

The Motherhood Wage Penalty in The Public and Private  
Sectors in Thailand, 2017



A Thesis Submitted in Partial Fulfillment of the Requirements  
for the Degree of Master of Arts in Labour Economics and Human  
Resource Management  
Field of Study of Labour Economics and Human Resource Management  
FACULTY OF ECONOMICS  
Chulalongkorn University  
Academic Year 2021  
Copyright of Chulalongkorn University

ผลกระทบเชิงลบต่อค่าจ้างของแม่ที่ทำงานในภาครัฐและภาคเอกชนในประเทศไทย ปี 2560



วิทยานิพนธ์นี้เป็นส่วนหนึ่งของการศึกษาตามหลักสูตรปริญญาศิลปศาสตรมหาบัณฑิต

สาขาวิชาเศรษฐศาสตร์แรงงานและการจัดการทรัพยากรมนุษย์

สาขาวิชาเศรษฐศาสตร์แรงงานและการจัดการทรัพยากรมนุษย์

คณะเศรษฐศาสตร์ จุฬาลงกรณ์มหาวิทยาลัย

ปีการศึกษา 2564

ลิขสิทธิ์ของจุฬาลงกรณ์มหาวิทยาลัย

|                |   |
|----------------|---|
| Thesis Title   | The Motherhood Wage Penalty in The Public and Private Sectors in Thailand, 2017 |
| By             | Miss Qiuge Chen   |
| Field of Study | Labour Economics and Human Resource Management                                  |
| Thesis Advisor | YONG YOON   |

---

Accepted by the FACULTY OF ECONOMICS, Chulalongkorn University in Partial Fulfillment of the Requirement for the Master of Arts

..... Dean of the FACULTY OF  
ECONOMICS  
(SITTIDAJ PONGKIJVORASIN)

THESIS COMMITTEE

..... Chairman  
(JESSICA MARY VECHBANYONGRATANA)  
..... Thesis Advisor  
(YONG YOON)  
..... Examiner  
(Sasiwimon Warunsiri Paweenawat)



จุฬาลงกรณ์มหาวิทยาลัย  
CHULALONGKORN UNIVERSITY

ฉิวจิ เฉิน : ผลกระทบเชิงลบต่อค่าจ้างของแม่ที่ทำงานในภาครัฐและภาคเอกชนในประเทศไทย ปี 2560.  
 ( The Motherhood Wage Penalty in The Public and Private Sectors in  
 Thailand, 2017) อ.ที่ปรึกษาหลัก : ยอง ยูน

การวิจัยก่อนหน้านี้แสดงให้เห็นว่าการมีบุตรส่งผลให้แรงงานเพศหญิงมีรายได้ต่อเดือนต่ำกว่าแรงงานเพศหญิงที่ไม่มีบุตรในประเทศไทย งานวิจัยฉบับนี้อ้างอิงข้อมูลจากรายงานเศรษฐกิจและสังคม (SES) ประจำปี 2560 เพื่อศึกษาผลกระทบทางลบทางด้านการรายได้ของการมีบุตรสำหรับแรงงานเพศหญิงมีผลต่อสตรีจากภาคส่วนอื่นๆอย่างไรจากการใช้ข้อมูลของผู้หญิงจำนวน 9522 คน ที่มีอายุระหว่าง 15 ถึง 65 ปี โดยข้อมูลจาก SES ปี 2560 พบว่าผลกระทบทางลบเชิงรายได้โดยเฉลี่ยในการเป็นมารดาของแรงงานเพศหญิงอยู่ที่ 7.6 เปอร์เซ็นต์ โดยเฉลี่ยสูงขึ้น 1.6% ในภาครัฐ เมื่อเทียบกับภาคเอกชน ทฤษฎีทุนมนุษย์อธิบายช่องว่างค่าจ้างระหว่างแรงงานเพศหญิงที่มีบุตรและไม่มีการรวมไปถึงผลกระทบที่แตกต่างกันของผลกระทบทางรายได้จากการมีบุตรของแรงงานเพศหญิงระหว่างภาครัฐและเอกชน



|            |   |                                  |
|------------|---|----------------------------------|
| สาขาวิชา   | เศรษฐศาสตร์แรงงานและการจัดการทรัพยากรมนุษย์ | ลายมือชื่อนิติ .....<br>.....    |
| ปีการศึกษา | 2564  | ลายมือชื่อ อ.ที่ปรึกษาหลัก ..... |

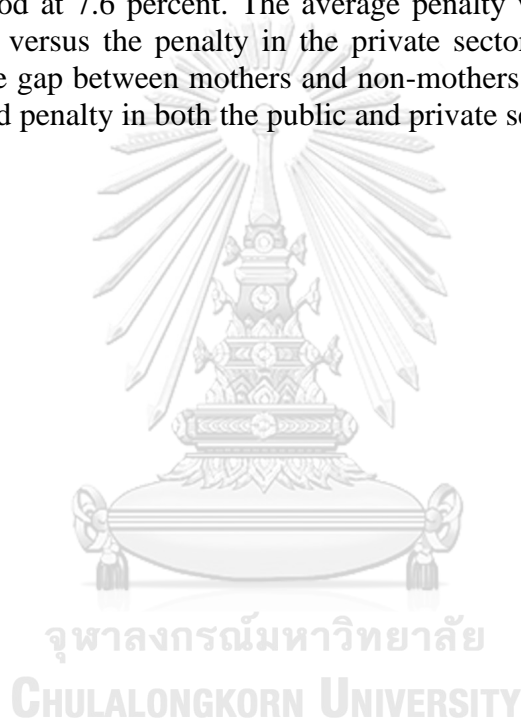
# # 6284018829 : MAJOR LABOUR ECONOMICS AND HUMAN RESOURCE MANAGEMENT

KEYWORD Motherhood, Wage penalty, Mincer function, Thailand

D:

Qiuge Chen : The Motherhood Wage Penalty in The Public and Private Sectors in Thailand, 2017. Advisor: YONG YOON

Prior research has shown that the Motherhood Wage Penalty on mothers has led to mothers earning a lower monthly income than women without children in Thailand. This paper uses the Social Economic Survey (SES) of 2017 to study how the motherhood penalty affects women from different sectors. Using data of 9522 women from age 15 to 65 in the SES 2017, I find that the average motherhood wage penalty stood at 7.6 percent. The average penalty was 1.6 percent higher in the public sector versus the penalty in the private sector. Human Capital Theory explains the wage gap between mothers and non-mothers and the differing impacts of the motherhood penalty in both the public and private sectors.



Field of Study: Labour Economics and  
Human Resource  
Management

Academic  
Year: 2021

Student's  
Signature .....

Advisor's  
Signature .....

## ACKNOWLEDGEMENTS

First and foremost, I would like to express my deep and sincere gratitude to my advisor Aj.Yong Yoon for helping me through my journey here at Chulalongkorn University. I aspire to the excellent guidance and comments during my dissertation writing. I have been blessed to have a professional and knowledgeable advisor who is passionate about research.

I am very grateful to my parents and beloved friends for supporting me and showing their love for me during the pandemic. My journey in Chulalongkorn started before COVID-19 when our life was still free and full of possibilities yet suddenly ended after the pandemic broke out. The virus, the face masks, and the social isolation made people fear and hushed everyone to make decisions under uncertainty. However, the love and support I had from my family and friends, encouraged me to be more fearless when taking every step.

