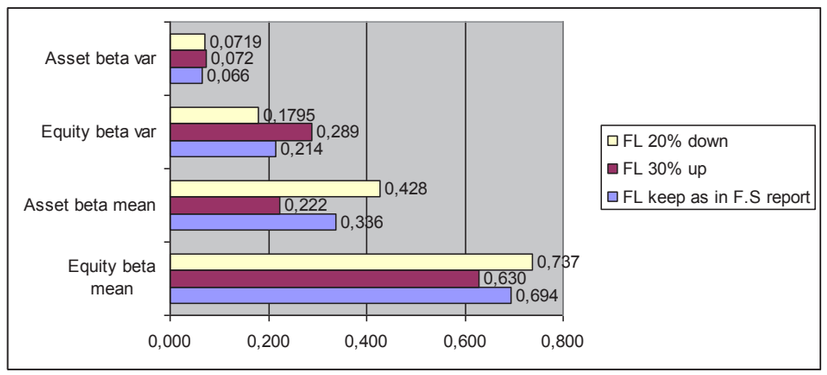
Exhibit 7: Comparing statistical results of three (3) scenarios of changing FL of 121 listed firms in the consumer good industry



Author note

My sincere thanks are for the editorial office and Lecturers/Doctors at Banking University and International University of Japan. Through the qualitative analysis, please kindly email me if any error found.

MARKET INTERRUPTION AND GENDER EARNING GAP IN THAI LABOR MARKET

by

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Abstract

This paper studies gender earning gap in Thai labor market. An overall gender earning gap in Thailand is decreasing over time. For the group of labors who have experience no more than 5 years (entry-level), an average female worker earns more than an average male worker since 1990s. On the other hand, for the group of labors who have experience more than 5 years (experienced), an average male worker earn more than an average female. Results from both parametric (Blinder-Oaxaca, 1973) and semi-parametric (DiNardo-Fortin-Lemieux, 1996) decompositions show that the disadvantage of entry-level female workers is significantly smaller than the disadvantage of experienced female workers. In addition, we found that a marital status plays an important role in determining gender earning gap for experienced workers but not for entry-level workers. This finding suggests that a natural market interruption of female, e.g., child-bearing duty, is an important factor determining gender earning gap in Thai labor market rather than gender market discrimination.

Keywords: Thailand, gender earning gap, market interruption, entry - level labor, decomposition

JEL classification: J13, J16, J71

1. Introduction

The gender discrimination has been in a debate for a century in various aspects such as social (i.e. the equality to work, to study and to live) economics (paid salary), politics (gender of the leader) and religion. It is the fact that, physically, men seem to be stronger than women. This aspect is the main factor that creates the gender discrimination. However, the physical differences between men and women do not always reflect the abilities or skills among them. The native cultures of many countries make the gender discrimination last for a long time until the industrial revolution when the demand for labor has been increased. Since then, the norm of living has been changed forever. For most of the world, women have been provided the opportunities to work outside their homes much more than the past. Now we can see many women become leaders of various institutions, from small businesses to the largest global chain companies including being the leaders of many countries. Although these changes have been ongoing for over 200 years, we can still notice the gender inequality in many parts of the world. Most of gender discrimination in economical aspect is the earning inequality which is easy to measure and can reflect the standard of living, even in developed countries. Bertrand and Hallock (2001) showed that high-level executive women in the US

firms earned about 45% less than men due to the size of company, age and seniority. Manning & Swaffield (2005) proposed that a human capital, job-shopping and psychological effect have caused the gender earning gap to increases in UK labor market after 10 years of working experience. In Denmark, Datta Gupta and Eriksson (2006) found that there were still gender gaps in the manufacturing sectors even though there are new workplace practices. Due to their family responsibilities, the women' work schedules are less flexible which prevents them from obtaining work related training that can earn them higher wages.

Thailand has transformed from the agricultural economy to an industrialized economy since 1977 when the GDP from manufacturing sector was higher than those of the agricultural sector. The economics growth increased from 5% per years in 1971-1985 to above 8% per years in 1987-1995 and peaked at around 12% per year in 1988-1990 (NESDB, 2009). During these times, a large amount of the labors have been need for the industrial sectors. Women have been major sources of the labor supply expansion and the government started to launch the education policies to serve the country development. Since then, women have got higher education and have started to work in the manufacturing or service sectors which made them receive higher wages or earning. From the former studies, the earning inequalities are reducing over time under the expansion of education for the females. Although females have returned to receive higher education more than males (Nakavachara, 2010), Warunsiri and McNown, 2010) and Beaudry and Lewis (2014), the wage inequality remain exists, especially in the top-end and low-end of the labors which is caused by the massification of higher-education (higher than high school level) and the migration to work in the low-end city respectively (Lathapipat (2009).

In Thai social norm, women have to take care of their family members especially after they get married which may be a factor that makes the discrimination in the labor market. Our study tries to find the major sources of discrimination in Thai labor market by using the Labor Force Survey (LFS) data of Thailand that has been collected for 28 years (1985-2012). We separate the labor into two groups using the time the labors have gain experience. The entry-level labors are classified as the labors who have just enter to the labor market (not more than 5 years of experience). The experienced groups are classified by a labor with experience more than 5 years. We start with the entry-level labors for testing the gender wage gap and then compare the result with those of the experienced group. We would like to know what the major sources of gender discrimination or gender earning gap are and whether and how we can reduce the gap.

In this paper, we analyze the gender earning inequality within and between the entry-level labors and the experienced labors for the Thai labor market. We follow the Blinder-Oaxaca (BO) decomposition method and compare the result with those using the semi-parametric method proposed by DiNardo-Fortin-Lemieux (DFL). The second part of this paper introduces the background of Thai's labor market since 1985-2012. This section contains the data of Thailand's Labor Force Survey (LFS), labor demand and supply, the unemployment rate, labor in each working status and industrial sectors including the characteristics of each group of labors. We propose the entry-level labors versus the experienced groups which make more clearly that why we are interested in the entry-level labors. In the third part, we analyze these data using the BO decomposition and the results on each type of labor groups. The semi-parametric decomposition is used for analyzing the distribution of earning inequality for each group of labors and then the results are compared with those of the BO. Finally, we provide the discussions of the study and make the important remark and the needed-to-do topics for the future research.

2. Background of Thai's labor market

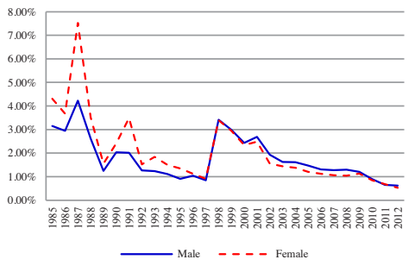
This paper uses 28 years of time series data from Thailand's Labor Force Survey (LFS) during 1985-2012 collected by the National Statistical Office (NSO). NSO had initiated the data survey since 1963 and conducted a survey only during the 1st and the 3rd quarter, in February and August respectively. In 1984-1997, NSO had conducted surveys 3 times a year in February (coinciding with the non-agricultural season), May (when the graduates enter to job market) and August (during the agricultural season). Since 1998, they have conducted surveys quarterly and after 2001 they have made the monthly survey. We use only the 3rd quarter of each year, which had surveyed completely for time series data and entry-level labors have time to find and get the jobs, to analyze in this study. We are interested in the information of gender, wage, earning, year of schooling, work hours, marital status, employment rate, unemployment rate, occupations and industries.

This study defines full-time working hour as total hours per week of 35 hours or more. Before 2001, we have legal age of labor force from 13 years old which was then change to 15 years old to comply with the child labor law. Therefore, we consider the age between 15-65 years with total hours worked of 35 hours a week or more as full time employment. The earnings include wage or salary, bonus, overtime, and other money which is calculated in real term of "Baht per hour" unit. All earnings are deflated by using the 2011 consumer price index (CPI) as the base year.

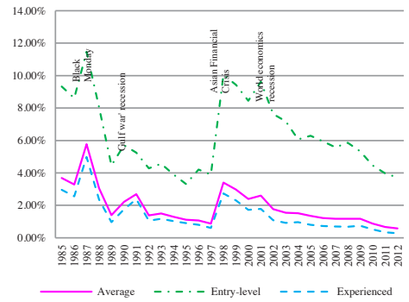
We measure education of each people by using the years of schooling which can define as who had learnt more will have more years of schooling. From the survey data there are many types of level of education and we found that some of people have to stop to learn before they finish the level. Then we generate the years of schooling from the reported level of education and convert to number of years that people attain to school. The current education system in Thailand is 6-3-3: the first six years are for the primary school, the next three years are for secondary school and the last three years are for the high school or technical college degree (lower than B.S. degree). In the past, we used the education system as 4-3-3-2 with 4 years compulsory education in 1936 and extended to7 years in 1951with 7-3-2 education system. The education system changed to 6-3-3 in 1977 under the first 6 years compulsory education policy and extended to 9 years and 12 years compulsory education in 1999 and 2002 respectively. We can divide the education level into many classes. For example if we focus only 3 classes, higher education, high school and lower education, we can group higher education as who have 16 year or more years of schooling, for 12-15 years of schooling is the high school and the lower education group who have less years of schooling than 12 years. In this paper we are usually use the year of schooling directly, sometime we categorize the level of education for seeing obviously.

Figure 1: The unemployment rate, 1985-2012.

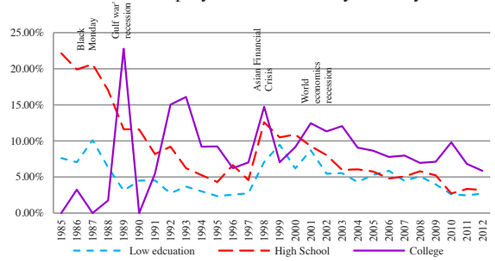
Panel A: The unemployment rate by gender.



Panel B: Unemployment rate by group of experience



Panel C: The unemployment rate of entry-level by education level



Sources: Calculated from LFS of Thailand collected by NSO, 2013.

In this study we focus on the entry-level labors with the potential experience between 0-5 years. This group of labor is the one who have just graduated or have low experience. We can see that this group has more chance to be laid off from the companies when there is crisis. We can calculate the experience from age - year of schooling - 6 (The children under 6 years old are not yet officially counted into the Thai education system, equivalent to the kindergarten or preschool.) and compare to the experienced group which has experience more than 5 years. If we consider the unemployment rate, we can see that the entry-level labors have the highest unemployment rate at 4-6% in normal time and easily jump to 10-12% during crises or shocks as show in figure 1 panel B. while the average unemployment rate is only 0.72% in 2012 and had never reached 6% during crisis times. On figure 1 panel C we concentrated on the entry-level labor group and found that the college graduate has the highest unemployment rate at about 7%. The unemployment rate jumps to the highest during the crises while the low education group has the unemployment rate around 5% which is close to those of the high school group. We can even see that the highest education group has the highest unemployment rate but people still try to get the education as much as they can because they would like to get more incomes with the higher degree as many studies show that the return on education depends on the education level or year of schooling. However there are some problems on Thai labor market such as mismatching between demand and supply for educated labors and job shopping of new graduates. Then we focus on the entry-level labors who get the direct effect from any changes, policies, crises or shocks.

