International Journal of Behavioral Science
2015, Vol. 10, Issue 2, 19-36

ISSN: 1906-4675

Gender Wage Inequality in Thailand: A Sectoral Perspective

Minh-Tam Thi Bui[1] and Chompoonuh Kosalakorn Permpoonwiwat[2]

The research examines wage inequality between male and female workers in Thailand. Using Blinder-Oaxaca decomposition technique, wage inequality between male and female workers is partitioned into the unexplained part in their wage gap and the explained part due to differences in their endowments. We found that in general gender wage gap in Thailand has–narrowed down over the last decades from 14 percent in 1996 to 10 percent in 2006 and then 1 percent in 2013. However, the extent of gender discrimination favoring men represented by the unexplained part of the wage gap increased sharply in 2013 after a small decline in 2006. Women, on average, have made greater improvements in education and skills to build up their human capital thus raising their wages but those efforts were eliminated by discrimination. The disaggregation analysis across economic sectors reveals different degrees of discrimination in different industries. Wage inequality was rising even in the female-dominant sectors.

Keywords: gender wage inequality, Blinder-oaxaca decomposition, industry structure, Thailand

Since the rapid industrialization in the late 1950s and admission to the World Trade Organization (WTO) in 1995, the advancement of Thai women has been closely associated with economic progress. The development in terms of employment opportunities for women, the delivery of education and training to improve women's skills, and the improvement of the working environment specifically to the needs of women has been created. With the transformation from a purely agricultural economy into a more industrialized economy, the labor market structure, especially types of work for men and women, were also adjusted. Employment opportunities were much more accessible to women whose potentials and capabilities have been recognized in every economic sector. Moreover, Thailand is committed to the Millennium Development Goals (MDGs) initiated by the United Nations, of which promoting gender equality and empowering women to be one of the targets by the year 2015, according to the MDG report of the National Economics and Social Development Board (NESDB) in 2010 (National Economics and Social Development Board, 2010).

Despite the improvement in women's employment opportunities and policy support, Thai women's wages and working conditions have been deteriorating. A recent study of the International Labor Organization (ILO) showed that average wages for men in Thailand were generally higher than for women and there were only two out of 17 industries (i.e. whole sale and retail trade; and transport, storage and communication) where women earned higher wages than men (International Labor Organization, 2013). The evidence represents an existing of gender wage discrimination and also different gender wage gaps across industries in Thailand.

[1] Lecturer, School of Economics and Public Policy, Srinakharinwirot University, Bangkok, Thailand
[2] Associate Professor, School of Economics and Public Policy, Srinakharinwirot University, Bangkok, Thailand

Gender wage gap in Thailand

There has been a number of empirical works on the gender wage gap in Thailand. Overall, it has been confirmed in a number of studies (Khorpetch & Kulkolkarn, 2011; Mutsalklisana, 2011; Nakavachara, 2010) that the wage gap between Thai men and women has been narrowed over the last decades and mainly due to the improvement in education achievement of Thai women. Nakavachara (2010) found the main factor contributing to the decline in gender wage gap in Thailand during 1985-2005 was the education enhancement of women. Women have, in fact, overcome men in education attainment in the past decades. Mutsalklisana (2011) explored the root causes of decline in income disparity between men and women in Thailand from 1997 to 2006. It is found that the reduction over time in the mean wage gap is mostly due to an increase in female human capital accumulation and the improvement in female occupation outlook relative to men. This study also showed that one of the reasons that a sizable mean wage gap still exists in Thailand, was because of an increase in the return to observables characteristics of men. Such a rise in returns overshadowed the increase in female human capital accumulation (Mutsalklisana, 2011). The above studies indicated that there was a certain degree of discrimination against women in Thai labor market.

Further disaggregate analysis of the gender wage gaps, using micro data, looks at different groups of men and women. In general, female workers were shown to be more productive than the men but they received lower wages than male workers because of gender discrimination (Khorpetch & Kulkolkarn, 2011). The study, using the Labor Force Survey of Thailand in the third quarter 2008, indicated that discrimination was worse in the younger than the older worker groups. Female workers receive lower wages than male worker particularly in the group aged 15-24 and 25-54 years old and the gap of wage is smallest in the group aged 55-60 years old. Among different income groups, Mutsalklisana (2011) found that the gender wage inequality was greater for the majority of the wage distribution, particularly, for middle to high income workers.

Wathanumsuk, Sajjanand and Srisawaluk (2012) studied the gender wage gap in among 400 semi-skilled employees in the automobile industry in Chachoengsao province in Thailand to show that there were differences in wage rates between women and men in all periods of employment starting from probation time. Another study of Maithongdee (2010) looking at the gender wage differentials in professional occupations revealed that the wage gap in the private sector was even higher than the overall level, taking into account the selection bias.

Relevant empirical studies in other countries

The association between industry composition and gender wage discrimination has been studied in both developed and developing countries. A very recent study by Olivetti and Petrongolo (2014) documented the relationship between women's role in the labor market and the process of structural transformation in 19 developed countries. It was claimed that besides the demand and supply forces in the labor market, the process of industry structural transformation also have an important impact on gender wage gap across countries, explaining roughly one third of the cross-country variation in women's wage gap comparing to men's. In fact, it was found that gender bias in labor demand can be decomposed in measurable within- and between-industry components.

The gender intensity or the predominance of male and female workers in different industries has been considered as one of the important factors shaping gender wage differentials, even in developed countries. Wade (2013) cited the results from a report of the Workplace Gender Equality Agency in Australia that gender pay gap in 2013 in favor of men had widened to 17.5 percent in overall, and even in two of Australia's female-dominated industries, namely health care and social assistance sector. These two sectors have the biggest gender pay gap of 32.3 percent even though women outnumber men by four to one Moreover, this report also noted the rise in the overall pay gap between men and women from 14.9 percent in 2004 to 17.5 percent in 2013.

The impact of industry gender intensity on wage disparity between male and female workers in that industry was also studied in developing and transition economies. In Georgia, for instance, Khitarishvili (2009) evaluated gender wage differentials during the period 2000–2004 and obtained a very similar findings as those in Thailand that women should in fact earn more than men but the contribution of education to the gender wage gap is minimal due to large discrimination. Moreover, personal characteristics seemed to matter very little in explaining gender wage differentials while the explained portion of the gap was almost completely attributed to industrial wage differentials.