I would also like to express special gratitude to myself for making that decision that brought me to Thailand as well as the decision to go home right after the breakout. I still remember the excitement I had when getting the offer from Chulalongkorn three years ago. The sunset I watched from my little balcony in Lumpini, the tropical views on the campus, and the endless summer in Thailand, they were the sparks in my life, the sparks in my heart that shall always guide me forward.

Qiuge Chen

# TABLE OF CONTENTS

|  | <b>Page</b> |
|--|-------------|
| .....  | iii         |
| ABSTRACT (THAI) .....  | iii         |
| .....  | iv          |
| ABSTRACT (ENGLISH).....  | iv          |
| ACKNOWLEDGEMENTS.....  | v           |
| TABLE OF CONTENTS.....   | vi          |
| Introduction.....  | 1           |
| 1.1 Statement of the Problem.....  | 1           |
| 1.2 Research Questions.....  | 2           |
| 1.3 Objectives of Study.....   | 3           |
| 1.4 Scope of Study.....  | 3           |
| 1.5 Definition.....  | 3           |
| 1.5.1 Motherhood penalty.....  | 3           |
| 1.6 Organization of Study.....   | 4           |
| Literature Review.....   | 4           |
| 2.1 Motherhood Penalty in Thailand.....  | 4           |
| 2.2 Measuring Motherhood Penalty.....  | 5           |
| 2.4 Empirical Studies of Motherhood Penalty.....                                       | 6           |
| CHAPTER 3 THEORETICAL FRAMEWORK AND METHODOLOGY.....                                   | 15          |
| 3.1 THEORETICAL FRAMEWORK.....   | 15          |
| 3.1.1 Human Capital Theory.....  | 15          |
| 3.1.2 The Earnings Equation Framework.....   | 18          |
| 3.2 Research Methodology.....  | 19          |
| 3.2.1 Identify mothers in the SES dataset.....   | 19          |
| 3.2.1.1 The Monthly Earning and Human Capital Variables Imputation<br>Methodology..... | 21          |

|  |    |
|--|----|
| 3.2.2 The Method of Estimations .....      | 23 |
| CHAPTER 4 Descriptive Statistics .....     | 26 |
| CHAPTER 5 EMPIRICAL RESULTS .....          | 29 |
| 5.1 Sectors.....                           | 30 |
| 5.2 Multiple Regression.....               | 32 |
| CHAPTER 6 CONCLUSION AND IMPLICATIONS..... | 35 |
| 6.1 Limitations.....                       | 36 |
| 6.3 Suggestions for Further Study .....    | 37 |
| REFERENCES .....                           | 38 |
| VITA.....                                  | 41 |





## **Introduction**

### **1.1 Statement of the Problem**

With the modernization and feminist movements in Thailand since the B.E. decade of the 2410s (A.D. 1860s), the status of Thai women has been significantly improved over the decades up through the present time (Buranajaroenkij, 2017). The rise of female labor force participation has been an evident consequence of the changing responsibility of women (Schultz, 1990). However, the change in the economic status brings conflicts over the social expectations that women should keep a work-family balance whilst carrying a lion's share in taking care of the family members, especially childbearing (Vichit-Vadakan, 1994). Given that the domestic duties are considered to be roles primarily even exclusively for women, the capability of women who participate in the labor market to balance family and work normally would be questioned. Thus, either becoming a working mother is voluntary or reluctant, the growth of working mothers is inevitable.

Working mothers are individuals who are capable of combining career and the responsibility of childbearing. However, the impact on the changes of socio-economic status of women also distresses women's work-family choices. Those conflicts manifested themselves in many ways. Firstly, fertility might reduce or disrupt the human capital accumulation, hindering the professional growth of women (Mincer, 1989). Besides that, this conflict caused by fertility will expose women to motherhood penalty which indicates that in the workplace, working mothers suffer from disadvantages in pay and other welfare compared to childless women thus further increases the gender discrimination in the labor market, causing a negative impact on women's fertility preferences (Budig & England, 2001). With the rising proportion of female labour and slumping birth rate in Thailand, women are prioritizing building up their career over having children.

As mentioned above, many empirical studies from countries like the United States, Canada, France, and other developed countries have shown that with one more child, there would be a wage penalty which causes from 5 percent to 10 percent drop in women's income. This wage penalty caused by fertility on women is considered as motherhood penalty (Budig & England, 2001). For the last two decades, motherhood penalty is a global issue that many developed countries have carried out intensive research on but only a few research focused on Thailand. Liao and Paweenawat (2019) had found the increasing wage gap between mothers and non-mothers existing in Thailand however it is still unclear the size of the impact of the motherhood penalty and the role that the public and private sectors playing in the motherhood penalty. Given that the wage structure is very different in private sector and public sector, with more strict wage structure based on seniority, the wage penalty on mothers might be different. This difference of wage penalty on private and public sector has been found in China and France but it is still unclear in Thailand. Thus, this thesis will be the first thesis studying on the motherhood wage penalty in Thailand through both public and private sectors and have found that the average penalty was 1.6 percent higher in the public sector versus the penalty in the private sector. Human Capital Theory explains the wage gap between mothers and non-mothers and the differing impacts of the motherhood penalty in both the public and private sectors.

## **1.2 Research Questions**

There are two main questions addressed in this thesis:

1. Was there a motherhood penalty in Thailand in the year 2017?
2. Are there any differences in the motherhood penalty from public and private sectors?

### **1.3 Objectives of Study**

The objectives of the study are as follows:

3. To estimate the motherhood wage penalty in the year 2017
4. To estimate the motherhood wage penalty on mothers in both public and private sectors.

### **1.4 Scope of Study**

The study focuses on the working mothers in Thailand and the estimation of the motherhood penalty following the assumptions of Becker (1981), Schultz (1961), and Mincer (1979) then uses the Mincer earnings equation to estimate the motherhood penalty in Thailand.

The empirical data in the empirical analyses consist of the Household Socio-Economic Survey (SES) of Thailand of the year 2017, acquired from the National Statistical Office. The reason why this study uses this data is that SES contains the information of motherhood as well as has collected more detailed information than Labor Force Survey and precisely gives out the information about earnings.

### **1.5 Definition**

#### **1.5.1 Motherhood penalty**

The central concept in this thesis is the motherhood penalty which refers to the negative impact on women's wage caused by fertility. Becker (1981) published a book to describe the phenomenon of the negative impact on women's wage caused by fertility. This phenomenon was interpreted by Becker (1985) with the sexual division of labor that mothers chose to seek fewer demanding jobs so that they could spend more time on housework and childbearing. After two decades of persistent research,

with controlling for variables such as human capital, working experience, education, and other endogenous factors, Budig and England (2001) found that with one more child, the penalty on mothers remains significant. The existing papers concluded the percentage drop on wage level due to the increasing number of children varies from 5 percent to 10 percent.

### 1.6 Organization of Study

This study is organized into six chapters. The first chapter is the introduction which includes the statement of the problem, research questions, objectives, and scope of the study. Chapter 2 reviews the theoretical model of the motherhood penalty and empirical literature on the motherhood penalty. Next, chapter 3 presents the theoretical framework, research methodology, and data source. Chapter 4- 5 reports the results from imputation, econometrics, and data analyses. Finally, chapter 6 states the conclusions and implications for the motherhood penalty in Thailand as well as the limitations and suggestions for further studies.



