Journal of Asian Economics 78 (2022) 101435

Contents lists available at ScienceDirect

Journal of Asian Economics

journal homepage: www.elsevier.com/locate/asieco

Parenthood penalty and gender wage gap: Recent evidence from Thailand

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ARTICLE INFO

JEL Classification:
J13
J22
J24
J31
D10

Keywords:
Gender wage gap
Parenthood penalty
Thailand

ABSTRACT

This study first examines the evolution of gender wage gap in Thailand, using cross-sectional data from the Labor Force Survey (LFS) for 1985–2017. We find that education, occupation, and industry significantly contribute to gender wage gap convergence in Thailand. Furthermore, for females, the wage gap between mothers and non-mothers has increased over time, while for males, the changes are relatively small. Thereafter, we examine the gender wage gap associated with marriage and parental status, using panel data from the Socio-Economic Survey (SES) for 2005–2012, and find wage penalty for both motherhood and fatherhood in Thailand.

1. Introduction

A substantial long-term decline in gender wage gaps has been evidenced in both developed and developing countries in recent years. In particular, developing economies have been experiencing rapid convergence in gender wage gaps owing to labor market transformation, compared with developed countries (Tzannatos, 1999). Ñopo et al. (2012) concluded that gender wage differences can be attributed to various socioeconomic factors such as personal and job characteristics of women (e.g., education, occupation, and job status), labor market structure (e.g., occupational segregation by gender), as well as institutional, cultural, and social norms.

Thailand is an interesting case study to examine the evolution of gender wage gap. The country has made remarkable progress in social and economic development from 1985 to 2017, transforming from a low-income country to an upper-income country (World Bank, 2018), leading to women's increasing role in the economy and society. However, Thai females still undertake a major share of household responsibilities as well as balance their roles as workers and as mothers. Nevertheless, the female labor force participation rate in Thailand is historically high and stable with the average rate for married women being close to 80% from 1985 to 2016 (Liao & Paweenawat, 2021).

Furthermore, Thailand is one of the developing countries that has been witnessing a steady decrease in gender wage gap from the 1980 s to recent years, as evidenced in many studies (Bui & Permpoonwiwat, 2015; Jithitikulchai, 2017; Khorpetch & Kulkolkarn, 2011; Mutsalklisana, 2011; Nakavachara, 2010). Most of these studies have attributed this phenomenon primarily to the improvement of Thai women's education. Specifically, the increase in female human capital accumulation and the improvement in female

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https://doi.org/10.1016/j.asieco.2021.101435
Received 5 October 2020; Received in revised form 22 September 2021; Accepted 18 December 2021
Available online 28 December 2021

occupation outlook relative to men explain the wage gap convergence in Thailand (Mutsalklisana, 2011; Nakavachara, 2010).

Fig. 1 shows the percentage of difference in average wages between men and women in Thailand, which has decreased over the last three decades. Fig. 2 presents the hourly wage density[1] for men and women in 1985, 1995, 2005, and 2017. The figure indicates that the gender wage gap in the Thai labor market has been reducing continuously in terms of both mean values and the overall wage density.

The first objective of this paper is to examine the evolution of gender wage gap in Thailand by using data from the Labor Force Survey (LFS) for 1985–2017. We apply the Oaxaca-Blinder decomposition (Blinder, 1973; Oaxaca, 1973) and Juhn-Murphy-Pierce (JMP) decomposition (Juhn, Murphy, & Pierce, 1991, 1993), accounting for not only conventional human capital, but also the industry and occupation factors that contribute to the changes in gender wage gap. Our results confirm the previous findings that education is the major contributor for the convergence of gender wage gap. Furthermore, occupation and industry account for the rapidly diminishing gender wage gap.

However, even though Thailand has been experiencing a convergence in the gender wage gap over the last three decades, the gap between mothers/mother-workers and non-mothers/non-mother workers has increased approximately 10% over time, while for males, the changes are relatively small (Fig. 3). Several studies in developed countries (e.g., Walffogel, 1998; Cools & Strøm, 2016; Grimshaw & Rubery, 2015) have found that the convergence of men's and women's earnings has slowed down in recent years, and this trend has been accompanied by a greater gender wage gap among parents and non-parents, which is also known as the family gap in wages.

Thus, based on our first result, which indicates that the gender wage gap in Thailand has been diminishing over the last three decades, our study will proceed further to better understand wage gap from the perspective of the gender-specific parenthood-based gap. Thus, our second objective is to estimate the wage gap associated with parenthood. We explore the wage gap associated with marriage and parental status for both men and women. To the best of our knowledge, no previous studies have empirically focused on the effect of parenthood on gender wage gap in the Thai labor market. Furthermore, our study is the first to analyze whether parenthood-based gender wage gaps exist and how they evolve over time in Thailand.

Our estimation begins with analyzing data from the LFS for 1985–2017, which provides us with a large number of observations and covers a long time span. However, the results obtained from models using this cross-section data might suffer from individual heterogeneity. To overcome this limitation, besides LFS, we also use panel data from Socio-Economic Survey (SES) for 2005–2012, and compare the results from different models. Then, following Juhn and McCue (2017), we use the fixed effects model along with the event-study analysis and cohort-specific estimation to explore the wage gap associated with marriage and parenthood. With the increase in single motherhood (Paweenawat, 2018) and decline in fertility rates (Hirschman, 1994) in Thailand, marriage and parenthood have been increasingly decoupled.

We found wage penalty for both motherhood and fatherhood in Thailand, which contradicts the existing evidence of motherhood penalty and fatherhood bonus in most developed countries. Furthermore, the results are robust when considering married and unmarried gender groups across different birth cohorts under both LFS and SES data. The estimates of the fixed effects model suggest that without taking selection into account, the results will be partially overstated. Our study contributes to the literature, in a wider context than just Thailand. To the best of our knowledge, this is the first study to analyze gender wage gap in the context of developing countries, taking into account the effect of parenthood on the wages of both mothers and fathers.

The remainder of the paper is organized as follows. Section 2 presents a literature review of gender and family wage gaps. Section 3 presents the data and variables used for estimation. Section 4 describes the methodology. Section 5 presents the estimation results. Finally, Section 6 concludes the study.

2. Literature review

Studies on gender wage gap have been abundant in both developed and developing countries. The decreasing trend in gender wag gap has been witnessed worldwide and has been studied for decades (e.g., Newell & Relly, 2001; Dimova & Gang, 2004; Goldin, 2006; Blau & Khan, 2008; Zweimüller, Winter-Ebmer, & Weichselbaumer, 2008). The convergence of men and women in human capital factors have been widely known to account for the decrease in gender wage gap (e.g. Altonji & Blank, 1999; Goldin, Katz, & Kuziemko, 2006; Blau, Ferber, & Winkler, 2014).

Olivetti and Petrongolo (2014) claim that industry structural transformation has had a significant impact on gender wage gap across countries. Recent studies (e.g., Weeden, Cha, & Bucca, 2016; Blau & Khan, 2017) find that in the US, human capital variables and the different labor market behaviors of men and women explained a small part of the gender wage gap, as women obtain higher level of education than men, while the differences in industry and occupation explained a larger part. Furthermore, the impact of industry on wage disparity has been addressed in the context of developing countries in the literatures (e.g., Taniguchi & Tuwo, 2014 for Indonesia; Ismail, 2011 for Malaysia; Bui & Permpoonwiwat, 2015 for Thailand).

Several studies have investigated the issue of gender wage gap in Thailand. Nakavachara (2010) identified the increase in female education as the main contributor to the decline of gender wage gap from 1985 to 2005, and found that females are in far better positions than 20 years ago. Khorpetch and Kulkolkarn (2011) investigated the gender wage gap across different groups of men and women and found that while female workers were more productive than their male counterparts, they received lower wages because of

[1] Wage density is estimated as follows: $f(y,h) = \sum_{i=1}^{n} \frac{w_i}{h} K(\frac{y-y_i}{h})$ where y_i denotes the log hourly wage for men or women, n represents the number of observations, w_i denotes the survey weight from the data, h denotes the bandwidth, and K represents the kernel function (Silverman, 1986).

