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臺灣高科技製造業之性別薪資差異與就業區隔之實證研究

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計 畫 主 持 人 ： 莊慧玲

計畫參與人員： 碩士班研究生-兼任助理：張君瑋
碩士班研究生-兼任助理：董庭菀
碩士班研究生-兼任助理：陳彥穎
大專生-兼任助理：陳盈如
大專生-兼任助理：陳昱君
大專生-兼任助理：曾子芯

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中 文 摘 要 ： 台灣的高科技製造業除了產值高之外，該產業就業者也享有高於其它產業就業者的薪資報酬。根據主計處薪資與生產力統計2014年資料，在本計畫所界定的高科技製造業：「電子零組件製造業」與「電腦、電子產品及光學製品製造業」中，就業者平均薪資高於全體製造業就業者約25%，但是由女/男相對薪資所呈現的性別差異現象，在高科技製造業(0.65)卻更為明顯(全體為0.72)。基此，本計畫的主要目的，即是藉由對於產業間的性別薪資差異實證分析，以瞭解高科技製造業的性別薪資差異現象。本計畫以1978-2013期間主計處「人力運用調查」資料為研究對象，應用Horrace and Oaxaca (2001) 根據Oaxaca-Blinder差異分解方法所延伸發展出來的產業間差異排序法，實證探討性別薪資差異在不同產業間的特徵。本計畫的主要研究發現可分為兩部分說明，一是根據Oaxaca-Blinder差異分解的結果，受雇就業者整體的性別薪資差異中有2-14%可以由產業差異來加以解釋，由此可知產業因素在性別薪資差異現象中所扮演的角色不容忽視。另一主要研究發現則是根據產業間差異排序法來估計產業間性別薪資差異所得到的結果，吾人發現在涵蓋大多數高科技製造業的製造產業中，女性就業者的平均薪資低於男性就業者14-32%之多；各產業中對於女性就業者相對有利的產業為金融業，在金融業就業的女性，其平均薪資低於男性就業者約3-20%，此性別薪資差異比例相較於高科技製造業所屬之製造產業的14-32%為低。

中文關鍵詞： 高科技製造業、性別薪資差異、人力運用調查、Oaxaca-Blinder差異分解、產業間差異排序法

英 文 摘 要 ： Given the high output value of the high-tech manufacturing industry in Taiwan, the employees in the high-tech industry have received higher salary compensations compared to the employees in the other industries. According to the 2014 statistics reported by the Directorate-General of Budget, Accounting and Statistics, Executive Yuan of Taiwan, the average monthly salary of the employee in the high-tech industry is 25% higher than that of the other industries. However, the female/male relative salary in the high-tech industry (0.65) is lower than the total manufacturing industries (0.72). In other words, the gender wage gap seems to be more apparent in the high-tech industry. The purpose of this project is to empirically examine the gender wage gap across industries in order to understand more about the gender wage gap in the high-tech industry. Based on the 1978-2013 “Manpower Utilization Survey” data, this project applies the interindustry ranking approach proposed by Horrace and Oaxaca (2001) to analyze the gender wage gap across industries in Taiwan with a focus on high-tech manufacturing industry. We study this issue from two perspectives: first, by decomposing, examining, and breaking down the overall gender wage gap based on the Oaxaca-Blinder decomposition approach, we find that 2-14% of the overall gender wage gap during this period can be attributed to workers' industry affiliation. Second, through the analysis of the gender wage gap across industries in Taiwan, we notice that the wage level for women in the Manufacturing Industry which includes most of the high-tech manufacturing firms in Taiwan is 14-32% below that of men. It is also noticed that the Financial Industry is the most financially advantageous industry for women during the past decade based on the interindustry ranking approach. The wage level for women in the Financial Industry was only 3-20% below that of men, compared to the 14-32% for women in the Manufacturing Industry.

英文關鍵詞： High-Tech Manufacturing Industry, Gender Wage Gap, Manpower Utilization Survey, Oaxaca-Blinder Decomposition, Interindustry Ranking Approach

行政院科技部補助專題研究計畫成果報告

臺灣高科技製造業之性別薪資差異
與就業區隔之實證研究

An Empirical Study on the Gender Wage Gap
and Employment Segregation in the
High-Tech Industry of Taiwan

計畫類別：■ 個別型計畫　　□ 整合型計畫
計畫編號：MOST 106－2629－H－007－001
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計畫主持人：莊慧玲

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執行單位：國立清華大學經濟學系(所)

中 華 民 國　107　年　3　月　31　日

1 Introduction

The role of industry in affecting wage gaps is a topic worthy of further investigation. Ever since the seminal work by Becker (1957), studies on the gender wage gap have focused on identifying the sources of the gap, in order to learn more about the role of sex discrimination in the labor market. It was not until the 1990s that studies on interindustry differences in gender wage gaps were first addressed. By examining U.S. data in 1988, Fields and Wolff (1995) (hereafter FW) found that "the combined industry effects explain about one-third of the overall gender wage gap." A study on European countries by Gannon et al. (2007) further indicated that the "combined industry effects explain 29 percent of the gender wage gap in Ireland" while the "industry effects on the gender wage gap fluctuate sharply across European countries." Both studies highlighted the important role played by industry in describing the phenomenon of gender wage gaps in Western countries.

The role that industry plays in affecting gender wage gaps should be even more significant for export-oriented countries, because their industrial structure is more responsive to changes in the composition of export products. Since Taiwan is a well-known export-oriented economy, an analysis based on Taiwan's data can serve as a representative case study. Taiwan's industry and export mixes have shifted toward more highly-skilled, technology-intensive products, while its lower-skilled, labor-intensive industries have moved abroad. As a result, we expect to observe changes in the interindustry wage differentials for both genders, which may lead to a variation in the pattern of gender wage gaps by industry. The purpose of this study is to examine the gender wage gap in Taiwan with a focus on the financial industry based on the interindustry ranking approach.[1]

This study expands the current literature on Taiwan's gender wage gap by examining the issue through various approaches. First, we study the topic through a wage decomposition analysis. Second, we look at the issue through an analysis on the gender wage gap across industries so as to signify the role of industry in Taiwan's gender wage gap. Our analysis focuses on the position of the financial industry in the interindustry gender wage gap ranking. We also conduct a cross-country comparison of the gender wage gap between Taiwan and

[1] The financial industry includes the financial, insurance and real estate industries as defined by the Taiwan's Standard Industrial Classification. The financial industry is denoted by "Finance" in the tables of this study.

U.S. labor markets.

The remainder of this paper is organized as follows. The next section briefly discusses the literature and the definition of industry classification. Section 3 describes the 1978-2013 Manpower Utilization Survey (MUS) datasets and the econometric methods. Section 4 presents and discusses the empirical results. The final section concludes the study.

2 Literature Review and Industrial Classification

Zveglich et al. (1997) noted a persistent gender wage gap in Taiwan from 1978 to 1992, with women earning 65% of what men earned. This ratio exhibits an increasing trend from 1992 onwards, reaching a level of about 75% in 2001 and remaining at this level until the present. Many studies have empirically examined the continuing existence of gender wage gaps in Taiwan, with the target mainly on identifying the role of sex discrimination in the labor market. Therefore, most of the existing literature on gender wage gaps in Taiwan has applied the Oaxaca (1973) and Blinder (1973) (hereafter OB) decomposition framework, which uses the unexplained portion of the wage gap as a proxy for sex discrimination.

Using 1982 MUS data, Gannicott (1986) found that the unexplained portion of the female-male wage gap accounts for about 60% of the gap. Liu and Liu (1987) showed significant gender wage gap differentials across occupations in Taiwan's labor market. Kao et al. (1994) incorporated Polachek's expected human capital approach into their analysis based on 1989 data and presented that more than 80% of the gender wage gap could be explained by the difference in the expected investment of human capital between males and females. Tan (1998) modified the OB decomposition model by taking into consideration the problem of sample selection bias due to the public-private sector choice. Tseng (2001) presented findings indicating that the unexplained portion of the gender wage gap increased from 55% to 67% and then to 74%, based on 1982, 1992, and 2000 data.

Differences among the gender wage gaps across industries in Taiwan suggest that more emphasis should be placed on the role of industry in explaining this country's gender wage gaps. As shown in Figure 1, there is an apparent variation in gender wage gaps across industries. For instance, the female-male wage ratio in the agriculture, forestry and fisheries industry (hereafter, the agriculture industry) is consistently lower than the overall female-male wage ratio in Taiwan, while this ratio for the construction industry is always higher than the overall ratio. Moreover, the variation in the female-male wage ratio in the mining industry over time is more volatile compared to that in the other industries. Indeed, Zveglich et al. (1997) noted, "Education and experience account for most of the explained gap before 1989, while occupation and industry characteristics dominate thereafter." These findings, coupled with those shown in Figure 1, suggest that the role of industry in explaining the gender wage gap in Taiwan should be emphasized.

FW developed a unique econometric method to study the interindustry variation in gender wage gaps. They extended the OB decomposition approach to allow for industry dummies, thus enabling them to identify the role of industry in gender wage gaps more clearly. FW applied this method to the U.S. labor market, based on the 1988 Current Population Survey (CPS) data. Their findings indicate, "Of the overall gender wage gap, 12-22% can be explained by differences between the patterns of the interindustry wage differentials of men and women and 15-19% by differences in the distribution of male and female workers across industries."

Inherent within FW's framework are industry identification insufficiencies and standard error problems. In order to resolve these problems implied in FW's framework, Horrace and Oaxaca (2001) (hereafter HO) proposed several alterative indicators to measure gender wage gaps across industries. They also conducted an empirical analysis using U.S. 1998 CPS data to illustrate the advantages and disadvantages of each measurement. Other studies have used similar approaches to FW and HO to study the interplay between gender wage gaps and the interindustry wage differentials of European countries (e.g., Rycx and Tojerow, 2002; Gannon et al., 2007).