Theoretical and empirical literature review

Cain (1986) identified two broad definitions of economic discrimination. First, economic discrimination may be defined as long-lasting inequality in economic well-being among the groups; in particular, differences in household or family income. Second, economic discrimination is also defined as differences in pay or wage rates for equally productive groups based on their color, gender, or ethnic ties. In this sense, economic discrimination is measured as the difference in (or ratio of) average wage rates of two groups of workers who may be reasonably assumed to have equal productive capacities. This concept of economic discrimination has challenged a fundamental principle of the workings of competitive economies: that equally productive workers should receive equal wages

Cain (1986) also presented an excellent survey on the main theories of labor market discrimination. According to his summary, the labor market discrimination can be based on either on neoclassical economic theories or institutional theories. Within the first foundation, discrimination can occur in both competitive market and monopolistic market and the sources of discriminatory preferences may come from consumers, workers or employers. From the gender perspective, discrimination entails the possibility of wage differences among male and female workers that cannot be explained by differences in observed characteristics such as education, experience, health, age and so on, reflecting productivity differences.

An extensive literature in wage inequalities is based on a competitive market theoretical framework of the seminal study initiated by Becker (1957). This famous theory brought the concept of discrimination from the demand side of the labor market and discussed how markets might influence gender pay differentials. Becker argued that employers (like customers or coworkers) might have a "taste for discrimination" and maximize utility, not profit, by employing preferably men and paying them higher wages. As a consequence, if competition in market is assumed, discrimination tends to diminish in the long run, since non-discriminatory employers can produce at lower costs.

With regards to gender wage discrimination in certain industries and sectors of the economy, some studies (Ashenfelter & Hannan, 1986; Black & Strahan, 2001; Khitarishvili, 2009) related competition in selected industries to the gender wage gaps in those industries and found results consistent with Becker's theory. Such empirical work often estimate a Mincer earnings equation (Mincer, 1958) –an original human capital model relating individual earnings with human capital determinants such as education, experience, and other relevant characteristics. The model allows for an estimation of the returns to each year of schooling, each year of experience and by adding gender as an independent variable it also allows researchers to evaluate women are remunerated differently from men after controlling for similar characteristics of human capital. Different decomposition technique can follow to identify the cause of wage gap in each sector or industry.

Scope and objective of the research

For the case of Thailand, in spite of various literatures looking at the gender wage gap, to the authors' knowledge, a specific measurement on the degree of gender discrimination across industries or sectors of the country has not been done. Although the industry factors were incorporated into the earning functions of previous studies (Khorpetch & Kulkolkarn, 2011; Nakavachara, 2007), the level discrimination in different industries and sectors has not been specified. In this regards, the current paper contributes to the literature of gender wage discrimination issue in Thailand particularly in the above direction. In addition, owing to the availability of recent Labor Force Surveys (LFS) conducted by the National Statistical Office of Thailand across all provinces of the Kingdom, this study covers three time periods in 1996, 2006 and 2013 in order to detect a possible long-term change in gender wage inequality. The choice of these time periods is further explained in the description of the empirical data.

With the aim to provide a piece of evidence on the changes in gender wage discrimination across industries in Thailand and draw new insights into the situation of gender discrimination in each industry, the current research attempts to answer two questions:

1. How wage gap in general between men and women has been changed in Thailand over the three time periods 1996, 2006, and 2013?. What were the factors explaining for the gap and its change?

2. Which industry exhibits a high degree of gender discrimination and what can be the contributing factors to this?

In particular, the research proposed the first hypothesis that as gender wage gap has declined gradually, so as has the level of discrimination. Another hypothesis is that the variation in male or female intensity in different industries can contributes to the variation in discrimination across industries. By testing the above hypothesis and addressing those research questions, the research could identify sectors that call for corresponding policy actions.

The next section briefly describes the method including the wage gap decomposition technique and secondary data used for analysis. It is followed by a presentation of key changes in the overall gender wage gap and employment shares of male and female workers across industries of Thai economy over the period of the study. This section will also discuss

decomposition results of gender wage gap to determine if discriminations exist. Key findings are summarized in the conclusions along with corresponding policy implications.

Method

This section considers methods of decomposing or disaggregating the gender wage gap into contributing factors. The main purpose is to explain the distribution of wage as an economic outcome variable by set of factors that vary systematically with male and female groups. The variation in wage may be explained by variations in education, experience, tenure and working location besides the unobservable and unexplained parts.

The most popular method in the literature of labor market outcome difference between groups is the Blinder-Oaxaca decomposition (Blinder, 1973; Oaxaca, 1973). It allows to decompose the group wage differential into one part that is explained by differences in the observed characteristics (due to productivity differences) and the other unexplained part attributable to differences in the estimated coefficients (due to discrimination). This unexplained part often incorporates the effects difference of unobservable characteristics between groups.

This paper applied the Oaxaca decomposition technique to divide the wage differential between male and female groups into "explained" and "unexplained" parts to find out if there is any discrimination. The method is based on the Mincer earnings function regression which analyses the relationship between earnings and its correlates. It will be different from descriptive methods in the first section as causal effects can be detected. It, therefore, allows us to identify factors that generate earning inequality and to calculate how far the gender wage gap can be explained by inequalities in which factors.

This study follows formulas in (Jann, 2008) to brief the mathematical presentation of the technique applying for two groups of male and female workers, denoted as **M** and **F** respectively, who have different outcome variable Y (log of earnings). X is a set of predictors including human capital indicators such as education and work experience. The mean outcome difference (R) is defined as difference in expected values of the outcome variable.

$$R = E(Y_M) - E(Y_F)$$

Assume a linear model of the earning function, the mean earnings difference can be expressed as the difference in the linear prediction at group-specific means of regressors, that is,

$$R = E(Y_M) - E(Y_F) = E(X_M)'\beta_M - E(X_F)'\beta_F$$

where X is a vector containing also a constant beside a set of predictors, β contains the intercept and slope parameters. With some mathematical rearrangement, the outcome difference R can be divided into three components as follows:

$$R = [E(X_M) - E(X_F)]'\beta_F + E(X_F)'(\beta_M - \beta_F) + [E(X_M) - E(X_F)]'(\beta_M - \beta_F)$$

or

$$R = E + C + I$$

The first component E is the part of the differential that is due to group differences in the predictors referred to as the "endowment effect". The second component measures the differences in the coefficients including differences in the intercept. The last component is an interaction term between difference in endowments between the two groups and difference in coefficient as they are coexistent.

There is also an alternative decomposition called "two-fold" decomposition where the interaction term is allocated into the endowment effect and unexplained part by using a non-discriminatory coefficient β^*. The coefficient vector β^* can be a weighted average of the two vectors β_M and β_F or also be estimated from a pooled regression sample over both groups. In this sense, R can be written as the sum of quantity effect Q and the unexplained part U.

$$R = Q + U$$

Empirical data

In empirical research, the decomposition method requires micro survey data. In Thailand, the Labor Force Survey (LFS) has been conducted since 1996 quarterly and even monthly in recent years. Wage and earnings data are collected by their frequency of the remuneration which can be daily, weekly or monthly. In recent data sets, all income sources are converted into monthly aggregated numbers.

