak terhad kepada penyiasatan perbezaan antara kumpulan pekerjaan dan kumpulan dalam pekerjaan tetapi juga meliputi penyedidikan perbezaan gaji antara kumpulan pekerjaan dalam kumpulan pekerjaan. Kedua, tesis ini menunjukkan bahawa penganggar Bayesian memberikan anggaran yang paling tepat dan efisien berbanding dengan teknik konvensional kebolehjadian maksimum (ML) dan kebolehjadian maksimum terhad (RML). Ketiga, tesis ini mengkaji pengaruh pemisahan pekerjaan berdasarkan jantina dengan

menggunakan model upah dua tingkat di mana klasifikasi pekerjaan diuraikan menggunakan klasifikasi dua digit. Pendekatan ini memberikan anggaran yang lebih tepat tetapi belum diterokai dengan baik. Data dikumpulkan dari soal-selidik Tenaga Buruh Palestin (PLFS) sepanjang tahun 2014 hingga 2018. Hasilnya melaporkan bukti ketidakseimbangan upah disebabkan oleh kumpulan pekerjaan menyumbang kepada sekitar 23.4% perbezaan gaji. Secara puratanya, upah dalam pekerjaan yang dikuasai oleh lelaki lebih tinggi daripada upah yang diintegrasikan dengan jantina dan pekerjaan yang dikuasai oleh wanita. Hasilnya juga menunjukkan bahawa lelaki menikmati kelebihan upah berbanding wanita dalam semua pekerjaan mengikut jenis jantina, di mana ia menyokong hipotesis kelebihan lelaki sejagat. Tambahan lagi, ukuran jurang gaji jantina lebih luas dalam pekerjaan yang dikuasai oleh wanita berbanding dengan pekerjaan jenis jantina yang lain. Selain diskriminasi pekerjaan berdasarkan jantina, sebahagian besar jurang gaji antara pekerjaan di pasaran buruh Palestin boleh dijelaskan oleh ciri-ciri pekerja, termasuk tempat kerja, sektor perindustrian, sektor pekerjaan, wilayah, status pekerjaan dan status perkahwinan. Tesis ini mencadangkan untuk mengurangkan gaji pekerja melalui penguatkuasaan gaji setara dan program yang mendorong penyertaan wanita dalam pasaran buruh.

THE IMPACT OF GENDER AND GENDER COMPOSITION ON OCCUPATIONAL WAGE INEQUALITY IN PALESTINE: A MULTILEVEL MODELING APPROACH

ABSTRACT

Inequality in the wage paid between males and females is a global phenomenon faced by the world. The problem is more severe in developing countries due to the social-cultural factor. Palestine is one of the countries experiencing a high ratio of imbalance participation rate of genders in the labor market in which female participation is among the lowest worldwide. On the other hand, occupational discrimination and wage inequality still exist between males and females. Combining both issues, this thesis seeks to examine the impact of gender and occupational gender composition on wage levels in the Palestinian labor market and contributes in three ways: first, this is the first study that analyzes the occupational gender wage gap in Palestine using multilevel linear models due to its high ratio of the gender pay gap. It does not limit the investigation of the between-occupation groups and within-occupation groups variations but also includes the examination between-gender-within occupation groups wage differentials. Second, this thesis demonstrates that the Bayesian estimator provides the most accurate and efficient estimation as compared to the conventional technique of maximum likelihood (ML) and restricted maximum likelihood (RML). Third, the thesis examines the effect of occupational sex segregation by utilizing the two-level wage models where occupations classification is decomposed using an ISCO-08 two-digit classification. This approach provides a more accurate estimate but not yet

well-explored. The data are collected from the Palestinian Labour Force Survey (PLFS) over the period 2014 to 2018. The results reported evidence of wage inequality due to occupational groups which account for about 23.4% of wage differentials. On average, wages in male-dominated occupations are higher than those in gender-integrated and female-dominated occupations, which supports the devaluation hypothesis. The results also indicate that men enjoyed wage advantage over women across the gender-typed occupations, which supports the universal male advantage hypothesis. Moreover, the size of the gender pay gap is wider in occupations dominated by females as compared to other gender-typed occupations. Besides gender-based occupational discrimination, a significant portion of the between-occupation wage gap in the Palestinian labor market is mainly explained by workers' characteristics including place of work, industrial sectors, sector of employment, region, work status, and marital status. The thesis suggests reducing the gender wage gap through equal pay enforcement and programs to encourage women's participation in the labor market.

CHAPTER 1

INTRODUCTION

1.1 Overview

This chapter comprises seven sections. The second section provides the study background. The third section details the problem statement and research questions. The fourth section presents the study's aims and objectives. The fifth section presents the scope of the study. The sixth section describes the methodology and flowchart of the analysis procedure. The seventh section summarizes the contribution of the study. The last section presents the organization of the thesis.