The level of industrial classification is another issue addressed in the literature. Those studies that focus on analyzing gender wage gaps commonly use a one-digit industrial classification. For instance, studies based on U.S. data by Horrace (2005) and HO and Ural et al.'s (2009) study on South Korean data are mainly conducted at the one-digit level. Studies including higher-digit level industrial classifications (mostly at the two-digit or three-digit level) in their analysis, such as FW's study on U.S. data and the study on Belgium by Rycx and Tojerow (2002), have investigated the gender wage gap across industries at the one-digit level as well. Although FW noted that a finer industry disaggregation, such as the three-digit industrial classification used in their study, yields a higher industrial effect than found in most previous research, the one-digit industrial classification is more commonly used in the literature, especially for over time or cross country comparisons.

This study uses the one-digit classification to define the industry dummy variables. This classification is compatible with the industry variable definition commonly used in the empirical literature on gender wage gaps in Taiwan (e.g. Gannicott, 1986; and Kao et al., 1994). This way of classifying industries allows us to compare our earnings equations' estimation results with those found in the literature. The difference between Taiwan's Standard Industrial Classification (TSIC) and International Standard Industrial Classification (ISIC) is relatively minor at the one-digit level, as shown in the Appendix of Chuang and Lin (2011). Therefore, a one-digit classification makes our cross country comparison more credible.[2] During the 1978-2013 sample period, TSIC underwent five revisions. The one-digit classification changed from 10 to 19 categories. This study applies the 10-category classification in order to maintain a consistent definition of the industry dummy variables.

In summary, the line of literature that focuses on the gender wage gap across industries is particularly useful in measuring the contribution of industry effects to the overall gender wage gap. Since few works have applied these recently developed techniques to study the gender wage gap in Taiwan, this study looks to fill this gap in the literature. In addition, this study targets the interindustry ranking position of the financial industry since it consistently maintains the highest ranking during the past 15 years.

3 Data and Methods

3.1 Data Description

Our data are taken from the Directorate-General of Budget, Accounting and Statistics of the Executive Yuan in Taiwan. The MUS survey has been conducted annually since 1978 with the purpose of understanding manpower utilization in the Taiwan Area.[3] The survey's sample is drawn from civilians aged 15 and older in the sample households. There are about

[2]The details of the contents of the one-digit industrial classification of TSIC can be found in the Appendix of Chuang and Lin (2011).

[3]For related studies using MUS datasets, please refer to Zveglich et al. (1997), Lin (2010), and Lin and Yun (2010).

18,000 randomly drawn sample households in each year's survey. The data used in this study cover 1978 to 2013. As we focus on the gender wage gap, the sample used in our analysis is restricted to paid employees in the private sector aged between 15 and 65. The key variable in this study, wage rate, is defined based on the data for monthly wage income. Therefore, our analysis excludes samples that do not have information on the monthly wage income.[4]

The MUS datasets contain information regarding the wages paid to both females and males, as well as information about control variables that are commonly included in a wage function, such as human capital variables, family background variables, and job characteristic variables. Table 1 presents the detailed definitions of the variables. It is noted that the MUS datasets used herein are drawn from an individual-level survey. As a result, the Mincerian wage equation is more suitable for the current study.[5] Additionally, most of the existing literature using the MUS datasets applies a Mincerian type of wage equation. Our estimation results can be compared with this existing literature on the same grounds.

3.2 Estimating Mincerian Wage Regression

The theory underlying this study's wage equation specification is based on Mincer's human-capital earnings function (Mincer and Polachek, 1974), which is commonly applied in studies based on individual-level data. We estimate the Mincerian wage equation for males and females in each year as follows:[6]

$$y_i^\ell = \alpha^\ell + x_i^\ell \theta^\ell + \sum_{j=1}^{J} \beta_j^\ell d_{ij}^\ell + \sum_{k=1}^{K} \pi_k^\ell q_{ik}^\ell + \varepsilon_i^\ell,\ \ \ell \in \{f, m\};\ i = 1, ..., N;\ N \in \{F, M\}, \qquad (1)$$

[4] The "wage rate" used in this study does not include other labor compensation. It includes only wages earned by a worker on a regular basis (i.e., regular income). This definition is in line with the wage rate commonly used in the literature on the gender wage gap. In addition, wage income, on average, accounts for more than 80% of the total compensation for employed workers in Taiwan.

[5] The Mincerian wage equation is a standard method in the analysis. For a detailed discussion on the Mincerian wage regression and related studies, please refer to Chuang and Lin (2011) as well as Tao et al. (2016).

[6] We should keep in mind that the potential problems in the specification of the Mincerian wage regression include the possibility of simultaneity that the choice of industry and/or occupation is endogenous and that the relationship between experience and earnings may be mutually causal. Given that the average tenure of our samples ranges from 4.2 to 6.6 years, the industry and occupational choice may be considered to be pre-determined in this study. On the other hand, if we exclude industry dummy variables, then the wage regression equations may suffer from an omitted variable bias.

where (1) represents the log-wage regressions for F females and M males, respectively. Superscript ℓ denotes the gender indicator, where f stands for female and m stands for male; y_i = the logarithm of the hourly wage, which is monthly earnings divided by (weekly working hours $\times$ 4.33 weeks); continuous regressors x_i include education, potential experience, squared potential experience, job tenure, and squared job tenure; d_{ij} = a dummy variable that equals one if the i^{th} worker is employed in the jth industry, and equals zero otherwise;[7] q_{ik} = a collection of other sets of dummy variables, such as a binary variable for marital status, three binary variables for living area, and six dummy variables for occupations, etc. Without loss of generality, the first category is set as the left-out reference group both in the J and K classifications, i.e., $d_{i1} = q_{i1} = 0$. α, θ, β, and π are parameters to be estimated. Lastly, ε_i is the disturbance term.

3.3 Assessing Interindustry Gender Wage Gaps

Given the estimated Mincerian wage regression in (1), we can compute the log-wage for a representative male and for a representative female worker in industry j by averaging the fitted values in (1) for all persons in industry j as:

$$\hat{y}_j^\ell = \hat{\alpha}^\ell + \bar{x}_j^\ell \hat{\theta}^\ell + \hat{\beta}_j^\ell + \sum_{k=1}^{K} \hat{\pi}_k^\ell \bar{q}_{jk}^\ell, \;\; \ell \in \{f, m\}; \;\; j = 1, ..., J, \tag{2}$$

where $\bar{x}_j^\ell$ and $\bar{q}_{jk}^\ell$ are the mean characteristics of a representative worker in industry j. In addition, a "hat in (2)" denotes the estimated counterpart of the true parameter throughout this paper.

Following the OB strategy, we decompose the gender wage gap in industry j into unexplained and explained components as follows:[8]

[7]We have combined the mining industry and electricity, gas and water industry into one category due to the small sample issue that led to the multicollinearity problem in the estimation for some years when these two types of industry are separated. As shown in the Appendix of Chuang and Lin (2011), a major sub-type of the mining industry is energy mining, which is closely related to the electricity, gas and water industry. To some extent, this may justify our combining these two groups of industries in order to gain more observations.

[8]Note that we follow the line of HO to express the gender wage gap in industry j by subtracting the predicted wage of the male from that of the female. However, Zveglich et al. (1997) described the gender wage gap by subtracting the predicted wage of the female from that of the male.

$$\hat{y}_j^f - \hat{y}_j^m = (\hat{\alpha}^f - \hat{\alpha}^m) + (\hat{\beta}_j^f - \hat{\beta}_j^m) + \bar{x}_j^f(\hat{\theta}^f - \hat{\theta}^m) + \sum_{k=1}^{K}(\hat{\pi}_k^f - \hat{\pi}_k^m)\bar{q}_{jk}^f + \sum_{k=1}^{K}\hat{\pi}_k^m(\bar{q}_{jk}^f - \bar{q}_{jk}^m) + (\bar{x}_j^f - \bar{x}_j^m)\hat{\theta}^m, \tag{3}$$

where the first four terms on the right-hand side of (3) are the unexplained components, while the last two terms correspond to the explained wage gap in industry (3). It is widely known that the OB decomposition suffers from the so-called index problem, i.e., the decomposition is not invariant to the selection of the unobserved non-discriminatory wage structure (Neumark, 1988; Ferber and Green, 1982). For instance, Ferber and Green (1982) revealed that the wage gap for university professors is just 2% based on the male non-discriminatory wage structure, while it is 70% based on the female non-discriminatory wage structure. This paper refers to the index problem as the first identification problem (**IP1**), while the problem regarding the choice of the left-out reference group (Oaxaca and Ransom, 1999) is referred to as the second identification problem (**IP2**).

FW defined the industry gender wage gap for industry j as:

$$\hat{g}_j = (\hat{\alpha}^f - \hat{\alpha}^m) + (\hat{\beta}_j^f - \hat{\beta}_j^m). \tag{4}$$

Instead of viewing the difference between the coefficients of the jth industry for males and females, FW added an extra term, $\hat{\alpha}^f - \hat{\alpha}^m$, to capture the effect of choosing the reference group. However, $\hat{g}_j$ is not invariant to the choice of the left-out reference group according to the discussion in Oaxaca and Ransom (1999) even though it is able to get rid of **IP1**.