This study selects three time periods in the third quarter of 1996, 2006 and 2013 with the aim to investigate long-term changes of the gender wage gap. By the time this study was started, the latest available dataset of the LFS published by Thailand's National Statistical Office was of the third quarter of 2013. The authors were also able to access a number of datasets from previous surveys and among those, the earliest one was in 1996. In addition, with the aim of capturing long-term change in a ten year-period, the dataset in 2006 was included into the study. For consistency, the third quarter dataset were selected for all three time periods. Average monthly wages are selected to measure earnings outcome in most of the cases but daily wages are also used in some specific factor for comparison. The logarithm of earning is the only one outcome variable in this study. Earnings are defined in terms of monthly wage income from main employment, expressed in Thai baht.

As for a set of regressors, the study covers some typical human capital variables including years of schooling (edu), years of experience (exp) defined in a conventional way (exp = age-years of schooling-6) and also square of experience (exp_sq). Several dummy variables are included. Urban represents the location of work which can be rural (non-metropolitan) or urban (metropolitan) areas. Married indicates the marital status of a worker (Married = 1 if married and 0 otherwise). Public shows whether the worker was working as government employee (public = 1) or otherwise.

In addition, dummy variables are also created for each occupational level. There are 10 occupational levels in Thailand's statistical system. They include level (1) managerial, (2) professional, (3) technician, (4) clerical support, (5) sales and service workers, (6) skilled agricultural workers, (7) craft and related trades, (8) plant and machine operators, (9) cleaners and laborers and (10) armed forces. The ranking is deemed to be in descending order of qualifications and skills. Level (9) was selected as a reference for the creation of dummy variables in other sectors.

The sample

The samples were selected from a large number of observations in the Labor Force Survey. This analysis is focused on investigating gender wage differentials among individuals who work for pay in Thailand. The sample in the analysis is restricted to the wage earners in the working age from 15 to 60 years old. Employed individuals earning zero income are excluded from the sample. As a result, the sample size is 22,598 in 1996, 49,052 in 2006 and 50,509 in 2013 for both groups of male and female wage earners as shown in table 1.

Table 1

Sample Size of the Study Dataset in Three Time Periods 1996, 2006, 2013

Number of Observations	1996		2006		2013	
	Male	Female	Male	Female	Male	Female
Male / Female	12,657	9,941	26,467	22,585	27,056	23,453
Total	22,598		49,052		50,509	

Results and Discussion

Descriptive analysis

The study first looks at the allocation of female labor forces in percentage across different economic sectors and its change over the three periods. A higher percentage represents a greater degree of concentration of labor in a specific sector of the economy. As shown in Table 2, in 1996, female workers were most concentrated in three sectors led by manufacturing (29.7 percent), then agriculture and fishery (13.7 percent), and whole sales, retail trade (10.1 percent). Meanwhile, some other sectors like mining, electricity, gas, water supply, transportation, storage and communications attracted least female employees, less than 1 percent of total female workforce. The pattern among male workers was different in 1996 with the top three sectors belong to manufacturing (23.9 percent), construction (22.4 percent) and whole sale, retail trade (10.9 percent).

As the economic structure of Thailand has changed significantly over the past decades, sectoral ranking in men and women employment follows respectively. It is noteworthy from Table 2 that in 2006 and 2013, most of the changes in the composition of the female paid labor occurred within the service sectors such as whole sale and retail trade, hotel and restaurants as well as the education, health and social sectors. As for men, they have shifted to new sectors such as electricity, gas, water supply or public administration, transportation or hotel and restaurants with outflows from traditional sectors like construction. At the same time, manufacturing and agriculture sectors did not experience major shifts and still dominate in the employment of both men and women. Almost 35 to 38 percent of respectively male and female paid workforce was engaged in these two sectors in 2013.

Table 2

Sectoral Composition of Male Employment and Female Employment

Sector	1996		2006		2013	
	Men	Women	Men	Women	Men	Women
Agriculture, forestry & fishery	10.7	13.7	15.2	14.1	11.8	9.7
Mining	0.5	0.1	0.4	0.1	0.5	0.2
Manufacturing	23.9	29.7	23.6	32.1	23.9	27.8
Construction	22.4	9.1	1.0	0.2	1.7	0.5
Electricity, gas & water supply	1.6	0.6	16.5	4.0	16.2	4.0
Wholesale & retail trade	10.9	10.1	13.1	10.6	13.0	13.1
Hotels & restaurants	1.7	2.3	2.8	5.8	2.7	6.0
Transport, storage & communications	0.2	0.3	4.5	1.9	4.7	2.4
Financial intermediation	5.0	1.4	1.7	2.8	2.1	3.2
Real estate activities	10.4	5.6	3.0	3.2	3.1	3.7
Public administration	5.5	9.7	9.1	5.5	11.8	7.9
Education	1.3	4.4	5.2	8.8	4.4	10.0
Health and social work	2.9	3.4	1.5	6.0	1.6	6.8
Other community, social & personal service activities	0.3	4.1	2.1	2.3	2.2	2.5
Activities of private households	2.6	5.6	0.4	2.6	0.3	2.1
Total	100.0	100.0	100.0	100.0	100.0	100.0

Figure 1 represents occupational segregation among Thai men and women through years 1996, 2006, and 2013. The first panel ranks occupations by female labor share in a descending order. In 1996, women were most dominant in some sectors like community and social services, education, household activities and even in transportations and public administration. Those pre-dominance has completely changed in 2006 and 2013. The second and third panels indicate a similar pattern in women occupational dominance. In 2006 and 2013, women were employed in traditionally female occupations such as activities of private households, health and social work, hotels and restaurants, and education. Men were more likely to work in construction, mining, electricity, gas, and water supply which were traditionally male-dominated environment.

Women employment share was reinforced in activities of private households and education but they were no longer dominant in community and social services. However, there have been emerging sectors which attracted more women to work rather than men, as financial intermediation, health and social work, hotels and restaurants, for instance. Moreover, while women participation in public administrative works and transport, storage and communications had dropped recently but a considerable increase was seen in financial intermediation sector compare to the participation in 1996. Again, it can be seen that the new attractive workplaces for women belong to service sectors. It is also noteworthy that more women now participate in conventionally male-dominant industries including mining and

construction. The new segregation of occupations might play an important role behind the gender wage gap in Thailand.