1.2 Background Study

The results of various researches indicate that the imbalance in pay among genders is a prevalent feature of labor markets worldwide (Blau and Khan, 2003). Various factors may explain this gender imbalance in wages such as differences in human capital, sociodemographic, productivity, occupational, and industrial characteristics, which might differ among workers. Brown *et al*. (1980) consider occupational gender discrimination as a potential source of wage differentials. Bayard *et al*. (2003) show that females' concentration in a restricted number of occupations appears to be one of the contributing factors of the gender pay gap, despite its actual impact still debatable. Several studies examined the influence of occupational segregation on the gender pay gap net of workers' characteristics using either aggregated or disaggregated occupations (England *et al*., 2007; de Ruitjer and Huffman, 2003; Huffman, 2004b; Couppie´ *et al*., 2014; Brynin and Perales, 2016; Bunel and Guironnet, 2017; Strawinski *et al*., 2018; Kim, 2018).

Most of these studies investigated occupational segregation by examining the effect of gender composition in occupations on wages. Mostly, scholars confirmed the negative impact of gender composition on wages and showed that wages in occupations dominated by females are lesser than wages in occupations dominated by males. Accordingly, different mechanisms have been suggested to explain such lower pay in occupations predominant by women. One possible mechanism is the devaluation of female's work leading to gender bias. Another possible reason is the Human Capital Theory, which attributes wage variability among males and females due to differences in human capital attributes such as education. Finally, the crowding hypothesis for which females are more presented in specific occupations leading to labor oversupply and thus lower wages (de Ruitjer *et al*., 2003).

Different views and explanations of the gender pay gap have been extensively discussed by several researchers for policy-making and scientific objectives. Some studies relied on the estimation of the standard Mincer wage model separately for men and women controlling for human capital and non-human capital characteristics (Mincer, 1974; Daoud, 2005). Other studies used Blinder-Oaxaca's (1973) decomposition approach, which is applied to the Mincer wage model. This approach generally decomposed gender wage differentials into an explained part by variations in human capital endowments, and an unexplained part usually attributed to gender segregation in the labor market. Despite these approaches have been widely used in the literature, the estimation results obtained from the Ordinary Least Square (OLS) may suffer from various econometric problems. For example, inefficiency estimate due to the weakness of the data such as endogeneity and self-selection bias (Heckman and Vytlacil; 1998, Card; 2001). Moreover, discrimination may be underestimated if

some controls included in the wage model are themselves sources of discrimination (Strawinski *et al*., 2018).

On the other hand, labor market data usually have a hierarchical structure in which workers are nested in occupational groups. Ignoring this data structure, many occupational dummies are created to control for occupational effects in which several degrees of freedom will be introduced resulting in downward biased standard errors of the estimated coefficient from the classical approaches. Moreover, adding the contextual effect of occupational-level controls to the wage model may result in correlated disturbances for workers in the same jobs, which violates the independence assumptions of the OLS method (Raudenbush and Bryk, 2002; Snijders and Bosker, 2012). Multilevel linear models, however, circumvent these problems by including occupations at the second level. One important advantage of multilevel modeling is that an investigator can address the sources of wage differences at the individual-level and job-level and thus allowing for distinguishing the impact of gender at the individual-level from the contextual influence of occupational sex composition (Huffman, 2004b; de Ruijter and Huffman, 2003; de Ruijter *et al*., 2003; Bunel and Guironnet, 2017; Kim, 2018).

Different estimation techniques have been proposed to estimate the parameters of both fixed and random effects of multilevel models. ML is the most frequent method used to estimate model parameters, but this estimation may be biased for more complex models or small sample sizes. RML, however, was introduced to overcome this problem and may provide less biased results. Unlike conventional methods, the Bayesian estimation method may provide more precise estimates since it is not a large sample approximation method. It combines prior believes with the likelihood of the

data to obtain a complete posterior distribution of model parameters (Hox, *et al*., 2018; Smid *et al*., 2020).

The Palestinian labor market has distinctive features that include high unemployment rates, especially for women, and the low participation rate of women, which distinguishes it from other economies in the world. As reported in the 2018 labor force conducted by the Palestinian Central Bureau of Statistics (PCBS), the women's participation rate was 19.9% compared to that of men 70.3% exhibiting a decreasing trend in the gender participation gap. Although this gap has improved over time, the women's participation rate in Palestine stands among the lowest in the world. Besides, Palestine is also experiencing a high pay gap in the labor market. The unadjusted wage gap between males and females was 29% with males earn 119.1 New Israeli Shekels (NIS) while women only earn 84.6 NIS daily pay on average (PCBS, 2018). Recent evidence from Palestine showed that men earn higher wages than women counterparts. For example, the gender wage gap is about 40% in occupations where more than 50% of workers are females in the West Bank; suggesting strong evidence of gender discrimination (Hammoudeh, 2020). The facts and data reveal that the imbalances of gender participation and the higher rates of wage inequality are the two major issues/ phenomena faced by Palestine for a long time. Therefore, there is a need to identify the problems/ reasons behind them follow by appropriate policy action to overcome the problems.