HO then proposed the four alternatives (i.e., $\hat{\phi}_j$, $\hat{\delta}_j$, $\hat{\gamma}_j$, and $\hat{\rho}_j$) to overcome **IP2.** The four measures are defined as follows:[9]

[9]It is worth noting that the measure $\hat{\rho}_j$ can be regarded as an extension of $\hat{\gamma}_j$ and is defined in Table 4 of HO.

$$\hat{\phi}_j = (\hat{\alpha}^f - \hat{\alpha}^m) + (\hat{\beta}^f_j - \hat{\beta}^m_j) + \bar{x}^f_j(\hat{\theta}^f - \hat{\theta}^m) + \sum_{k=1}^{K}(\hat{\pi}^f_k - \hat{\pi}^m_k)\bar{q}^f_{jk}$$

$$\hat{\delta}_j = (\hat{\alpha}^f - \hat{\alpha}^m) + (\hat{\beta}^f_j - \hat{\beta}^m_j) + \bar{x}^f(\hat{\theta}^f - \hat{\theta}^m) + \sum_{k=1}^{K}(\hat{\pi}^f_k - \hat{\pi}^m_k)\bar{q}^f_k$$

$$\hat{\gamma}_j = \max_{n=1\ldots J} \hat{g}_n - \hat{g}_j = \max_{n=1\ldots J} \hat{\delta}_n - \hat{\delta}_j$$

$$\hat{\rho}_j = \max_{n=1\ldots J} \hat{\phi}_n - \hat{\phi}_j$$

It turns out that $\hat{\delta}_j$ and $\hat{\phi}_j$ are free from **IP2**, but they still suffer from **IP1** (the index problem).[10] This is because we have to arbitrarily pick the male wage as the unknown non-discriminatory wage structure in the decomposition of the overall gender wage gap in equation (3). On the other hand, the ranking-based measures $\hat{\rho}_j$ and $\hat{\gamma}_j$ need to simulate the critical values in order to conduct a statistical inference (Horrace, 2005).

We are thus motivated to adopt the measure recently developed by Lin (2007b, 2010), which resolves both **IP1** and **IP2** and provides a handy standard error for the significance test.[11] The idea behind the new measure is that the normalized regression approach for the detailed Oaxaca decomposition offers a simple resolution to **IP2** (Yun, 2005). It is natural to extend the normalized regression approach to the gender wage gap by industry.

Following the normalized regression approach, the overall gender wage differential in industry j can be decomposed as follows:

$$\bar{y}^f_j - \bar{y}^m_j = (\hat{\alpha}^{f+} - \hat{\alpha}^{m+}) + (\hat{\beta}^{f+}_j - \hat{\beta}^{m+}_j) + \sum_{k=1}^{K}(\hat{\pi}^{f+}_k - \hat{\pi}^{m+}_k)\bar{q}^f_{jk} + \bar{x}^f_j(\hat{\theta}^f - \hat{\theta}^m) \quad (5)$$
$$+ \sum_{k=1}^{K}\hat{\pi}^{m+}_k(\bar{q}^f_{jk} - \bar{q}^m_{jk}) + (\bar{x}^f_j - \bar{x}^m_j)\hat{\theta}^m,$$

[10] HO treated the regressors as non-stochastic and derived the corresponding standard errors for the measures $\hat{\phi}_j$ and $\hat{\delta}_j$. Lin (2007a) calculated the correct standard errors under the stochastic regressors assumption.

[11] The new measure has been applied to explore the gender wage gap by college major in Lin (2010). Lin and Yun (2010) also discussed this new measure in greater detail. Lin (2010) inspected the role that college major played in the gender wage gap and demonstrated that controlling the college major significantly increases the explained proportion and various gender pay gap measures are constructed. The main difference between the current work and Lin (2010) is that we focus on the interindustry gender pay gap while Lin (2010) concentrated on sub-group decomposition based on the field of study.

where $\hat{\alpha}^+ = \hat{\alpha} + \hat{\bar{\beta}} + \hat{\bar{\pi}}$, $\hat{\beta}_j^+ = \hat{\beta}_j - \hat{\bar{\beta}}$, $\hat{\pi}_k^+ = \hat{\pi}_k - \hat{\bar{\pi}}$, $\bar{\beta} = \sum_{j=1}^{J} \beta_j / J$ and $\bar{\pi} = \sum_{k=1}^{K} \pi_k / K$.[12] Based on the decomposition equation in (5), Lin (2007b) proposed an alternative industrial gender wage gap measure, which is in the spirit of the measure of FW ($\hat{g}_j$) in that it uses coefficients of the normalized equations. The new measure $\hat{\lambda}_j$ is defined as follows:

$$\hat{\lambda}_j = (\hat{\alpha}^f - \hat{\alpha}^m) + (\hat{\bar{\pi}}^f - \hat{\bar{\pi}}^m) + (\hat{\beta}_j^f - \hat{\beta}_j^m), \tag{6}$$

where $\hat{\lambda}_j$ is identified since it is free from the choice of the left-out reference group of any dummy variables (e.g., Oaxaca and Ransom, 1999) and the choice of the unobservable non-discriminatory wage structure (e.g., Neumark, 1988; Oaxaca and Ransom, 1994). Compared to the ranking-based measures, $\hat{\lambda}_j$ is ready for a statistical inference since the standard errors are easy to compute after a simple transformation.[13]

We note that the rankings of the measures are divided into two groups. One is for the measures ($\hat{\delta}_j$, $\hat{g}_j$, $\hat{\lambda}_j$, $\hat{\gamma}_j$) and the other is for ($\hat{\phi}_j$, $\hat{\rho}_j$). The index in each group shares the same ranking, even though the rankings are not the same for the two groups. In addition, the higher the ranking is (i.e., the smaller the ranking number), the smaller the gender wage gap will be for a specific industry. In what follows, we adopt the interindustry ranking measures introduced by FW and HO as well as by Lin (2007b, 2010) to estimate the gender wage gaps across industries.

4 Empirical Results

4.1 Wage Decomposition and the Role of Industry

Our general findings for the Mincerian wage equations are consistent with findings in the literature. As specified in (1), these regressions are separately estimated for females and males in each year. The results show that the (log) wages are concave in job tenure. The marriage premium is positive for males in most years, but is negative for females in several of the years.

Our variables of greatest interest are the industry variables. With the mining industry as the reference group, there are seven industry dummy variables. Most of the coefficients of the

[12] Chuang and Lin (2011) detailed the normalized regression approach.

[13] Chuang and Lin (2011) described the computation of the variance covariance matrix for $\hat{\lambda}_j$.

industry dummies are significant, even though the earnings function controls for schooling, experience, tenure, marital status, occupation, and region variables. The industry variables are jointly significant for males, females, and the total samples for each year.

We apply the OB decomposition techniques to assess the contribution of the industry dummies toward explaining the gender wage gap. We decompose the gender wage gap based on the regression with and without the industry dummies. Table 2 reports the decomposition results for some selected years. We conduct the decomposition calculation according to the male-based, female-based, and average-based approaches. As claimed by Ferber and Green (1982), the decomposition results may differ substantially depending on the calculation basis of the non-discriminatory wage structure (a wage structure that is unaffected by gender discrimination). Our results indicate that the female-based calculation tends to yield a higher percentage of the explained proportion.[14]

Using the OB techniques, an industry's significance in explaining gender wage gaps is readily apparent as we note the explained proportion increases when the industry dummies are included. This increase holds for each year regardless of whether we use estimates from a male-based, female-based, or average-based approach for our calculation. For the case of the average-based calculation, the explained proportion varies from 28% to 49% based on the regression with the industry dummy.[15] However, without the industry dummy, the explained proportion is smaller, ranging from 21% to 41%. The inclusion of the industry dummies raises the explained proportion of the gender wage gap by 4% to 10% (2% to 8% for the case of the female-based calculation; 5% to 14% for the case of the male-based calculation), revealing the importance of the industry variables. The significant F-statistics for testing the joint contribution of adding the industry dummies provide further evidence that industry type plays an influential role in contributing and explaining the gender wage gap.

[14]There is no exact relationship between the choice of the unknown wage base and the resulting percentage of the explained/unexplained proportion, as this proportion is really data dependent. For example, Ferber and Green (1982) showed another direction by revealing that the wage gap (unexplained proportion) for university professors is just 2% based on a male-based wage structure, while it is 70% based on a female non-discriminatory wage structure.

[15]The range of the explained portion found in this study is consistent with most findings in the literature such as the explained portion of 40% found in Gannicott (1986) and the explained portion of 26-45% found in Tseng (2001).

4.2 Interindustry Gender Wage Gaps

Because of the industry type's significant role, we further analyze the gender wage gaps based on the interindustry ranking approach introduced in Section 3.3. Moreover, the MUS survey provides us with long-term data to investigate the possible trends of the interindustry gender wage gap. In the following, we first discuss the overall trend of interindustry gender wage gaps and compare our findings with other developed countries, such as the U.S. Next, we focus on the interindustry ranking position of the financial industry since it consistently maintains the highest ranking during the past 15 years.

4.2.1 Overall Trend of Interindustry Gender Wage Gaps

We calculate the various measures for the interindustry gender wage gap described in Section 3.3, as well as their corresponding standard errors, in order to examine the gender wage gap across industries. Table 3 reports the estimated results for some selected years.[16] As expected, most industry gender wage gaps are negative, because males generally earn more than females. This holds even after controlling for productivity-related characteristics of workers. Even though most measures are negative, some positive signs are found for the measures $\hat{g}_j$ and $\hat{\lambda}_j$. However, these positive coefficients have no statistical significance.

In terms of statistical significance, the estimates of $\hat{g}_j$ for most industries are statistically insignificant in our sample period. Almost all the estimates of $\hat{\phi}_j$ for the various industries are statistically significant for each year in our sample period. As for $\hat{\delta}_j$, the majority of the estimates are statistically significant. The performance in terms of the statistical significance of $\hat{\lambda}_j$ lies in-between $\hat{g}_j$ and $\hat{\phi}_j$. The measure $\hat{\lambda}_j$ gives rise to more statistically significant estimates than $\hat{g}_j$, but fewer than that for $\hat{\phi}_j$. However, all estimates of $\hat{\lambda}_j$ are insignificant in 2013. In addition, the magnitude of the wage gap based on the statistically significant estimates indicates that the magnitude of the gender wage gap is generally larger for the measures $\hat{\delta}_j$ and $\hat{\phi}_j$ compared to that for the measures $\hat{g}_j$ and $\hat{\lambda}_j$.