## Literature Review

### 2.1 Motherhood Penalty in Thailand

In Thailand, the gender wage gap has been widely discussed, studies have proved the convergence in the gender wage gap (Liao, 2019) and marriage discourages female labor force participation (Tumsarp & Pholphirul, 2020), yet rarely are specific on the change of working condition and earnings of women after fertility. As the constantly decreasing fertility rate of Thailand, women attend to give top priority to a career instead of fertility. Because in the past two decades, more opportunities arose for women in the working place due to the increasing enrollment ratio of female tertiary and even exceeded that of men about ten percent (Romanow, 2012). The rising equity

in the workplace enables women to explore more opportunities in their careers thus further encourages women to participate more in labor market. However, fertility and childbearing are still obstacles for women to reach higher positions in the workplace partly can be explained by the Ministry of Labor in Thailand (2017) where women are entitled to 90 days of maternal leave whilst on the fathers' side only those who work in the public sector are entitled to 15 days maternal leave.

In summary, even there are not many specific studies on the motherhood penalty in Thailand yet the wage penalty after fertility is predictable especially when more and more young generations tend to continue their career after fertility. Whether the motherhood penalty truly exists would be a valuable question to study on.

## 2.2 Measuring Motherhood Penalty

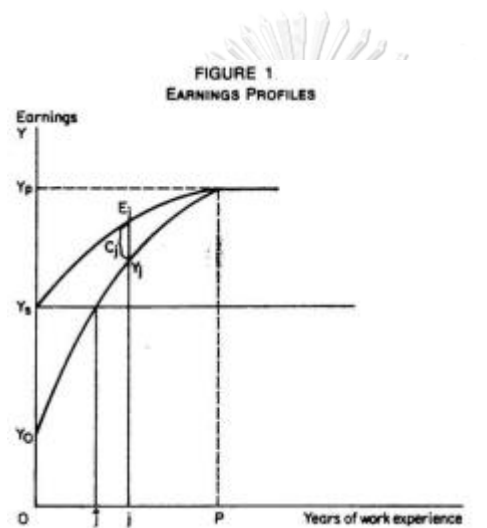
As mentioned above, Mincer brought up the equation based on each educational level in terms of schooling and on-the-job training in terms of working experience because he addressed that schooling itself cannot explain the return to work thus the amount of working experience should also be considered.

$$\ln\omega_t = \ln\omega_0 + \rho s + \beta_1 x + \beta_2 x^2$$

The wage equation in the form  $\ln\omega_t$  is a quadratic function where  $t$  is the human was rewarded at  $\omega_t$ . In Mincer's theory,  $\omega_0$  is the earning of people with no schooling or working experience.  $s$  is the year of schooling and  $x$  is the working experience which equals to the age at time  $t$  minus years of schooling then minus the age starting schooling which is  $x = t - s - b$ .

As schooling is the investment made mainly before one entered the labor market, on-the-job training is seen as the investment made by the employers. As mentioned above there is a compensational relationship between working experience and on-the-job

training which causes the increase in on-the-job training to hinder the accumulation of working experience hence employers prefer to invest more in the younger employees who have more time to produce and work. Both employees and employers will benefit from the investment in on-the-job training. However, the accumulation of human capital will decrease when reaching a certain age and further causing the decline in wage which was addressed by Heckman (1976), Psacharopoulos (1985), and Weiss (1986) in their age-earning profile theory.



Source: Jacob Mincer, *Schooling, Experience, and Earnings*, 1976.

#### 2.4 Empirical Studies of Motherhood Penalty

The current research mostly carried out by developed countries has found the motherhood penalty to be widespread. However, the size of the impact of the motherhood penalty on working mothers varies in different countries. In the late 1970s, by using the ninth waves panel study of American Income Dynamics, Martha S. Hill studied the impact on women's wage brought by marital status and number of children where found the number of children has 6.8 percent negative impact on white women. In this study, even though Martha showed the significant positive wage effect of marriage men yet did not find evidence of a detrimental wage effect of marriage among women given that women were, on average, less stable workers than single

women thus the human capital theory cannot fully explain this situation Martha addressed.

In 2001, Budig and England used the fixed-effect model to investigate the data collected by the National Longitudinal Survey of Youth from the year 1982 to 1993 in America also showed the 7 percent decrease in women's wage that caused by motherhood and advanced the study by controlling working experience and other work-related variables to further find the decrease on women's wage remain 5 percent. Unlike Martha failed to explain the wage penalty on married women, Budig successfully explained about one-third of the wage penalty on women with children in the workplace by the lack of accumulation of human capital caused by their employment breaks, part-time employment, and the accumulation of fewer years of experience and seniority.

Later in Spain, Molina & Montuenga (2009) found the existence of motherhood penalty in Europe by using the Mincer equation based on the data from the European Community Panel between the year 1994 and 2001 which with one more child living in the household will lead to 6 percent loss in women's wage. Moreover, with two children, there will be an almost 14 percent decrease in women's wage, and with three children, the loss will be 15 percent. It turned out that with a higher educational level, broader working experience, and greater seniority, the wage will go higher which confirmed the human capital theory. Further in the discussion, the job type, contract type, and sector also matter, which will also be considered in this study.

Similarly, as one of the European countries with low female labor participation, researchers in Italy specifically investigated the reason why women left the labor

market and chose not to re-enter after childbirth. After using fixed effect estimated data from the Work Histories Italian Panel between the year 1985 to 2003, researchers found the gap between mothers and non-mothers is about 3 percent which hindered the re-entrance to the labor market. However, in this thesis, they separately discussed the career break job penalty and motherhood penalty which they used the depreciation of human capital to address the reason for the job break penalty. Thus, they did not use human capital theory to explain the motherhood penalty as career breaks are included.

The size of the impact of the motherhood penalty increases with the number of children. However, the size of the impact also differed from the age of fertility and the phrase the mother is in. In the year 2011, Viitanen (2011) used a longitudinal cohort to see the impact of the motherhood penalty through their lifelong experience until giving birth. By using the data from the UK National Child Development Study, Viitanen (2011) confirmed the wage penalty caused by motherhood in the UK was on average 8.1 percent by the first child at age 23 of the mother. Moreover, Viitanen (2011) also found that the motherhood penalty remains existence even 30 years after the first child. The motherhood penalty on mothers will reach the peak around the age of 33 where the impact of the motherhood penalty is 22 percent.

Based on the data from the Danish administrative data from 1980 to 2013, Kleven, Landais, and Sogaard used an event study approach to find the motherhood penalty caused by the arrival of children will be close to 20 percent in the long run.

In Thailand, using the Socio-economic Survey from the year 2005 to 2012, to solve the selection effect, Liao and Sasiwimon (2019) estimated the motherhood penalty by



fixed-effects model and an event study analysis thus found the motherhood penalty on women with young children decreases from 37.5 percent to 16.2 percent for married women and from 52.7 percent to 37.6 percent for unmarried women.