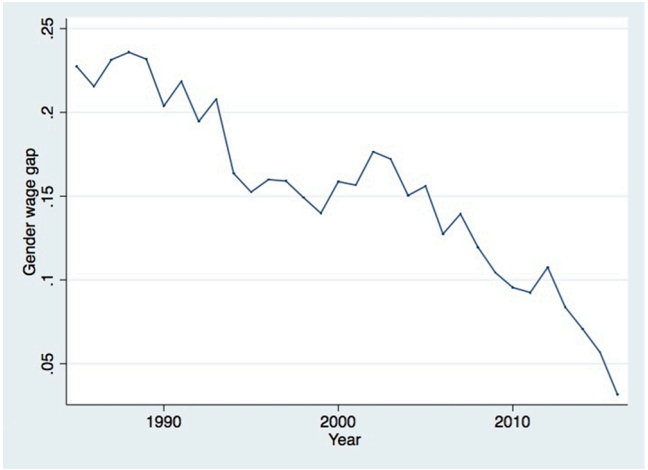

Fig. 1. Gender wage gap in Thailand (1985–2017)
Source: Authors' Calculation from LFS (1985–2017).

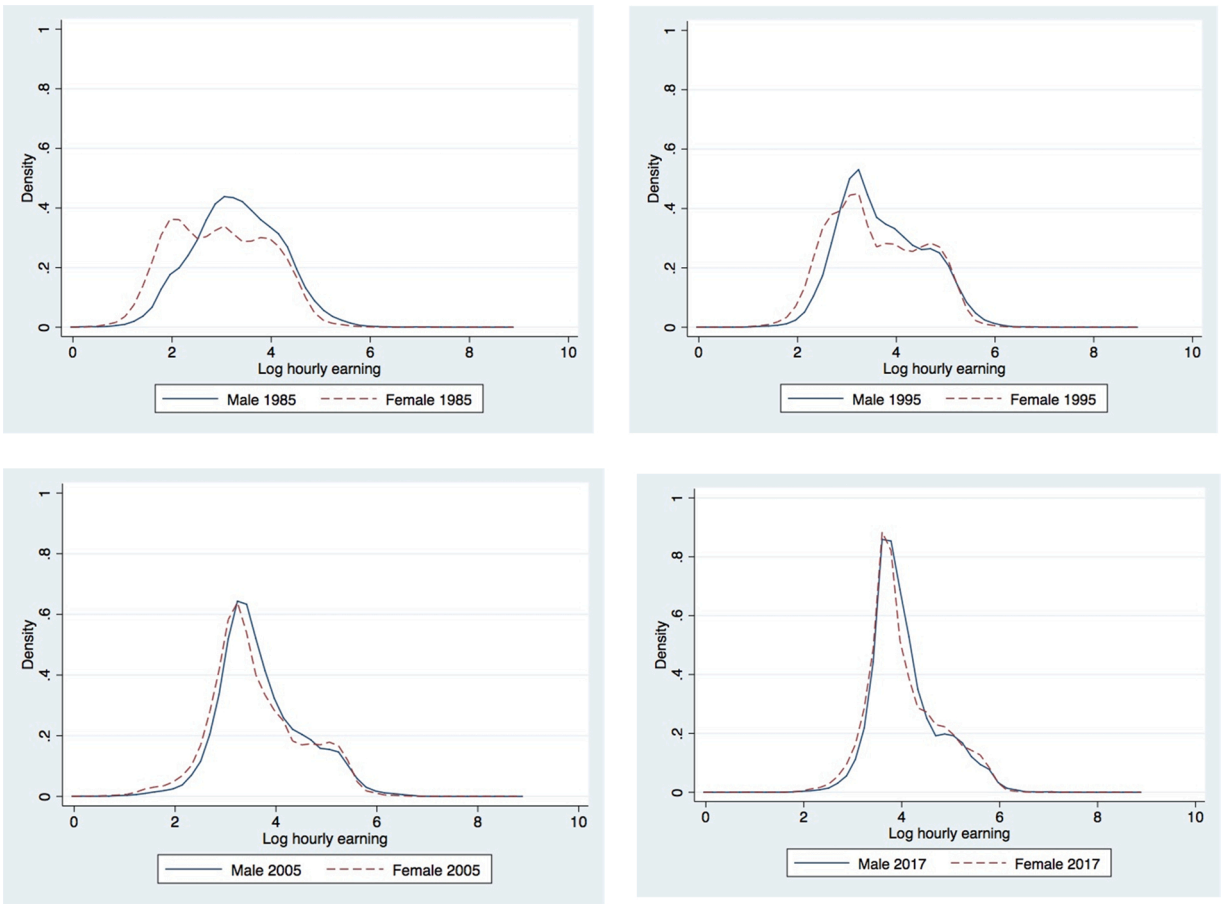

Fig. 2. Log hourly wage density comparison (male VS female)
Source: Authors' Calculation from LFS (1985–2017).

gender discrimination. Using the Blinder-Oaxaca decomposition, Bui and Permpoonwiwat (2015) find that the gender wage gap in Thailand has decreased from 1996 to 2013, and that there are different degrees of discrimination against females in different industries.

Fig. 3. Motherhood & Fatherhood wage gap in Thailand (1985–2017). Note: The motherhood wage gap is the percentage difference of hourly wage between mothers and non-mothers for female, while the fatherhood wage gap is the percentage difference of hourly wage between fathers and non-fathers for male.
Source: Authors' Calculation from LFS (1985–2017).

Even though the relevance of the "glass ceiling" effect in the context of gender pay gap has received significant attention in the literatures, the parenthood wage gap has not received much attention, especially in developing countries. Waldfogel (1998) finds that in the US, while the gender wage gap has been narrowing, the motherhood wage gap has been increasing. This phenomenon may be attributed to the institutional structure in the US that emphasizes equal pay but not family-friendly labor market policies, such as maternity leave and childcare. However, in the case of Thailand, high emphasis on maintaining family ties in Thai families and the rapid decline in fertility rate in Thailand (Knodel and Wongsith, 1987) might provide a different picture in this regard.

Theoretically, parenthood has a negative effect on labor force supply, considering the time constraint on individuals' total time (Glauber, 2007; Goldin, 1995; Gronau, 1988). However, the impact of fertility on labor force outcomes differs by gender. In particular, after couples have children, women tend to participate less in the labor market, while men tend to work harder acting as the breadwinner in the family. Thus, the parenthood effect should be negative for women but positive for men (Becker, 1981; Killewald & Gough, 2013; Mu & Xie, 2016).

This hypothesized difference in the fertility effect on women and men is called "motherhood penalty" and "fatherhood premium," respectively, in the literatures (Angrist & Evans, 1998; Neumark & Korenman, 1994); Waldfogel, 1997a; Killewald, 2013; Mu & Xie, 2016). According to Grimshaw & Rubery (2015), the existence of motherhood wage gap is universal in both developing and developed countries, but the magnitude varies across different countries. Motherhood wage gap hinders the progress of gender equality. One possible reason is that women sacrifice the earnings from employment for childbirth and childcare. Another reason is that the motherhood wage gap tends to risk the gender wage gap over the life cycle.

Waldfogel (1998) concluded that besides the difference in human capital, there are three main hypotheses accounting for the family wage gap. First, the unobserved heterogeneity, such as the difference in motivation to work for women with children and for those without children, may affect the wage gap (Neumark & Korenman, 1992); Hersch & Stratton, 1994). Second, the discrimination against mothers (Waldfogel, 1998). Third, the institutional features of the labor market; for example, if women can maintain their employment after childbirth, they will receive a higher pay than those who cannot (Waldfogel, 1994, 1997b).

Both motherhood and fatherhood wage gaps have been associated with the difference in working behavior between men and women after they attain parenthood. Women have a greater likelihood to take up part-time jobs after childbirth, while men tend to increase their working hours after they attain fatherhood (Weeden et al., 2016). Bertrand, Goldin, and Katz (2010) suggest that the wage gap between men and women increases over time, and the presence of children is the major concurrent factor for the increasing gender wage gap among the highly educated population. The extent to which women are willing or able to substitute for their time that is used for childcare is limited even for those who have made costly investments in skills that are highly valued in market work.