We divided the data into three major periods by using the Asian Financial Crisis (Tom Yum Kung crisis). The first period (1985 to 1996) calls before crisis (BC) which we separate into two sub-periods, 1985-1990 and 1991-1996 as BC80 and BC90 respectively. The second period is the crisis time or during crisis (DC), 1997-2000. And the third period is after crisis (AC), from 2001 to 2012, which we separate into two sub-periods, 2001-2006 and 2007-2012 as AC1 and AC2 respectively. The way we separate the period will help us see precisely behavior of Thai's labor market in each time.

2.1 Overview of Thai labor market

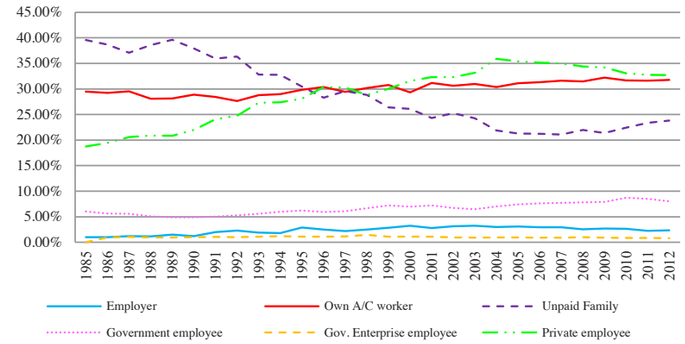
Figure 2: Population and labor force participation rate of Thailand, 1985-2012.

Panel A: Thai population and labor force **Panel B:** Labor participation rate

Sources: Population data from Department of Provincial Administration (DPA), the labor force and labor participation is calculated from the LFS of Thailand collected by the NSO, 2013.

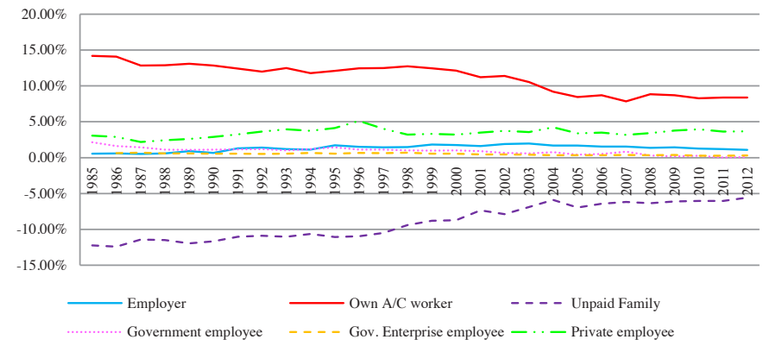
Thailand has the population around 64.46 million in 2012 with 31.70 and 32.76 million of male and female population respectively as shown in figure 2 panel A and panel B. From the NSO information we found that population of Thailand has increased over time while labor force participation rate has decreased, 80.48% in 1985 to 73.00% in 2012 and male has supplied their labor force more than female as in figure 2 panel B. We can see the unemployment rate in figure 1 panel A, before crisis (1997), Thai labor market has unemployment rate only 1.07% as show in figure 1 panel A. During the crisis 1998 to 2001, the unemployment rate has been growing up rapidly to 3.41% and climb down to 2.60% in 2001. After the crisis the unemployment rate has dropped to 1.76% and to 0.58% in 2002 and 2012 respectively. We found that the employment behavior has changed. After the crisis, the unemployment rate of male is greater than female which had never happened. The female employment rate has increased, since then is almost equal to the employment rate of male.

Figure 3: Proportion of workers by working status of Thai labor market, 1985-2012.



Sources: Calculated from LFS of Thailand collected by NSO, 2013.

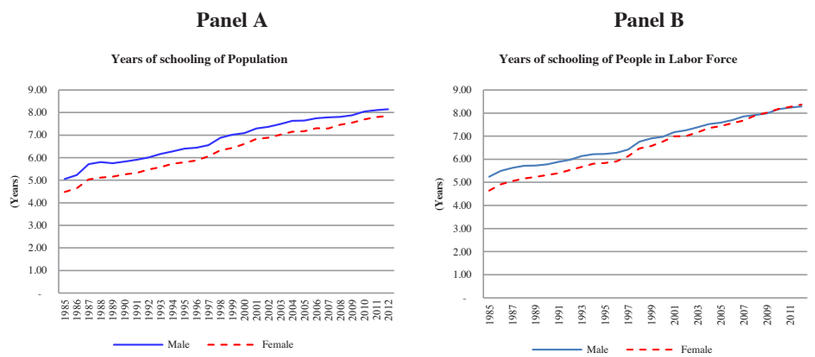
Figure 4: Different rate of gender proportion of workers by working status, 1985-2012.



Sources: Calculated from LFS of Thailand collected by NSO, 2013.

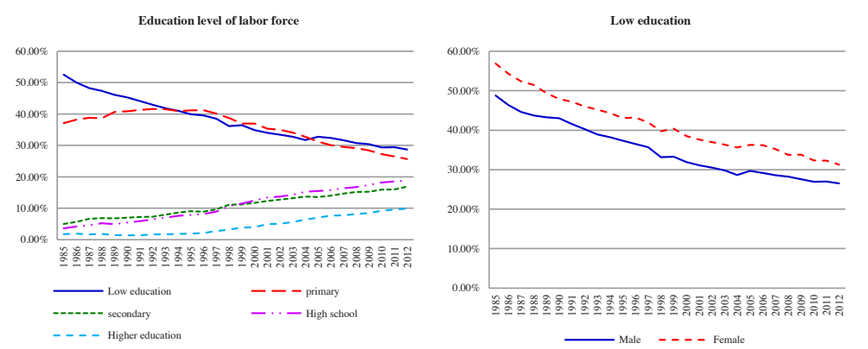
The structure of working status of Thai labor market is show in figure 3. There are three main sectors; the first sector is private employee, the second sector is own account workers (who operated an enterprise on his own account without employee) and the last one is unpaid family (who works without pay on a farm or in a business enterprise owned or operated by the head of family or by any other family members). Before crisis we found that each main sector has 30% share. After crisis the private employee sector increased to 37% and unpaid family has dropped to 20%. This study analyzes only the earnings of employee of the governments and private sectors (around 45% of Thai labor market). From figure 4, we see that women work for unpaid family more than men (with the negative number) but this trend has sharply declined over time, as the gap of the rate between male and female decreased from -12.22% in 1985 to -5.58% in 2012. Women in unpaid family are moving out to the others. In the other sectors, men join to work more than women especially in the own account worker group where men have higher proportion than women: 14.18% in 1985 and dropped to 8.37% in 2012. For the employer sector, the gap of this proportion between male and female is higher, increasing from 0.55% to 1.95% and drop down to 1.10% in 1985, 2004 and 2012 respectively. After crisis, women work for government much more than the past and tend to increase over time. This result is correlated with the last session that women tend to work more in service sector. The most of government works are provide services for their population. We observe that women try to have their own businesses which make the different rate of gender proportion lower over time.

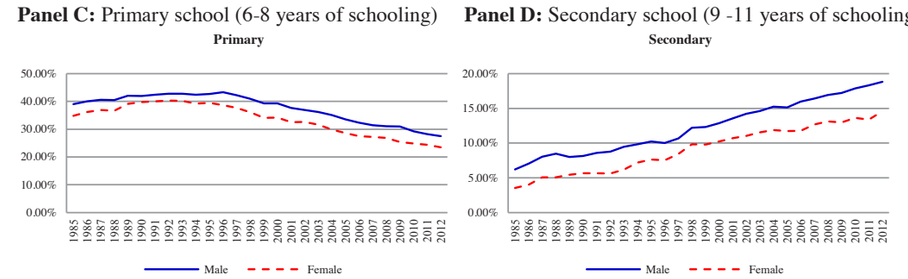
Figure 5: Average years of schooling of Thai people, 1985-2012.

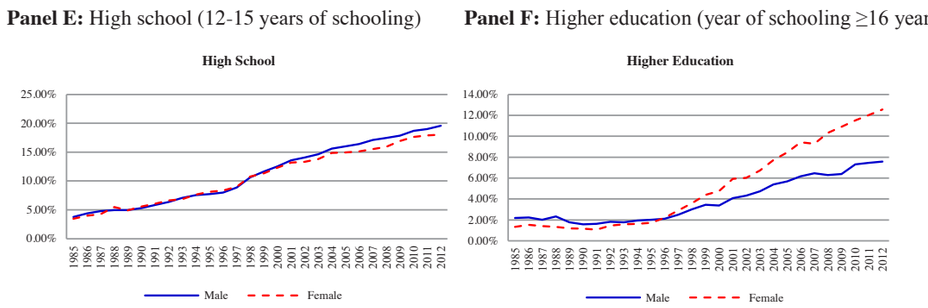


Sources: Calculated from LFS of Thailand collected by NSO, 2010.

Figure 6: Proportion of workers by education level (using year of schooling) and gender of Thai labor market 1985-2012



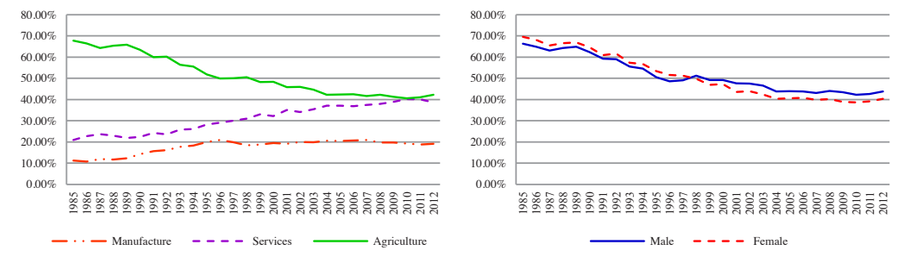




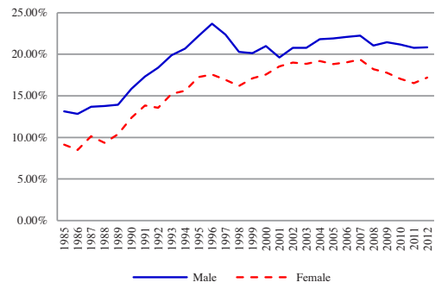
Sources: Calculated from LFS of Thailand collected by NSO, 2013.