Even though all the studies show that the motherhood penalty truly exists and has a huge impact on women, there is no agreement on the different sizes of the impact of the motherhood penalty for women from various groups. By using data from NLSY79, Elizabeth (2004) found that the impact of the motherhood penalty is dramatically huge and is long in duration. One possibility addressed in this study is that the decision of quitting their job also leads to giving up on the former accumulation of human capital.

However, research also found there is a U-shape penalty pattern: only the women with middle level of academic will be effectively influenced by motherhood penalty while women with high academic level and low academic level are barely influenced (Altonji & Blank, 1999).



The wage equation brought up by Mincer did not distinguish types of occupation, thus some researchers further focused on the public-private comparison. Duvivier (2014) in France investigated the wage penalty on employees from public and private sectors by using data from the Families and Employers survey addressed that, women in the private sector with more than one child were affected larger than those in the public sector (Duvivier & Narcy, 2015). The reveal revealed that, in France, the motherhood penalty on mothers with two children of the private sector is estimated 5.8 percent higher than those from the public sector whilst the gap of motherhood penalty between mothers with more than two children from the public sector and private

sector is 9 percent. Mothers with one child earn the same wage as women without children (Duvivier & Narcy, 2015). As a result, the former researchers who have not investigated private and public sectors might have ignored huge differences between the two sectors. However, the differences in the public and private sectors are attributed specifically to the human capital depreciation effect.

Similarly, Xiao Jie (2017) in China found the size of the negative impact of one more child on the wage of women from different income and household levels varies from 20 percent to 28.8 percent. For the married women from different sectors, women from the state-owned economy have to endure a 12.8 percent loss in wage while the loss for women who work in the public sector is 6 percent. Despite that, in the private sector, the motherhood penalty only affects women with high-income levels. After controlling the human capital variables, the motherhood penalty on working mothers reduced about 50 percent and even more. On the group of women with lower income, the wage penalty is attributed mainly to the interruption of accumulation of human capital. In addition, married women with higher income and positions will mainly suffer from the depreciation of human capital which means that higher position requires more skilled and seniority. Besides that, the study also found that with higher education level when women enter the labor market, the wage penalty caused by motherhood is mitigated. On the contrary, working mothers of the public sector suffer more from the motherhood penalty than mothers of the private sector in China. Because the cost of entering and exiting the public sector is rather higher compared to the private sector which the private sector when facing difficulty balancing work and childbearing, they would choose to change jobs to ease up the conflicts.

Although there is no research estimating the size of motherhood penalty on public and private sectors in Thailand yet, studies on the gender wage gap had found that the

gender wage gap in the public sector was nearly non-existent whilst men earn higher on average in the private sector (Kanokmaneeorn, 2016). The reason Kanokmaneeorn (2016) addressed in this thesis is that the wage structure of the public sector in Thailand is too fierce that gender does not make any difference in the wage difference. This gives an interesting perspective to look deeper into the motherhood penalty in Thailand.



**Table 1 Literature Review**

| <b>Author</b>        | <b>Year</b> | <b>Country</b> | <b>Data</b>   | <b>Conclusion</b>   |
|----------------------|-------------|----------------|---|---|
| Martha S. Hill       | 1979        | United States  | the ninth waves panel study of American Income Dynamics         | The number-of-children have 6.8 percent negative impact on white women  |
| Budig                | 2001        | United States  | National Longitudinal Survey of Youth for the year 1982 to 1993 | 7 percent decrease in women's wage that caused by fertility   |
| Molina and Montuenga | 2009        | Spain          | European Community Panel between the year 1994 and 2001         | 1 child will lead to a 6% loss in women's wage. 2 children, there will be almost 14% loss in women's wage, and 3 children, the loss will be 15% |
| Pacelli              | 2013        | Italy          | Work Histories Italian Panel between the year 1985 to 2003      | the gap between mothers and non-mothers is about 3 percent which hindered the re-entrance to the labor market                                   |

|          |      |                |  |  |
|----------|------|----------------|--|--|
| Viitanen | 2011 | United Kingdom | UK National Child Development Study          | 8.1% by the first child at age 23 of the motherhood penalty remains existence even 30 years after the first child. The motherhood penalty on mothers will reach the peak around the age of 33 where the impact of the motherhood penalty is 22%. |
| Kleven   | 2018 | Denmark        | Danish administrative data from 1980 to 2013 | The motherhood penalty caused by the arrival of children will be close to 20 percent in the long run.  |
| Liao     | 2019 | Thailand       | SES 2005-2012                                | The motherhood penalty on women with young children decreases from 37.5 percent to 16.2 percent for married women and from 52.7 percent to 37.6 percent for unmarried women.   |

|                 |      |          |                               |   |
|-----------------|------|----------|-------------------------------|---|
| Duvivier        | 2014 | France   | Families and Employers survey | The motherhood penalty on mothers with two children of the private sector is estimated 5.8 percent higher than those from the public sector whilst the gap of motherhood penalty between mothers with more than two children from the public sector and private sector is 9 percent |
| Xiao            | 2017 | China    | National Survey of women      | Women from the state-owned economy must endure a 12.8 percent loss in wage while the loss for women who work in the public sector is 6 percent.   |
| Kanokman eeporn | 2016 | Thailand |                               | The gender wage gap in the public sector was nearly non-existent whilst men earn higher on average in the private sector  |



จุฬาลงกรณ์มหาวิทยาลัย  
CHULALONGKORN UNIVERSITY

## **CHAPTER 3 THEORETICAL FRAMEWORK AND METHODOLOGY**

### **3.1 THEORETICAL FRAMEWORK**

#### **3.1.1 Human Capital Theory**

According to prior research, motherhood is often associated with lower hourly pay which could be mainly explained by four theories: human capital theory, the theory of compensating wage differentials, the allocation of effort theory, and employer discrimination. After setting working experience as a controlled variable, the most reasonable explanation for the motherhood penalty is that the role of mother requires women to dedicate more time and effort to family, thus women tend to trade off higher wages for jobs that are easier to balance with parenting. Human capital theory indicates that experience will benefit productivity because workers will be more productive while taking on-the-job training. Building upon this theory, the initial wage for a worker would be on a lower level while with the accumulation of experience and seniority it gradually goes up. The human capital theory is the most popular and probably the major explanation for the motherhood penalty.

The concept of human capital theory was firstly addressed by Adam Smith in 1776 where he defined the acquisition of education, skills, and working experience as in the capital in human. However, it was not formally established until the year 1960 when Schultz emerged four major points in his paper. First, he pointed out that human capital, as well as conventional capital, can be invested by the growth of education, skills, and health (Schultz, 1961). Second, the investment in human capital is the direct expenditures on knowledge-related investment in education, health-related investment in healthcare, skills-related investment in on-job-training, and the job opportunities related to the internal migration of an individual or the whole family. Thirdly, both individuals and society will benefit from the investment in human

capital. Forth, the most valuable feature of the investment in human capital is the investment in education which is not only the powerful drive of the dynamic and growing economy but also one of the solutions to wage inequality.

Different from the macroeconomic perspective Schultz took, Becker investigated the microeconomic perspective that combined the accumulation of human capital with the income distribution theory. Therefore, the human capital theory was extended by Becker beyond those four points mentioned above. Firstly, the concept of the investment in human capital not only covers skills, knowledge, and education, but also information, on-the-job training, and emotional health (Becker, 1962). Secondly, age also matters. Young people benefit more from the increase of wage from the on-the-job training than people at an elder age. Thirdly, Becker described in detail how on-the-job training led to the increase in wage and the positive effect both individuals and the firms benefit from.