From the above, this thesis is motivated by the apparent lack of studies on the use of Bayesian multilevel modeling in examining the gender wage gap and gender discrimination research. Moreover, considering the prevalence of the gender pay gap and occupational discrimination in Palestine, there is a need to understand and examine the effect of gender and occupational gender composition on wages. To this end, the

scopes of the available evidence in Palestine are mainly descriptive and mostly relied on traditional methods such as Oaxaca-Blinder and Mincer wage equation. Besides, the impact of occupational gender compositions on wages investigated using the two-digit occupational classifications based on the International Standard Classification of Occupations (ISCO; ILO, 2012) has not yet been examined in Palestine, especially those applied to the Bayesian multilevel linear regression method with two-digit occupational classifications in the second level, to the best of the author's knowledge. So, it is not obvious to what extent occupational sex compositions could explain wage inequality and the gender pay gap across different occupations in Palestine.

1.3 Problem Statement and Research Questions

The gender pay gap is a prevalent phenomenon across various labor markets worldwide. One potential cause of this gap is occupational segregation. The studies focused on examining occupational sex discrimination are broad, covering different countries and periods as well as applying different decomposition methods. Some studies relied on a single wage equation including the Oaxaca-Blinder decomposition method (Blinder, 1973; Oaxaca, 1973). However, this approach has various potential limitations. First, discrimination may be underestimated if some controls included in the wage model are themselves sources of discrimination (Strawinski *et al*., 2018). Second, this approach ignores the hierarchical structure of the data resulting in the violence of the independence assumption of error terms in OLS and thus the error terms are correlated resulting from nested data (Raudenbush and Bryk, 2002). Many dummies for occupations are included in the model leading to higher degrees of freedom and thus standard error are either less accurate or biased. Some researchers estimate a separate regression model for each occupation, which is time-consuming,

to measure the gender pay gap and occupational sex discrimination in different occupations (Strawinski *et al*., 2018).

Other studies relied on examining the effect of occupational gender composition on wage inequality; these studies tried to address the sources of inequality such as between occupation gender inequality and within occupation gender inequality. Most of these previous studies applied multilevel analysis using conventional estimation techniques such as ML and RML methods (de Ruitjer and Huffman, 2003; Huffman, 2004; Bunel and Guironnet, 2017; Kim, 2018; Strawinski *et al*., 2018). Parameter estimates from these conventional methods may suffer from inaccuracy estimates in complex models or small sample sizes, especially for random components. (Hox *et al*., 2018).

Historical records in the Palestinian labor market showed that the gender pay gap is a prevalent phenomenon faced by Palestine for a long time (Daoud, 2005; PCBS, 2018; Hammoudeh, 2020). Therefore, there is a need to identify the problems/ reasons behind them follow by appropriate policy action to overcome the problems. A possible cause of this gender pay gap is occupational sex segregation in the labor market. However, most studies applied to the Palestinian context relied on the traditional decomposition approaches (e.g., Blinder-Oaxaca approach) based on one-digit occupational classifications, which provided limited information and less accurate estimate. Furthermore, the effect of occupational sex segregation is not well explored in the Palestinian labor market. Hammoudeh (2020) provides a descriptive study of occupational discrimination but her study was only applied to the West Bank data.

Considering the above discussion, this thesis seeks to fill the gaps in the literature and seeking solutions to the limitations in terms of answering the following research questions.

a. Which econometric technique among the three methods (i.e., ML, RML, Bayesian) provides more efficient estimates in studying the gender pay gap across occupational groups using a multilevel linear model?
b. Do males and females earn significantly lesser wages if they work in occupations dominated by females as compared to sex-integrated and male-dominated occupations in the Palestinian labor market, net of individual-level controls?
c. What is the size of the gender pay gap across all three types of occupations (i.e., male-dominated, sex-integrated, female-dominated) that can explain within-occupational groups wage inequality?

1.4 Research Aim and Objectives

The main aim of this thesis is to investigate the impact of gender and occupational gender composition on wages in the Palestinian labor market using a multilevel analysis strategy utilizing detailed data on daily wages with the two-digit ISCO-08.

The more detailed objectives of the current thesis are expressed as follows:

a. To determine which estimation method among the three methods (i.e., ML, RML, Bayesian) should better predict different proposed two-level wage models.
b. To analyze whether or to what extent males and females earn lower wages in occupations dominated by females than those in occupations dominated by males (i.e., devaluation) net of individual-level controls.

c. To identify whether or to what extent the size and magnitude of the gender pay gap across all three types of occupations can explain within-occupational groups wage inequality.

1.5 Scope of the Study

The current thesis focuses on filling the gap in the current literature about occupational gender discrimination research in the Palestinian labor market. The effect of gender and occupational sex segregation using two-digit ISCO-08 has not yet been well explored in Palestine. Therefore, four different two-level linear models are applied to the wage equation where occupational groups are considered at the second level to examine the impact of gender and occupational gender composition on wages in the Palestinian labor market. Detailed data on daily wages with two-digits occupational classification obtained from PLFS over the period 2014 -2018 are analyzed. The occupational gender composition is controlled by defining three dummies which are male-dominated, gender-integrated, and female-dominated occupations where the first dummy is used as the reference category. Individual-level controls including human capital, industrial sectors, and demographic variables are also included. Parameters of the two-level linear models in this thesis are estimated using three different econometric techniques which are ML, RML, and Bayesian estimation methods to determine which estimation method provides more efficient results for robustness purposes.