The magnitude of the wage gap, based on the statistically significant estimates, indicates that there are notable variations in the gender wage gaps across industries. For example, in 2013 the financial industry shows the smallest gender wage gap (-0.0483 based on $\hat{\delta}_j$ and

[16] Detailed results are available from the authors upon request.

-0.0494 based on $\hat{\phi}_j$), while the service industry has the largest gender wage gap (-0.1659 based on $\hat{\delta}_j$). These figures suggest that women in the financial industry earn 4.83% (based on $\hat{\delta}_j$ and 4.94% based on $\hat{\phi}_j$) less than men, and in the service industry women have a 16.59% (based on $\hat{\delta}_j$) lower wage than that of men. In other words, there were smaller wage gaps between male and female workers in the financial industry, while the gender wage gaps were larger in the service industry in 2013.

According to the industry ranking discussion in Section 3.3, a higher ranking (smaller ranking number) implies a smaller gender wage gap for a specific industry. There are two groups of industry ranking for these measures: the $\hat{\delta}$-group and the $\hat{\phi}$-group measures. The mining industry continued to occupy the lowest ranking (8^{th}) from 1978 to 1991, based on both groups of measures except for 1988. Females in this industry faced the largest gender wage gap compared to those in other industries during 1978-1991. Since 1991, this industry has not necessarily been the least advantageous industry to females, but it is still the industry with the most frequently observed lowest rankings during these years. The industry that ranks the highest (with the least gender wage gap) varies year by year for different measures during the years before 1997. For example, based on the $\hat{\delta}$-group measures, the most advantageous industry for women is the agriculture industry for 1978, but it changes to the construction industry for 1979 to 1997, except for 1992 and 1995.[17] Based on the $\hat{\phi}$-group measures, the highest ranking industry is trading in 1978 and the financial industry after 1996. Both the $\hat{\delta}$-group measures and the $\hat{\phi}$-group measures indicate that the financial industry became the highest ranking industry starting from the year 1998, except for 2012, as measured by $\hat{\delta}$.

The pattern of the industry rankings over time can be understood more clearly in Table 4. It reports the highest and lowest ranking industries, the corresponding estimated gender wage gaps, and the range of the highest and lowest ranking industries for the whole sample

[17] The change in the ranking position for a specific industry may be attributed to the change in industrial structure due to the economic development of Taiwan. Indeed, according to Hsu et al. (2006), the change in industrial structure due to Taiwan's economic growth and the increase in the educational level of female workers in Taiwan are the two main factors that explain the narrowing of the gender wage gap in Taiwan during the period from 1978 to 2003. Their findings may provide some justification of the change in the ranking position for different industries found in this study. It is worthwhile to conduct further analysis on the cause of the wage differentials between male and female workers in Taiwan in order to have better understanding of the change in the ranking position for any specific industry.

period.[18] According to the results in Table 4, the range based on $\hat{\delta}_j$ is smaller than that based on $\hat{\phi}_j$ for most years, with less variation in the interindustry gender wage gap during the most recent years. This finding is consistent with the trend towards a narrowing of the gender wage gap. The dispersion of the gender wage gap by industry becomes smaller, because the overall gender wage gap is shrinking.

A cross country comparison with the results from HO suggests that the range of the interindustry gender wage gap in Taiwan is larger than that in the U.S.[19] Our estimated ranges are also larger than those found in Belgium according to Rycx and Tojerow (2002). The implication of the industry ranking of the gender wage gap is quite different between the Taiwan and U.S. labor markets. The financial industry is more likely to rank the highest in Taiwan, while it ranks the lowest based on $\hat{\delta}_j$ (and the second lowest based on $\hat{\phi}_j$) in the U.S. labor market.[20] The agriculture industry is found to possess the smallest gender wage gap in HO, whereas it has a larger gender wage gap (ranked 7^{th} in 1998 and ranked 7^{th} in 2008 based on $\hat{\phi}_j$) in our study.

It is noted that the ratio of female workers in the agriculture industry is 26.30% in Taiwan compared to 24.42% in the U.S. for the year 1998. In the same year, the ratio of female workers in the financial industry is 51.56% in Taiwan compared to 58.72% in the U.S.

[18]The ranking and the range for $\hat{\lambda}_j$ are exactly the same as those for $\hat{\delta}_j$. Table 4 therefore only reports the results for $\hat{\delta}_j$ and $\hat{\phi}_j$.

[19]It would be more interesting to compare our findings to those of other Asian countries. However, to our knowledge, there is not much empirical work using a similar estimation approach to measure interindustry gender wage gaps for Asian countries in the literature. Most empirical studies have treated the industry dummies as a set of explanatory variables of the wage regression, e.g., the case of Thailand in Fang and Sakellariou (2011). Including the industry variables does not help to explain the gender wage gaps in Thailand, while it does increase the explained proportion of the OB decomposition in our study. Some studies simply grouped the female and male samples by industry and then performed separate decomposition analyses, e.g., the gender wage gap of Bangladesh in Kapsos (2009), where the explained proportion in the financial intermediation industry can be up to 60%. Ural et al.'s (2009) study based on South Korean data is one among the few that applied a similar approach. They used four industrial classifications: knowledge-based manufacturing, other manufacturing, knowledge-based service, and other service. Their findings suggest that the non-discriminatory percentage is the highest in the knowledge-based service sector, implying that the discriminatory gender wage gap is the lowest in this sector. The financial industry, which is more likely to have the smallest gender wage gap in Taiwan, is classified as being in the knowledge-based service sector in Ural et al. (2009).

[20]The results in HO are based on the 1998 CPS data for one-digit industries, and the results in Rycx and Tojerow (2002) are based on the 1995 ESES for two-digit industries. Again, we should be very cautious when interpreting these comparisons, because the definitions of the industry classification may differ across countries.

labor market, that is, the male/female employment ratio is not much different between the Taiwan and U.S. labor markets in both the agriculture and financial industries. However, the ranking positions of these two industries are quite divergent between the two labor markets. As a result, it is worthwhile studying further what the driving forces are that result in the opposite performances of the interindustry gender wage gap between Taiwan and the U.S.[21]

We conduct an estimation using the two-digit industrial classification for comparison. Only three industries are classified under the two-digit classification scheme: the manufacturing, trading, and construction industries. The other industry classifications are left at the one-digit level, based on the 2008 sample. Our estimation results indicate that the range of the interindustry gender wage gaps is 0.22 based on the δ measure and 0.28 based on the ϕ measure. Both ranges of the interindustry gender wage gaps are larger compared to the results for the one-digit classification reported.[22] As expected, larger variations in gender wage gaps across industries are found using finer industry classifications. However, we encounter much difficulty in obtaining a sufficient number of observations in each industry when finer industry classifications are utilized. That is the reason why we only use a two-digit classification for three industries. As the insufficient sample problem varies year by year and from industry to industry, it will be even more difficult to find a consistent industry classification at the two-digit level that works for every year from 1978 to 2013. According to the above discussion, a final cautionary note is that "industry" is an ambiguous concept, because the definition content of any specific "industry" may not be exactly the same over time.[23] Therefore, any related results are sensitive to the degree of dis-aggregation on industry classifications.

[21]There are some other possible explanations. For instance, it may be due to the difference in the custom of salary negotiations in the U.S. and Taiwan financial industries. In the U.S. financial industry, males are more likely to negotiate their salary, whereas Taiwanese people (both males and females) are usually too shy to initiate a salary negotiation. Indeed, it would be worthwhile to further explore the differential gender pay gaps in the financial sector for both countries in future research.

[22]Detailed results are available from the authors upon request.

[23]The inexact definition issue is more problematic in the case of a finer industry classification. For example, based on the TSIC definition in 2016, for the four-digit classification in the manufacture industry, there is an industry category of "manufacture of luggage and handbags", but there is no such industry listed in the four-digit classification in the manufacture industry in TSIC of 1978. As a result, a firm that is classified in the "manufacture of luggage and handbags" industry in 2016 will probably be classified in the "manufacture of other leather products" industry in 1978.

4.2.2 The Interindustry Ranking Position of the Financial Industry

Based on the pattern of the industry ranking over time reported in Table 4, starting from 1982, the financial industry represents the highest ranking industry for each year except for 1992-1995, as measured by $\hat{\phi}_j$. Females in this industry have in fact experienced the smallest gender wage gaps compared to workers in other industries in most years. Although the $\hat{\delta}$-group measures pick the construction industry as the most advantageous industry for women in most years before 1997, these measures indicate that females in the financial industry have faced the smallest gender wage gap since 1998. The only one exception is in 2012, as measured by $\hat{\delta}$. In other words, both groups of measures suggest that this industry is the most advantageous industry for women during the past 15 years. The wage level for women here is 3-20% below that for men.

As to the industry that is least advantageous to women, both groups of measures indicate that the mining industry was the lowest ranking industry for females before 1991 (the $\hat{\phi}$-group measure in 1988 was the only exception). Women in this industry earned a wage 15-93% below that of men for the whole sample period (the gap is 35-93% between the years 1978 and 1997). As noted earlier, there is less commonality in the lowest ranking industry from 1992 onwards. Based on our discussion, we may conclude that the mining industry is the least advantageous industry and the financial industry is the most advantageous industry for females.