The education for Thai people is very important and it is the main factor to develop the country. In the past, only boys can study with the monks in the temple when girls have to learn about housework at home. We had the first school in a reign of the King Chulalongkorn (King Rama V) in 1871 when the schools were developed for both boys and girls. Since 1932, Thailand had the compulsory education policy for supporting the people to enter school. Since 1936, the compulsory education was 4 years for serving the rapidly country development at that time and then changed to 7 years in 1951. After 1977, the compulsory education was changed to 6 years and in 1999 it was expanded to 9 years and the people have had the right for free education for 12 years since 2002. These policies give the chance to people to get more years of schooling as shown in figure 5 panel A and B. The average years of schooling of Thai people has climbed from 4.76 years in 1985 to 7.99 years in 2012 when the people in those of labor market climbed from 4.97 to 8.32 years in 1985 and 2012 respectively.

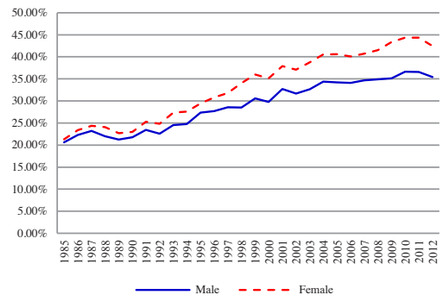
Figure 7: Proportion of workers by industry and gender of Thai labor market 1985-2012



Panel C: Proportion of labors in manufacture sector



Panel D: Proportion of labors in service sector



Sources: Calculated from LFS of Thailand collected by NSO, 2013.

We group the years of schooling to five education levels, low education (who have years of schooling less than 6 years), primary school (who have 6-8 years of schooling), secondary school (who have 9-11 years of schooling), high school (who have 12-15 years of schooling) and higher education (who have years of schooling more than 15 years). We can see that in 1985, around 72.23% of labors in labor force have low education while labors with higher education were only 2.17% as shown in figure 6 panel A. After the Thai education policy was enforced, the education level of labors in the market has improved. We can reduce the low education labors to 28.71% and increase the higher education to 9.87% in 2012. We can see that the education of the women are less than those of men in primary, secondary and high school as shows in figure 6 panels C-E. When there are higher amount of number of women in lower and higher education as shown in figure 6 panels B and F. From the combination of figure 5 and figure 6 we can observe that women who have high education will enter to labor market.

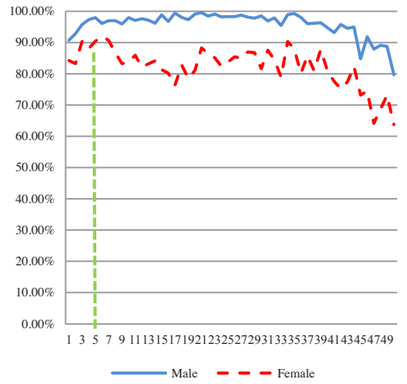
Thailand is gradually changing away from the agricultural country that agriculture is the main sector in the labor market but the trend has declined over time as shown in figure 7 panel A. The agriculture share decreased from around 67.78% in 1985 to 42.22% in 2012. While the labor in agriculture sector is dropping, the labor in services and manufacture sectors are growing up. The labors in services has climbed from 20.92% in 1985 to 38.62% in 2012 when the labor in manufacture sector has also increased and nearly stable after the crisis. It was increased from 11.30% in 1985 to 20.93% in 1996 and dropped to18.44% in 1998. Then it increase a little bit and almost stable at around 20% since 2002. If we consider to the labor participation in panel B, in 1985 ratio of women worked in agriculture sector more than ratio of men (69.57% vs. 66.26%, respectively) since the crisis this ratio was changed ratio of men worked in the agricultural sector more than ratio of women (43.78% and 40.38% in 2012, respectively). We found that ratio of women worked in the services sector more than ratio of men and the number of women in this sector increased with higher rate as shown in panel D. Men worked for manufacture sector more than women. The number of men in this sector dropped very sharply during the crisis but the men still have higher share than women as shown in panel C.

2.2 Entry-level labors vs. experienced labors

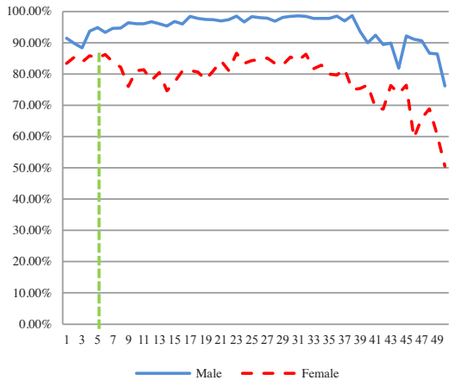
This paper we separate the data into two groups by using the potential experience. The first group is called entry-level labors who have only 0-5 years of potential experience and the other group is experienced who have more than 5 years of experience in the labor market for analyzing the gender discrimination or gender earning inequality. We found that the trend of labor participation at the first 5 years of experience the labor participation gap between men and women are not much different (the gap varies between 0-8%) as shown in figure 8 panel A-D and the gap is greater after 5 years of experience (10%-20%) as shown in panel C. Then we expect that the gender earning gap should not be much different which is consistent with the other studies such as Bertrand et al. (2010) and Manning & Swaffield (2005) who reported that the gender gap among the early-career or entry-level workers are quite small in both the United States and the United Kingdom, respectively. However, the figures indicate that women have less labor participation than men in the labor market which could be due to the norm of Thai culture that women have to take care of family members.

Figure 8: Labor participation of labor force by the years of experience in 1986, 1996, 1999 and 2006

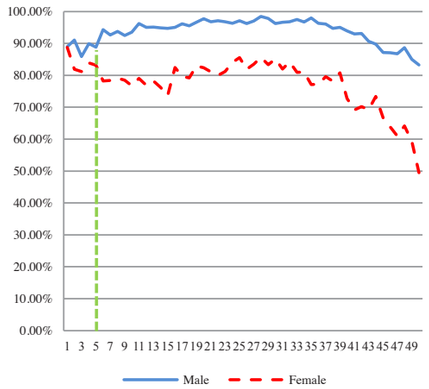
Panel A: Labor participation, 1986



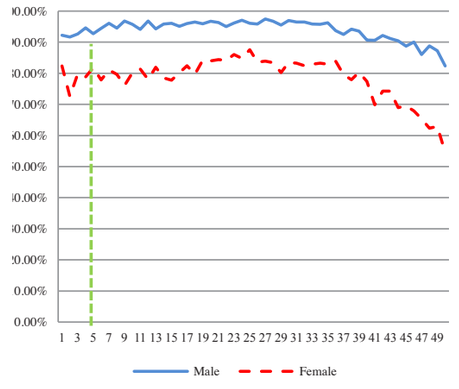
Panel B: Labor participation, 1996



Panel C: Labor participation, 1999



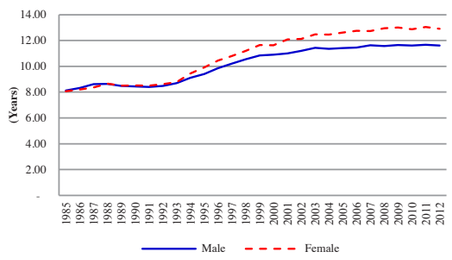
Panel D: Labor participation , 2006



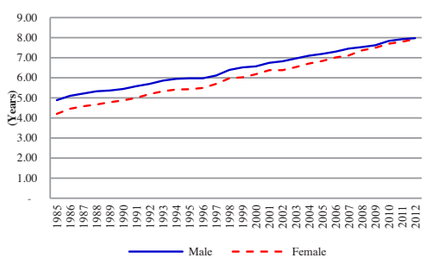
Sources: Calculated from LFS of Thailand collected by NSO, 2013.

Figure 8: Average years of schooling of entry-level labors and experienced labor, 1985-2012

Panel A: Entry-level labors



Panel B: Experienced labors

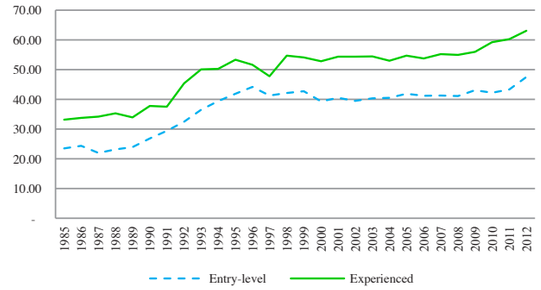


Sources: Calculated from LFS of Thailand collected by NSO, 2013.

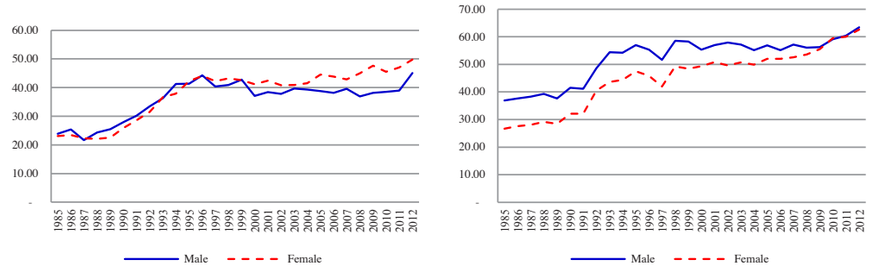
There are many interesting features in entry-level group such as unemployment rate in figure 1 panel B or general gender gap in topic of return on education (Warunsiri and McNown, 2010) and marital status (Buchmueller, 1996) that has been studied in previous works. We start with the comparison the experienced and entry-level features on the year of schooling, real earning per hour, marital status and real earning per hour by marital status. We found that the years of schooling of entry-level labors grow from 8.09 years in 1985 to 12.22 years in 2012 while those if the experienced labors have grown from 4.56 to 7.95 years respectively. And in the entry-level group, women have higher years of schooling than men and the gap is broader over time as show in figure 8 panel A. The average year of schooling of the experienced group, women have lower years of schooling and tend to increase gradually as in panel B. It means that on average, entry-level labors get more years of schooling than the experienced group which is a result from the compulsory education policies. Moreover, young Thai women get higher education than men since 1989.

Figure 9: Average earning per hour of entry-level labors and experienced labor, 1985-2012

Panel A: Real earning per hour of Full time workers by experience



Panel B: Earning per hour of entry-level labor **Panel C:** Earning per hour of experienced labor



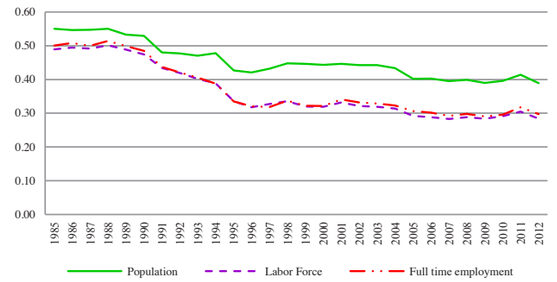
Sources: Calculated from LFS of Thailand collected by NSO, 2013.