1.6 Methodology

This thesis applies two-level linear modeling to the wage equation for the data used in this study where workers are presented at the individual-level and two-digit

occupational groups are presented at the second level. This thesis also includes three dummies to represent the gender compositions in occupations and various controls such as education, age, etc. are also included in the fixed part of the model.

Four different two-level linear models are proposed to address our research objectives and their respective parameters are estimated using ML, RML, and Bayesian estimation methods. The estimation results from these three methods are also compared for robustness purposes. Figure 1.1 presents a flowchart of the analysis procedure used in this thesis.

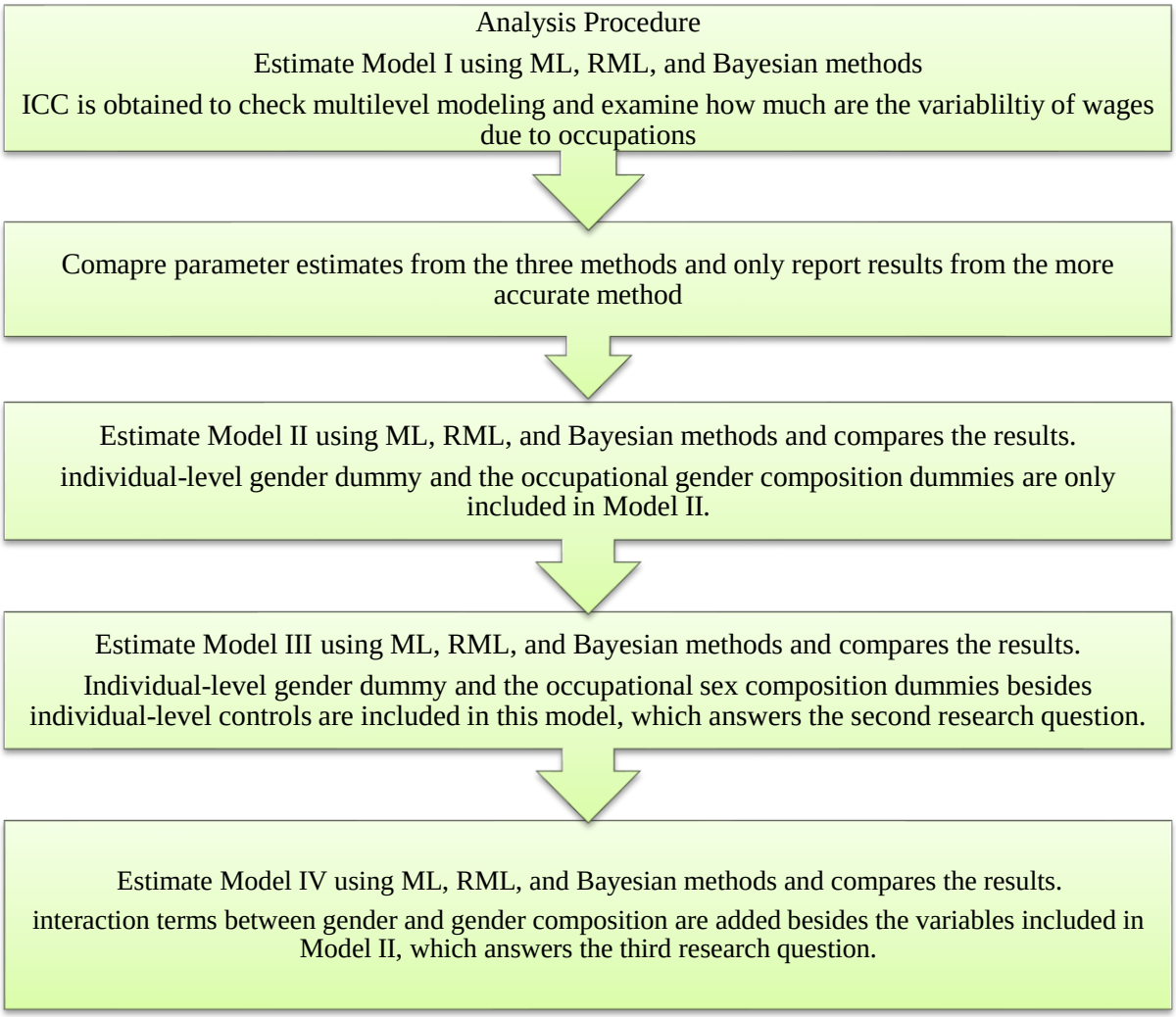

Figure 1.1 Flowchart of the Analysis Procedure

1.7 Contribution of the Study

To the best of our knowledge, this is the first-ever exploratory study that analyzes the occupational gender wage gap in Palestine using multilevel linear models. It does not limit to investigate the between-occupation groups and within-occupation groups variability but also investigates between-gender-within occupation groups wage differentials. This study showed that females are disadvantaged across all occupations and the gender pay gap is higher in female-dominated occupations as compared to gender-mixed and men-dominated occupations in the Palestinian labor market. Besides, this study showed that gender compositions, region, industrial sectors, place of work, sector of employment, work status, and marital status are the main contributing factors to occupational gender wage inequality in the Palestinian labor market.