Given that the importance of education has been universally approved, however, it was distinguished into different types and means by researchers (Sweetland, 1996). Mincer set working experience and schooling as determinants of individual income where he pointed out that based on the free choice to occupation, the investment in human capital in terms of education and training differs among individuals (Mincer, 1958). However, both training and education take time and each year of either of them postpones the individual's earning for another year. By estimating the age and salary income of male workers in the experienced civilian labor force who worked 50-52 weeks in 1949, Mincer estimated the content of aggregative skewness and dispersion caused by the differences in training and schooling which not only found the existence of the compensatory in income also indicated that even the relationship between income growth and age is positive, due to the increasing divergence with the



age of life paths among earning of different occupations, the inequality of income among different age groups also increase. In the second stage, Mincer distinguished on-the-job training and schooling by estimating the lifetime training per capita at school and on-the-job training of males from the United States between the year 1939 and 1949. Therefore, he put forward the equation where the logarithm of wage is modeled as the sum of years of schooling and the quadratic function of working experience interns of the on-the-job training (Mincer, 1979). Based on the data conducted by Mincer using SES of West Godavari District in South India where Mincer analyzed 415 households and the pupils belonged to those households, Mincer brought up the equation to calculate the wage can be summarized by schooling and working experience. The results showed that schooling explained 37 percent of the wage gap while together with working experience would explain 50 percent of the wage gap which further demonstrated that the reduction in inequality in education will eventually lead to the reduction in inequality in wage (Mincer, 1979).

Based on the fact that the inequality in education and the investment in on-the-job training will lead to the inequality in wage, Mincer discussed the white and non-white wage comparison as well as male-female wage comparison where he estimated the investment in on-the-job training of women and found that the investment on on-the-job training of female was \$1,495 which was about one-tenth of the amounts invested by men \$15,700. Hence, when put the dropping out of the work and less passion about work than men due to prolonged periods of child-rearing into consideration, the lack of training further causes firms to prefer male employees over females. The discussion based on gender gave us a different perspective to investigate the wage inequality that barely anyone ever studied at which is very meaningful to both women and socio-economic development.

Accordingly, motherhood hinders the development of human capital when a mother dedicates her time to childbearing and parenting which would be seen as sacrificing her on-the-job training time for balancing work and parenting (Jeremy, 2012). The wage structure in the public sector and private sector is different since the wage level from the public sector is more likely to be regulated by the rules and institutions. Hence, it is without saying that the decision about changing companies after fertility will cause them to lose their job tenure and the company-specific accumulation of human capital which further has a larger negative impact on women from the private sector. Former research in France has found that women in the private sector suffer more from motherhood wage penalty than those from public sectors because of the child-related career interruptions (Chloe, 2014) which indicates that the wage level of women from the private sector is more likely to be affected by the accumulation of human capital.

### 3.1.2 The Earnings Equation Framework

To sum up the existing empirical research on the motherhood penalty, this thesis will estimate the motherhood penalty by the Mincer Wage Function. There will also be other variables confirmed by former researchers, for example, public and private sector, dummy variables, for example, region, and the working experience square. Given that these studies would use human capital theory to discuss the motherhood penalty in Thailand, so the earning function for this study following Mincer's model is

$$\ln\omega_t = \ln\omega_0 + \rho s + \beta_1(\text{age}) + \beta_2(\text{age})^2 + \beta_3(\text{sector})$$

### **3.2 Research Methodology**

The data used in this thesis will be from the Household Socio-Economic Survey (SES) for the year 2017 collected by the National Statistic Office (NSO) of Thailand. The full SES survey is conducted by NSO every year and contains both household and individual information of 52,000 households all over the country.

As mentioned above, the SES was conducted on household registration, thus did not fully cover all the information of one individual in the household, hence posed a great challenge in distinguishing mothers and non-mothers. To avoid that, this study only investigates working women aged between 15-65 who are either household heads or the spouse of the household head.

#### **3.2.1 Identify mothers in the SES dataset**

In order to locate the mothers, this thesis only looks into those females who are either household head or the spouse of the household head and aged between 15 and 65 who are reported currently working.

Thus, the number of children will be those who reported their relationship to the household head as either unmarried or married children to the household head. Thus, the relationship between the children in the household and the female household head or spouse will be fixed.

This method requires microdata which is available in the Household Socio-Economic Survey (SES) of Thailand. The SES collects the details of employee's incomes. Specifically, working mothers and working non-mothers are cross-classified by three

groups of demographic and social characteristics: 2-marital status, with or without children, and 2 sectors that are shown in Table 3.1.

Table 3.1

| Variable Name  | Number of Categories | Categories  |
|----------------|----------------------|---|
| Marital Status | 2                    | Never married   |
|                |                      | Married (including married, widowed, divorced, separated, and married but unknown status) |
| Sector         | 2                    | Private sector  |
|                |                      | Public sector   |

Source: Author's classification

However, everyone's work is unequal, and the working status for the past 12 months varies. Thus, SES both listed one individual's wage and working months of the past 12 months, compensation of last month, and the overall wage and compensation of the past 12 months. In order to avoid the wage penalty caused by the working status in the past 12 months, this study uses the combination of wage of last month and compensation and the bonus of last month as the income level.

Monthly earning=wage of the last month + compensation of the last month

Because SES only gives out the level of one's education, so in order to conduct Mincer function, this study estimates one's years of schooling instead of the highest education level.

As the Mincer wage equation required, working experience equals age minus years of schooling, and the year one starts schooling which is considered as 6 years old.

1. Personal information - age, gender, marital status, years of schooling, number of children, and number of children under 15 years old.
2. Occupation information- working status (private sector and public sector) and monthly earning.

The selected sample must meet the following criteria:

1. People who are women.
2. Women who are either household head or the spouse to the household head
3. People whose age is in the range between 15 to 65 years old.
4. People who have a work status as currently working in the private sector, public sector.
5. Full-time workers are reported to work a minimum of 36 hours per week.

### *3.2.1.1 The Monthly Earning and Human Capital Variables Imputation Methodology*

As previously indicated, this study inputs SES household data to estimate the relationship between individual earnings and human capital variables such as schooling and working experience. The household earnings are estimated as the wage of last month and compensation and the bonus of last month. The experience of a worker equals to the age at time  $t$  minus years of schooling then minus the age starting