Regarding fatherhood, Killewald (2013) and Budig (2014) find a relatively small wage premium, while Wilde, Batchelder, and Ellwood (2010) find little evidence regarding the wage premium. Contrary to most studies (e.g., Lundberg & Rose, 2000; Simonsen & Skipper, 2008), Cools & Strøm (2016) find the presence of fatherhood wage penalty in Norway, indicating men's consistent involvement in child rearing. Juhn and McCue (2017) also suggest that with reduced specialization, fathers also experience a wage penalty. To the best of our knowledge, while most studies have provided evidence of parenthood wage gap for developed countries, none of them have considered the case of developing countries. Thus, our study, which focuses on Thailand, is the first to shed light on the case of a developing country. This is the main contribution of our study.

3. Data and variables

We use two datasets in this study. First, we use the annual Labor Force Survey (LFS) of Thailand from 1985 to 2017, collected by the

National Statistical Office (NSO) of Thailand. Following Sussangkarn and Chalamwong (1996), we only use the third quarter of the year to hedge against the immigration of Thai agricultural workers during the dry and rainy seasons, (Lekfuangfu, 2017; Paweenawat & McNown, 2018).

In 2001, NSO defined the labor force population to include any individual aged 15 years or older.[2] In this study, we include individuals aged between 15 and 65 years and with 35 h and above per week.[3] Considering that hourly wage provides a more appropriate measure of earnings to analyze the wage gap, we calculate the hourly wage[4] using weekly earnings divided by the sum of working hours per week.

We assigned individuals to three mutually exclusive educational groups according to their level of education: primary level (with none, some, or completed primary level education); secondary level (with some or completed secondary level education); and university level (with some or completed university level education). Seven industrial, seven occupational, and five regional dummy variables were generated.

Table 1 shows the occupational gender differences and the trends of the changes over time. The increasing percentage of women's employment in managerial and professional jobs might indicate the rising human capital achievement of women, reduction in employers' discrimination, or women's labor market commitment. For administration-related jobs, the gender difference is the highest, women's employment rate is higher compared with men and the rate continues to increase over time, while for production-related jobs, the result is opposite. In agricultural-related jobs, the gender difference is relatively small and stable during the period.

Possible complexities need to be addressed when interpreting the results. First, the parental status is measured by the presence of children below the age of 19 years in a household, and is associated with the relation to the head of the household. Children who do not live in the household cannot be identified. In addition, older couples with adult children are not counted as parents. Besides, the marital status is separated into married and unmarried in our analysis. For the unmarried group, the status includes single, widow, divorced, and separated. The parenthood wage gap for this group has a large variation in the number of observations. To mitigate these problems, we re-estimate the model by restricting individuals' age to 25–50 years and disaggregating the age groups. The results show a similar pattern compared to the entire sample.

Table 2 presents the summary statistics of LFS. We separate the sample by whether or not individuals have children below the age of 19 years in the household.[5] Labor force participation of men is over 10% higher than women for both the groups, with and without children. The participation rate of individuals without children is higher than those with children for both men and women. The average wage for men is higher than for women for the two groups. The without-children group is older and earns higher wages than the with-children group, considering the fact that those who have adult children have already moved out from the household.

Comparing educational attainment, men have an average higher level of education than women. Among the with-children group, 60.9% females have attained primary-level education, compared with 56.5% males. The percentage of males who attained secondary level education was higher (36.4%) than that of females (31%), while the percentage of females who obtained university level education was higher than that of males.

Although LFS provides a large number of observations and a longer time span, unobserved individual heterogeneity may cause certain problems. Therefore, to overcome the self-selection bias, we use data from the Thai Socio-Economic Survey (SES) conducted by the NSO in 2005, 2006, 2007, 2010, and 2012, in order to further estimate the earnings gap. The survey comprises randomly sampled 15,000 individuals and 6000 households all over the country. It contains both household and individual information, but does not contain information on working hours.

Table 3 shows the summary statistics of the SES panel data. The pattern is similar to LFS data. Although the SES has a shorter time period compared with LFS, a comparison of the two datasets indicates that the labor force participation rate is relatively stable (average 72.1% in LFS and 73.7% in SES for females; 85.5% in LFS and 85.1% in SES for males). However, in SES, the monthly wage is higher, the age of the with-children group is older, and the average education level is higher, compared with LFS.

4. Methodology

4.1. Estimating the gender wage gap

In order to investigate the gender wage gap for both point in time and across time periods, two decomposition methods are applied.

4.1.1. Blinder-Oaxaca decomposition

The Blinder-Oaxaca decomposition method has been widely used to analyze the gender wage gap (e.g., Zweimüller et al., 2008; Hertz et al., 2008; El-Haddad, 2009; Tansel, 2004; Blau & Khan, 2017). The traditional Blinder-Oaxaca decomposition segregates the

[2] Before 2001, individuals aged 13 years and older, who were either employed or unemployed, were defined as the labor force.

[3] Considering the sample may include individual with multiple jobs, we check the reported working hours from main work and other work of individual, in which those who report other working hours only account for 3–4% of the sample. The estimation results for those who only report working hour from main job are similar with the basic ones.

[4] Wages are deflated by the Thailand Consumer Price Index (CPI). The CPI indices (2015 as the base year) are obtained from the Bureau of Trade and Economic Indices, Ministry of Commerce, Thailand.

[5] The parenthood is defined as those who have child under age 19 in the household. We do not consider parent who do not live in the same household with their children.

Table 1
The changes of percentage in gender difference in occupations.

Year	Men	Women	Difference
Managerial jobs and related			
1985–1995	75.50%	24.50%	51.00%
1996–2006	70.87%	29.13%	41.74%
2007–2017	69.30%	30.70%	38.59%
Professional jobs and related			
1985–1995	65.29%	34.71%	30.57%
1996–2006	52.95%	47.05%	5.91%
2007–2017	48.66%	51.34%	-2.67%
Administration jobs and related			
1985–1995	42.97%	57.03%	-14.05%
1996–2006	36.08%	63.92%	-27.84%
2007–2017	30.84%	69.16%	-38.32%
Production jobs and related			
1985–1995	58.07%	41.93%	16.14%
1996–2006	61.92%	38.08%	23.83%
2007–2017	70.30%	29.70%	40.61%
Agricultural jobs and related			
1985–1995	50.51%	49.49%	1.03%
1996–2006	52.99%	47.01%	5.97%
2007–2017	54.17%	45.83%	8.34%

Note: The occupations are harmonized according to International Standard Classification of Occupations 2008 (ISCO-08).
Source: Authors' Calculation from LFS (1985–2017).

Table 2
Summary statistics for LFS 1985–2017, men and women.

	With children		Without children	
	Female	Male	Female	Male
Mean of labor force participation	0.679	0.838	0.764	0.872
Log hourly wage	3.563	3.693	3.831	3.859
Log monthly wage	8.805	8.959	9.076	9.125
Age	36.509	36.529	42.909	41.357
Education:				
Primary level	0.609	0.565	0.570	0.499
Secondary level	0.310	0.364	0.261	0.359
University level	0.074	0.063	0.152	0.125
Observations	1,365,789	1,180,178	667,066	597,201

Source: Authors' Calculation from LFS (1985–2017).

Table 3
Summary statistics for SES panel 2005–2012, men and women.

	With children		Without children	
	Female	Male	Female	Male
Mean of labor force participation	0.709	0.846	0.766	0.855
Log monthly wage	10.138	10.303	10.485	10.496
Age	37.371	37.128	42.215	40.872
Education:				
Primary level	0.514	0.483	0.481	0.452
Secondary level	0.268	0.334	0.208	0.326
University level	0.218	0.183	0.310	0.222
Observations	21,339	18,768	10,496	9370

Source: Authors' Calculation from SES panel (2005–2012).

difference in log wages into two parts: one component is explained by differences in characteristics and the other is unexplained (Blinder, 1973; Oaxaca, 1973). While the unexplained gap has always been interpreted as the extent of discrimination in literature, some scholars argue that the unexplained gap may also suggest the effects of unmeasured productivity, compensating differentials, competitiveness, risk aversion, and glass ceilings (Blau & Khan, 2017).

The earnings equations are separated into two groups based on the linear model:

$$Y_i^1 = X_i^1 \beta_i^1 + \varepsilon_i^1 \quad (1)$$

$$Y_i^2 = X_i^2\beta_i^2 + \varepsilon_i^2 \tag{2}$$

where Y_i is the log wages of individual i, X_i is the vector of explanatory variables, including education, marital status, number of children, age, age squared, and regional dummies. β_i is a vector of coefficients and ε_i is the error term.