The accuracy of the estimated parameters in multilevel linear models should be sought by researchers. Therefore, this thesis estimates our models using ML, RML, and Bayesian estimation techniques and compared the estimation results obtained across these methods. This thesis demonstrates that the Bayesian approach provides a better estimate as compared to ML and RML approaches. Finally, the thesis contributes to the extensive literature in the debate on the gender pay gap in terms of methodological and empirical contributions.

To highlight, this thesis is focused on Palestine as Palestine exhibits unique structures/ features in its social-economy and labor market which make it stand out differently from the other countries. The extremely high gap in the participation rate among males and females and the gender wage inequality in the Palestinian labor market are the main issues worth to be explored. This thesis intends to address this problem by examining the impact of gender and occupational gender discrimination

as it considered as a potential source of wage inequality by employing two-level wage models using detailed two-digit occupations included the second level, which is an effective deal with the labor market data and thus makes our study stands different from other queries in the Palestinian labor market research.

Moreover, this thesis proves that parameter estimates of the multilevel linear wage models using the Bayesian estimation technique are better than using the conventional ML and RML estimation approaches in obtaining estimates with more efficiency and accuracy.

1.8 Thesis Organization

The organization of the thesis is as follows: Chapter 2 is devoted to showing the theoretical and empirical related-literature to the gender wage gap. A summary of some key facts, reasons, consequences, and global statistics of the Palestinian and global gender gap is presented as well. Chapter 3 describes the theoretical framework of two-level multilevel linear models. Three different estimation approaches (ML, RM, and Bayesian methods) are also presented and compared. Chapter 4 presents the descriptive statistics of the data used in this thesis and the proposed empirical econometric models that will be estimated. Chapter 5 explains and discusses the estimation results obtained from the estimated multilevel models by the three methods. The last chapter concludes the thesis by a recapitulation of the study's findings and discusses them with related literature. This chapter also discusses the limitations of this thesis and suggestions for future work, policy implications, and contributions.

CHAPTER 2

LITERATURE REVIEW

2.1 Introduction

This chapter comprises five sections. The second section summarizes the theoretical background of the gender pay gap. The third section provides a brief review of the literature survey on both empirical and methodological aspects. The fourth section presents some key facts, reasons, consequences, and global statistics of the global gender gap as well as the context of the gender pay gap in Palestine. The last section concludes the chapter.

2.2 Theoretical Review of Gender Wage Inequality

The imbalance in pay among genders is referred to as the concept of gender wage inequality. Such inequality is still prevalent worldwide (Blau and Kahn, 2003, 2017; ILO, 2018a). Therefore, it is essential to realize the determining factors of pay imbalances and to strive for resolving this problem. Gender-based occupational discrimination is proposed to be one of the potential factors of the gender wage gap (Brown *et al*., 1980; England *et al*., 1994; Petersen and Morgan, 1995; Macpherson and Hirsch, 1995; de Ruijter *et al*., 2003; de Ruijter and Huffmanm 2003; Levanon *et al*., 2009; Kim, 2018). Accordingly, different economic theories have been proposed to explain the impact of gender-based occupational discrimination besides workers' characteristics on wages (Robinson, 1969; Becker, 1971; Arrow, 1972; Bergmann, 1974). Among these theories are the human capital theory (Becker, 1971) and the labor market discrimination models. Such models of labor market discriminations are

devaluation (Arrow, 1972; Levanon *et al*., 2009), crowding (Bergmann, 1974), statistical discrimination (Phelps, 1972; Bielby, 1986), and monopsony theories (Robinson, 1969; Farrell, 2004). Grybaite (2006) reviewed most of these models.

2.2.1 Human Capital Theory

The most important theory that explains the gender wage gap is the human capital theory, where individuals may acquire abilities and skills through schooling, training, and work experience in which their earnings can be determined from them. Mincer and Polachek (1974) postulated that females opt to join occupations to diminish their loss resulted from their irregular labor force engagement. Furthermore, Becker (1985) contributed to the human capital theory and showed its significance to explanations of the gender pay gap. He showed that, traditionally, females were more likely to be involved in part-time jobs and discontinued partly than their male counterparts. This is probably because they left the labor market after marriage or having their first child. Consequently, they were less likely to invest in education and training that enhanced wages and job-related skills. However, the shortcoming of the human capital theory that it cannot capture the whole gender pay gap, that is, education, training, and experience had explained a limited share of the wage gap (Grybaite, 2006).