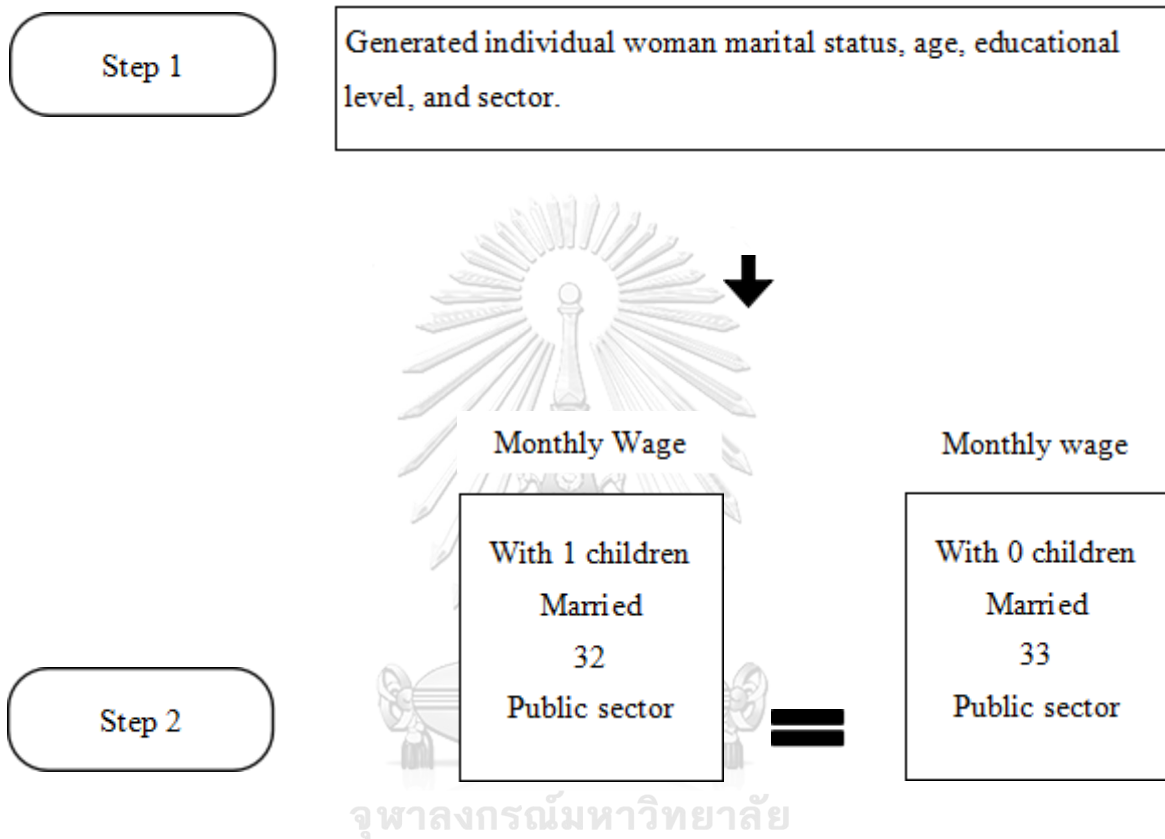
schooling. The main assumption is that the average monthly wage of mothers equals the average monthly wage of non-mothers of the same educational level, years of working experience, and the public or private sector. The following will be a step-by-step report of how to impute women's incomes as follow:

1. The study divided the observation data into 2 variable groups, comparing marital status and sector, as showed in Table 3.1.
2. This study calculated the average monthly wage of women who shared the same marital status, number of children under 15 years old, and sector.
3. The assumption indicates that working mothers who have the same demographic characteristic as the non-mothers could earn the same wage rate. This study generated the average earnings of women without children in each group as the pre-earning of mothers of the same group to estimate if there is a wage penalty on mothers.

4.

Figure 3.1

The monthly income and human capital variables imputation methodology



### 3.2.2 The Method of Estimations

According to Mincer's model that indicates the relationship between the individual's wage and their human capital characteristics.

$$\ln\omega_t = \beta_0 + \beta_1 cl15 + \beta_2 Edu + \beta_3 Exp + \beta_4 Exp^2 + \beta_5 Sector + \beta_6 Marital\ status + \beta_7 Mom$$

#### Dependent Variable

$\ln\omega_t$  denotes the natural logarithm of working women's real monthly wage, already estimated from the type of wage and type of job. The relationship between wage and human capital variables is positive yet not linear. Mincer (1974) brought up this

quadratic equation addressed the statistically significant positive relationship between wage and school and working experience.

### Independent Variables

1. *Cl 15* denotes the number of children under 15 years old one woman has given birth to before or after entering the labor market. Given the assumption that motherhood will lead to a decrease in women's wage, previous studies have confirmed that with one more child, the wage of women will decrease a certain percentage. Thus, according to human capital theory, in this study, the coefficient of birth would be negative.
2. *Edu* denotes the year of schooling one woman obtained before or after one entered the labor market. The previous study based on the human capital theory found that with a higher level of education obtained before entered the labor force, the wage penalty of motherhood will be mitigated (Xiao Jie, 2017) which is consistent with the human capital theory.
3. *Exp* denotes the years of working experience. With the long working experience, it is generally considered the accumulation of human capital also increases which makes women earn higher. Meanwhile, the  $Exp^2$  denotes the square of women's age in terms of working experience in years which means that when one is aging, her intelligence and the physical condition get worse therefore both on-the-job training and learning would be less efficient than younger people which is consistent with the human capital theory.
4. *Sector* denotes the sector woman works in. It includes two dummies including the private sector and public sector. In the previous research, though there are not many studies based on the motherhood penalty on women from different sectors, indicated that in the public sector, the gender wage gap was nearly non-existent whilst men earn higher on average in the private sector due to the strict wage



structure in the public sector in Thailand (Kanokmaneeporn, 2019).

5. *Area* denotes the area women live in, including 1 dummy variable which is municipal area and non-municipal area.
6. *Marital status* denotes if one is married before or not, including 1 dummy variable which is not married or married. The former research indicated that in Thailand, marriage somehow encourages women to participate more in the labor market so this would be an interesting variable to investigate.



## CHAPTER 4 Descriptive Statistics

This chapter describes the statistic of a working mother in Thailand. The data was collected from the Socio-Economic Survey (SES) conducted by the National Statistic Office of Thailand, of the year 2017.

Table 4.1 shows the summary statistics mean monthly wage of women from the SES 2017. According to the table, the real monthly earning of working non-mother is about 14.6 percent higher than that of working mothers which is consistent with the former research.

Table 4.1 Descriptive Statistics of Monthly Wage (Baht)

| Year | The number of samples | Total    | Mean       |          |
|------|-----------------------|----------|------------|----------|
|      |                       |          | Non-mother | Mother   |
| 2017 | 8622                  | 15013.09 | 16004.79   | 13960.69 |

Source: Author's classification

  
 จุฬาลงกรณ์มหาวิทยาลัย  
 CHULALONGKORN UNIVERSITY

Table 4.2 reports the mean monthly earning of women with and without children on all variables. It is obvious that the mean monthly earning of non-mothers is higher than that of mothers about 10 percent which is consistent with the former study. When investigating the human capital variables, women with a higher level of education attainment tends to have a higher wage than women with lower educational level and the gap between university level and secondary level is very significant which could be attributed to the accumulation of human capital. The wage gap between mothers and non-mothers is decreasing with the increase of educational level which partly proves that the increase of educational level will bring down the wage gap among

mothers and non-mothers. Not surprisingly, women from municipal area earn significantly more than those from the non-municipal area and under smaller motherhood penalty, which is probably caused by more job opportunities, fewer discriminations, and perhaps higher education attainment accelerate the accumulation of human capital that eventually lessen the wage penalty on mothers.

As we mentioned above, the gender wage gap in the public sector is nearly non-existent however according to the table 4.2, women from public sector might suffer more from the motherhood wage penalty which is inconsistent to the former research in Thailand but consist to the finding in China (Xiao Jie, 2010). In addition, married women undertake more motherhood penalty than unmarried mothers but also earn less on average than women who are never married.