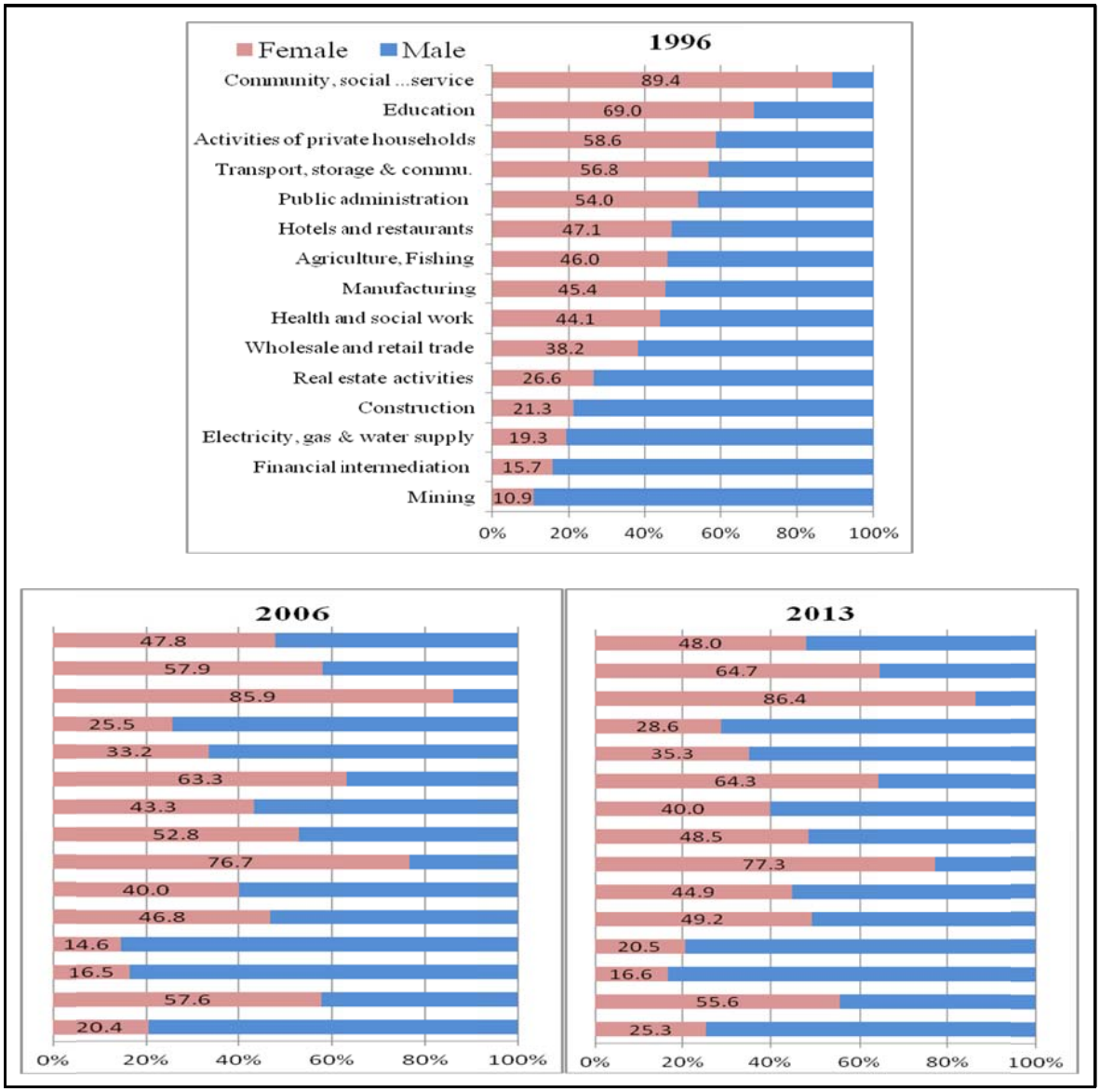

Figure 1. Female/Male Labor Share by Sector.

In Thailand, wage differentials existed in nearly every industry as shown in Figure 2, presenting the ratio of women's mean wages to men's in three time periods of the study. In general, the ratio is generally less than one, implying that women received lower wage than men in each sector on average. The highest gap was detected in 1996 in the other community, social and personal service sector where an average female worker received only 40 percent of an average male counterpart could earn in the same sector. It is surprising for a reason that women dominated this sector in the same period. In opposite, in some industry women's wages have actually outpaced men's wages on average like mining, wholesale and retail trade, transportation, storage and communication in 2006 or manufacturing, education, health and social work as well as community activities in 2013. It is very clear that those above-mentioned sectors in 1996 were traditionally "male" occupations but those in 2013 were more female-dominated. It is, therefore, uncertain in the case of Thailand to draw a strong association between the gender segregation in each sector with its gender wage gap. In the

next section, the decomposition technique will be applied to data in Thailand to determine contributing factors to those gaps, either from the difference in observable characteristics between male and female workers or simply from some kinds of discriminations.

Decomposition analysis

The paper first attempts to estimate the basic Mincer earning function using a linear regression model, separately for men and women. The regression consists of monthly wage in logarithm form as the dependent variable, and a series of explanatory variables as education (years of schooling), years of experience, its square, work location (metropolitan or non-metropolitan), marital status (whether they are married), working in public sector and various occupational levels. There are 10 occupational levels in Thailand's statistical system. They include level (1) managerial, (2) professional, (3) technician, (4) clerical support, (5) sales and service workers, (6) skilled agricultural workers, (7) craft and related trades, (8) plant and machine operators, (9) cleaners and laborers, and (10) armed forces. The ranking is deemed to be in descending order of qualifications and skills. Level (9) was selected as a reference for the creation of dummy variables in other sectors.