2.2.2 Labor Market Discrimination

The part of the remuneration gap that is not attributed to gender differences in qualifications is usually in the most part linked to labor market discrimination. Several concepts relating to discrimination have been adopted in the description and analysis of labor market conditions. Basically, economic discrimination refers to a situation

whereby workers with the same qualification and job tasks get different remuneration and are even not equally treated in terms of promotion and staff training on their jobs. Workers of the same ability or qualification sometimes get different salaries because they belong to different groups (Becker, 1971; Petersen and Morgan; 1995). This is a form of 'direct discrimination'. A good example is male and female being on different salary scales because of their gender (Arrow, 1972; Grybaite, 2006). Women are sometimes faced with restricted good job positions in their places of work and have little say in the recruitment and promotion of staff. This situation is called 'distribution discrimination'. There is also 'value discrimination' or 'devaluation', which is a situation whereby jobs dominated by women are less remunerated while those jobs that are dominated by men are highly remunerated (England *et al*., 1994; Petersen and Morgan, 1995; Macpherson and Hirsch, 1995; Tomaskovic-Devey, 1995; Grybaite, 2006). As noted by Arrow (1972), wage discrimination against women is a significant basis for their relegation and the absence of economic parity with men. Therefore, labor market discrimination has effects on women's earnings and careers. Brown *et al*. (1980) showed that occupational gender discrimination is considered a potential driver of wage inequality.

2.2.2(a) Taste Theory

The common reference point for economic analysis of discrimination is the work of Gary Becker in 1957. According to Becker, some people have what he called 'a taste for discrimination'. A taste for discrimination is not limited to a like or dislike, but alike which a person is prepared to carry out (Becker, 1971).

Becker's model of discrimination is analyzed based on the traditional economic framework of utility-maximization which applies to individuals and profit-

maximization which applies to firms. Thus, rational individuals will always aim at maximizing their satisfaction, while firms aim at maximizing profit and this regularly defines the behaviors of both economic units (individuals/consumers and firms). Becker's model submits that employees, co-workers, or customers do exhibit tastes for discrimination against women, which normally results in segregation among workers. The author identified three sources of discrimination (employer discrimination, employee, and customer discrimination) upon which he based his analysis. 'Employer discrimination' occurs when employers have tastes for discrimination against their employees because they belong to certain groups, while 'employee discrimination' happens when employees have tastes for discrimination against their co-workers in an organization. 'Customer discrimination' is a situation whereby customers have tastes for discrimination against the sellers they have interacted with. Worthy of note is that employment discrimination could occur based on gender in an organization. For example, employers who demonstrate a willingness to employ women as secretaries may show reluctance when it comes to hiring them as constructors. Similarly, males may be ready to work with women in subordinate positions but dislike working with women in higher positions. Another situation whereby customers who are ready to buy flowers from women may dislike doing business with women who deal with cars (Becker, 1971; Grybaite, 2006).

2.2.2(b) Statistical Discrimination Models (Imperfect Information)

The statistical discrimination model was developed by Edmund Phelps in the year 1972. According to this model, employers appraise individual women based on the average characteristics of the group they belong to. Employers are frequently worried that women pay less attention to their occupations when compared to men. In

addition, employers expect that women do quit their occupations when they start to bear children. Therefore, employers tend to be of the view that it is dicey and more unsafe to consider women than men for employment. If employers are sure that if employed, on average, women are not so productive and not very stable, statistical discrimination against women may come into play (Phelps, 1972; Bielby, 1986; Grybaite, 2006).

2.2.2(c) Monopsony Theory

The monopsony theory submits that in a situation whereby the employer enjoys a monopoly position, the absence of competition results in a low labor price. The conceptualization of gender wage discrimination was first undertaken by Robinson (1969) with the submission that gender wage discrimination emanates from employers' attempt for profit maximization under imperfect labor market competition. In his demonstration, Robinson illustrates that if women are less concerned by wages, they will be paid in the process of deciding whether to supply their labor to only one employer than men, employers get more wage-setting power over their female workers and stand the chance to make more profits by underpaying them (female workers), all things being equal. Monopsonistic wage discrimination explains the economic perspective to the persistence of gender wage disparities, even after making provision for disparities in employee productivity (emanating from characteristics of an employee or his/her place of work). Since monopsonistic wage gives room for discrimination against women (or different sets of employees) is beneficial for employers of labor, it is probably going to be far-reaching and to continue in the long-run. As opposed to the traditional "taste-based" way of employer discrimination (Becker, 1971, first edition in 1957), Robinsonian discrimination is not attributed to

employer biases against women, and there is a high tendency for it to succeed, even if the biases against women were to diminish. Moreover, as noted by Farrel (2004), women have economic sacrifices to make with a view to getting careers that are characterized by more flexibility, less hazard, and more fulfillment. Farrell (2004) also noted that the perception that bias-based discriminatory remuneration for women is mostly a tale, but women habitually receive lower remuneration than men not for discrimination against them, but due to their lifestyles which consequential have effects on their income-earning ability. The author discards the view that women do face discrimination in their places of work and submits that women's low pays is not due to discrimination.