This table shows some information consistent with the former studies but also brings out some interesting information that is contrary to the existing papers discussing specifically Thailand which deserves some ample estimations and discussion in the next phrase.

Table 4.2 Descriptive Statistics of All Variables

|                       | Mother   | Non-mother | Total | Gap    |
|-----------------------|----------|------------|-------|--------|
| Mean monthly earning  | 13960.69 | 16004.79   | 15013 | 14.64% |
| <b>Sector</b>         |          |            |       |        |
| Public sector         | 23525.44 | 29240.88   | 26429 | 24%    |
| Private sector        | 10518.50 | 11414.73   | 10982 | 9%     |
| <b>Area</b>           |          |            |       |        |
| Municipal area        | 15947.86 | 17454.24   | 16775 | 9.45%  |
| Non-municipal area    | 10791.33 | 12546.47   | 11579 | 16.26% |
| <b>Marital status</b> |          |            |       |        |
| Married               | 13954.23 | 15328.49   | 14565 | 10%    |
| Never married         | 19356.80 | 18055.21   | 18061 | -7%    |

Source: Author's Description

Table 4.3 Descriptive Statistics of All Variables

|                    | Mother | Non-mother | Total |
|--------------------|--------|------------|-------|
| Years of schooling | 9.59   | 9.56       | 10    |
| Age                | 33.52  | 32.87      | 33.32 |

## CHAPTER 5 EMPIRICAL RESULTS

This chapter reports the empirical results of this study. After regression of the main model based on Mincer's equation, it could be assumed that the motherhood wage penalty on mothers truly exists in Thailand. Table 5.1 shows the motherhood penalty on mothers is about 7.6 percent which means that the wage level of mothers declines about 7.6 percent compared to the non-mothers and is statistically significant on 0.1% which is consistent with the former study.

With regard to human capital variables, with the longer year of schooling, the wage level of women will increase 5.5 percent. When it comes to the working experience, with longer working experience, the wage level of women will increase by 3.6 percent. However, as found by the age-earning function, the square of working experience has a negative impact on wage level which means that when the working experience reaches a certain year, the wage level of women will decline.

With regard to marital status, marriage will cause an 8.7 percent decline in women's wage level.

When it comes to the characters of work, sectors have a statistically significant effect on women's wage level. Women from the public sector earn 30.4 percent more than those who work in the private sector, and it is statically significant on a 0.1% level.

Specification1:  $\ln\omega_i = \beta_0 + \beta_1cl15 + \beta_2Edu + \beta_3Exp + \beta_4Exp^2 + \beta_5Sector + \beta_6Marital\ status + \beta_7Area$

Table 5.1

|                              | Monthly wage         |
|------------------------------|----------------------|
| Number of Children under 15  | -0.076***<br>(0.007) |
| Years of schooling           | 0.055***<br>(0.001)  |
| Working Experience           | 0.036***<br>(0.002)  |
| Square of working experience | -0.001***<br>(0.00)  |
| Marital status               | -0.087***<br>(0.021) |
| Sector                       | 0.307***<br>(0.018)  |
| Area                         | -0.205***<br>(0.014) |
| Constant                     | 8.731***<br>(0.039)  |
| R <sup>2</sup>               | 0.460                |

### 5.1 Sectors

In the public sector which is the combination of public sector and state-owned enterprise, with one more child under 15 years old, the wage level will decline 7 percent and is statistically significant on 0.1 percent level. Generally, mothers who have children under 15 years old are usually those who still carry the duty of childbearing and perhaps homeschooling whilst working compared to those women whose children are in college or already working. The higher educational level in

terms of the long years of education forbids mothers from the motherhood wage penalty which is consistent with Mincer's theory.

In the private sector, mothers have lower monthly wage compared to non-mothers, and their wage declines about 5.8 percent with one more child which is smaller than that in the public sector. This result could be explained by the fact that the wage structure in the private sector is more competitive due to both marital status and the area mothers live in can explain part of the wage gap among mothers and non-mothers in the private sector.

$$\text{Specification 2: } \ln w_t = \beta_0 + \beta_1 cl15 + \beta_2 Edu + \beta_3 Exp + \beta_4 Exp^2 + \beta_5 Sector$$

Table 5.2

|                              | Monthly wage         |                      |
|------------------------------|----------------------|----------------------|
|                              | Public Sector        | Private Sector       |
| Number of Children Under 15  | -0.070***<br>(0.016) | -0.058***<br>(0.008) |
| Years of schooling           | 0.091***<br>(0.003)  | 0.042***<br>(0.002)  |
| Working Experience           | 0.036***<br>(0.004)  | 0.021***<br>(0.002)  |
| Square of working experience | 0.000***<br>(0.00)   | -0.001**<br>(0.000)  |
| Marital Status               | -0.66<br>(0.141)     | -0.116<br>(0.023)    |
| Area                         | -0.235***            | -0.188***            |

|          |          |          |
|----------|----------|----------|
|          | (0.00)   | (0.015)  |
| Constant | 8.141*** | 9.091*** |
|          | (0.085)  | (0.046)  |
| R2       | 0.432    | 0.313    |

## 5.2 Multiple Regression

After the multiple regression on the motherhood penalty, this part will look deeper into the mechanism of motherhood penalty from different penalty.

First, the number of children under 15 will be set as raw wage penalty and step by step estimating other variables to measure the change of the regression coefficients of the the number of children under 15. Table 5.4 reports the change of regression coefficient of the number of children after controlling demographic characteristics, marital status, and human capital variables in both the public sector and private sector, which is clear that in each model, the motherhood wage penalty declines along with the wage equation, proving the human capital theory (except the third model of the private sector). Furthermore, after estimating the related variables, the wage gap among mothers and non-mothers explained by the number of children under 15 remains statistically significant which means that the motherhood wage penalty exists in Thailand in both sectors.

Table 5.4 Motherhood wage penalty

|                  | Public Sector | Private Sector |
|------------------|---------------|----------------|
| Raw wage penalty | -0.149***     | -0.082***      |



|   |           |           |
|---|-----------|-----------|
| Estimated wage penalty                                  |           |           |
| (1) Controls: Age, area                                 | -0.126*** | -0.49***  |
| Age   |           |           |
| Area  |           |           |
| (2) Controls: Marital Status                            | -0.099*** | -0.031*** |
| Age   |           |           |
| Area  |           |           |
| Marital Status  |           |           |
| (3) Controls: years of schooling,<br>working experience | -0.073*** | -0.058*** |
| Age   |           |           |
| Area  |           |           |
| Marital Status  |           |           |
| Years of Schooling                                      |           |           |
| Square of Working Experience                            |           |           |

---

When only considering if one has a child or not, the motherhood wage penalty on mothers from both public and private sectors peak which with one more child under 15 years old, the wage level of mothers from the public sector will decline 14.9 percent and 8.2 percent for women in the private sector.

After controlling the demographic characteristics, including the age of the women and the area they live, the explanatory power of the number of children under 15 declines.

When putting marital status into the model, it explains the same amount of wage gap among mothers and non-mothers varies from sectors.