The ordinary least squares (OLS) method estimates of the coefficient β_i can be obtained and the mean values of earnings for the two groups can be estimated. By deducting the means of the two groups, we have

$$\overline{Y}^1 - \overline{Y}^2 = \overline{X}^1\beta^1 - \overline{X}^2\beta^2 = \beta^1(\overline{X}^1 - \overline{X}^2) + \overline{X}^2(\beta^1 - \beta^2) \tag{3}$$

In Eq. (3), the wage gap consists of two terms: the first term represents the impact of gender difference in explanatory variables, and the second term represents the unexplained differential.

4.1.2. Juhn-Murphy-Pierce decomposition

While the Blinder-Oaxaca decomposition method measures the mean of the earnings gap caused by the observable characteristics of the two groups and the unobserved part at any point in time, the Juhn-Murphy-Pierce (JMP) decomposition method analyzes the change in the earnings gap across time (Juhn et al., 1991, 1993). JMP decomposition is not based on average workers, as the BO decomposition, but on the distribution of workers under the wage structure (Blau & Khan, 1997; Rubery, Earnshaw, Marchington, Cooke, & Vincent, 2002).

The JMP method begins with the standard wage equation, replacing the typical residual, ε_{it}, into a standardized residual θ_{it}, with a mean of zero and variance of one for each year.

$$Y_{it} = X_{it}\beta_t + \sigma_t\theta_{it} \tag{4}$$

where $Y_{it}$is the log wages for individual i in year t; X_i is the vector of explanatory variables; and σ_t is the residual standard error of the baseline group's wages at time t. The smaller value of σ_t indicates a lower earnings inequality.

The change in the gender wage gap ($\Delta\overline{Y}$) between two time points (t = 0,1) can be decomposed into

$$\Delta\overline{Y}_1 - \Delta\overline{Y}_0 = \Delta\overline{X}_1\beta_1 - \Delta\overline{X}_0\beta_0 + \sigma_1\Delta\overline{\theta}_1 - \sigma_0\Delta\overline{\theta}_0 \tag{5}$$

where $\Delta\overline{Y} = \overline{Y}^{Male} - \overline{Y}^{Female}$, which is the difference of estimated wage of average male and female. Adding and minus $\Delta\overline{X}_1\beta_0$ and $\sigma_0\Delta\overline{\theta}_1$ to Eq. (5):

$$\Delta\overline{Y}_1 - \Delta\overline{Y}_0 = (\Delta\overline{X}_1 - \Delta\overline{X}_0)\beta_0 + \Delta\overline{X}_1(\beta_1 - \beta_0) + \sigma_0(\Delta\overline{\theta}_1 - \Delta\overline{\theta}_0) + \Delta\overline{\theta}_1(\sigma_1 - \sigma_0) \tag{6}$$

The first term on the right-hand side is the observed X effect, indicating the changes in the quantities of observable characteristics over time. The second term is the observed price effect, which is associated with the changes in the net wage returns to each observed characteristic over time. The third term is the unobserved quantity effect, and the fourth term is the unobserved price effect. The impact of changes in the observed effect and those in the unexplained gap together sum up to constitute the observed change in the total wage gap.

4.2. Estimating the parenthood wage gap

The estimation of parenthood wage gap begins with the normal Blinder-Oaxaca decomposition (Eq. (3)) using LFS, concerning the effects of marriage and the presence of children. Owing to individual heterogeneity, our results from LFS suffer from the self-selection bias. For example, poor or less motivated women are more likely to marry and have children. Moreover, the change in earnings may cause marriage or parenthood, rather than the other way around. For example, women may choose to have children after getting a demotion or they may decide to marry if they receive a promotion.

Thus, we shift our focus to the SES panel data and apply the fixed effects model. As suggested by Juhn and McCue (2017), the fixed effects model cannot solve the selection bias entirely, as the selection is based on differences in expected earnings trajectories rather than in the level of earnings. Therefore, considering these possible problems, we conduct an event-study analysis, estimating the earnings trajectories before and after the event, in particular, marriage and the presence of children, using SES panel data (Juhn & McCue, 2017).

We formulate the fixed effects model as follows:

$$Y_{it} = \beta X_{it} + \gamma M_{it} + \delta K_{it} + \alpha_i + \varepsilon_{it} \tag{7}$$

where M is a marriage dummy variable, which equals 1 if the individual is married, and zero otherwise; K is a parenthood dummy variable, which equals 1 if the individual has at least one child; α_i is the unobserved component of individual characteristics that affect

the earnings; and X refers to other controlling variables, including education, age, age squared, and regional dummies.[6] We assume that the controls might be correlated with marriage or parenthood in the model. The individual effect is assumed to be time invariant and may correlate with other dependent variables.

The fixed effects model, which estimates the earnings gap for the same individuals before and after marriage and having children, yields persistent results in the mean earnings between single and married women, as well as mothers and non-mothers. Juhn and McCue (2016) suggest that the selection effects applying the fixed effects model using panel data are closely related to the cross-sectional results.

As suggested by Weeden et al. (2016), much of the literature on family wage gaps relies on longitudinal data from a single cohort, and is less concerned with trends. Exceptions are Goldstein and Kenney (2001) and Isen and Stevenson (2010), who argue that the most educated women are less likely to marry in earlier cohorts but more likely to marry in recent cohorts. Pal and Waldfogel (2016) find a decline in motherhood wage gap from 6% to 1% during 1993–2013, while Avellar and Smock (2003) do not find any changes in the motherhood wage gap.

Women in later cohorts obtaining more education are less likely to be affected by marriage and the presence of children (Goldin, 2006). Juhn and McCue (2017) suggest that in the US, the selection of women into motherhood may become more positively correlated with income and education over time. We estimate the parenthood gap by comparing the cohorts born between 1955 and 1994.

5. Results

5.1. Gender wage gap

Table 4 shows the Blinder-Oaxaca decomposition results for men and women. In Panel (A), the positive total difference indicates higher average wages for men than for women. For each year—1985, 1995, 2005, and 2017—we find a positive wage gap, and the gap continues to decrease over time, from 0.344 to 0.033. The explained gap decreases over time and becomes increasingly negative, which indicated that females, on average, have more favorable observed characteristics (Nakavachara, 2010). For details of explained part, education plays a significant role in the explained gap. In 1985, education only accounted for a small positive part (0.008), while in 2017, it shows a significant influence on the wage gap (−0.079).

Our results are consistent with Phananiramai (1993) and Nakavachara (2010), the contribution of education indicates the superior schooling for women in the wage sector. The magnitude of education increases rapidly in the first two decades, and thereafter, the pace becomes slower in the most recent decade. Compared to education, other factors have a relatively smaller impact on the gender wage gap. However, the impact of industry and occupation variables shows an increasing trend (0.009 to −0.012; 0.039 to −0.027). Over the last thirty years, Thailand has gone through a significant structural transformation, where the proportion of agriculture sector has decreased and manufacturing and service sector has increased. The transformation has contributed to the increase of income in Thailand and has been found to benefit women more than men in ways of providing higher flexibility of labor market and matching women's ability to occupational requirement better (Rendall, 2013; Vanitcharearnthum, 2019). According to Blau and Kahn (2017), the overall wage structure can affect the gender wage gap, as men and women have different skills and they work in different occupations and industries. In Panel (B), we show the evolution of gender wage gap across different age groups and in each time period. The results shows that older workers have higher gender wage gap than younger workers, and the gap has decreased over time across each age groups.

Table 5 shows the Juhn-Murphy-Pierce decomposition results. We divide the data into three time periods: 1985–1995, 1995–2005, and 2005–2017.[7] The negative change in the total difference represents the reduction in the gender wage gap between men and women, which is consistent with the result of the Blinder-Oaxaca decomposition. The wage gap decreases by 20.3% during 1985–1995, 3.5% during 1995–2005, and 7.3% during 2005–2017. The decline in the change in explained part has increased over time (0.002 during 1985–1995; 0.016 during 1995–2005; and 0.021 during 2005–2017).