2.2.2(d) Crowding Theory

The crowding model is a discrimination theory developed by Barbara Bergmann (see Bergmann, 1974). The theory submits that since women are deprived of access to numerous occupations, they are jam-packed into the few occupations open to them. The curves of supply and demand for labor give room for a better understanding of the crowding hypothesis. Thus, when supply falls short of demand for labor, it drives up wages, but labor market crowding causes supply to be greater than demand which causes wages to fall. While the law of supply and demand tends to explain the effects of crowding, crowding offers little about its comprehension. The underlying assumption is that the excess supply of the female labor force results in low wages. Therefore, the overcrowding model appears to support the evidence that all things being equal, pays is likely to be lower in women-dominated occupations than in men-dominated occupations. The crowding of women in a particular occupation provides insight into a reduction in wages based on gender (Bergmann, 1974;

Sorensen, 1990). Contradiction exists in the crowding hypothesis because of evidence that men working in occupations that are dominated by women also receive low wages like their female counterparts (England, 1992; Macpherson and Hirsch, 1995; de Ruijter *et al*., 2003). Though, there are cases of men who are not excluded from male occupations but go into female occupations on the premise of giving priority or because of special skills or due to misinformation. Such men have no option other than to accept the lower pay in women-dominated occupations. While this theory appears to be useful in understanding gender disparity (inequality) in the labor market and pay gap, it does not provide the answer to significant questions (i.e., why female occupations are crowded). A proposal was put forward by Breen and Garcia-Penalosa in an attempt to explain gender segregation (see Breen and Garcia-Penalosa, 2002). According to these authors' model, individuals do not have complete information about their possibility of success and tend to base their career choices on previous beliefs about those possibilities. Furthermore, previous differences in the favorites have effects on the beliefs of the present generation of people (Breen and Garcia-Penalosa, 2002). Therefore, choices of career are not the same even if men and women currently have the same preferences and qualities. Irrespective of the fundamental reason for crowding, if crowding is the only reason for the gender pay gap, there will not be statistically significant variation in the average wages received by men and women within the same occupation apart from differences in levels of productivity and other qualities (Bergmann, 1974; 1986; England, 1992).

2.3 Previous Related Work

2.3.1 Review on Empirical Finding

There is plentiful literature on studying the gender pay gap, its causes and drivers, and its effects on economic development. Among the factors that have been commonly ascribed to explain the gender wage inequality are the individual and job characteristics (human capital, experience, occupation, working hours, contract type, work status), the structure of the labor market (occupational sex segregation, sex composition, formality level), institutional factors (firm size), and social and cultural norms. This thesis focuses on studies that have investigated the sex composition effects and the impact of occupational gender segregation on worker wages and the gender pay gap.

The role of gender segregation in preserving the gender pay gap has been well documented by various scholars in which they elucidating that wages in occupations dominated by females are lesser than those occupations dominated by males, in spite, they entail similarly duties (Bergmann, 1974; Blau and Beller, 1988; Sorensen, 1990; Groshen, 1991; Fields and Wolff, 1991; England, 1992; Tomaskovic-Devey, 1993; England *et al*., 1996; Baker and Fortin, 1999; Addison *et al*., 2018).

A study by de Ruijter *et al*. (2003) has applied multilevel models to investigate the size and causes of the gender wage across occupations inequality in the Netherland utilizing data from the Dutch labor market for the year 1997. The study included the composition of gender in five-digit occupational groups. They showed that the occupational inequality levels in the Netherland are smaller than in the United States and thus the gender composition effects on wage inequality in the Netherland were much lesser. Moreover, they showed that the hypothesis of human capital was partially

explained the gender pay gap, that is, males and females in female-dominated occupations received relatively lower wages than males and females in male-dominated occupations. Furthermore, the disparities in the required responsibility played an important role in explaining the occupational gender pay gap. Meanwhile, jobs that require high levels of responsibility, skills, and education exhibited considerable high wage penalties for being employed in female-dominated jobs instead of male-dominated jobs. However, their finding did not support the crowding hypothesis, which means that jobs that are dominated by women are undervalued compared to their productivity shares.

In a subsequent study, de Ruijter and Huffman (2003) compared the proportional contribution of the occupational sex composition effect and within-occupational gender wage inequality to the total pay gap in the Netherland. The study implemented a two-level econometric technique using data from the Dutch labor market in 1997, which contains five-digit occupational classification. An occupation in which males represent 85% and above of its workers is considered a male-dominated occupation, more than 65% of females are considered female-dominated, and the remaining are considered as mixed occupations. The results suggested that about 38% of wage differentials are attributed to occupational groups. Moreover, males received wages higher than females across all occupations in the Netherland, which supports the universal wage men advantage hypothesis. Whereas, the gender pay gap is higher and more pronounced in male-dominated jobs while it was lowest in female-dominated jobs. However, most of the wage inequality was found in gender-mixed occupations. Despite these findings, the study was not able to examine whether there is a gender pay gap when both genders are employed in the same occupation in the same workplace.

Moreover, a study by Huffman (2004b) has examined the gender pay gap in terms of job ranking compared to other jobs in the US labor market for the year 1990. It was based on the local occupation-industry and their ranking in the US labor market. The study has implemented multilevel models, which allow studying the inter-and intra-occupational wage inequality and thus provide a better understanding of discrimination. The results suggested that the occupational group accounted for about 36% of the wage disparities in the US labor market. He also showed that workers were paid less in occupations dominated by females compared to their male-dominated jobs counterparts. Female wage disadvantage was wider in female-dominated occupations as well. Moreover, wage inequality rose with the job's rank and the pay gap in female-dominated occupations rose, where on average, men receive wages greater than women when the number of females increased in these occupations.