When we further examine the female employment ratio across industries, we notice that more women are employed in almost every industry following the increase in the female employment ratio over time. However, the increasing rate is much smaller in the mining industry compared to that in the financial industry. For the former, the 1978-1991 average female employment ratio is 13.45%, while the 1992-2013 average female employment ratio slightly rises to 15.28%. This same ratio for the financial industry increases from 48.78% to 52.90% over the equivalent time period. The tendency of more female workers to be employed in the most advantageous industry over time may provide some explanation for the trend toward the narrowing of the gender wage gap from 1992 onwards.

As the financial industry is the most advantageous industry for women during the recent years in our sample period, this study conducts further analysis on the gender wage gap for this industry based on the data in 2013.[24] The Mincerian wage regression is estimated for both males and females in this industry and reported in Table 5. The human capital variables show a very significant influence on the wages for both male and female workers in the financial industry. Among all the human capital variables, the tenure variable shows a non-linear effect on the wages with a concave shape similar to the result for total samples. As to the role of job characteristics, firm size plays a more significant part than the firms location. In terms of the gender difference, male workers receive a positive marriage premium while female workers have wage advantages in the urban area. Overall, there is little difference in wages for both male and female workers in the financial industry.

As shown in Table 5, most of the variables exhibit a similar effect on the wages in terms of the significance level and the magnitude for males and females in the financial industry. We run a similar wage regression for male and female workers in the lowest ranking industry, the construction industry, in 2013 (in terms of ϕ_j) for comparison. We see that the estimated wage regressions show quite a diverse result for males and females in the construction industry. For instance, most human capital variables such as the job tenure and the potential experience variables exhibit a non-linear effect on male wages as expected. However, these human capital variables have no significant influence on wages at all for female workers in the construction industry. Based on the comparison of the estimation results between the financial and construction industries, we may infer that the similarity of the wage regression results between male and female workers in the financial industry may provide some justification for our finding in the interindustry ranking analysis. In other words, the gender wage gap in the financial industry tends to be the smallest among all industries, which, to some extent, may be attributed to the similarity of the wage structure between the male and female workers in the financial industry.

5 Conclusion

This study applies the approaches of both wage decomposition and interindustry ranking of the gender wage gap to examine the role of industry at explaining Taiwan's gender wage

[24]Since the insufficient sample issue is less problematic for a specific industry in a single year, we use the two-digit classification in our estimation in the Mincerian wage equation for the 2013 financial industry.

gap based on 1978-2013 MUS data with a focus on the financial industry. We first apply the OB wage decomposition approach to measure the contribution of the industry dummy variables. We find that the inclusion of the industry dummy variables increases the explained portion of the gender wage gap over our sample period by 2% to 14%.

We also apply various interindustry ranking measures developed in the recent literature to estimate the gender wage gap across industries. Our estimation results suggest that women in the financial industry have about 5% lower wages than men, and in the service industry women have about 17% lower wages than men in 2013, as measured by $\hat{\delta}_j$. For the whole sample period, the wage level for women in the financial industry is 3-20% below that for men, and women in the mining industry earned a wage 15-93% below that for men. The pattern of interindustry ranking for the gender wage gap over time suggests that the mining industry is more likely to be the most disadvantageous industry to women, whereas the financial industry tends to be the most advantageous industry for female workers over time. As a result, we conduct further analysis on the wage regression for male and female workers in the financial industry. The wage regression results indicate that there is little difference in terms of the significance level of the explanatory variables for both males and females in the this industry. Such a finding may justify the following implication from the interindustry ranking of Taiwans gender wage gap: the financial industry tends to be the highest ranking industry with the most advantageous salary for female workers over time.

To sum up, this study provides a benchmark platform for future research. Many extensions can be developed from the findings. For instance, further analysis on the cause and effect of the wage differentials between male and female workers in Taiwan's labor market would be an interesting extension. It would also be worthwhile to conduct a thorough study on the interindustry wage differentials for a sub-sample of college graduate, because there are quite a few college graduates employed in the financial industry. For instance, in 2013, 38.61% of employees in the financial industry have college degrees, which is the highest across different industries.

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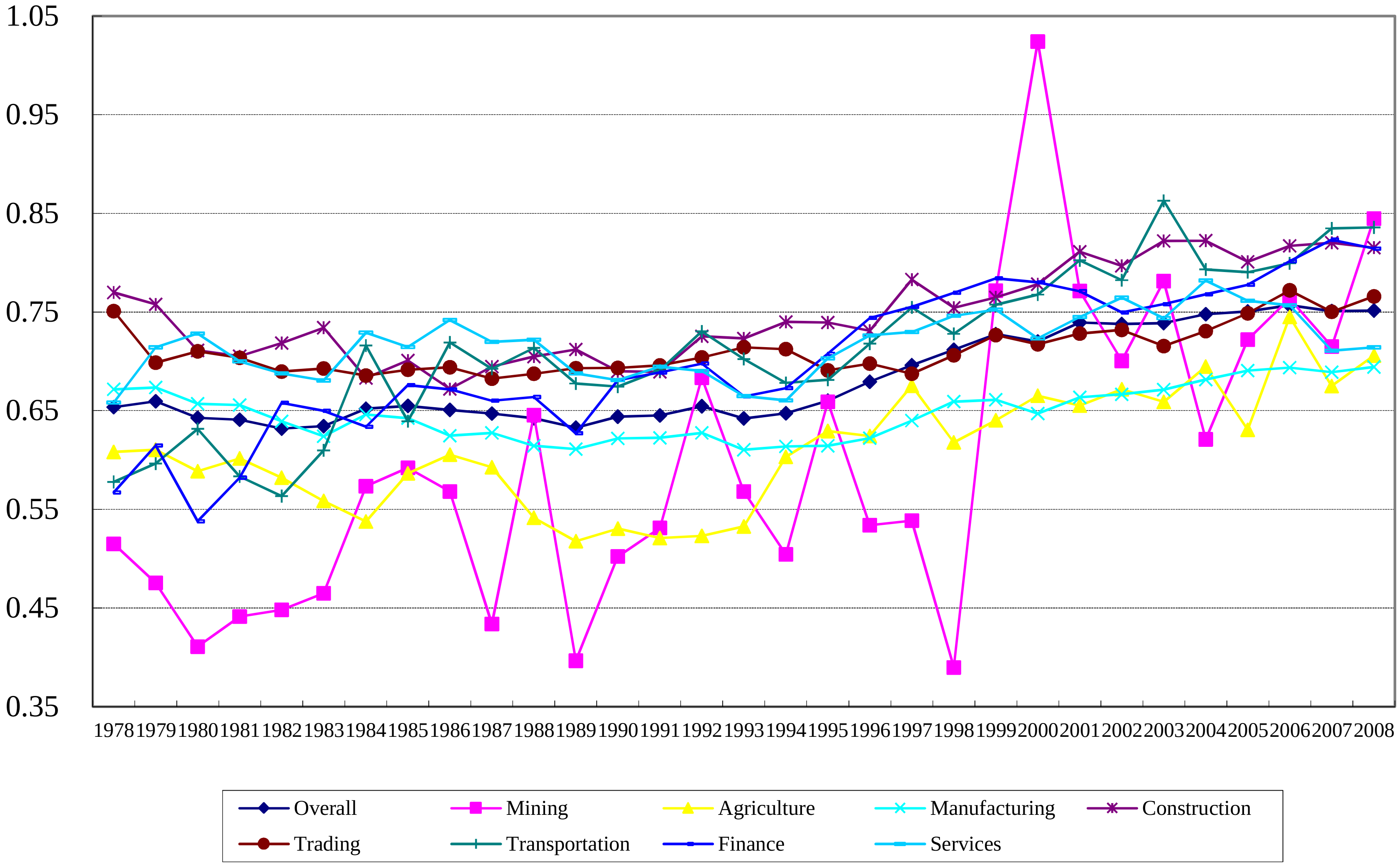

Figure 1: Female-Male Wage Ratio by Industry

Table 1: Variable Definitions

Variables	Definitions
Log(Hourly Wage)	log[monthly income/(weekly working hours*4.33 weeks)]
Schooling	illiterate: 0; elementary school: 6; middle school: 9; high school: 12; college: 14; undergraduate: 16; master: 18; and PhD: 22
Experience	
Job Tenure	experience at the current job
Job Tenure^2	squared job tenure
Potential Exper.	age - years of schooling - 6
Potential Exper.^{2}	squared potential experience
Industry	Mining (reference group), Manufacturing, Transportation, Finance, Services, Construction, Trading and Agriculture
Occupation	Legislators, Senior Officials and Managers(P1); Professionals, Technicians and Associate Professionals(P2); Clerical Support Workers, Service and Sales Workers(P3); Craft and Related Trades Workers(P4); Plant and Machine Operators and Assemblers(P5); Elementary Laborers(P6); Skilled Agricultural, Forestry and Fishery Workers are set as the reference group
Marital Status	1: married; 0: otherwise
Region	
North	1: Taipei, Keelung, Hsinshu Cities; and Taipei, Taoyuan, Hsinchu Counties; 0: otherwise
Central	1: Taichung City; and Miaoli, Taichung, Changhua, Nantou, Yunlin Counties; 0: otherwise
South	1: Chiayi, Tainan, Kaohsiung Cities; and Chiayi, Tainan, Kaohsiung, Pingtung, Penghu Counties; 0: otherwise
East	1: Taitung, Hualien Counties; 0: otherwise
Urban	1: Keelung, Hsinchu, Taichung, Chiayi, Tainan, Taipei, Kaohsiung Cities; 0: otherwise
Firm Size	1: big firms with number of employees greater than 100; 0: otherwise

Notes: [a]Mining denotes Mining, Quarrying, Electricity, Gas Supply and Water Supply; Transportation denotes Transportation, Storage and Communications; Finance denotes Financial, Insurance and Real Estate; Services denotes Social, Personal and Related Community Services; Trading denotes Wholesale and Retail Trade; and Agriculture denotes Agriculture, Forestry, Fishing, Animal Husbandry and Hunting based on the one-digit industrial classification of the TSIC 2011 revision.