Specifically, regarding the changes in the explained part, each of the factors contributes to the changes in quantities and changes in price (Eq. (5)). In the first two time periods, the change in quantities contributes more to the change in total difference (73.25% during 1985–1995; 54.88% during 1995–2005). The education factor in quantities accounts for a large part during the first two periods, but decreases substantially during the last period (24.85% during 1985–1995; 52.92% during 1995–2005; and 7.96% during 2005–2017). Industry and occupation variables also contribute to the convergence of gender wage gap.

The results are consistent with those in other developing countries. For example, industry accounts for nearly one-fourth of the explained part of wage gap in Malaysia (Ismail, 2011), and the significance of educational attainments and industry category for the gender wage gap is found in Indonesia (Taniguchi & Tuwo, 2014).

The results of the two decomposition methods suggest that the gender wage gap in Thailand has witnessed a decreasing trend over the last 32 years, and the wages of men and women almost converge on each other. Thus, we move to examine the parenthood wage gap, considering whether marriage and having children causing the gender wage inequality.

[6] In the fixed effect model, education and regions are controlled and can change for some people over time that allows for correlation between unobserved effect and observed variables (Lundberg & Rose, 2000). Additional control of year fixed effect is added in the estimation for robustness check, in which has provided similar results.

[7] Each of the periods contains major economic events, including the Asian financial crisis in 1997, global financial crisis in 2008, Thailand floods in 2011, and Eurozone crisis in 2012. Similar patterns are shown for the time periods taking the crises into consideration.

Table 4
Blinder-Oaxaca results (men and women).

	1985		1995		2005		2017	
Panel (A)								
Total Difference	0.344		0.141		0.105		0.033	
Unexplained	0.162		0.200		0.183		0.134	
Explained	0.182		-0.059		-0.077		-0.101	
Explained details:								
Education:	0.008	2.26%	-0.043	-30.52%	-0.071	-67.81%	-0.079	-243.52%
Primary level	0.004		0.001		-0.004		-0.050	
Secondary level	0.015		0.008		0.020		-0.052	
University level	-0.012		-0.052		-0.088		0.022	
Age&Age square:	0.106	30.74%	0.053	37.90%	0.011	10.70%	0.015	46.17%
Age	0.308		0.136		0.031		0.024	
Age squared	-0.203		-0.082		-0.020		-0.009	
Industry variables	0.009	2.55%	-0.003	-1.81%	-0.002	-2.37%	-0.012	-35.99%
Occupation variables	0.039	11.24%	-0.072	-51.20%	-0.018	-17.04%	-0.027	-82.46%
Regions	-0.012	-3.52%	-0.007	-4.77%	-0.003	-3.18%	-0.001	-3.36%
Panel (B)								
Total Difference								
Age 15–24	0.260	(0.026)	0.062	(0.014)	-0.006	(0.012)	0.023	(0.015)
Age 25–34	0.110	(0.024)	0.009	(0.014)	0.017	(0.011)	-0.044	(0.010)
Age 35–44	0.251	(0.042)	0.065	(0.020)	0.128	(0.015)	-0.011	(0.012)
Age 45–54	0.448	(0.067)	0.202	(0.035)	0.161	(0.022)	0.088	(0.016)
Age 55 and over	0.731	(0.131)	0.503	(0.058)	0.413	(0.047)	0.061	(0.027)

Note: Robust standard errors in parentheses. The estimates are derived from Eq. (3) specified in year and age groups (panel B). Industry variables include agriculture and mining, manufacturing, utilities, construction, transportation and communication, services, and others. Occupation variables include managers and legislators, professionals and technicians, clerks, plant & machine and craft workers, agricultural workers, service workers, and unskilled workers.
Source: Authors' estimates.

Table 5
Juhn-Murphy-Pierce results (men and women).

	1985–1995			1995–2005			2005–2017		
Change in total difference (dT)		-0.203			-0.035			-0.073	
Change in unexplained part		0.002			-0.019			-0.051	
Change in explained part		-0.002			-0.016			-0.021	
Change in explained details:	Q+P	Q	P	Q+P	Q	P	Q+P	Q	P
Total	-0.205	-0.149	-0.057	-0.016	-0.019	0.003	-0.021	0.001	-0.022
(% of dT)		73.25%	27.81%		54.88%	-8.80%		-1.15%	30.56%
Education:	-0.045	-0.051	0.006	-0.029	-0.019	-0.011	-0.010	-0.006	-0.005
(% of dT)		24.85%	-2.83%		52.92%	30.71%		7.96%	6.26%
Primary level	-0.006	-0.009	0.003	-0.001	0.001	-0.001	-0.046	-0.002	-0.043
Secondary level	-0.005	-0.005	0.000	0.015	0.033	-0.018	-0.071	-0.003	-0.068
University level	-0.034	-0.036	0.002	-0.043	-0.052	0.008	0.106	-0.001	0.107
Age	-0.155	-0.092	-0.062	-0.092	-0.082	-0.011	-0.003	0.019	-0.022
Age square	0.104	0.048	0.056	0.051	0.042	0.009	0.006	-0.011	0.017
Industry variables	-0.261	0.767	0.202	0.053	0.036	0.017	0.000	-0.003	0.003
Occupation variables	-0.089	-0.047	-0.043	0.004	0.008	-0.004	-0.013	0.001	-0.014
Change in unexplained details:	0.002	0.019	-0.017	-0.019	-0.023	0.004	-0.051	-0.028	-0.023
(% of dT)		-9.31%	8.25%		66.29%	-12.37%		39.02%	31.57%

Note: The estimates are derived from Eq. (6) specified in three time periods. P is the price effect and Q is the quantity effect in Eq. (6). Industry variables include agriculture and mining, manufacturing, utilities, construction, transportation and communication, services, and others. Occupation variables include managers and legislators, professionals and technicians, clerks, plant&machine and craft workers, agricultural workers, service workers, and unskilled workers.
Source: Authors' estimates.

Fig. 3 shows the percentage of difference in average wage between women (men) without children and women (men) with children in Thailand. The positive number indicates that childless women (men) earn more than mothers (fathers). We do not observe the fatherhood premium from the figure. For women, the gap has increased approximately 10% over the last three decades, while for men the changes are relatively small.

5.2. Parenthood wage gap

Overall, the parenthood wage gap for both mothers and fathers over the three decades show wage penalty. Table 6 Panel (A) show

the Blinder-Oaxaca decomposition for the motherhood earnings gap for both married and unmarried women, specified in four cohorts and two age groups. The negative results indicate that those without children earn a higher wage than those with children for both the married and unmarried groups, suggesting a negative impact of motherhood on women's wages. The result is consistent with previous studies on motherhood penalty (Becker, 1981, 1985; Waldfogel, 1997a; Glauber, 2007; Juhn & McCue, 2017).

To explain the motherhood wage gap, Becker (1985) hypothesizes that women with children are less motivated or put less effort in the labor market. Later studies have provided support for this hypothesis (Hersch & Stratton, 1994; Neumark & Korenman, 1994; Waldfogel, 1997a). Besides, the discrimination against women with children in the labor market has also been found to explain the motherhood penalty (Goldin, 1990). Moreover, Waldfogel (1998) suggests that the lack of institutional support for mother-workers in the labor market, such as job-protected maternity leave, generates barriers for women with children in employment.

The negative effect of motherhood varies substantially across the cohorts and does not show a monotonic pattern. In general, for the married group, the gap has declined across cohorts (−0.257 to −0.103; −0.209 to −0.063; −0.096 to −0.02). For the overall sample, the unmarried group shows a larger wage gap compared with the married group. For those aged 30–35 years, the married group has a smaller gap compared with those aged 25–29 years, while for the unmarried group, the results are the opposite.

Previous studies on the parenthood wage gap mainly focus on developed countries. The magnitude of motherhood wage gap varies based on different sample selections and methodologies. Waldfogel (1997a) finds that women with one child pay a 6% wage penalty and a 13% wage penalty for those with two children, using hourly wage. Budig and England (2001) suggest a 5% motherhood wage penalty considering the mother fixed effect. Using the annual earnings information, Juhn and McCue (2017) find a 35% motherhood wage penalty for married women with children aged below 6 years, and a 17% wage penalty for those with children aged between 6 and 17 years, taking into account the selection bias from marriage and parenthood.