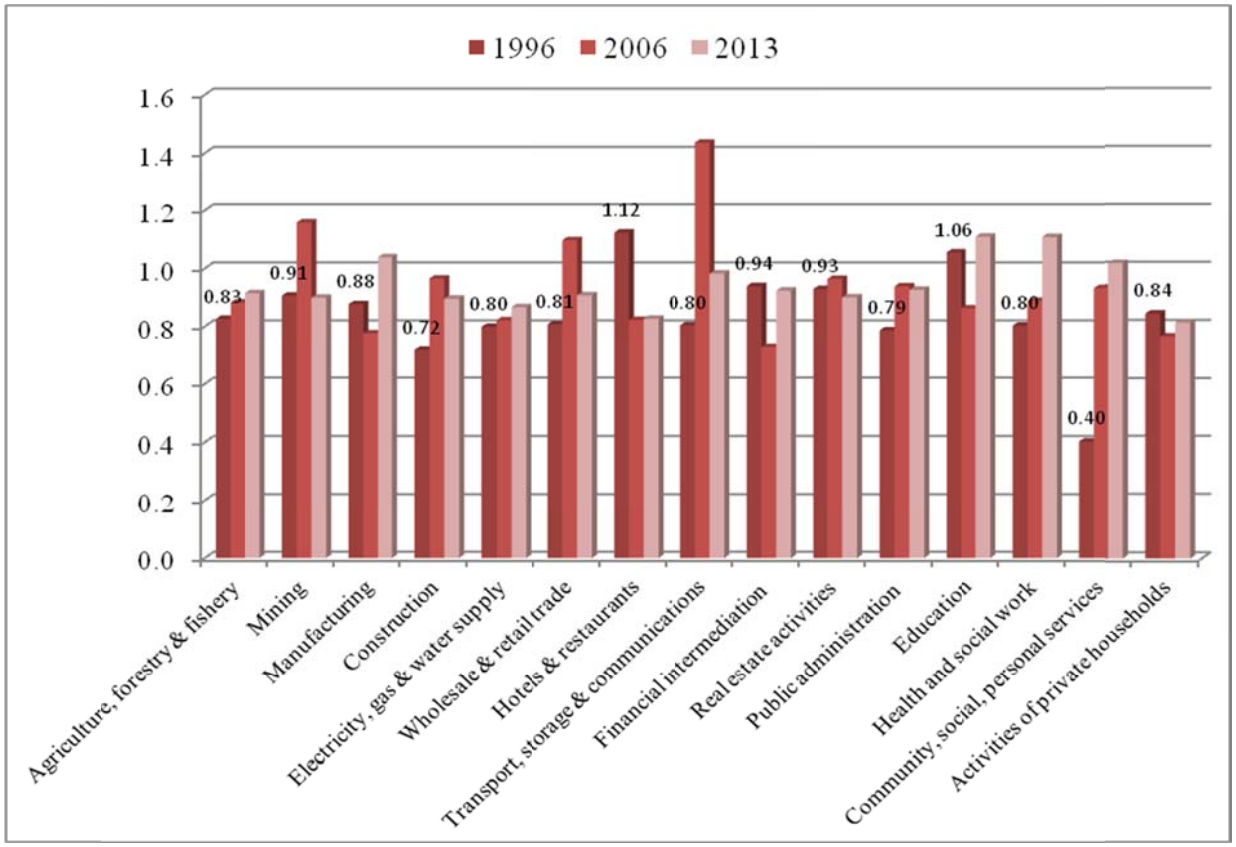

Figure 2. Female/Male Wage Ratio by Sector During the Period 1993, 2006, and 2013.

It can be seen from Table 3 that most of the coefficients are highly statistically significant in all three time periods. The R-squared in each equation is in the range of 0.37-0.62 implying the explaining power of human capital variables for the variation of wages. As for the effects of each variable on wages, the returns to education were slightly higher for women than for men in 2006 and 2013 but the reverse was true in 1996. On average, an additional year of schooling would increase mean wage of female workers by 8 percent,

compared to 7.7 percent for male workers with similar personal and working characteristics in 2013. The rate of returns to education for both men and women decreased over time from 10 percent in 1996 to 8.5 percent in 2006 then to 8 percent in 2013.

In a similar pattern, returns to one year of experience among male workers are found higher than those among females in 1996 at a very small margin of 0.4 percent. However, in 2006 and 2013 women's return from their experience surpassed those of men by 0.5 percent for each year of experience. As for working location, people in urban and metropolitan areas often have higher return than those in non-metropolitan at a margin of around 20-27 percent. Working as a government employee brought smaller returns compared to workers with similar characteristics working for non-government sectors. Occupation level dummy variables show to be almost all significant across years and the coefficients are positive. This is reasonable since the reference group of cleaners and laborers possess the lowest qualifications and skills so that the highly skilled occupational groups got higher returns in their wages.

Table 4

Two-Fold Decomposition of Monthly Gender Wage Gap over Time 1996, 2006, and 2013

	1996		2006		2013	
In wage	Coefficient	*SE*	Coefficient	*SE*	Coefficient	*SE*
Overall difference	0.1478	0.020	0.10139	0.011	0.0100*	0.011
Explained (Q)	-0.0041	0.015	-0.0708	0.008	-0.1160***	0.007
Coefficients (U)	0.1519	0.015	0.17215	0.008	0.1260***	0.009
Share in overall difference (%)						
Explained (Q)	-2.77		-69.79		-1163.95	
Coefficients (U)	102.77		169.79		1263.95	
Number of observations	22,598		49,052		50,509	

*Note. * $p < 0.10$, ** $p < 0.05$, *** $p < 0.01$.*

Table 4 provides information on the wage gap change between Thai male and female workers over the three periods of a 17 year-long horizon and the contribution of factors to those wage disparities. Apparently, the gender wage gap in Thailand has been narrowed down over time. Mean earnings of men was 15 percent higher than those of women in 1996 but that premium declined to 10 percent after a decade and stayed at a low gap of 1percent recently in 2013.

Table 3

Earnings Functions of Male and Female Workers during the Three Periods 1996, 2006, and 2013