Even though the entry-level group has higher education but when they enter to labor market, only the education could not help them to get the job. In addition, during crises this group was the first group has to be laid off or unemployed, with highest unemployment rate as show in figure 1. In 1987, the Black Monday crisis, the unemployment rate of the entry-level group jumped to 11.46% and increased to 10.04% during the Asian Financial crisis in 1998. Normally they have 5% unemployment rate which is higher than those of the others 4.0%. Therefore the job security for this group is very sensitive to any policies, shocks or crises. In addition, this could reflect the efficiency of Thai education system or shed light on the new trend of Thai labor market that start shopping for the jobs.

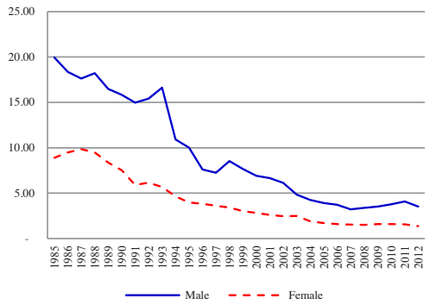
It is the fact that earnings of entry-level labors are lower than those of the experienced labors as show in figure 9. There are also differences on the trend of gender earning gap as shown in figure 9 panel B and C which show that the earning per hour of women in experienced group are catching up with the men while the entry-level labors, women earn more than men since 1999. These trends are related to the trend of years of schooling in figure 8. Our study shows the new trend of gender gap in entry-level labors which are different from the other previous studies which found only gender earning gap tend to be lower over time.

Figure 10: Share of single to married in Thai labor market, 1985-2012

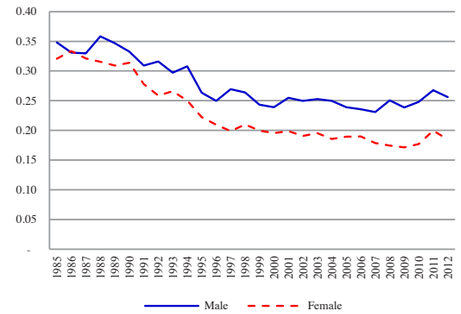
Panel A: Share of single to married in labor market



Panel B: Share of single to married, entry-level workers



Panel C: Share of single to married, experienced workers

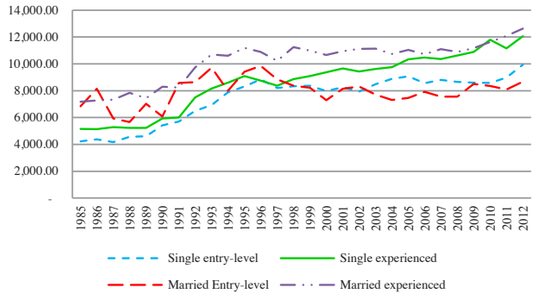


Sources: Calculated from LFS of Thailand collected by NSO, 2013.

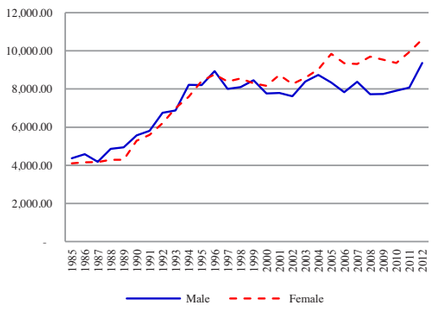
The marital status is a main factor that has made males and females have the different earnings. From the data, we found that people decide to get married more than the last decade, for risk-sharing or any other reasons, especially in the entry-level group as show in figure 10, panel C. For all population in panel A, we found that share of single to married is at 0.55 in 1985 and drops to 0.39 in 2012 while the number in labor force is around 0.49 and 0.28 respectively. The share of single to married in the entry-level group is 12.74 in 1985 and drops to 2.16 in 2012 and the share of single to married in the experienced group is dropping down a little bit and close to stable at around 0.20 as shown in panel D.

Figure 11: Average real earning per month of entry-level labors and experienced labor by marital status, 1985-2012

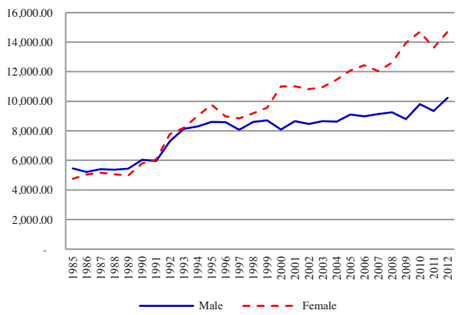
Panel A: Earning per month of fulltime employment by marital status and experience.



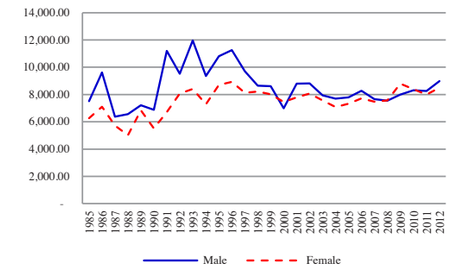
Panel B: Earning of single entry-level workers



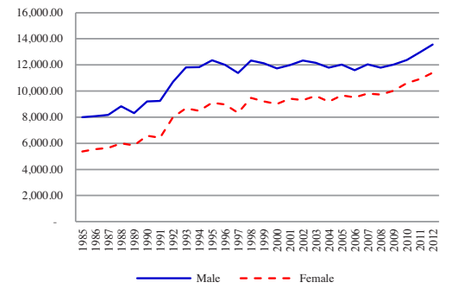
Panel C: Earning of single experienced workers



Panel D: Earning of married entry-level workers



Panel E: Earning of married experienced workers



Sources: Calculated from LFS of Thailand collected by NSO, 2013.

From figure 11 panel A, we observe that the behavior of the market was changed after crisis. Before 1997 both married experienced labors and married entry-level labor were got earning more than single labors but after that the experienced labors were get more earning than entry-level labors. We found that single females in both entry-level and experienced groups have higher earning per month than single males as panels B and C. Especially single experienced females can earn more than single experienced males and the gap between them increase overtime as panel C. Moreover, we can observe that the earning of single males in both groups is not much different as shown in panels B and C. In the married group, we can observe that males earn more than females especially in the experienced group as shown in panels D and E. Due to the fact that married women have high probability to face with the market interruption under the family lives especially to give birth and take care of their family members. This could make the employers to expect that married women will be less productive at work which made them get lower earnings than men. As the old Thai culture, married men have to work for raising their families when women have to quit the job or allocate more time to look after members of family. Then married men have to push more effort to work and try to earn more for their families. Our paper will focus on the impact of the marital status to the earning inequality for finding the reason behind the gender gap. We study the earning inequality by using the Blinder-Oaxaca decomposition and semi-parametric decomposition to study more detail of the inequality in each group.

3. Gender gap detectors

There are many approaches to measure the gender earning inequality such as common earning inequality metrics, parametric and non-parametric decomposition etc. One of the most extensively used methods is a decomposition method by Blinder-Oaxaca (BO) was first studied by Blinder (1993) and Oaxaca (1993). From the limitation of the BO which consider only mean values of the data, then the decomposing distribution methods are developed by Juhn, Murphy and Pierce (1993) and DiNardo, Fortin, Lemieux (1996), Firpo, Fortin and Lemieux (2009) and Fortin, Lemieux and Firpo (2011). Many literatures follow these approaches as Sierminska Frick and Grabka (2008) used the regression-based techniques the Juhn, Murphy & Pierce decomposition and semi-parametric method as DiNardo-Fortin-Lemieux (DFL) to find the gender wealth gap in Germany, Lathapipat (2008) and (2009) study the changes educational distribution and its impact on the evolution of wages in Thailand during 1987-2006 by using the Recentred Influence Function (RIF) of Firpo- Fortin-Lemieux and Nakvachara (2010) use the BO and DFL to study the gender gap in Thailand. In this study, we follow to the BO and DFL decomposition for finding the parametric and semi-parametric results as shown in the next section.

3.1 Blinder - Oaxaca Decomposition

We follow the standard Mincer (1974)'s earning equation

$$y_{ig} = X_{ig}\beta_g + \varepsilon_{ig} \quad (1)$$

when X_{ig} is the observation on the explanatory variables which includes year of schooling, age and age-squared, i = 1, 2, 3, …, N_g, and $\Sigma_g N_g = N$, y is the log hourly earnings, β is the beta coefficient or gender wage structure that we can find from the ordinary least square which is estimated for g groups, male (m) and female (f), and ε is the residual. Blinder (1973) and Oaxaca (1973) presented the decomposition

$$\begin{aligned}\bar{y}_m - \bar{y}_f &= [E_{\beta_m}(y_{im} \mid X_{im}) - E_{\beta_m}(y_{if} \mid X_{if}) \\ &\quad + [E_{\beta_m}(y_{if} \mid X_{if}) - E_{\beta_f}(y_{if} \mid X_{if})] \\ &= (\bar{X}_m - \bar{X}_f)\hat{\beta}_m + \bar{X}_f(\hat{\beta}_m - \hat{\beta}_f) \quad (2)\end{aligned}$$

when $\bar{y}_g = \frac{\sum_{i=1}^{N_g} y_{ig}}{N_g}$ and $\bar{X}_g = \frac{\sum_{i=1}^{N_g} X_{ig}}{N_g}$. The first term on the right hand side of equation (2) shows the differences in the observable characteristics between groups or explained part, the second term shows the differences in coefficient estimates or unexplained part which can well be a result of gender discrimination.

Following Neumark (1988), we will use returns to schooling from pooled data, $\hat{\beta}_a$ as the reference return. Then we are added and deducted the terms $\bar{X}_m\hat{\beta}_a$ and $\bar{X}_f\hat{\beta}_a$ to equation (2) and rearrange as

$$\begin{aligned}\bar{y}_m - \bar{y}_f = \Delta y &= (\bar{X}_m - \bar{X}_f)\hat{\beta}_m + \bar{X}_f(\hat{\beta}_m - \hat{\beta}_f) + \bar{X}_m\hat{\beta}_a + \bar{X}_f\hat{\beta}_a - \bar{X}_m\hat{\beta}_a - \bar{X}_f\hat{\beta}_a) \\ &= (\bar{X}_m - \bar{X}_f)\hat{\beta}_a + \bar{X}_m(\hat{\beta}_m - \hat{\beta}_a) + \bar{X}_f(\hat{\beta}_a - \hat{\beta}_f) \\ &= \Delta\bar{X}\hat{\beta}_a + \bar{X}_m\Delta\hat{\beta}_m + \bar{X}_f\Delta\hat{\beta}_f \quad (3)\end{aligned}$$

The first term is the explained part which can explain by the observable characteristics. The rest are the unexplained part or residual gap which consist of the advantage of males and the disadvantage of female on the second and the third terms respectively. Then if there is no gender gap in the return of male and female, we can see that both groups will get the same wage or the difference of beta close to zero. If men are more favorable in the market, the second and the third terms will be positive but we can see that sometime these terms are negative which means males could not take advantage from their attributes or females are being more favorably compensated compared to the pooled wage. In this study we use the equation (3) for analyzing the data and get the results as discussed the following section.