Table 7 presents the results for the motherhood wage gap using SES panel data. The left-hand column uses OLS estimation and the right-hand column applies the fixed effects model. Consistent with the LFS results, the estimates for both models show negative values, indicating the motherhood penalty for each cohort. Moreover, the married group has a smaller motherhood gap than the unmarried group.

When we take the selection into consideration, especially for the younger-aged children group, the motherhood gap is usually smaller than that obtained from the OLS estimation. The gap for the younger-aged children group has decreased across cohorts (married: −0.375 to −0.162; unmarried: −0.527 to −0.376), but the gap for the older-aged children group has not decreased.

The results suggest that the motherhood effect on wages in LFS may be somewhat overestimated if we consider the selection. The findings are similar to Juhn and McCue (2017), which compared the motherhood effect using Current Population Surveys (CPS) data without solving for the selection with that using the Survey of Income and Program Participation (SIPP) panel data using the fixed effects model.

Similarly, Table 6 Panel (B) shows the Blinder-Oaxaca decomposition results for fatherhood using LFS data, conditioning on marital status. The negative results indicate the existence of fatherhood penalty across each cohort and age group, which is distinct from the fatherhood bonus found in developed countries.

An exception in the literature on fatherhood wage gap is Cools and Strom (2014), who find wage penalty for fathers in Norway, indicating men's increasing involvement in child rearing and a large share of fatherhood penalty can be explained by the duration of parental leave.

With the rapid progress in social and economic development, the role of women in Thailand has undergone a transformation.

Table 6
Parenthood earning gap by birth cohort and marital status using LFS.

	Overall		Age 25–29		Age 30–35	
Birth cohort	Married	Unmarried	Married	Unmarried	Married	Unmarried
(A) Motherhood						
1955–1964	-0.257	-0.399	-0.209	-0.326	-0.096	-0.410
	(0.008)	(0.010)	(0.026)	(0.023)	(0.022)	(0.024)
1965–1974	-0.094	-0.555	-0.242	-0.345	-0.192	-0.395
	(0.006)	(0.007)	(0.011)	(0.013)	(0.012)	(0.015)
1975–1984	-0.042	-0.485	-0.170	-0.233	-0.088	-0.325
	(0.005)	(0.006)	(0.008)	(0.010)	(0.009)	(0.012)
1985–1994	-0.103	-0.435	-0.063	-0.175	-0.020	-0.217
	(0.007)	(0.008)	(0.011)	(0.013)	(0.028)	(0.043)
(B) Fatherhood						
1955–1964	-0.280	-0.263	-0.192	-0.228	-0.168	-0.283
	(0.006)	(0.011)	(0.020)	(0.023)	(0.015)	(0.025)
1965–1974	-0.122	-0.442	-0.205	-0.274	-0.178	-0.293
	(0.005)	(0.007)	(0.010)	(0.012)	(0.009)	(0.015)
1975–1984	-0.057	-0.396	-0.134	-0.231	-0.092	-0.217
	(0.005)	(0.005)	(0.008)	(0.009)	(0.008)	(0.012)
1985–1994	-0.082	-0.372	-0.048	-0.181	-0.017	-0.199
	(0.007)	(0.006)	(0.010)	(0.011)	(0.019)	(0.028)

Note: Robust standard errors in parentheses. The estimates are derived from coefficients from Eq. (3) specified in cohorts and age groups. Each regression includes controls for education, age, age square, and regional dummies.
Source: Authors' estimates.

Table 7
Motherhood earning gap by birth cohort and marital status using SES panel.

	OLS		Fixed effect	
Birth cohort	Married	Unmarried	Married	Unmarried
Overall				
1955–1964	-0.158	-0.331	-0.119	-0.321
	(0.057)	(0.081)	(0.070)	(0.103)
1965–1974	-0.257	-0.472	-0.282	-0.504
	(0.050)	(0.054)	(0.061)	(0.073)
1975–1984	-0.310	-0.331	-0.324	-0.322
	(0.035)	(0.039)	(0.046)	(0.046)
1985–1994	-0.196	-0.348	-0.157	-0.337
	(0.058)	(0.058)	(0.066)	(0.061)
Child < 6				
1955–1964	-0.452	-0.558	-0.375	-0.527
	(0.076)	(0.122)	(0.089)	(0.146)
1965–1974	-0.124	-0.484	-0.120	-0.524
	(0.059)	(0.071)	(0.069)	(0.088)
1975–1984	-0.295	-0.374	-0.314	-0.348
	(0.038)	(0.053)	(0.048)	(0.060)
1985–1994	-0.198	-0.383	-0.162	-0.376
	(0.061)	(0.073)	(0.068)	(0.077)
Child 6–17				
1955–1964	-0.042	-0.230	-0.017	-0.212
	(0.062)	(0.091)	(0.075)	(0.115)
1965–1974	-0.323	-0.467	-0.341	-0.490
	(0.053)	(0.063)	(0.064)	(0.082)
1975–1984	-0.343	-0.299	-0.344	-0.305
	(0.047)	(0.048)	(0.057)	(0.057)
1985–1994	-0.191	-0.322	-0.165	-0.314
	(0.085)	(0.068)	(0.094)	(0.072)

Note: Robust standard errors in parentheses. The fixed effect estimates are derived from coefficients from Eq. (7) specified in cohorts and children groups. Each regression includes controls for education, age, age square, and regional dummies.
Source: Authors' estimates.

Furthermore, there is more support for women, particularly married women, in the labor market. Consequently, married men are expected to share more household responsibilities, including childcare, compared to their wives (Pinyuchon & Gray, 1997; Yoddumnern-Attig, 1992). Policies promoting men to participate in childbearing and child rearing encourage Thai fathers to be more involved in their wives' pregnancy and childcare (Tanasirijiranont, 2016).

However, according to the Ministry of Labor in Thailand (2017), women are entitled to 90 days of maternal leave. Currently, working fathers are not entitled to paternal leave in the private sector. Moreover, in the public sector, working fathers are only entitled to 15 days parental leave, which is much shorter compared with developed countries. For example, in Sweden, both parents are offered 480 days of parental leave. The insufficient supports for fathers in the labor market and the needs of fathers in household chores put them into an embarrassing situation in Thailand.

Overall, the fatherhood wage gap for the married group across cohorts decreases over time (−0.28 to −0.082), while it increases for the unmarried group (−0.26 to −0.37). The unmarried fatherhood gap is larger than the married one, which is similar to what we have found in the case of motherhood. Compared with the motherhood wage gap, the magnitude and trend of fatherhood wage gap does not exhibit any significant difference.

Table 8 shows the results for the fatherhood wage gap using SES panel data, with a comparative analysis of the OLS and fixed effect model. Robust results for the fatherhood penalty have been found in both estimation models, which is consistent with LFS data estimation.

The fatherhood wage gap has also decreased across the cohorts for the married group (−0.243 to −0.065). The results for the married fatherhood wage gap are lower than the unmarried group, which is consistent with previous findings. The gaps under the fixed effects model are lower compared to OLS, indicating that the fatherhood effect may also be partially overstated in LFS after solving for selection bias.

6. Conclusion

This study explores the gender wage gap in Thailand from 1985 to 2017. Using two decomposition methods, we find a continuous decline in wage gap. Education has accounted for the largest part in explaining the convergence in gender wage gap over time, followed by the industry and occupation. However, this convergence has slowed down in recent years, and the wage gap is greater among parents and non-parents. We quantify the wage effects of parenthood and find a wage penalty for both motherhood and fatherhood in Thailand, which is contrary to the findings in most developed countries.

Moreover, population aging is underway aggressively in Thailand. The UN projections indicate that the share of the elderly

Table 8
Fatherhood earning gap by birth cohort and marital status using SES panel.