[b] Log (Hourly Wage) denotes the dependent variable y_i in (1). The continuous independent variables x_i include Schooling and Experience (including the job tenure, the square of the job tenure, potential experience, and the square of the potential experience). Here, d_i corresponds to the Industry dummy variables. The other discrete independent variables consist of dummy variables for Occupation, Marital Status, Region, Urban, and Firm Size.

Table 2: Decomposition of the Overall Gender Wage Gap with and without the Industry Dummies

Year	Female-Based Calculation			Male-Based Calculation			Average-Based Calculation		
	Explained Proportion with Industry Dummies	Explained Proportion without Industry Dummies	Difference in Explained Proportion	Explained Proportion with Industry Dummies	Explained Proportion without Industry Dummies	Difference in Explained Proportion	Explained Proportion with Industry Dummies	Explained Proportion without Industry Dummies	Difference in Explained Proportion
1978	57.93%	49.63%	8.29%	40.81%	32.90%	7.91%	49.37%	41.26%	8.10%
1983	42.96%	36.55%	6.41%	32.34%	18.27%	14.07%	37.65%	27.41%	10.24%
1988	30.77%	26.61%	4.16%	24.58%	14.49%	10.09%	27.67%	20.55%	7.12%
1993	30.22%	26.87%	3.35%	25.79%	12.22%	13.57%	28.01%	19.55%	8.46%
1998	31.40%	27.91%	3.48%	25.87%	17.84%	8.03%	28.63%	22.88%	5.76%
2003	36.35%	34.16%	2.19%	21.59%	15.21%	6.38%	28.97%	24.68%	4.28%
2008	39.77%	36.95%	2.82%	28.53%	23.07%	5.46%	34.15%	30.01%	4.14%
2013	39.59%	34.60%	4.99%	22.00%	10.02%	11.98%	30.79%	22.31%	8.49%

Notes: The decomposition is computed based on the following equation:

$$\hat{y}^f - \hat{y}^m = \left(\overline{X}^f - \overline{X}^m\right)\beta^* + \left[\overline{X}^f\left(\hat{\beta}^f - \beta^*\right) + \overline{X}^m\left(\beta^* - \hat{\beta}^m\right)\right],$$

where the first term is interpreted as the “explained” component of the gender wage differential and the second term is the “unexplained” component. β^* denotes the unknown nondiscriminatory wage structure. Panels of the Female-Based Calculation, Male-Based Calculation, and Average-Based Calculation correspond to decomposition results using female coefficients, male coefficients, and the average of male and female coefficients as the unknown nondiscriminatory wage structures, respectively.

Table 3: Estimates of the Gender Wage Gap by Industry for Selected Years

Industries	$\overline{y}_j^f - \overline{y}_j^m$	$\hat{g}_j$	$\hat{\delta}_j$	$\hat{\lambda}_j$	$\hat{\gamma}_j$	Rank	$\hat{\phi}_j$	$\hat{\rho}_j$	Rank
1978									
Mining	-3091.01	-0.4427***	-0.4644***	-0.3560***	0.3849***	8	-0.5537***	0.4367***	8
Agriculture	-1908.81	-0.0578	-0.0795	0.0289	0.0000	1	-0.2908***	0.1737***	7
Manufacturing	-1759.08	-0.1218	-0.1434***	-0.0351	0.0640	3	-0.1366***	0.0196	3
Construction	-1342.96	-0.0917	-0.1134***	-0.0050	0.0339	2	-0.1334***	0.0164	2
Trading	-1458.67	-0.1475	-0.1692***	-0.0609	0.0898	4	-0.1170***	0.0000	1
Transportation	-3154.49	-0.3147**	-0.3364***	-0.2280***	0.2569**	7	-0.2582***	0.1412***	6
Finance	-3510.16	-0.2063	-0.2280***	-0.1196*	0.1485	6	-0.1695***	0.0525	4
Services	-1952.60	-0.1846	-0.2063***	-0.0980*	0.1268	5	-0.2077***	0.0907***	5
1983									
Mining	-6888.63	-0.3586*	-0.6824***	-0.5689***	0.5770***	8	-0.798***	0.6459***	8
Agriculture	-4307.93	0.0028	-0.3209**	-0.2075	0.2156	6	-0.2804***	0.1283***	7
Manufacturing	-4303.26	0.0860	-0.2377***	-0.1243**	0.1324***	3	-0.2681***	0.116***	6
Construction	-3139.21	0.2184	-0.1053***	0.0081	0.0000	1	-0.1729***	0.0208	2
Trading	-3828.33	0.0556	-0.2681***	-0.1547***	0.1628***	4	-0.1966***	0.0445	3
Transportation	-6173.75	-0.0154	-0.3391***	-0.2257***	0.2338***	7	-0.2664***	0.1143**	5
Finance	-5496.40	0.0874	-0.2363***	-0.1229*	0.1310***	2	-0.1521***	0.0000	1
Services	-3853.45	0.0480	-0.2757***	-0.1623***	0.1704***	5	-0.2253***	0.0732*	4
1988									
Mining	-6435.70	-0.1500	-0.3495**	-0.1757	0.1890	8	-0.3478**	0.2126	7
Agriculture	-6057.36	-0.0952*	-0.2946**	-0.1209	0.1341	5	-0.3525***	0.2173***	8
Manufacturing	-6109.14	-0.0901	-0.2895***	-0.1158***	0.1291***	4	-0.3255***	0.1903***	6
Construction	-4865.40	0.0389	-0.1605***	0.0132	0.0000	1	-0.1893***	0.0541	3
Trading	-5341.90	-0.1157	-0.3151***	-0.1414***	0.1546***	6	-0.2421***	0.1069***	4
Transportation	-5661.20	-0.0417	-0.2412***	-0.0674	0.0807*	3	-0.1825***	0.0474	2
Finance	-7197.80	-0.0002	-0.1996***	-0.0259	0.0391	2	-0.1352***	0.0000	1
Services	-4390.80	-0.1435	-0.3429***	-0.1692***	0.1824***	7	-0.2788***	0.1436***	5
1993									
Mining	-13769.00	-0.1805	-0.4670***	-0.4063***	0.2741**	7	-0.4484***	0.2699**	8
Agriculture	-10600.70	-0.1967***	-0.4831***	-0.4224***	0.2902**	8	-0.3749***	0.1965***	6
Manufacturing	-10835.80	-0.0362	-0.3226***	-0.2619***	0.1297***	5	-0.3789***	0.2005***	7
Construction	-8706.80	0.0935	-0.1929***	-0.1322***	0.0000	1	-0.2286***	0.0502**	4
Trading	-7950.40	0.0493	-0.2371***	-0.1764***	0.0442*	2	-0.1784***	0.0000	1
Transportation	-10093.10	-0.0113	-0.2977***	-0.2370***	0.1048***	4	-0.2264***	0.0479	3
Finance	-11858.00	0.0073	-0.2792***	-0.2184***	0.0862***	3	-0.2237***	0.0453*	2
Services	-9947.00	-0.0395	-0.3259***	-0.2652***	0.1330***	6	-0.2750***	0.0966***	5

Notes: [a] Please see Table 1 for industry definition.

[b] We do not report the full set of results here for simplification. Detailed results are available from the authors upon request.

* denotes statistically significant at the 10% significance level.

** denotes statistically significant at the 5% significance level.

*** denotes statistically significant at the 1% significance level.

Table 3: Estimates of the Gender Wage Gap by Industry for Selected Years (Cont.)