3.2 The BO decomposition results

Again, we decide to separate the data into three periods based on the 1997 financial crisis. These groups belongs to the period before crisis, in 1985-1990 (BC80) and 1991-1996 (BC90), one group during crisis, 1997-2000 (DC) and two groups after crisis, 2001-2006 (AC1) and 2007-2012 (AC2). We found that the economy on each period is different even within the periods before crisis. During 1985-1990 were the period of development, the GDP (NESDB 2015) on this period was growing very fast and touch the highest GDP growth at 13.29 in 1988. After that, during 1991-1995, the GDP growth was around 8. During the period of crisis, 1997-2000, Thailand faced with the negative GDP growth shock and the economics recovered after that. There are three groups of labor that we analyze in this study, all fulltime workers, experienced and entry-level workers. The BO decomposition results are shown in table 1. We found that on average of fulltime workers, the total gap, column (6), between men and women decrease over time; 32.04, 21.59, 14.23, 8.15 and 2.05 in BC80, BC90, DC, AC1 and AC2 respectively. The trend is almost the same in experienced workers, from 34.39 in BC80 to 4.29 in AC2. We can see that the total gap of the entry-level labor is very low and had negative sign, 7.78 to -16.78 in BC80 to AC2 respectively. This means that the average earning gap between men and women in the entry-level labors is lower than experienced labors at the same time. And the results show that after BC80, women got higher earning than men under the same characteristics and this gap tends to increase over time.

Table 1: Blinder-Oaxaca (1973) results of LFS, 1985-2012.

Condition	Explained gap	Unexplained gap			Total Gap
		Total	Advantage of Male	Disadvantage of Female	
(1)	(2)	(3)	(4)	(5)	(6)
All fulltime workers					
BC (1985-1990)	0.0728	0.2476	0.1012	0.1464	0.3204
BC (1991-1996)	0.0162	0.1997	0.0822	0.1175	0.2159
DC (1997-2000)	-0.0093	0.1516	0.0655	0.0861	0.1423
AC (2001-2006)	-0.0544	0.1359	0.0605	0.0754	0.0815
AC (2007-2012)	-0.0966	0.1171	0.0528	0.0643	0.0205
Experienced workers					
BC (1985-1990)	0.0759	0.2681	0.1050	0.1631	0.3439
BC (1991-1996)	0.0272	0.2151	0.0854	0.1297	0.2424
DC (1997-2000)	0.0074	0.1619	0.0676	0.0944	0.1693
AC (2001-2006)	-0.0306	0.1417	0.0610	0.0807	0.1111
AC (2007-2012)	-0.0809	0.1238	0.0545	0.0692	0.0429
Entry-level workers					
BC (1985-1990)	-0.0174	0.0952	0.0490	0.0463	0.0778
BC (1991-1996)	-0.0876	0.0724	0.0374	0.0350	-0.0152
DC (1997-2000)	-0.1016	0.0274	0.0147	0.0127	-0.0742
AC (2001-2006)	-0.1489	0.0272	0.0146	0.0126	-0.1216
AC (2007-2012)	-0.1750	0.0072	0.0038	0.0034	-0.1678

These results are related to the figure 10 because BO using the mean value of the data to calculate. The explained gap, in column (2), if the value is positive mean that men had more favorable or the observable characteristics of men make them get better earning. From the results, only in BC80 and BC90 are positive and after that the observable characteristic of women are more attractive. The results of entry-level labors are completely negative, from -1.74 to -17.50 in BC80 to AC2 respectively, which mean the observable characteristic of women in this group are better than men and tend to better over time. These results are connected to the mean values of the data that show characteristic as years of schooling of women better than men over time. The unexplained gaps which imply to the gender discrimination consist of column (4) and column (5). Total unexplained gap, column (3), is also decline over time, for experienced labor change from 26.81 to 12.38 and entry-level labors change from 9.52 to 0.72 from BC80 to AC2 respectively. But from the results could not show precisely that females can take advantage form males even in the entry-level labors because the value of unexplained gap in column (4) and (5) are not negative at the same time. Then we can conclude that males can take advantage of females or males are being more favorably compensated and females could not take advantage of males or females are being less favorably compensated compare with the referenced pay structure in both experienced and entry-level labors. And gender discrimination or gender gap in Thai labor market tends to be lower over time.

From the BO decomposition results under the same attributes of years of schooling, age, age-square and potential experience show that women are more favorable over time especially in the entry-level labors who that women have more year of schooling than those of men. We wonder that if the market did not discriminate females at the beginning, why after they have more years of experience the data show males are more favorable than females even though the trend is declined. Then we check with the marital status for finding the supporting reason to explain our observation. We focus on the single and married workers in each group of labors. The results of BO decomposition are shown in table 2. The total gap, column (6), of married labors in each group is declined over time same as the results in previous table when the single labors' earning dominated by women after BC80 and tend to make wider gap in both experienced and entry-level group of labors. In single entry-level labors group, the total gap is 8.08, -3.15, -9.49 and jump to -18.44 and -25.87 in AC1 and AC2 respectively. These values imply that women earn more than men as show in equation (3). The explained gap, column (2), shows that the observable characteristics of women in the single labors are better than men in both groups as the results show negative value of explained gap and vice versa for married group. As the previous results, value of unexplained gap in column (4) and (5) are not negative at the same time before the crisis. Then we can conclude that married or single males can take advantage of married or single female respectively or married or single males are being more favorably compensated than females only in the period of before crisis. But after crisis we found that single women can take advantage of single men both in experienced and entry-level labors and tend to take more advantage over time.

Table 2: Blinder-Oaxaca (1973) results of LFS, 1985-2012 by marital status.

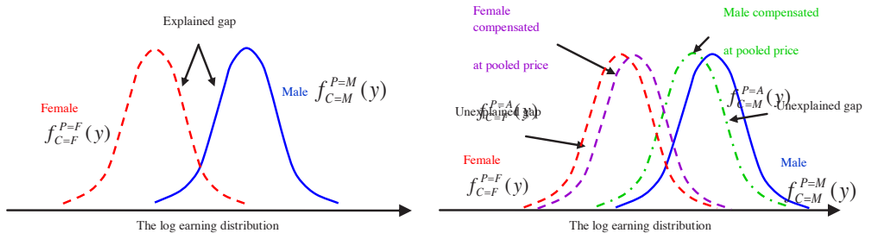
Condition	Explained gap	Unexplained gap			Total Gap
		Total	Advantage of Male	Disadvantage of Female	
(1)	(2)	(3)	(4)	(5)	(6)
Single experienced workers					
BC (1985-1990)	-0.0458	0.1592	0.0729	0.0863	0.1134
BC (1991-1996)	-0.1279	0.1021	0.0437	0.0584	-0.0259
DC (1997-2000)	-0.1765	0.0486	0.0209	0.0277	-0.1279
AC (2001-2006)	-0.2794	-0.0078	-0.0033	-0.0045	-0.2872
AC (2007-2012)	-0.3489	-0.0250	-0.0103	-0.0147	-0.3739
Single entry-level workers					
BC (1985-1990)	-0.0190	0.0998	0.0505	0.0492	0.0808
BC (1991-1996)	-0.0992	0.0678	0.0337	0.0340	-0.0315
DC (1997-2000)	-0.1247	0.0298	0.0153	0.0145	-0.0949
AC (2001-2006)	-0.2134	0.0290	0.0143	0.0146	-0.1844
AC (2007-2012)	-0.2538	-0.0049	-0.0023	-0.0026	-0.2587
Married experienced workers					
BC (1985-1990)	0.0961	0.2897	0.0975	0.1923	0.3859
BC (1991-1996)	0.0805	0.2332	0.0840	0.1492	0.3137
DC (1997-2000)	0.0759	0.1749	0.0674	0.1075	0.2508
AC (2001-2006)	0.0521	0.1665	0.0681	0.0984	0.2186
AC (2007-2012)	0.0102	0.1478	0.0630	0.0848	0.1580
Married entry-level workers					
BC (1985-1990)	0.1020	0.0748	0.0425	0.0323	0.1768
BC (1991-1996)	0.1028	0.1226	0.0766	0.0460	0.2254
DC (1997-2000)	0.0131	0.0234	0.0148	0.0087	0.0365
AC (2001-2006)	0.0042	0.0281	0.0182	0.0099	0.0323
AC (2007-2012)	-0.0309	0.0263	0.0165	0.0097	-0.0047

The results confirm that single women can allocate their time to work more than married women who face with market interruption, due to fertility. In addition, the single women dominate the single men's earning over time for both experienced and entry-level group under the observable characteristics. Even now we can conclude that single women can take advantage of single men. But we would like to make sure that these results are clearly observed. Then we have to test by using the other method. Because the BO decomposition is calculated by using only the mean values of the data then we could not see the entire earning distribution. Next sections, we decide to use the semi-parametric decomposition to analyze entire distribution and check the counterpart.

3.3 Semi-parametric decomposition

Figure 12: The log earning distribution and the gender gap.

Panel A: log earning distribution of male and female **Panel B:** log earning distribution and their counterfactual



The DiNardo-Fortin-Lemieux (DFL) decomposition had proposed a method to study the wage inequality. We modified DFL approach by using the pooled price and there are the gender gaps as shown in the figure 12 panel A the gender gap is the length between two curves of the gender distribution. We have to construct the counterfactual for simulation as if women were compensated at the pooled price. The different in the gender counterfactual earning densities is the gender disparity from observable characteristics or explained gap and the different between the each gender counterfactual earning density and gender earning density is the dissimilar from the unobservable attribute or unexplained gap as shown in figure 12 panel B. To analyze with semi-parametric decomposition we can see the entire distribution of the data that we use in each group which show more precisely than using only the average data as in BO decomposition.