	OLS		Fixed effect	
Birth cohort	Married	Unmarried	Married	Unmarried
Overall				
1955–1964	-0.243	-0.397	-0.222	-0.465
	(0.044)	(0.103)	(0.053)	(0.123)
1965–1974	-0.217	-0.178	-0.239	-0.137
	(0.040)	(0.062)	(0.049)	(0.079)
1975–1984	-0.175	-0.244	-0.174	-0.241
	(0.033)	(0.042)	(0.041)	(0.050)
1985–1994	-0.065	-0.309	-0.052	-0.306
	(0.062)	(0.045)	(0.069)	(0.048)
Child < 6				
1955–1964	-0.445	-0.553	-0.388	-0.606
	(0.054)	(0.160)	(0.064)	(0.195)
1965–1974	-0.179	-0.250	-0.189	-0.266
	(0.045)	(0.086)	(0.055)	(0.108)
1975–1984	-0.172	-0.272	-0.174	-0.277
	(0.035)	(0.055)	(0.042)	(0.060)
1985–1994	-0.032	-0.354	-0.009	-0.357
	(0.063)	(0.062)	(0.070)	(0.066)
Child 6–17				
1955–1964	-0.157	-0.347	-0.139	-0.381
	(0.047)	(0.111)	(0.056)	(0.128)
1965–1974	-0.247	-0.138	-0.263	-0.097
	(0.043)	0.073	(0.052)	(0.088)
1975–1984	-0.182	-0.221	-0.179	-0.216
	(0.046)	(0.053)	(0.050)	(0.063)
1985–1994	-0.184	-0.287	-0.172	-0.286
	(0.109)	(0.048)	(0.113)	(0.052)

Note: Robust standard errors in parentheses. The fixed effect estimates are derived from coefficients from Eq. (7) specified in cohorts and children groups. Each regression includes controls for education, age, age square, and regional dummies.
Source: Authors' estimates.

population will exceed that of children aged below 15 years in just a few years (Knodel & Teerawichitchainan, 2017). The Office of the National Economic and Social Development Board and United Nations Population Fund (NESDB & UNFPA, 2015) has predicted that the total fertility rate (TFR) will drop from 1.62 to 1.3 children from 2010 to 2040. The percentage of nuclear families without children has increased from 5.6% to 16.2% for all households from 1987 to 2013 (NESDB & UNFPA, 2015). This finding has raised a concern that Thai couples tend to be childless by choice.

The government should strive to lower the cost of child rearing, considering that there is a parenthood penalty for both mothers and fathers. For example, the Thai government could implement appropriate policies such as offering subsidies for newborn child, providing paid and adequate maternity leave, family leave, following majority of OECD countries, where egalitarian tax and benefit status are applied among household partners to promote greater gender equality and employment prospects among parents (Grimshaw & Rubery, 2015; Jaumotte, 2003).

Acknowledgment

We would like to thank the National Statistical Office of Thailand, the Research Institute for Policy Evaluation and Design, and the University of the Thai Chamber of Commerce (UTCC), Thailand, for access to the data used in this paper.

References

Altonji, J., & Blank, R. (1999). Race and gender in the labor market. In O. C. Ashenfelter, & D. Card (Eds.), *Vol. 3C. Handbook of labor economics* (pp. 3143–3259). Amsterdam and Boston: Elsevier, North-Holland.
Angrist, J. D., & Evans, W. N. (1998). Children and their parents' labor supply: Evidence from exogenous variation in family size. *American Economic Review, 88*(3), 450–477.
Avellar, S., & Smock, P. (2003). Has the price of motherhood declined over time? A cross-cohort comparison of the motherhood wage penalty. *Journal of Marriage and Family, 65*(3), 597–607.
Becker, G. (1981). *A treatise on the family* (Enlarged ed). Cambridge, MA: Harvard University Press.
Becker, G. (1985). Human capital, effort, and the sexual division of labor. *Journal of Labor Economics, 3*(1), S33–S58. https://doi.org/10.1086/298075
Bertrand, M., Goldin, C., & Katz, L. (2010). Dynamics of the gender gap for young professionals in the financial and corporate sectors. *American Economic Journal: Applied Economics, 2*(3), 228–255.
Blau, F., Ferber, M., & Winkler, A. (2014). *The economics of women, men, and work* (7th ed). Upper Saddle River, NJ: Pearson.
Blau, F., & Khan, L. (1997). Swimming upstream: Trends in the gender wage differential in the 1980s. *Journal of Labor Economics, 1997*(15), 1–42.
Blau, F., & Khan, L. (2008). Women's work and wages. In S. N. Durlauf, & L. E. Blume (Eds.), *The New Palgrave dictionary of economics* (2nd ed, pp. 762–772). London: Palgrave Macmillan.
Blau, F., & Khan, L. (2017). The gender wage gap: Extent, trends, and explanations. *Journal of Economic Literature, 55*(3), 789–865.