A study by Hansen and Wahlberg (2008) has investigated the relationship between occupational gender segregation and gender wage inequality in the Swedish labor market. The study used data from the Swedish household income survey 1997 and the labor force survey 1996. The finding suggested that the gender pay gap is higher in female-dominated occupations while it was lower in male-dominated occupations. Additionally, occupational sex segregation accounted for about 30% of wage inequality in the Swedish labor market. Furthermore, the study has decomposed the observed pay gap into explained and unexplained parts and found that the highest portion of the unexplained part was found in male-dominated occupations. Females commonly have a low penalty of being employed in female-dominated occupations than being employed in male-dominated occupations and thus women's preferences might explain the pay gap rather than employer discrimination.

Furthermore, Barón and Cobb-Clark (2010) extended DiNardo *et al*.'s (1996) method to decompose the gender wage inequality by splitting the vector of covariates into four sub-vectors (i.e., position in the labor market, experience, education, and demographic attributes). They also explored the occupational sex segregation and the gender wage inequality in public and private sectors distributions of wages utilizing data from the household income and labor dynamics over the period 2001 - 2006. They found that the gender pay gap was mostly explained by productivity characteristics in low pay jobs regardless of the employment sector. Whereas, the gender pay gap was mostly not explained in higher pay jobs by these characteristics in both sectors. The lower pay to females was substantially affected by gender discrepancies in the work position. Additionally, gender segregation is prevalent among all females across all jobs except higher-paid occupations and contributes significantly to gender wage inequality. The differences in work experience, however, explained a large amount of wage inequality in the private sector. Meanwhile, educational and demographic differences have a minor impact on the gender pay gap.

Zajkowska (2013) applied the Blinder-Oaxaca (1973) procedure to explore wage differentials in Poland. The study was applied to full-time workers from data collected by the International Social Survey Programme 2002: Family and Changing Gender Roles III. The results suggested that the unexplained part of the gender pay is high and might be attributed to discrimination, cultural and social factors, and preferences. Despite the explained part is important this quantity is small if compared to the unexplained part.

However, Grönlund and Magnusson (2013) implemented a multilevel analysis to explore why females earn a lower wage in female-dominated occupations using the Swedish level of living survey for the year 2000. They found that about 40% of the

variability in wages was attributed to the disparities in occupational groups. They have examined devaluation, crowding, and human capital hypotheses. They found results that are contradicted these three hypotheses, but more obviously for crowding and devaluation. The proportion of women in occupation has a nonlinear relationship with wages when controlling for gender composition dummies rather than the percentage of females. The results revealed that the effect of women proportion was overestimated and miss-specified and this effect accounted for a very small part of occupational groups difference in wages. Even though there is a substantial effect of occupational prestige (devaluation) and employee dependence (crowding) on occupational level differences in wages, these effects failed to explain any of the women's percentage effects. However, human capital theory exhibited that there are contextual effects of on-the-job training on wages, but this effect was spurious and failed to explain the lower wages of women in female-dominated occupations. Finally, this study recommended developing new methods of measuring the impact of occupational sex segregation on wages (Grönlund and Magnusson, 2013).

Biltagy (2014) implemented Blinder-Oaxaca's (1973) decomposition approach to examine the drivers of the gender wage inequality in Egypt utilizing data from the Egypt Labor Market Panel Survey for the year 2006. She found that the gender pay gap was mainly explained totally by discrimination. However, the variations in human capital attributes were more likely to decrease the gap among males and females. The effect of the sample selection bias is small but significantly decreased the size of the gender pay gap.

Couppié *et al*. (2014) examined the effects of educational levels and their sex composition on occupational gender discrimination and the gender pay gap, particularly at the beginning of working life in the French labor market using data from

Céreq's Génération 98 survey for the year 1998. Occupational groups were divided into five distinct groups according to their sex composition and educational segregation weights (see Table II p.375). The Blinder-Oaxaca decomposition procedure has been applied to each occupational group. The index of occupational segregation is estimated as 0.23, which exhibits that the occupational sex segregation is below the middle of overall segregation amongst French employees. They found that the gender pay gap in occupations dominated by women was not much higher than occupations dominated by men when the segregation is typically determined by educational pre-sorting. However, the wages of females were significantly declined and thus the gender wage gap became higher when there are weak links between education and occupations. The results also revealed that the unexplained gender pay gap in occupations dominated by men is considerably greater than in those dominated by women. Meanwhile, the gender wage inequality in mixed occupations seemed to be significant and typically caused by variances in the wage treatment of genders' attributes, and hence working in mixed jobs should not indicate less wage inequality at least at the entry-level of being employed. Moreover, the slightly small wage variation is not an indication of coming near equity. However, a modest wage differential does not necessarily show evidence of equity, which might hide the presence of some important components of discrimination as in men's occupations.

A study by Andrén and Andrén (2015) has examined occupational sex discrimination and wage inequality in Romania utilizing data from the Romanian integrated household survey covering the period from 1960 to 2000, i.e., before and after the transition period. The results revealed that the average overall observed gender wage gap was ranged from 21.4% to 28% during the study period. Moreover, the study has defined three occupational groups (male-dominated, female-dominated,