This section start with the earning density by using the kernel density estimator f(y) of Rosenblatt (1956) and Parzen (1962) in equation (4), yi is the log earning per hour, ω_i is the survey weight, n is the number of the observation, h is the band width and the kernel function (K). We can build respectively the males and females earning density by using the equation (5) and (6) respectively.

$$\hat{f}_h(y;h) = \sum_{i=1}^{n} \frac{\omega_i}{h} K\left(\frac{y - y_i}{h}\right) \quad (4)$$

$$\hat{f}^M(y;h) = \sum_{i=1}^{n_M} \frac{\omega_i}{h} K\left(\frac{y - y_i}{h}\right) \quad (5)$$

$$\hat{f}^F(y;h) = \sum_{i=1}^{n_F} \frac{\omega_i}{h} K\left(\frac{y - y_i}{h}\right) \quad (6)$$

The marginal density of earnings of all workers (f(y)) can be written in terms of the joint density between earnings and observable characteristics of workers (f(y,x)) integrated over the domain of all possible vectors of the attributes (Ω_x). The joint density can be replaced by the conditional density of earnings (f(y|x)) multiplied by the marginal density of the attributes (g(x)) as show in the equation (7).

$$\begin{aligned} f(y) &= f(y; P = A; C = A) \\ &= \int_{x\in\Omega_x} f(y,x)dx \\ f(y) &= \int_{x\in\Omega} f(y \mid x,)g(x)dx \end{aligned} \tag{7}$$

After that we create the male counterfactual earnings density which is the distribution of male earnings if their observable characteristics were compensated based on the pooled wage structure as equation (8). We need to modify the equation (7) by using set of attributes that are integrated over males. Then the marginal density of the attributes of all workers, g(x), is replaced by the marginal density of the attributes of male workers, $g_M(x)$ and $g_F(x)$ for the marginal density of the attributes of female workers in equation (9). Then we can construct the males and females counterfactual earning density. These densities show the earning that men or women should to get if their observable characteristics were compensated with the pooled wage structure.

Male

$$\begin{aligned} f_{C=M}^{P=A}(y) &= f(y; P = A; C = M) \\ &= \int_{x\in\Omega_x} f(y \mid x) g_M dx \\ &= \int_{x\in\Omega} f(y \mid x,) \frac{g_M(x)}{g(x)} dx \\ f_{C=M}^{P=A}(y) &= \int_{x\in\Omega_x} f(y \mid x)\, \psi^M \cdot g(x)dx \end{aligned} \tag{8}$$

Female

$$\begin{aligned} f_{C=F}^{P=A}(y) &= f(y; P = A; C = F) \\ &= \int_{x\in\Omega_x} f(y \mid x) g_F dx \\ &= \int_{x\in\Omega} f(y \mid x,) \frac{g_F(x)}{g(x)} dx \\ f_{C=F}^{P=A}(y) &= \int_{x\in\Omega_x} f(y \mid x)\, \psi^F \cdot g(x)dx \end{aligned} \tag{9}$$

Follow DFL reweighing procedure, we use ψ^M, ψ^F as the male and female reweighing parameter respectively which can be simplified using Bayes's rule:

$$\psi^M = \frac{g_M(x)}{g(x)} = \frac{g(x \mid C = M)}{g(x)}$$

$$\psi^M = \frac{P(C = M \mid x)}{P(C = M)} \tag{10}$$

$$\begin{aligned} \psi^F &= \frac{g_F(x)}{g(x)} = \frac{g(x \mid C = F)}{g(x)} \\ &= \frac{P(C = F \mid x)}{P(C = F)} \end{aligned}$$

$$\psi^F = \frac{1 - P(C = M \mid x)}{P(C = F)} \tag{11}$$

The probability term, P(C = M|X), can be estimated from a logit or probit regression and our study choose to estimate by logit regression (which not give different results from probit regression). The terms P(C=M) and P(C=F) is the proportion of male or female workers that we can calculate from the data. After we estimate the reweighing parameters ($\hat{\psi}_i^M$ and $\hat{\psi}_i^F$), then we can modify the standard kernel density estimation for using as the counterfactual earnings density functions of males and females as equation (12) and (13) respectively. Then we can see that "what should the density of earnings per hour of each gender has been if workers' attributes had remained at the average earning?"

$$\hat{f}_{C=M}^{P=A}(y;h) = \sum_{i=1}^{n} \frac{\omega_i \bar{\psi}_i^M}{h} K\left(\frac{y - y_i}{h}\right) \tag{12}$$

$$\hat{f}_{C=F}^{P=A}(y;h) = \sum_{i=1}^{n} \frac{\omega_i \bar{\psi}_i^F}{h} K\left(\frac{y - y_i}{h}\right) \tag{13}$$

After we get the counterfactual density we try to find the statistical test for two densities divergence to make sure that the new density is difference from the old one. We using the Kullback and Leibler (1951) for testing the densities distance as equation (14).

$$J_{12}(w) = \int_0^\infty [f_1(w) - f_2(w)] \ln \frac{f_1(w)}{f_2(w)} dw \tag{14}$$

when J_{12} is the Kullback and Leibler (KL) statistical measurement, f_1 is the density of male or female, f_2 is the density of counterfactual male or counterfactual female. Then we test the goodness of fit by using chi-square with p-value. The KL distances tell us about the distance between 2 densities and tell us that these densities close to be the same one or not.

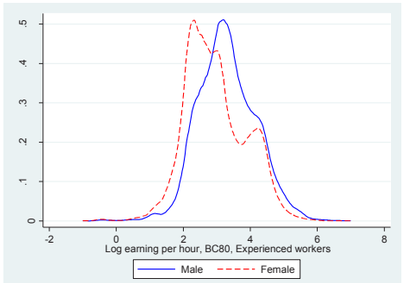
3.4 Semi-parametric decomposition results

From the DFL results we will observe the earning density of each gender and then we will test the different between the densities for making sure that there are statistically different by using the KL-distance. Moreover we can see the trend of the distances that are lower or less gender difference. On this stage we observe the data by separating into four groups at each period, the first group is different of actual earning density of each gender which shows the total gap from the KL-distance results. The second group is the difference between the counterfactual densities of each gender which tell us about the explained gap us

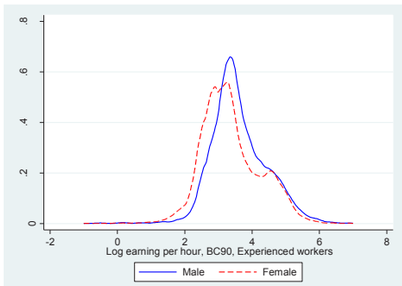
ing the KL-distance. We expect to see the gender gaps are lower overtime in any condition. Next, we observe the differences between actual and counterfactual densities of males and female on each period. We use KL-distance to check the gender gap by marital status for finding the factor of gender discrimination.

Figure 13: Earning density of males vs. females in each period of experienced workers and entry-level workers.

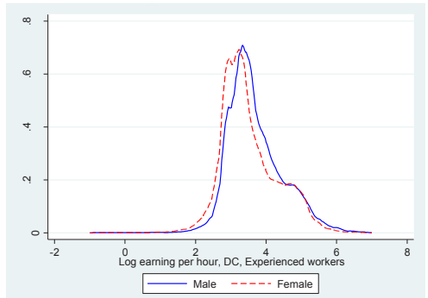
Panel A: BC80, Experienced workers



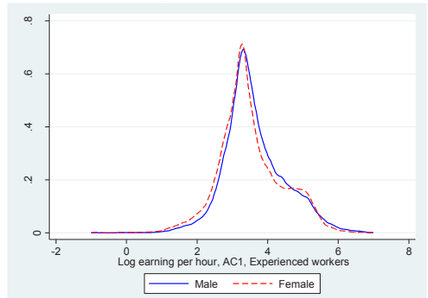
Panel B: BC90, Experienced workers



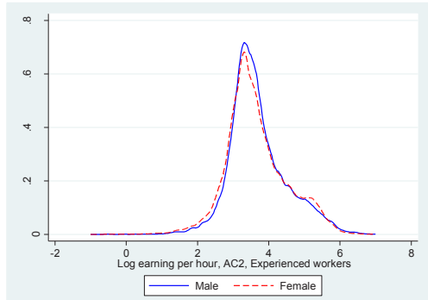
Panel C: DC, Experienced workers



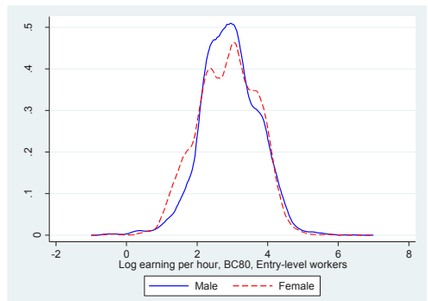
Panel D: AC1, Experienced workers



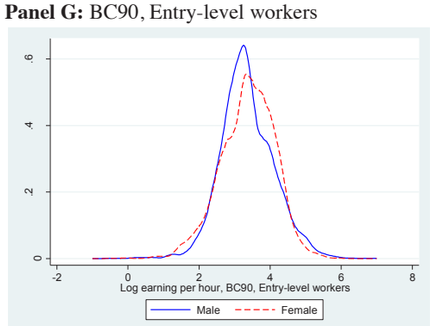
Panel E: AC2, Experienced workers



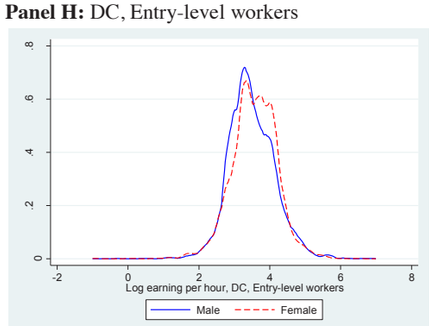
Panel F: BC80, Entry-level workers



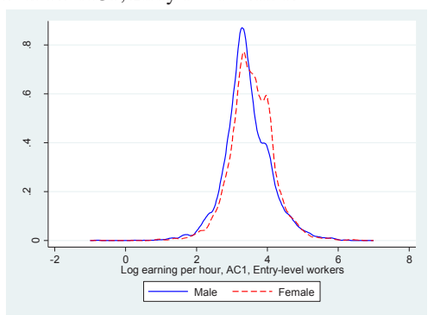
Panel G: BC90, Entry-level workers



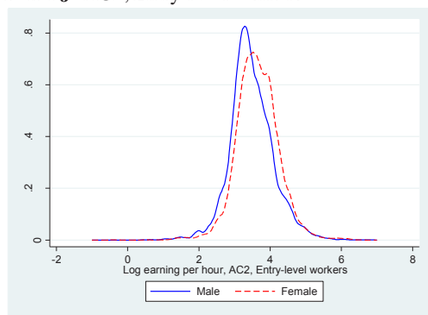
Panel H: DC, Entry-level workers



Panel I: AC1, Entry-level workers



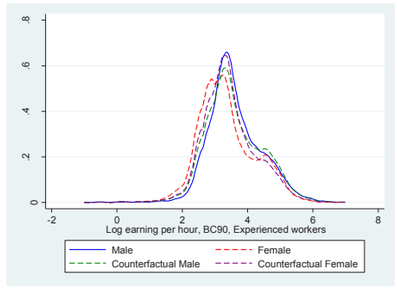
Panel J: AC2, Entry-level workers



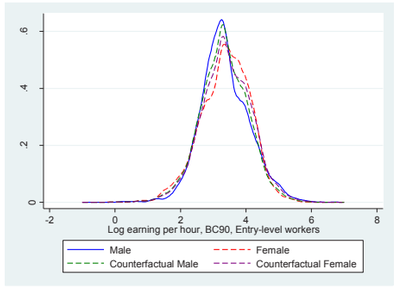
The semi-parametric decomposition shows the gender earning density as shown in figure 13. We can see that the experienced labors are dominated by males as in figure 13 panel A, B, and C. Their earning distributions are on the right hand side of the females in every period which mean males earn more than females but the gap is lower over time. For the entry-level labors group, we observe that the most of distribution in BC80 shows that males earn more than females, figure 13 panel F. In BC90 and DC, figure 13 panel G and H, at the middle earning level show that female earn more. After the crisis period, density distribution is switched which suggest that females earn more than males for almost entire the distribution as shown in figure 13 panel I and J. KL-distances, table 13, show that each pair of earning densities (column 5) is significantly difference and tend to lower distance over time (column 5). But entry-level group has longer distance over time from the result of earning of women greater than men. We can observe that most of the gender gap is come from the unexplained attributes or gender discrimination in experienced workers. But we found that most of gender gap in entry-level workers is come from the observable characteristics and gender gaps are growing over time.