Industries	$\bar{y}_j^f - \bar{y}_j^m$	$\hat{g}_j$	$\hat{\delta}_j$	$\hat{\lambda}_j$	$\hat{\gamma}_j$	Rank	$\hat{\phi}_j$	$\hat{\rho}_j$	Rank
1998									
Mining	-31655.30	-0.4038**	-0.6332***	-0.6707***	0.4765***	8	-0.5927***	0.4776***	8
Agriculture	-10820.60	-0.2911***	-0.5205***	-0.5580***	0.3638***	7	-0.3318***	0.2166***	7
Manufacturing	-11664.50	-0.0362	-0.2655***	-0.3031***	0.1089***	6	-0.3180***	0.2029***	6
Construction	-8377.40	0.0384	-0.1909***	-0.2285***	0.0343	2	-0.214***	0.0989***	5
Trading	-10176.20	0.0206	-0.2088***	-0.2463***	0.0521***	3	-0.1777***	0.0625***	3
Transportation	-11279.60	-0.0007	-0.2300***	-0.2676***	0.0734**	5	-0.1697***	0.0546*	2
Finance	-9925.80	0.0727	-0.1567***	-0.1942***	0.0000	1	-0.1151***	0.0000	1
Services	-9139.10	0.0080	-0.2213***	-0.2589***	0.0647***	4	-0.1817***	0.0666***	4
2003									
Mining	-8224.10	-0.0273	-0.3234**	-0.2296	0.1780	7	-0.2567*	0.1470	6
Agriculture	-8066.80	-0.0620	-0.3581***	-0.2642***	0.2126**	8	-0.2813***	0.1715***	8
Manufacturing	-11471.80	0.0880	-0.2081***	-0.1143***	0.0626***	6	-0.2693***	0.1595***	7
Construction	-5431.80	0.1388	-0.1573***	-0.0635	0.0119	2	-0.1690***	0.0593*	5
Trading	-9357.10	0.1069	-0.1892***	-0.0954**	0.0438**	5	-0.1530***	0.0433**	4
Transportation	-4951.80	0.1210	-0.1751***	-0.0813	0.0297	3	-0.145***	0.0353	2
Finance	-10858.90	0.1507	-0.1454***	-0.0516	0.0000	1	-0.1097***	0.0000	1
Services	-9174.60	0.1093	-0.1868***	-0.0930**	0.0414**	4	-0.1501***	0.0404**	3
2008									
Mining	-5068.60	-0.0751	-0.1387**	-0.0757	0.0827	3	-0.1655**	0.1259*	4
Agriculture	-7609.00	-0.0858	-0.1494**	-0.0865	0.0935	4	-0.2274***	0.1878***	8
Manufacturing	-11415.60	-0.1147	-0.1783***	-0.1154***	0.1223***	6	-0.2209***	0.1813***	7
Construction	-6274.10	-0.0664	-0.1300***	-0.0671	0.0740***	2	-0.1657***	0.1261***	5
Trading	-7684.20	-0.0948	-0.1583***	-0.0954**	0.1024***	5	-0.1257***	0.0861***	2
Transportation	-6824.30	-0.1179	-0.1815***	-0.1186***	0.1256***	7	-0.1356***	0.0960***	3
Finance	-7632.10	0.0076	-0.0559***	0.0070	0.0000	1	-0.0396***	0.0000	1
Services	-11500.10	-0.1310	-0.1945***	-0.1316***	0.1386***	8	-0.1725***	0.1329***	6
2013									
Mining	-9956.00	-0.1593	-0.1070*	-0.0176	0.0587	3	-0.1570**	0.1076*	3
Agriculture	-4181.90	-0.1137	-0.0614	0.0279	0.0131	2	-0.1963***	0.1468***	7
Manufacturing	-9616.40	-0.1974**	-0.1451***	-0.0557	0.0968***	5	-0.1829***	0.1335***	6
Construction	-4950.60	-0.1924**	-0.1401***	-0.0508	0.0918***	4	-0.2355***	0.1861***	8
Trading	-6718.70	-0.1999**	-0.1476***	-0.0583	0.0993***	6	-0.1174***	0.0679***	2
Transportation	-7259.90	-0.2144**	-0.1621***	-0.0727	0.1138***	7	-0.1804***	0.1310***	5
Finance	-6476.90	-0.1006	-0.0483***	0.0410	0.0000	1	-0.0494***	0.0000	1
Services	-9877.70	-0.2182**	-0.1659***	-0.0765	0.1176***	8	-0.1649***	0.1155***	4

Notes: [a] Please see Table 1 for industry definition.

[b] We do not report the full set of results here for simplification. Detailed results are available from the authors upon request.

* denotes statistically significant at the 10% significance level.

** denotes statistically significant at the 5% significance level.

*** denotes statistically significant at the 1% significance level.

Table 4: Summary Results of the Industry Ranking over Time

Estimators	Year	Highest		Lowest		Range	Year	Highest		Lowest		Range
$\hat{\delta}_j$	1978	-0.08	(Agriculture)	-0.46	(Mining)	0.38	1996	-0.20	(Construction)	-0.63	(Mining)	0.43
$\hat{\phi}_j$		-0.12	(Trading)	-0.55	(Mining)	0.43		-0.15	(Finance)	-0.51	(Mining)	0.36
$\hat{\delta}_j$	1979	-0.08	(Construction)	-0.42	(Mining)	0.34	1997	-0.17	(Construction)	-0.57	(Mining)	0.40
$\hat{\phi}_j$		-0.11	(Finance)	-0.55	(Mining)	0.44		-0.16	(Finance)	-0.59	(Mining)	0.43
$\hat{\delta}_j$	1980	-0.14	(Construction)	-0.81	(Mining)	0.67	1998	-0.16	(Finance)	-0.63	(Mining)	0.47
$\hat{\phi}_j$		-0.13	(Services)	-0.93	(Mining)	0.80		-0.12	(Finance)	-0.59	(Mining)	0.47
$\hat{\delta}_j$	1981	-0.15	(Construction)	-0.59	(Mining)	0.44	1999	-0.13	(Finance)	-0.29	(Mining)	0.16
$\hat{\phi}_j$		-0.17	(Services)	-0.65	(Mining)	0.48		-0.10	(Finance)	-0.30	(Manufacturing)	0.20
$\hat{\delta}_j$	1982	-0.15	(Construction)	-0.71	(Mining)	0.56	2000	-0.13	(Finance)	-0.31	(Agriculture)	0.18
$\hat{\phi}_j$		-0.14	(Finance)	-0.83	(Mining)	0.69		-0.09	(Finance)	-0.32	(Manufacturing)	0.23
$\hat{\delta}_j$	1983	-0.11	(Construction)	-0.68	(Mining)	0.57	2001	-0.14	(Finance)	-0.37	(Agriculture)	0.23
$\hat{\phi}_j$		-0.15	(Finance)	-0.80	(Mining)	0.65		-0.11	(Finance)	-0.28	(Manufacturing)	0.17
$\hat{\delta}_j$	1984	-0.20	(Construction)	-0.39	(Mining)	0.19	2002	-0.14	(Finance)	-0.23	(Mining)	0.09
$\hat{\phi}_j$		-0.18	(Finance)	-0.56	(Mining)	0.38		-0.12	(Finance)	-0.28	(Manufacturing)	0.16
$\hat{\delta}_j$	1985	-0.18	(Construction)	-0.41	(Mining)	0.23	2003	-0.15	(Finance)	-0.36	(Agriculture)	0.21
$\hat{\phi}_j$		-0.16	(Finance)	-0.46	(Mining)	0.30		-0.11	(Finance)	-0.28	(Agriculture)	0.17
$\hat{\delta}_j$	1986	-0.20	(Construction)	-0.48	(Mining)	0.28	2004	-0.14	(Finance)	-0.35	(Mining)	0.21
$\hat{\phi}_j$		-0.15	(Finance)	-0.50	(Mining)	0.35		-0.11	(Finance)	-0.29	(Mining)	0.18
$\hat{\delta}_j$	1987	-0.15	(Construction)	-0.68	(Mining)	0.53	2005	-0.12	(Finance)	-0.28	(Agriculture)	0.16
$\hat{\phi}_j$		-0.16	(Finance)	-0.68	(Mining)	0.52		-0.10	(Finance)	-0.32	(Agriculture)	0.22
$\hat{\delta}_j$	1988	-0.16	(Construction)	-0.35	(Mining)	0.19	2006	-0.10	(Finance)	-0.27	(Mining)	0.17
$\hat{\phi}_j$		-0.14	(Finance)	-0.35	(Agriculture)	0.21		-0.08	(Finance)	-0.25	(Mining)	0.17
$\hat{\delta}_j$	1989	-0.19	(Construction)	-0.72	(Mining)	0.53	2007	-0.05	(Finance)	-0.19	(Services)	0.14
$\hat{\phi}_j$		-0.20	(Finance)	-0.70	(Mining)	0.50		-0.03	(Finance)	-0.23	(Manufacturing)	0.20
$\hat{\delta}_j$	1990	-0.17	(Construction)	-0.59	(Mining)	0.42	2008	-0.06	(Finance)	-0.19	(Services)	0.13
$\hat{\phi}_j$		-0.15	(Finance)	-0.58	(Mining)	0.43		-0.04	(Finance)	-0.23	(Agriculture)	0.19
$\hat{\delta}_j$	1991	-0.21	(Construction)	-0.52	(Mining)	0.31	2009	-0.04	(Finance)	-0.19	(Mining)	0.15
$\hat{\phi}_j$		-0.20	(Finance)	-0.47	(Mining)	0.27		-0.03	(Finance)	-0.23	(Mining)	0.20
$\hat{\delta}_j$	1992	-0.10	(Agriculture)	-0.34	(Services)	0.24	2010	-0.04	(Finance)	-0.27	(Mining)	0.23
$\hat{\phi}_j$		-0.07	(Mining)	-0.44	(Agriculture)	0.37		-0.03	(Finance)	-0.30	(Mining)	0.27
$\hat{\delta}_j$	1993	-0.19	(Construction)	-0.48	(Agriculture)	0.29	2011	-0.03	(Finance)	-0.22	(Services)	0.19
$\hat{\phi}_j$		-0.18	(Trading)	-0.45	(Mining)	0.27		-0.03	(Finance)	-0.27	(Agriculture)	0.24
$\hat{\delta}_j$	1994	-0.17	(Construction)	-0.59	(Mining)	0.42	2012	-0.02	(Agriculture)	-0.19	(Services)	0.17
$\hat{\phi}_j$		-0.19	(Trading)	-0.67	(Mining)	0.48		-0.04	(Finance)	-0.20	(Construction)	0.16
$\hat{\delta}_j$	1995	-0.02	(Mining)	-0.30	(Manufacturing)	0.28	2013	-0.05	(Finance)	-0.17	(Services)	0.12
$\hat{\phi}_j$		-0.15	(Mining)	-0.36	(Manufacturing)	0.21		-0.05	(Finance)	-0.24	(Construction)	0.19

Table 5：Estimation Results of the Wage Equation in the Financial and Construction Industry for 2013