lnwage	1996		2006		2013	
	Male	Female	Male	Female	Male	Female
Edu	0.1098 ***	0.0956 ***	0.0848 ***	0.0861 ***	0.0775 ***	0.0801 ***
	0.003	*0.004*	*0.002*	*0.003*	*0.003*	*0.003*
Experience	0.0519 ***	0.0471 ***	0.0491 ***	0.0550 ***	0.0276 ***	0.0329 ***
	0.003	*0.006*	*0.002*	*0.002*	*0.002*	*0.002*
Experience	-0.0005 ***	-0.0006 ***	-0.0006 ***	-0.0008 ***	-0.0003 ***	-0.0004 ***
_squared	*0.000*	*0.000*	*0.000*	*0.000*	*0.000*	*0.000*
Urban	0.1678 ***	0.1748 ***	0.2755 ***	0.2770 ***	0.2056 ***	0.1956 ***
	0.016	*0.020*	*0.010*	*0.011*	*0.011*	*0.012*
Married	0.0863 ***	0.0315	0.0512 ***	-0.0295 ***	0.0494 ***	-0.0463 ***
	0.021	*0.023*	*0.012*	*0.012*	*0.014*	*0.013*
Public sec.	-0.2434 ***	-0.0565 **	0.0340 ***	0.0208 *	-0.1843 ***	-0.1135 ***
	0.021	*0.027*	*0.017*	*0.020*	*0.018*	*0.020*
Occupation1	0.0969 *	0.6111 ***	0.6310 ***	0.8668 ***	0.5220 ***	0.8677 ***
	0.059	*0.079*	*0.043*	*0.058*	*0.034*	*0.059*
Occupation2	0.0397	0.3458 ***	0.7642 ***	0.7343 ***	0.6592 ***	0.7339 ***
	0.029	*0.041*	*0.033*	*0.034*	*0.035*	*0.034*
Occupation3	-0.0774	0.1953 ***	0.5774 ***	0.5162 ***	0.4660 ***	0.5167 ***
	0.039	*0.044*	*0.024*	*0.028*	*0.030*	*0.028*
Occupation4	-0.1789 ***	0.1956 ***	0.4499 ***	0.3952 ***	0.2632 ***	0.3955 ***
	0.047	*0.097*	*0.027*	*0.027*	*0.030*	*0.027*
Occupation5	-0.2216	0.4581 **	0.2831 ***	0.2060 ***	0.2051 ***	0.2058 ***
	0.154	*0.060*	*0.022*	*0.022*	*0.027*	*0.022*
Occupation6	-0.0243	0.4051 ***	-0.0145 **	-0.0696	-0.1612 ***	-0.0702 ***
	0.029	*0.080*	*0.026*	*0.037*	*0.033*	*0.037*
Occupation7	0.0563 **	0.4258 ***	0.2688 ***	0.1544 ***	0.1303 ***	0.1550 ***
	0.027	*0.040*	*0.017*	*0.021*	*0.018*	*0.021*
Occupation8	0.0501	0.3046 ***	0.3424 ***	0.3414 ***	0.2068 ***	0.3405 ***
	0.051	*0.061*	*0.020*	*0.018*	*0.020*	*0.018*
Occupation10	0.1630 ***	0.4845 ***				
	0.028	*0.047*				
constant	6.8993 ***	6.7026 ***	7.1839 ***	7.1083 ***	7.7418 ***	7.1102 ***
	0.045	*0.054*	*0.031*	*0.031*	*0.033*	*0.031*
No. of Obs.	12,657	9,941	26,467	22,585	27,056	23,453
F-statistics	346	302	809	801	378	514
R-Squared	0.551	0.622	0.487	0.541	0.377	0.398

*Note. * p < 0.10, ** p < 0.05, *** p < 0.01, standard errors in italic.*

The most striking feature in this decomposition result is the negative coefficients for the explained part at a high significant level in 2006 and 2013. These negative numbers mean that considering women's characteristics and human capital factors only while controlling for all working characteristics being equal, women should have obtained higher earnings than men on average. For example, in 2013, the coefficient for explained part is -0.116 implies that a woman with similar education, experience and occupational qualifications as well as similar working location to those of a man should have earned 11.6 percent higher. In other words, women's endowments should have paid them 10.3 percent higher wage than men. This is because within our 2013 sample, an average woman obtained higher education than an average man by more than one year (10.5 versus 9.4 years) and there was a higher share of women working in metropolitan areas (62.4 versus 60.4 percent) although on average women had less experience (22 versus 23.7 years). However, the mean earning differentials between men and women showed to be the same (or only 1 percent difference). Then, what were the reasons for women's lower outcomes in the labor market?

Decomposition results indicate the explained part or endowment effect favoring women was 70 percent of the actual wage gap in 2006 and more than 11 times larger than the actual wage gap favoring men in 2013. It suggests that the discrimination effect is sufficiently large to offset the endowment effect in Thailand's labor market over the period of the study.

Furthermore, it can be noticed that although the absolute magnitude discrimination effects increased during 1996-2006 then reduced in 2013, its relative ratio to actual wage gap increased considerably from 103 percent in 1996, to 169 percent in 2006 then rocketing to 1264 percent in 2013. These numbers are very essential for policy implications because they intuitively mean that although women have made lots of efforts in improving their education over the men's, their efforts have been eliminated by discrimination at the workplace resulting in their lower wages still. To further clarify our above finding on the economy as a whole, this study also investigates whether it is also the case for each economic sector. As the participant rate of males and females in different economic sectors and industries vary, discrimination may occur in some sectors but not the other. Male or female dominance in each sector might be correlated to the extent of discrimination in that sector.

Table 5 presents decompositions results by sector or industry of the Thai economy. It is classified differently across years but attempts were made to group sub-industries into the most similar 16 sectors across three periods. Group 16 belongs to the extra-territorial organizations. It contains a small number of observations in all three samples which does not allow decomposition analysis. Names of the remaining 15 sectors or industries together with their number of observations in each time period are highlighted in bold in Table 5.

A general impression with data shown in Table 4 is that wage gaps, discriminations as well as changes in their magnitude over time are very different across sectors. For instance, the wage gap in agriculture first decreased in 2006 compared to 1996, then surged again in 2013. For most of the remaining sectors, an increase in remuneration gap was often seen from 1996 to 2006 then the gap was narrowed down in 2013. In manufacturing and construction industries, for example, there were wage differentials favoring men of 14.5 percent in 1996. The differential widened in 2006 to 22.8 percent for manufacturing and 44.2 percent for construction. In 2013, both sectors maintained a similar gap of 17-18 percent.

The rank of wage gaps among sector also changed across years. In 1996, the community, social and personal service activities had the highest wage difference of 80 percent, followed by health and social work at 25.9 percent and agriculture 20 percent. After 10 years, this ranking totally changed with construction sector on the top at 42 percent, following by financial intermediation at 26 percent and manufacturing at 23 percent. More recently, in 2013 a very similar wage gap in the range 17-18 percent can be observed in the above sectors while the top gap of 22 percent was in the hotels and restaurants industry. What do these numbers tell a story of change in the composition of the Thai economy? Does this mean a change in human capital characteristics of male and female workers or a change in the level of gender discrimination?

The degree of discrimination in each sector is measured by the share of unexplained part out of the total wage gaps. In 1996, highest discrimination against women was found in the transport, storage and communication sector, followed by wholesale and retail trade. In 2006, the degree of discrimination increased sharply in almost all sectors, except health and social work where there was actually a discrimination against men. Discrimination became moderate in 2013 but remained significant in some sectors such as real estate activities and water, electric supply. It is more interesting that discrimination against men can now be seen in wholesale and retail trade. Those figures suggest a possibility relation with the gender-dominance in employment of different sectors. For example, the wholesale and retailed trade was female dominant in 2006 and again in 2013 but not in 2006. There has been only 14-18 percent of employment in the electric, gas and water supply industry for women.