Figure 14: Example of Earning density and their counterfactual with KL distance experience vs. entry-level labors, BC90.

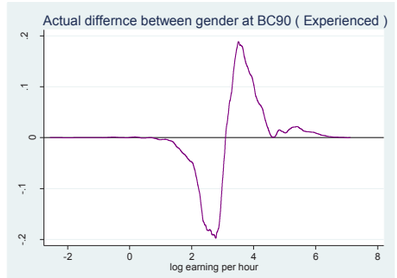
Panel A: Earning and counterfactual density Experienced workers



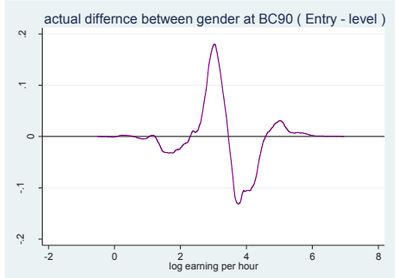
Panel B: Earning and counterfactual density, Entry-level workers



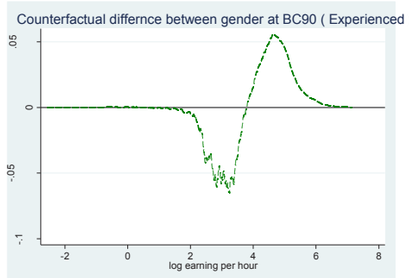
Panel C: KL distance of earning density, Experienced workers



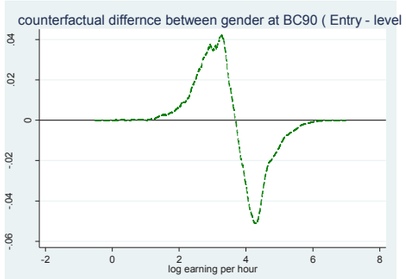
Panel D: KL distance of earning density, Entry-level workers



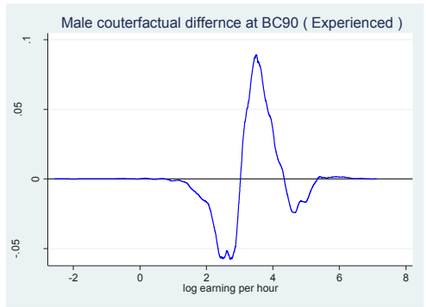
Panel E: KL distance of counterfactual, Experienced workers



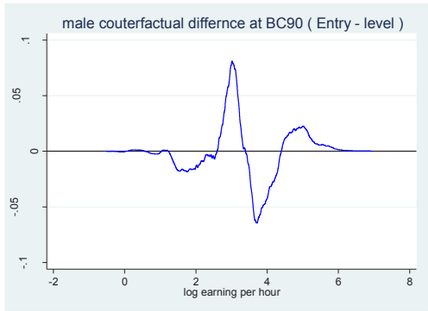
Panel F: KL distance of counterfactual, Entry-level workers



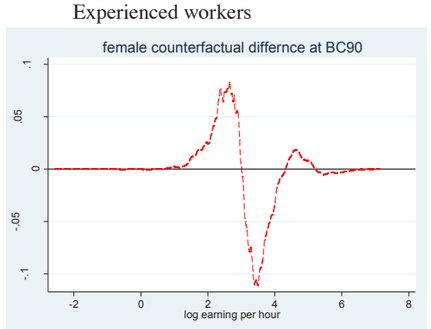
Panel G: KL distance of male vs. MC, Experienced workers



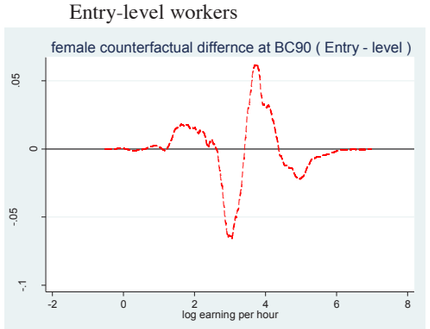
Panel H: KL distance of male vs MC, Entry-level workers



Panel I: KL distance of female vs. FC, Experienced workers



Panel J: KL distance of female vs FC, Entry-level workers



These illustrations of Kernel density, as show in figure 14, give the same results as those of the parametric decomposition, BO, and show clearer pictures of the gender earning gap. The counterfactual densities of the experienced are illustrated and measure the different between densities as KL distance as show in table 3 column (5) which show small gap between genders densities over time. We observe that there is no explained gap or identical density after crisis in experienced workers as show in table 3.4-1 column (2). Which means after crisis earning of male and female are not different if we focus only on their observable characteristics. Then we take into account of only unexplained gap (the different between each gender earning density and their counterfactual as shown in table 13 column (3) and (4)) which imply to the gender discrimination. And found that the counterfactual male in the experienced group have smaller gap over time which means the unobservable attributes are simultaneously lower. Normally, the male counterfactual densities will shift to the left hand side of their earning densities after they get the pooled price that mean males get higher earning than females or they will get lower earning than they get at that time if they accept the pooled price. For females, we can observe the opposite trend to those of males as shown in the figure 14 panel A which shows the counterfactual earning distribution stand on the right hand side of the earning density in every period which means females get lower earning than males.

Table 3: KL-distance test of earning density

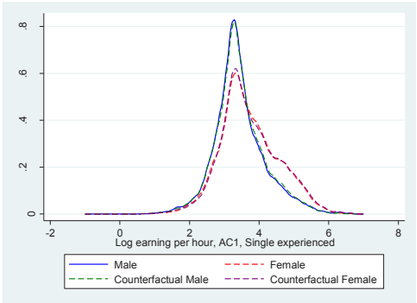
Condition (1)	Explained gap (Counterfactual gap) (2)	Unexplained gap: Male and counterfactual male (3)	Unexplained gap: Female and counterfactual female (4)	Earning density gap (5)
All fulltime workers				
BC (1985-1990)	28.4480	21.2473	39.8654	179.8362
BC (1991-1996)	16.1728	19.8256	33.8115	133.8325
DC (1997-2000)	6.3850	12.8272	21.8089	81.1099
AC (2001-2006)	0.1482*	3.3807*	5.1630	17.8554
AC (2007-2012)	1.6419*	2.5946*	3.9503	11.7586
Experienced workers				
BC (1985-1990)	45.5331	25.0937	56.0254	221.3068
BC (1991-1996)	26.5123	25.4990	49.9437	180.1176
DC (1997-2000)	15.4347	17.8865	33.9428	122.5199
AC (2001-2006)	2.3577*	5.3331	8.8527	33.7761
AC (2007-2012)	0.2333*	3.7250	5.8127	18.9939
Entry-level workers				
BC (1985-1990)	4.21406	26.87777	22.16897	98.41687
BC (1991-1996)	15.1171	28.5456	24.7863	109.0620
DC (1997-2000)	45.7789	13.6115	11.1986	75.7481
AC (2001-2006)	81.9603	12.3300	8.1340	106.9804
AC (2007-2012)	80.3743	5.8738*	3.9483	124.0044

Remark: * means both densities are identical density.

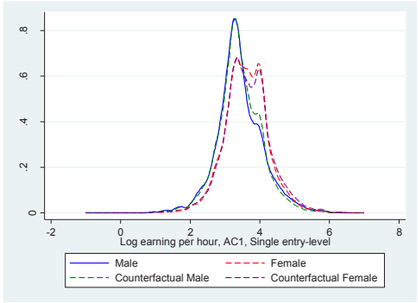
For the entry-level labors, females earn more than males after BC80 and their middle range of counterfactual density are shifted a little bit to the left hand side of female earning distribution which means females can earn more than males in some levels of earning as shown in figure 13 panel B and KL distance of earning densities between gender tend to be greater over time as show in table 3 column (5). KL distance of explained gap are greater over time as shows in table 3 column (2) which come from the observable characteristics of male and female are different and tend to be that female get better characteristics than male. The KL distance of the unexplained gap, the different between counterfactual densities and their earning densities, are lower over time as show in table 3 column (3) and (4).

Figure 15: Example of Earning density and their counterfactual of experience vs. entry-level labors by marital status, AC1.