Blinder, A. S. (1973). Wage discrimination: Reduced form and structural estimates. *Journal of Human Resources, 8*(4), 436–455.
Budig, M. (2014). The fatherhood bonus and the motherhood penalty: Parenthood and the gender gap in pay. Report prepared for the Third Way Next Research Report series.
Budig, M., & England, P. (2001). The wage penalty for motherhood. *American Sociological Review, 66*(2), 204–225.
Bui, M., & Permpoonwiwat, C. (2015). Gender wage inequality in Thailand: A sectoral perspective. *International Journal of Behavioral Science, 10*(2), 19–36.
Cools, S., & Strøm, M. (2016). Parenthood wage penalties in a double income society. *Review of Economics of the Household, 14*, 391–416.
Dimova, R., & Gang, I. (2004). Self-selection and earnings during volatile transition. IZA Discussion Paper 1158. Bonn, Germany: Institute for the Study of Labor (IZA).
El-Haddad, A. (2009). Labor market gender discrimination under structural adjustment: The case of Egypt. SRC/CIDA Research Program on Gender and Work, Working Paper series 003. Social Research Center, American University in Cairo, New Cairo Campus. Cairo, Egipto.
Glauber, R. (2007). Marriage and the motherhood wage penalty among African Americans, Hispanics, and Whites. *Journal of Marriage and Family, 69*(4), 951–961. ⟨https://www.jstor.org/stable/4622500⟩.
Goldin, C. (1990). *Understanding the gender gap: An economic history of American women* (p. 1990). Oxford: Oxford University Press.
Goldin, C. (1995). Career and family: College women look to the past. Cambridge: National Bureau of Economic Research (Working paper No. 5188).
Goldin, C. (2006). The quiet revolution that transformed women's employment, education, and family. *American Economic Review, 96*(2), 1–21.
Goldin, C., Katz, L., & Kuziemko, I. (2006). The homecoming of American College Women: The reversal of the college gender gap. *Journal of Economic Perspectives, 20*(4), 133–156.
Goldstein, J., & Kenney, C. (2001). Marriage delayed or marriage forgone? New cohort forecasts of first marriage for U.S. Women. *American Sociological Review, 66*(4), 506–519.
Grimshaw, D., & Rubery, J. (2015). The motherhood pay gap: A review of the issues, theory and international evidence. Conditions of Work and Employment Series No. 57, International Labour Office.
Gronau, R. (1988). Sex-related wage differentials and women's interrupted careers: The chicken or the egg. *Journal of Labor Economics, 6*(3), 277–301. ⟨https://www.jstor.org/stable/2534826⟩.
Hersch, J., & Stratton, L. (1994). Housework, wages, and the division of housework time for employed spouses. *American Economic Review Papers and Proceedings, 84*(2), 120–125. May 1994.
Hertz, T., Winters, P., De la O, A., Quiñones, E., Davis, B., & Zezza, A. (2008). Wage inequality in international perspective. Effects of location, sector, and gender. ESA Working Papers 289026, Food and Agriculture Organization of the United Nations, Agricultural Development Economics Division (ESA).
Hirschman, C. (1994). Why fertility changes? *Annual Review of Sociology, 20*, 203–233. https://doi.org/10.1146/annurev.so.20.080194.001223
Isen, A., & Stevenson, B. (2010). Women's education and family behavior: Trends in marriage, divorce and fertility. NBER Working Paper 15725, National Bureau of Economic Research, Inc.
Ismail, R. (2011). Gender wage differentials in the Malaysian services sector. *African Journal of Business Management, 5*(19), 7781–7789.
Jaumotte, F. (2003). Female labour force participation: Past trends and main determinants in OECD countries, OECD Economics Department Working Papers No. 376 (Paris).
Jithitikulchai, T. (2017). Do Thai women earn less than men in Thailand? Provided for Thailand Systematic Country Diagnostic report. World Bank Group, Bangkok, Thailand.
Juhn, C., & McCue, K. (2016). Selection and specialization in the evolution of marriage earnings gaps. *RSF: The Russell Sage Journal of the Social Sciences, 2*(4), 237–269.
Juhn, C., & McCue, K. (2017). Specialization then and now: Marriage, children, and the gender earnings gap across cohorts. *Journal of Economic Perspectives, 31*(1), 183–204.
Juhn, C., Murphy, K., & Pierce, B. (1993). Wage inequality and the rise in returns to skill. *Journal of Political Economy, 101*(3), 410–442.
Juhn, C., Murphy, K. M., & Pierce, B. (1991). Accounting for the slowdown in black-white wage convergence. In M. Kosters (Ed.), *Workers and their wages*. Washington, DC: AEI Press.
Khorpetch, C., & Kulkolkarn, K. (2011). Gender wage discrimination in the thai labor market. *Applied Economics Journal, 18*(2), 17–31.
Killewald, A. (2013). A reconsideration of the fatherhood premium: Marriage, coresidence, biology, and father's wages. *American Sociological Review, 78*(1), 96–116.
Killewald, A., & Gough, M. (2013). Does specialization explain marriage penalties and premiums? *American Sociological Review, 78*(3), 477–502. https://doi.org/10.1177/0003122413484151
Knodel, J., & Wongsith, M. (1987). Family size and children's education in Thailand: Evidence from a national sample. *Demography, 28*(1), 119–131 (Feb., 1991).
Knodel, J., & Teerawichitchainan, B. (2017). Family support for older persons in Thailand: Challenges and opportunities. Research Collection School of Social Sciences, Paper 2439. https://ink.library.smu.edu.sg/soss_research/2439.
Lekfuangfu, N. (2017). Intensive and extensive margins of labour supply in Thailand: Decomposing the pattern of work behaviours. PIER Discussion Papers 59, Puey Ungphakorn Institute for Economic Research, revised May 2017.
Liao, L., & Paweenawat, S. (2021). The inversion of married women's labour supply and wage: Evidence from Thailand. *Asian-Pacific Economic Literature, 35*(1), 82–98. https://doi.org/10.1111/apel.12320
Lundberg, S., & Rose, E. (2000). Parenthood and the earnings of married men and women. *Labour Economics, 7*(6), 689–710.
Mu, Z., & Xie, Y. (2016). 'Motherhood penalty' and 'Fatherhood premium'? Fertility effects on parents in China. *Demographic Research, 35*, 1373–1410. article 47.
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. (2010). Superior female education: Explaining the gender earnings gap trend in Thailand. *Journal of Asian Economics, 21*(2), 198–218. https://doi.org/10.1016/j.asieco.2009.09.006
NESDB & UNFPA. (2015). The State of Thailand's Population 2015: Features of Thai Families in Era of Low Fertility and Longevity. United Nations Population Fund and National Economic and Social Development Board.
Newell, A., & Relly, B. (2001). The gender pay gap in the transition from communism: Some empirical evidence‖. IZA Discussion Paper 268. Bonn, Germany: Institute for the Study of Labor (IZA).
Ñopo, H., Daza, N., & Ramos, J. (2012). Gender earnings gaps in the world. Washington, DC: World Bank. ⟨https://openknowledge.worldbank.org/handle/10986/9114⟩.
Neumark, D., & Korenman, S. (1992). Marriage, Motherhood, and Wages. *Journal of Human Resources, 27*(2), 233–255.
Neumark, D., & Korenman, S. (1994). Sources of Bias in Women's Wage Equations: Results using Sibling Data. *Journal of Human Resources, 29*(2), 379–405.
Oaxaca, R. L. (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.
Pal, I., & Waldfogel, J. (2016). The family gap in pay: New evidence for 1967 to 2013. *RSF: The Russell Sage Journal of the Social Sciences, 2*(4), 104–127. https://doi.org/10.7758/rsf.2016.2.4.04
Paweenawat, S. (2018). Time allocation of single mothers as compared to married mothers in Thailand. UTCC Working Paper 2018. ⟨https://searchlib.utcc.ac.th/library/onlinethesis/303649.pdf⟩.
Paweenawat, S., & McNown, R. (2018). A synthetic cohort analysis of female labour supply: The case of Thailand. *Applied Economics, 50*(5), 527–544.
Phananiramai, M. (1993). Women's economic roles in Thailand. Thailand Development Research Institute. ⟨https://tdri.or.th/2013/02/womens-economic-role-in-thailand/⟩.
Pinyuchon, M., & Gray, L. A. (1997). Understanding Thai families: A cultural context for therapists using a structural approach. *Contemporary Family Therapy, 19*(2), 209–228.
Rendall, M. (2013). Structural change in developing countries: Has it decreased gender inequality? *World Development, 45*, 1–16.

Rubery, J., Earnshaw, J., Marchington, M., Cooke, F. L., & Vincent, S. (2002). Changing organizational forms and the employment relationship. *Journal of Management Studies, 39*(5), 645–672.

Silverman, B. W. (1986). Density Estimation for Statistics and Data Analysis. London, England: Chapman & Hall.

Simonsen, M., & Skipper, L. (2008). An empirical assesment of effects of parenthood on wages. *Advances in Econometrics, 21*, 359–380.

Sussangkarn, C., & Chalamwong, Y. (1996). Thailand development strategies and their impacts on labour markets and migration. In D. O'Connor, & L. Farsakh (Eds.), *Development strategy, employment, and migration*. Paris: OECD.

Tanasirijiranont, R. (2016). Becoming a father: Childbearing perspective. *Nursing Journal, 43*(January 2016), 139–147.

Taniguchi, K., & Tuwo, A. (2014). New evidence on the gender wage gap in Indonesia. ADB Economics Working Paper Series, No. 404, Asian Development Bank.

Tansel, A. (2004). Public-private employment choice, wage differentials and gender in Turkey. IZA Discussion Paper 1262. Bonn, Germany: Institute for the Study of Labor (IZA).

Tzannatos, Z. (1999). Women and labor market changes in the global economy: Growth helps, inequalities hurt and public policy matters. The World Bank. Elsevier Science.

Vanitcharearnthum, V. (2019). Reducing inequalities: Recent experiences from Thailand. In *Getting even: Public policies to tackle inequality in Asia*. By Mustafa Talpur.

Waldfogel, J. (1994). Women working for less: Family status and women's pay in the U.S. and U.K. Working Paper #D-94-1, Malcolm Wiener Center for Social Policy, Harvard University, Cambridge, MA.

Waldfogel, J. (1997aaa). The effect of children on women's wages. *American Sociological Review, 62*(2), 209–217.

Waldfogel, J. (1997bbb). Working mothers then and now: A cross-cohort analysis of the effects of maternity leave on women's pay. In F. Blau, & R. Ehrenberg (Eds.), *Gender and family issues in the workplace*. New York: Russell Sage.

Waldfogel, J. (1998). Understanding the 'family gap' in pay for women with children. *Journal of Economic Perspectives, 12*(1), 137–156.

Weeden, K., Cha, Y., & Bucca, M. (2016). Long work hours, part-time work, and trends in the gender gap in pay, the motherhood wage penalty, and the fatherhood wage premium. *RSF: The Russell Sage Foundation Journal of the Social Sciences, 2*(4), 71–102. https://doi.org/10.7758/rsf.2016.2.4.03

Wilde, E., Batchelder, L., & Ellwood, D. (2010). The mommy track divides: The impact of childbearing on wages of women of differing skill levels. NBER Working Paper 16582, National Bureau of Economic Research, Inc.

World Bank. (2018). Thailand economic monitor: Beyond the innovation paradox. ⟨http://pubdocs.worldbank.org/en/147711523275364465/TEM-Innovation-9-April-2018WEB3⟩.

Yoddumnern-Attig, B. (1992). Thai family structure and organization changing roles and duties in historical perspective. In B. Yoddunmern-Attig, K. Richter, A. Soonthornd- nada, C. Sethaput, & A. Pranualratana (Eds.), *Changing role and statuses of women in Thailand: A documentary assessment* (pp. 8–34). Nakhonpathom: The Institute for Population and Social Research Mahidol University.

Zweimüller, M., Winter-Ebmer, R., & Weichselbaumer, D. (2008). Market orientation and gender wage gaps: An international study. *Kyklos, 61*(4), 615–635, 2008.