Conclusion

Key Findings

This study looks at the gender wage gap in Thailand over the three periods of a 17 year-long horizon and found that the gender wage gap in Thailand has narrowed down over time. Mean earnings of men was 15 percent higher than those of women in 1996 but that premium declined to 10 percent after a decade and stayed at a low gap of one percent recently in 2013.

Second, the results of this study indicate that most of those gaps cannot be explained by the observed characteristics of workers. The unexplained component of the wage gap outweighed the explained part in all three periods. The negative signs of the explained parts point out that women should have earned more than men on average because they possess better human capital characteristics such as education, working experience and occupational levels in general.

Moreover, the results show that the degree of unexplainable parts in the gender wage gaps have increased over years. It means our hypothesis of declining gender discrimination when gender wage gap narrows is not validated in this empirical research. In other words, the discrimination effect is sufficiently large which offset the endowment effect in Thai labor market over the period of the study. Although women have made lots of efforts in improving their education over men, their efforts have been eliminated by discrimination at the workplace resulting in their lower wages.

Table 5

Two-Fold Decomposition of Gender Wage Gap by Sector Over Time 1996, 2006, and 2013

lnwage	1996		2006		2013	
	Coef.	Share %	Coef.	Share %	Coef.	Share %
1. Agriculture, Forestry & Fishery		**441**		**6,594**		**5,825**
Overall difference	0.1982 **	100.00	0.1085 ***	100.00	0.1699 ***	100.00
Explained (Q)	0.0829	41.81	-0.0753 ***	-69.36	0.0149	8.79
coefficients (U)	0.1153	58.19	0.1838 ***	169.36	0.1550 ***	91.21
2. Mining		**73**		**130**		**182**
Overall difference	-0.1275	100.00	0.0389	100.00	-0.1932	100
Explained (Q)	-0.6468 **	507.44	-0.0848	-217.97	-0.2685 **	138.94
coefficients (U)	0.5193 **	-407.44	0.1238	317.97	0.0752	-38.94
3. Manufacturing		**522**		**12,392**		**11,947**
Overall difference	0.1060 ***	100.00	0.2280 ***	100.00	0.1817 ***	100.00
Explained (Q)	0.0476	44.86	0.0461 ***	20.23	0.0198 **	10.88
coefficients (U)	0.0585 ***	55.14	0.1819 ***	79.77	0.1619 ***	89.12
4. Electricity, gas and water supply		**501**		**476**		**686**
Overall difference	0.3329 ***	100.00	0.0389	100.00	0.0407	100.00
Explained (Q)	-0.0709	-21.29	-0.0848	-217.97	-0.1311	-321.96
coefficients (U)	0.4038 ***	121.29	0.1238	317.97	0.1718	421.96
5. Construction		**543**		**5,126**		**5,175**
Overall difference	0.3844 ***	100.00	0.1778 ***	100.00	0.1720 ***	100.00
Explained (Q)	0.1684 **	43.80	-0.0328 *	-18.48	0.0040	2.33
coefficients (U)	0.2160 ***	56.20	0.2106 ***	118.48	0.1680 ***	97.67
6. Wholesale and retail trade		**2,717**		**6,394**		**6,282**
Overall difference	0.1454 ***	100.00	0.0099	100.00	-0.0012	100.00
Explained (Q)	-0.0536	-36.85	-0.1622 ***	-1639.50	-0.0817 ***	6547.32
coefficients (U)	0.1990 ***	136.85	0.1721 ***	1739.50	0.0805 ***	-6447.32
7. Hotels and restaurants		**892**		**2,534**		**2,477**
Overall difference	0.0980	100.00	0.1901 ***	100.00	0.2225 ***	100.00
Explained (Q)	0.0699	71.34	0.0356 *	18.70	0.0643 ***	28.92
coefficients (U)	0.0281	28.66	0.1545 ***	81.30	0.1581 ***	71.08
8. Transport, storage& communications		**69**		**1,552**		**1,610**
Overall difference	0.0373	100.00	-0.4275 ***	100.00	-0.2041 ***	100.00
Explained (Q)	-0.4224 *	-1133.94	-0.4257 ***	99.58	-0.2796	137.00
coefficients (U)	0.4597 **	1233.94	-0.0018	0.42	0.0755 **	-37.00
9. Financial intermediation		**1,005**		**1,179**		**1,285**
Overall difference	-0.0393	100.00	0.2614 ***	100.00	0.0778	100.00
Explained (Q)	-0.1103	280.86	0.0110	4.22	0.0158	20.26
coefficients (U)	0.0710	-180.86	0.2504 ***	95.78	0.0621	79.74
10. Real estate activities		**4,650**		**1,277**		**1,512**
Overall difference	-0.0470	100.00	0.0521	100.00	0.0186	100.00
Explained (Q)	-0.0668 *	141.96	-0.1766 ***	-338.90	-0.0687 **	-369.94
coefficients (U)	0.0197	-41.96	0.2287 ***	438.90	0.0872 **	469.94
11. Public admin. & defence		**4,114**		**5,415**		**4,501**
Overall difference	0.0953 ***	100.00	0.0153	100.00	-0.0528 *	100.00
Explained (Q)	0.0421	44.16	-0.0908 ***	-595.18	-0.0965 ***	182.90
coefficients (U)	0.0532 ***	55.84	0.1061 ***	695.18	0.0437 *	-82.90
12. Education		**1,614**		**1,808**		**6,301**
Overall difference	-0.0378	100.00	0.1280	100.00 **	0.1428 ***	100.00
Explained (Q)	-0.0811 *	214.61	-0.0181	-14.10	0.0598 *	41.87
coefficients (U)	0.0433	-114.61	0.1461	114.10 ***	0.0830 *	58.13
13. Health and social work		**666**		**2,641**		**2,344**
Overall difference	0.2594 ***	100.00	-0.0019	100.00	0.0693	100.00
Explained (Q)	0.0459	17.69	-0.0425	2272.50	-0.0372	-53.67
coefficients (U)	0.2135 ***	82.31	0.0406	-2172.51	0.1065	153.67
14. Community, social services		**567**		**1,318**		**1,170**
Overall difference	0.8065 ***	100.00	0.1347 **	100.00	-0.0613	100.00
Explained (Q)	0.0739	9.17	0.0609	45.23	-0.1081	176.20
coefficients (U)	0.7326 ***	90.83	0.0738	54.77	0.0467	-76.20
15. Private household activities		**1,443**		**822**		**561**
Overall difference	0.2106 **	100.00	0.4120 ***	100.00	0.1061	100.00
Explained (Q)	0.0868 *	41.24	0.0153	3.70	-0.0109	-10.25
coefficients (U)	0.1237 *	58.76	0.3967 ***	96.30	0.1170	110.25

*Note. * p < 0.10, ** p < 0.05, *** p < 0.01*

Third, this paper draws new insights on the factor shaping gender wage inequality in Thailand by sector. Change in gender wage gap is very different across sectors although the overall wage gap has reduced. In 2013, wide gaps were found relatively high in hotels and restaurants industry (22.2 percent), manufacturing (18 percent), construction (17.2 percent), agriculture, fishery and forestry (17 percent). In 2006, the top gaps were in other community, social and personal service (80 percent), construction (38.4 percent) and electricity, gas, water supply (33.3 percent). The presence of a substantial gender wage gap in Thailand therefore can be seen in both male-dominant or female dominant industries.