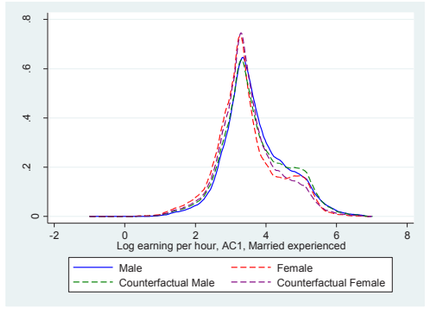
Panel A: Earning and counterfactual density Single experienced workers



Panel B: Earning and counterfactual density, Single entry-level workers



Panel C: Earning and counterfactual density
Married experienced workers



Panel D: Earning and counterfactual density,
Married entry-level workers

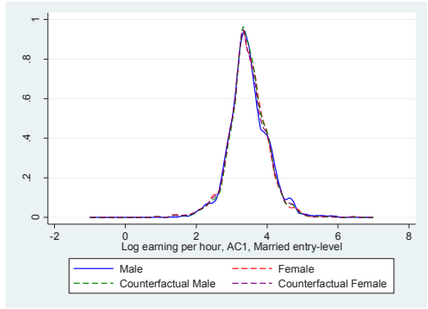


Table 4: KL-distance test of earning density for single group

Condition	Explained gap (Counterfactual gap)	Unexplained gap		Earning density gap
		Male and counterfactual male	Female and counterfactual female	
(1)	(2)	(3)	(4)	(5)
Single experienced workers				
BC (1985-1990)	2.1574*	32.9342	35.1924	142.2337
BC (1991-1996)	33.4379	24.8097	29.2457	158.1195
DC (1997-2000)	108.5987	13.3708	17.3855	161.9632
AC (2001-2006)	114.1106	2.3491*	2.9013*	127.2785
AC (2007-2012)	210.5517	3.9868	3.4915*	259.4423
Single entry-level workers				
BC (1985-1990)	6.9237	31.1389	27.5238	122.1070
BC (1991-1996)	22.0916	31.3600	30.7421	135.2610
DC (1997-2000)	78.5461	14.8717	16.0145	102.0811
AC (2001-2006)	171.4328	14.0292	11.9172	193.5465
AC (2007-2012)	235.8074	10.9791	9.9554	334.2056
Married experienced workers				
BC (1985-1990)	100.5837	26.1740	96.6569	299.0916
BC (1991-1996)	82.5853	30.8171	83.3299	273.0789
DC (1997-2000)	75.6547	23.6123	58.9437	205.1126
AC (2001-2006)	45.7196*	13.7983	27.1521	113.8184
AC (2007-2012)	1.2644*	0.6358*	1.0824*	4.4455
Married entry-level workers				
BC (1985-1990)	10.84989	1.6295*	0.8142*	15.31799
BC (1991-1996)	11.3727	4.2129	1.9481	18.9676
DC (1997-2000)	4.8747	3.7083*	1.1167*	8.0289
AC (2001-2006)	0.5875*	2.9712*	0.9831*	5.5963
AC (2007-2012)	0.0832*	1.3159*	0.4380*	2.9499*

Remark: * means both densities are identical density

After we found that earning of females in entry-level are not different from males as the gender discrimination but we can observe that experience females face something like the gender discrimination. Then we recheck earning densities under the condition of marital status which show us some factor behind this observation. On this study, we take in to account for four groups of the results. The first one is the group of single experienced male and single entry-level male, under our assumption that single male do not change their behavior until they got married as in the US, Knowles (2012) show that married men have more weekly hours work than single men. The second group is single experienced male and married experienced male. Then we focus on single experienced female and married experienced female. And the last one, we focus on the single entry-level female and married entry-level female, under our assumption that most of married female in the entry-level labors do not have children or not take care of their family.

By using DFL and KL-distance again we can get the results as figures 15. We can observe that both single experienced labors and single entry-level labors have gender gap in term of female earn more than male as show in panel A and B. And KL distance show greater gap over time as in table 4 column (5) and (2) which come from the observable characteristics. We consider to married experienced labors and found that KL-distance of this group is highest but tend to lower over time (table 3.4-2 column (5). We take in to account with the unexplained gap which we found that the married entry-level workers is the group that has lowest gender discrimination. These results confirm that Thai labor market is not facing with gender discrimination especially in entry-level. The main factor of the gender discrimination should come from the other factor as market interruption after the women got married for a while in the experience labor. Which imply that the married experience labors have more opportunity to have children and have to take care of them then they could not make productivity as the enterprise' expectations. But the trend of gender earning gap is lower over time.

Then we can conclude that on average, we found the gender earning inequality but this gap is lower over time which corresponds to the previous study (Nakavachara, 2010). In addition, we found that there is no gender discrimination in the entry-level labors. Our results agree with the study by Bertrand, Goldin and Katz (2010) who state that males' and females' earning are nearly identical when they just graduated or enter to the market and then the gender gap is rising from the differences in training, career interruption and the weekly hours work, using the data of MBAs from a top US business school. Moreover, our study shows that the female entry-level labors can earn more than male and there are not much different between gender both married and single in this group. And the earning of married females tends to different from married male and even with single females in the experienced group. Which confirm that women change their behavior after they married and may come from childbearing because the earning gap of married entry-level labors are not different. And the married entry-level labors have low opportunity to have children. The average age of this group is around 21 years while the average age of first time pregnancy from the Thai reproductive health survey 2009 report is 23.3 years (NSO, 2010). Then the main factor that pushes women to change their working behavior comes from the fertility and the fact that they have to take care of their children after that. The employers can be concerned about female productivity and then will offer the lower wage for married experienced women than men. Becker (1992) stated that the married women can make the household productivity which could not be evaluated for a normal market but it does not mean they don't have the productivity. Therefore, if some parts of household work can be substituted by someone or some other organizations, these women can go to work as well as men. Even women have to find the lower paying job instead when they have children as the study of Fernández-Kranz and Lacuesta (2013). These reasons make a gender earning gap which may not come directly from the gender discrimination.

From BO and DFL results, we can see that the gender gap tend to be lower over time and females could not take advantage of males even they have better characteristics. From these results we can see that women are not discriminated by gender but the major factors of gender earning gap are come from the marital status and the market interruption as fertility. This result imply as Angrist and Evans (1988) who found that women have to disappear for child-bearing about 13 years. Our results show in the married group with experienced labors which have high probability to have children in their families. Then women in this group have to allocate the time to take care of their family members more than the women in the other groups. This may be the main reasons behind the earning gender gap in Thai labor market. Following these techniques, we can see that the Thai's labor market does not have the gender discrimination, especially in the entry-level group. However the Thai's labor market has the gender gap among the experienced labors especially in the married group. These results make us to concern about the fertility decision. If we have just considered only the results, it would make the reader confused and think that the unmarried status provide a better career opportunity which will then make them want to stay single. But our results can be brought to the policy makers to develop the policies that support the women workers to work even they are married and have to hold their family work.

4. Conclusion

This paper studies gender earning gap in Thailand, between 1985 and 2012 for twenty eight years by using mainly the data from Thailand's Labor Force Survey (LFS) during 1985-2012 collected by the National Statistical Office (NSO). We separate the data based on the 1997 financial crisis. These groups belongs to the period before crisis, in 1985-1990 (BC80) and 1991-1996 (BC90), one group during crisis, 1997-2000 (DC) and two groups after crisis, 2001-2006 (AC1) and 2007-2012 (AC2). These data around 40% of Thai labor market. The unemployment rate of women is lower than men after crisis. We found that labors are working in services sector greater over time. And this sector prefers to hire women more than men. Women can take advantage on both of education policy and restriction of human resources.

After that, we use the parametric, Blinder-Oaxaca (1973), and semi-parametric, DiNardo-Fortin-Lemieux (1996), to measure the gender earning gap. We found that the main factor of earning is come from the experience and education which we use as years of schooling. Then we separate the data into two groups by using the potential experience, entry-level workers who have not more than 5 years of experience, and experienced workers who have more than 5 years of experience. We found that there are very low gender earning gap in entry-level workers which come from the main factor on education. In the entry-level workers, women have higher years of schooling than men. This characteristic makes them have high probability to get higher earning than men. But from the results of BO we could not conclude that women can take advantage from men absolutely. When experienced workers show that there are gender earning gap but it is lower over time. These results are correlated to DFL results but we can see the entire distribution and observe the trend of movement.

Then we explore on the different of entry-level workers and experience workers and found that one of the main different factors is the marital status. We separate the data into two groups on each type of potential experience then we have four observable groups. We found that women in both the single experienced workers and single entry-level workers can take advantage on men finally. That means we are facing with the gender earning gap in the opposite way of the gender gap definition. But we still have gender earning gap within the married workers and tend to be lower over time. These results lead us to explore the reasons behind the gender earning gap in Thailand. One thing that may happen with married women workers and make them different from men and single women workers is childbearing. This reason makes market expect that motherhood could not allocate their time for working as much as the single.

Then we can conclude that Thai labor market have less gender earning gap in term of normal definition. We could not found the gender earning gap in entry-level workers and single workers. We found the gender earning gap in married workers especially in the workers with children. Then we should to solve the gender earning gap on the right position.

5. Discussion

This paper studies gender earning gap in Thailand, between 1985 and 2012 for twenty eight years. In the past, there are many factors to generate the gender discrimination in Thailand due to the way of living and opportunity to enter to the job market for women. This study, we found that women get higher education than men over time particularly in the entry-level group. Women in this group also earn more than men. Even in the experienced group we found that single women earn more than men and the earning of single women catch up the married men who can have highest earning. From these results we can observe that there is not gender discrimination in the Thai labor market especially in entry-level group. This equality may come from the education policies and the development of country which makes the labor market demand for educated labor and give advantage to women to get higher paid.

Women have been interrupted from the market by various family reasons such as to give birth and to take care of their families. These reasons are disadvantages for them to receive a chance for a continuous training or obtain experience at work continuously. These shortcomings can affect their long term earning and they can be under pressured with the entrepreneur's expectation for their high level of productivity. We see that single women with experienced can earn as much as men which means that there are no gender discrimination in Thai labor market. But it does not mean that women stay single or have to tradeoff their earning with their live. Because we have to sustain the human race and the nation then if women decide to work only, it will cause the big problems in the future. For example, if women have to focus on work more than to take care of their children or think of family, we will get the troubled children and it will cause aging society due to lower birth rate and not enough new high quality generation to develop the country. For future study we should study about suitable jobs for women which make lowest job depreciation when they have to face with market interruption.

We refine the results with the parametric and semi-parametric approaches by using the Blinder-Oaxaca (1973) and DiNardo-Fortin-Lemieux (1996) respectively. The results from semi-parametric (DiNardo-Fortin-Lemieux, 1996) correspond with the parametric (Blinder-Oaxaca, 1973) results. This paper has proved that there is no gender discrimination in the Thai labor market particularly in the entry-level labor but it does not mean that Thailand has no discrimination in the society for the other aspects. Because the observation in this study is only the people who work and get the earning in the job market which around 40% of labor force in Thai labor market. From all results we found that women can take advantage from the country development because when country is developing they need a great number of labors. That only the men labors could not supply sufficiently. Then women are the source of labor supply to the market. In near future, people will try to have more years

of schooling for making higher wages. The low skilled labors will have a harder time to find the job in the market because nowadays we have a large amount of the foreign labors moving in from our neighboring countries. But eventually, these countries will develop and they will need all skilled labors which will make these foreign labors return to their countries which will decrease the number of these types of labors in the future. The shortage of the labors will force the employers to change their labors base to technologies base productions ultimately. The Thai education policies should support the suitable education for labor market.

Finally, government should launch the policies to support the women workers for taking care of their children in work place or help them find the reliable and payable nurseries for their children or senior people easier. These policies make us have the high quality of social living and will help to reduce the probability to become the aging society in the near future. And we can increase the labor supply to the market or the enterprise can hold their potential employee with them even they have to take care of their children.

6. Acknowledgements

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