After putting the human capital variables into the model, it explains partly the wage penalty on mothers, however, it varies from the sector. The unexplained wage penalty of women from the public sector declines about 2.7 percent in the private sector, based on model 2, after controlling human capital variables, the unexplained wage penalty on mothers increased about 1.8 percent, however, compared to the raw wage penalty on mothers in the private sector, the wage penalty has declined about 2.4 percent.

These estimations show that the human capital theory explains most of the wage penalty on mothers, giving that the wage penalty on mothers from both the public sector and private sector declined after controlling more human capital variables in the models. The wage penalty caused by fertility in the public sector could be mainly explained by the human capital theory where after controlling the human capital variables, the wage penalty has halved its raw wage penalty. For those women who work in the private sector, the increasing wage penalty from model 2 to model 3 means that they must accumulate more human capital compared to those in the public sector to avoid the wage penalty caused by their interruption of employment. Moreover, being married when entering the labor market can mitigate the wage penalty caused by fertility on women from the private sector.

## CHAPTER 6 CONCLUSION AND IMPLICATIONS

Based on the SES of 2017, there is a motherhood wage penalty in Thailand by 7.6 percent. Both sector and human capital can most explain the motherhood wage gap on women in 2017 where they both affect the coefficient of the number of children under 15 years old. However, the wage penalty on mothers from public sector is bigger than those from the private sector which could be explained by mainly three reasons.

First, the wage progression in the public sector is rather strict and major dependent on seniority which requires women not to tend to leave their workplace after fertility, instead, they would transfer to a lower position or more flexible position to keep the work and life balance. Even if they transfer back to their position after maternity leave, their wage level will not rise much due to the lack of accumulation of skills and working experience (Hirsch, 2005; Russo and Hassink, 2008; Nelen and de Grip, 2009).

Second, women are under more family-friendly measurements in the public sector compared to those in the private sector. For example, parents who work in the public sector are entitled to 15 days of paternity leave whilst there is no paternity leave for people who work in the private sector. Former research has found that women from the private sector tend to leave the labor market after fertility while women from the public sector choose to remain due to the ties made by the generous parental leave. However, the generous time out for women will lead to their lack of accumulation of human capital once they get back to the workplace thus further increase the wage gap among mothers and non-mothers in the public sector (Fang & Sakellariou, 2011). On the contrary, women from the private sector with less competitive wage or lower position tend to leave the labor force market after fertility and only those who are in a higher position will be competitive enough to make sure they wage level will not

decline once they get back to make the wage gap among mothers and non-mothers seems to be smaller than that in the public sector (Xiao, 2017).

Third, human capital variables are easier for one to obtain or accumulate in the private sector thus women can avoid the motherhood wage penalty by improving the accumulation of human capital for example higher level of education or more on-the-job training in the private sector. With more job opportunities, easier access to on-the-job training, more convenience to change jobs, and the based on working experience wage progression, women from the private sector have more initiative in their wage level.

### **6.1 Limitations**

1. The study is based on SES of 2017, so there is no comparison over time so it would be impossible to see the change of motherhood wage penalty on women over time.
2. The selection issues. Given that this thesis only looks into women in the labor market, women in the private sector may be more likely to drop out of work. Since this thesis does not observe these women in the data, the estimates for motherhood penalty may be biased for the private sector.
3. Even though SES gives the information of income and compensation or bonus from last month, using the income and compensation or bonus in isolation is risky. However, because this study is about the comparison of the public and private sector, the SES does not provide the information of if one switches her job from the public sector or private sector which will cause more error and inaccurate in this study, so this study sticks to using the income and compensation or bonus of last month in isolation.

### **6.3 Suggestions for Further Study**

In order to explain the motherhood wage penalty in Thailand among sectors, it would be interesting to look into different sectors in detail over time to estimate the change of motherhood wage penalty alongside the changes in the development of all the sectors. Also, it would be interesting to estimate the fatherhood penalty in different sectors over time because the fatherhood penalty is a special phenomenon in Thailand.



## REFERENCES

- Altonji, J. G., & Blank, R. M. (1999). Race and gender in the labor market. *Handbook of labor economics*, 3, 3143-3259.
- Becker, G. S. (1985). Human capital, effort, and the sexual division of labor. *Journal of labor economics*, 3(1, Part 2), S33-S58.
- Budig, M. J., & England, P. (2001). The wage penalty for motherhood. *American sociological review*, 204-225.
- Cooksey, E., Joshi, H., & Verropoulou, G. (2009). Does mothers' employment affect children's development? Evidence from the children of the British 1970 Birth Cohort and the American NLSY79. *Longitudinal and Life Course Studies*, 1(1).
- Duvivier, C., & Narcy, M. (2015). The motherhood wage penalty and its determinants: A public-private comparison. *Labour*, 29(4), 415-443.
- Fang, Z., & Sakellariou, C. (2011). A case of sticky floors: gender wage differentials in Thailand. *Asian Economic Journal*, 25(1), 35-54.
- Heckman, J. J. (1976). A life-cycle model of earnings, learning, and consumption. *Journal of political economy*, 84(4, Part 2), S9-S44.
- Kleven, H., Landais, C., & Sjøgaard, J. E. (2019). Children and gender inequality: Evidence from Denmark. *American Economic Journal: Applied Economics*, 11(4), 181-209.
- Mincer, J. (1958). Investment in human capital and personal income distribution. *Journal of political economy*, 66(4), 281-302.
- Mincer, J. (1976). Schooling, experience, and earnings. by Jacob Mincer. *Review*, 29, 454-455.
- Mincer, J., & Jovanovic, B. (1981). Labor mobility and wages. *Studies in labor markets*, 21-64.
- Molina, J. A., & Montuenga, V. M. (2009). The motherhood wage penalty in Spain. *Journal of Family and Economic Issues*, 30(3), 237-251.
- Pacelli, L., Pasqua, S., & Villosio, C. (2013). Labor market penalties for mothers in Italy. *Journal of Labor Research*, 34(4), 408-432.
- Psacharopoulos, G. (1985). Returns to education: A further international update and implications. *Journal of Human resources*, 583-604.
- Schultz, T. P. (1990). Women's changing participation in the labor force: a world perspective. *Economic Development and Cultural Change*, 38(3), 457-488.
- Sweetland, S. R. (1996). Human capital theory: Foundations of a field of inquiry. *Review of educational research*, 66(3), 341-359.
- Tumsarp, P., & Pholphirul, P. (2020). Does marriage discourage female labor force participation? Empirical evidence from Thailand. *Marriage & Family Review*, 56(7), 677-688.
- Vichit-Vadakan, J. (1994). Women and the Family in Thailand in the Midst of Social Change. *Law and Society Review*, 515-524.
- Viitanen, T. (2014). The motherhood wage gap in the UK over the life cycle. *Review of Economics of the Household*, 12(2), 259-276.
- Waldfogel, J. (1997). The effect of children on women's wages. *American sociological review*, 209-217.



จุฬาลงกรณ์มหาวิทยาลัย  
**CHULALONGKORN UNIVERSITY**



จุฬาลงกรณ์มหาวิทยาลัย  
**CHULALONGKORN UNIVERSITY**



## VITA

**NAME** Chen Qiuge  
**DATE OF BIRTH** 10 October 1996  
**PLACE OF BIRTH** China



จุฬาลงกรณ์มหาวิทยาลัย  
CHULALONGKORN UNIVERSITY