Forth, even after controlling for industrial or sectoral segregation, the explained part of the gap is very small, mostly negative, implying the existence of discrimination. The degree of discrimination also varies across industries, regardless the dominance belonging to male or female workers. In 1996, the most discriminated sectors were community and social service activity, mining, transport, storage and communications as well as real estate activities and construction. In 2013, the most discriminated sectors changed to new industries such as electricity, gas and water supply and construction. In some certain industries like agriculture, manufacturing, hotels and restaurants which have relatively equal shares of male and female workers, discriminations were still high.

Recommendations

With the aim of closing the gender wage gap, this study shows that improving education and other human capital factors for women is necessary but not sufficient. Thai women have made significant achievement in improving their education, skills and qualifications to be as high as men's but the wage premium of men over women and discrimination prevail. Therefore, figuring out the factors leading to discrimination at workplace is even more important and requires further research. The form of discrimination may vary across different industries. Typical discriminations could possibly be an unfair access to all occupations and industries or unfair job promotion and opportunities favoring men against women who have equal or even better qualifications and skills.

Targeted policies to tackle for discriminations in different industries depend on whether the sector/industry is male or female dominated. Those policies can vary involving different stakeholders such as employers, the labor union or the women themselves.

Limitations and direction for future research

This paper only looks at three time periods over a long time horizon of 17 years in order to detect long-term changes. It was, however, the snapshots of the whole process looking at the issues from a static view. A more comprehensive study should investigate a dynamic change of the gender wage gap and discriminations. That kind of study would obviously require more complete data set.

Although the current study can identify the degree of wage discrimination out of the general wage gap in different industries, information and analysis on factors which might cause such discrimination are beyond the scope of the research. It would be very helpful for policy formulation if primary surveys are conducted to gather information on psychological

factors, individual preference or institutional factors in specific industries so as to design more relevant policies.

A deeper investigation into the relationship between industrial composition and gender wage discrimination might have to consider underlying factors for changes in each industry, for example the level of competition due to trade liberalization in Thailand or specific industry regulation and development strategies. By doing so, future research can test for the Becker's conclusion that competition would reduce discriminations.

Acknowledgements

This research is supported by a grant to the authors from the School of Economics and Public Policy, Srinakharinwirot University. We are thankful to Paweena Leetrakun, who assisted with data collection and preparation. We are also indebted to participants at the International Interdisciplinary Symposium of the Graduate School, Srinakharinwirot University, in November 2014, who provided constructive comments on the paper.

References

Ashenfelter, O., & Hannan, T. (1986). Sex discrimination and product market competition: The case of the banking industry. *The Quarterly Journal of Economics, 101*(1), 149-173.

Becker, G. S. (1957). *The economics of discrimination*. Chicago: University of Chicago Press.

Black, S. E., & Strahan, P. E. (2001). The division of spoils: Rent-sharing and discrimination in a regulated industry. *The American Economic Review, 91*(4), 814-831.

Blinder, A. S. (1973). Wage discrimination: Reduced form and structural estimates. *The Journal of Human Resources, 8*(4), 436-455.

Cain, G. G. (1986). The economic analysis of labor market discrimination: A survey. In C.A. Orley & L. Richard (Eds.), *Handbook of Labor Economics*. Elsevier.

International Labor Organization. (2013). *Thailand - A labor market profile.* Bangkok, Thailand: International Labor Organisation, Regional Office for Asia and the Pacific. Retrieved from http://www.ilo.org/asia/whatwedo/publications/WCMS_205099/lang--en/index.htm

Jann, B. (2008). The Blinder-Oaxaca decomposition for linear regression models. *Stata Journal, 8*(4), 453-479.

Khitarishvili, T. (2009). *Explaining the gender wage gap in Georgia*. New York, NY: The Levy Economics Institute Working Paper Collection of Bard College.

Khorpetch, C., & Kulkolkarn, K. (2011). Gender wage discrimination in the Thai labor market. *Applied Economics Journal, 18*(2), 17-31.

Maithongdee, N. (2010). *Gender discrimination and wage differentials: The case of private employees in professional occupations* (Unpublished master's thesis). National Institude of Development Administration, Bangkok, Thailand.

Mincer, J. (1958). Investment in human capital and personal income distribution. *Journal of Political Economy, 66*(4), 281-302.

Mutsalklisana, C. S. (2011). *Essays in labor and development economics* (Unpublished doctoral's dissertation). University of California, Riverside. Retrieved May 10, 2014 from http://worldcat.org/z-wcorg/ database

Nakavachara, V. (2007). *Essays on labor and development economics* (Unpublished doctoral dissertation). University of Southern California, Los Angeles, United State.

Nakavachara, V. (2010). Superior female education: Explaining the gender earnings gap trend in Thailand. *Journal of Asian Economics, 21*(2), 198-218.

National Economics and Social Development Board. (2010). *Thailand Millennium Development Goals Report 2009*. Bangkok: Office of the National Economic and Social Development Board.

Oaxaca, R. (1973). Male-female wage differentials in urban labor markets. *International Economic Review, 14*(3), 693-709.

Olivetti, C., & Petrongolo, B. (2014). Gender gaps across countries and skills: Demand, supply and the industry structure. *Review of Economic Dynamics, 17*(4), 842-859.

Wade, M. (2013). Gender pay gap widens even in sectors boasting female majority. *The Sydney Morning Herald*. Retrieved October 15, 2014 from http://www.smh.com.au /national/gender-pay-gap-widens-even-in-sectors-boasting-female-majority-20130902-2t13j.html

Wathanumsuk, J., Sajjanand, S., & Srisawaluk, O. (2012). *Gender Pay Gap: A Case study of Automobile Industry at Well Grow Industrial Estates in Chachoengsao Province*. *Proceeding from the 2nd STOU Graduate Research Conference*. Nonthaburi, Thailand: Sukhothai Thammathirat Open University.