	2013 Financial Industry				2013 Construction Industry			
	Male		Female		Male		Female	
	Coef.	Std. Err	Coef.	Std. Err	Coef.	Std. Err	Coef.	Std. Err
Marital Status	0.0679	0.0243 ***	0.0034	0.0194	0.0220	0.0186	-0.0320	0.0428
Firm Size	0.1003	0.0279 ***	0.1048	0.0249 ***	0.2327	0.0676 ***	0.1382	0.0998
Urban	0.0297	0.0230	0.0360	0.0194 *	-0.0683	0.0177 ***	-0.0102	0.0405
Schooling	0.0621	0.0045 ***	0.0463	0.0045 ***	0.0055	0.0040	0.0117	0.0102
Job Tenure	0.0180	0.0065 ***	0.0211	0.0059 ***	0.0208	0.0052 ***	0.0152	0.0125
Job Tenure^2	-0.0002	0.0001 ***	-0.0002	0.0001 ***	-0.0003	0.0001 ***	-0.0002	0.0002
Potential Exper	0.0239	0.0045 ***	0.0141	0.0041 ***	0.0187	0.0033 ***	0.0066	0.0084
Potential Exper^2	-0.0001	0.0002	0.0000	0.0001	-0.0003	0.0001 ***	0.0000	0.0003
North	0.1018	0.0740	0.0016	0.0578	0.1037	0.0346 ***	0.3264	0.0958 ***
Central	0.0155	0.0749	-0.0322	0.0584	0.0753	0.0335 **	0.2072	0.0951 **
South	0.0247	0.0750	-0.0912	0.0586	0.0119	0.0339	0.1816	0.0943 *
P1	0.3274	0.1913 *	0.8294	0.1207 ***	0.7121	0.1888 ***	NA	NA
P2	-0.1200	0.1871	0.2775	0.1096 **	0.3269	0.1714 *	-0.5638	0.2690 **
P3	-0.4006	0.1864 **	0.1526	0.1102	-0.0081	0.1927	-0.6710	0.2700 **
P4	-0.2253	0.2059	-0.1295	0.3077	0.2223	0.1690	-0.4089	0.2776
P5	-0.2493	0.2022	NA	NA	0.2280	0.1741	NA	NA
P6	-0.2183	0.1894	-0.0075	0.1127	0.1639	0.1702	-0.6371	0.2757 **
Constant	3.9709	0.2307 ***	3.7886	0.1670 ***	4.4537	0.1917 ***	5.0562	0.3860 ***

Notes: [a] Please see Table 1 for occupation definition.

[b] There are 1920 observations in the Construction industry in 2013 and the number of female in Construction industry is only 195. Thus, there are some missing values in the coefficients of some variables.

* denotes statistically significant at the 10% significance level.

** denotes statistically significant at the 5% significance level.

*** denotes statistically significant at the 1% significance level.

附件

性別影響評估檢視表（科技部性別與科技研究計畫）

【自評】：請計畫主持人填寫

填表日期： 106 年 3 月 31 日		
填表人姓名： 莊慧玲	職稱： 教授	身分：■計畫主持人
電話： 03-5742892	e-mail： hlchuang@mx.nthu.edu.tw	

填 表 說 明

本年度性別與科技研究計畫試辦填寫「性別影響評估檢視表」(自評部分)，不需於計畫申請前送審。

壹、計畫名稱	臺灣高科技製造業之性別薪資差異與就業區隔之實證研究
貳、執行機關	國立清華大學

參、計畫內容涉及領域：	勾選（可複選）
3-1 權力、決策、影響力領域	V
3-2 就業、經濟、福利領域	V
3-3 人口、婚姻、家庭領域	
3-4 教育、文化、媒體領域	
3-5 人身安全、司法領域	
3-6 健康、醫療、照顧領域	
3-7 環境、能源、科技領域	
3-8 其他（勾選「其他」欄位者，請簡述計畫涉及領域）	

肆、問題與需求評估

項 目	說 明	備 註
4-1計畫之現況問題與需求概述	台灣的高科技製造業除了產值高之外，該產業就業者也享有高於其它產業就業者的薪資報酬。根據主計處薪資與生產力統計2014年資料，高科技製造業就業者平均薪資高於全體製造業就業者約25%，但是由女/男相對薪資所呈現的性別差異現象，在高科技製造業(0.65)卻更為明顯(全體為0.72)。由此可見性別薪資差異現象在高科技製造業不容忽視，因此值得針對高科技製造業就業者的性別薪資差異現象進行探討。	簡要說明計畫之現況問題與需求。

4-2和本計畫相關之性別統計與性別分析	根據1978-2013期間主計處「人力運用調查」資料所進行的實證研究結果，本計畫發現受雇就業者整體的性別薪資差異中有2-14%可以由產業差異來加以解釋。此外，在涵蓋大多數高科技製造業的製造產業中，女性就業者的平均薪資低於男性就業者14-32%之多。	1.透過相關資料庫、圖書等各種途徑蒐集既有的性別統計與性別分析。 2.性別統計與性別分析應儘量顧及不同性別、性傾向及性別認同者之年齡、族群、地區等面向。
4-3建議未來需要強化與本計畫相關的性別統計與性別分析及其方法	基於產業因素在性別薪資差異現象中所扮演的角色不容忽視之研究發現，建議未來在薪資的性別統計方面，提供產業間的性別薪資差異分析。	說明需要強化的性別統計類別及方法，包括釐清性別統計的定義及範圍，向主計單位建議分析項目或編列經費委託調查，並提出確保執行的方法。
伍、計畫目標概述（併同敘明性別目標）	兩性在高科技製造業雖然都享有高於全體製造業就業者平均薪資的優勢，但是性別薪資差異現象在高科技製造業卻更為明顯，因此值得針對高科技製造業就業者的性別薪資差異現象進行探討。基此，本計畫的主要目的即是藉由產業間排序之分析作法，針對產業間的性別薪資差異進行實證分析，以瞭解高科技製造業的性別薪資差異現象。	
陸、性別參與情形或改善方法（計畫於研擬、決策、發展、執行之過程中，不同性別者之參與機制，如計畫相關組織或機制，性別比例是否達**1/3**）	本計畫執行期間，先後聘任六位兼任助理，協助文獻與資料收集以及實證估計工作，六位兼任助理中有兩位男性與四位女性碩士生與大學生，因此藉由參與此計畫的執行，不同性別的兼任助理得有機會相互學習與分工合作。	

柒、受益對象

1.若7-1至7-3任一指標評定「是」者，應繼續填列「捌、評估內容」8-1至8-9；如7-1至7-3皆評定為「否」者，則免填「捌、評估內容」8-1至8-9。

2.本項不論評定結果為「是」或「否」，皆需填寫評定原因。

項　目	評定結果(請勾選)		評定原因	備　註
	是	否		
7-1 以特定性別、性傾向或性別認同者為受益對象		**V**	本計畫之研究對象包括男性與女性，因此不論是男性或是女性，均可藉由本計畫之研究結果得知產業因素在性別薪資差異現象中所扮演之角色。	如受益對象以男性或女性為主，或以同性戀、異性戀或雙性戀為主，或個人自認屬於男性或女性者，請評定為「是」。
7-2 受益對象無區別，但計畫內容涉及一般社會認知既存的性別偏見，或	**V**		女性就業者之平均薪資低於男性就業者為一般社會之認知，本計畫之研究發現有助於吾人更進一步瞭解性別薪資差異現象在	如受益對象雖未限於特定性別人口群，但計畫內容涉及性別偏見、性別比例差距或隔離等之可能性者，請評定為「是」。

統計資料顯示性別比例差距過大者			產業間的排序關係。	
7-3 公共建設之空間規劃與工程設計涉及對不同性別、性傾向或性別認同者權益相關者		**V**	本計畫之研究主題與內容不涉及空間規劃與工程設計之相關議題。	如公共建設之空間規劃與工程設計涉及不同性別、性傾向或性別認同者使用便利及合理性、區位安全性，或消除空間死角，或考慮特殊使用需求者之可能性者，請評定為「是」。

捌、評估內容

（一）資源與過程

項　目	說　明	備　註
8-1經費配置：計畫如何編列或調整預算配置，以回應性別需求與達成性別目標。	本計畫執行期間聘任不同性別之碩士級與大學部兼任助理共六名，協助資料收集與統計分析之工作。讓不同性別之學生皆有機會瞭解產業因素對薪資性別差異現象的影響。	說明該計畫所編列經費如何針對性別差異，回應性別需求。
8-2執行策略：計畫如何縮小不同性別、性傾向或性別認同者差異之迫切性與需求性。	藉由本計畫研究結果可得知影響性別薪資差異之主要因素為何，可提供不同性別之就業者更為積極的面對在職場中可能遇到的性別薪資差異對待情況，以期改善臺灣動市場的性別薪資差異現象。	計畫如何設計執行策略，以回應性別需求與達成性別目標。
8-3宣導傳播：計畫宣導方式如何顧及弱勢性別資訊獲取能力或使用習慣之差異。	本計畫有關性別薪資差異的產業排序關係，可提供不同性別之就業者參考，以投入對其較為有利的產業就業。	說明傳佈訊息給目標對象所採用的方式，是否針對不同背景的目標對象採取不同傳播方法的設計。
8-4性別友善措施：搭配其他對不同性別、性傾向或性別認同者之友善措施或方案。	根據本計畫研究結果所指出的性別薪資差異的產業排序關係，可以輔助排序較後端的產業，參考排序較為前端的產業，在薪資結構的設計上進行調整，以改善該產業之性別薪資差異現象。	說明計畫之性別友善措施或方案。

（二）效益評估

項　目	說　明	備　註

8-5落實法規政策：計畫符合相關法規政策之情形。	本計畫之研究發現可提供「性別工作平等法」相關法規修訂時之參考依據。	說明計畫如何落實憲法、法律、性別平等政策綱領、性別主流化政策之基本精神，可參考行政院性別平等會網站 http://www.gec.ey.gov.tw/
8-6預防或消除性別隔離：計畫如何預防或消除性別隔離。	本計畫之研究發現有助於不同產業與不同性別之就業者，預防在職場中可能面對在薪資上受到差別對待的狀況。	說明計畫如何預防或消除傳統文化對不同性別、性傾向或性別認同者之限制或僵化期待。
8-7平等取得社會資源：計畫如何提升平等獲取社會資源機會。	受雇就業者可以藉由在不同產業的工作經驗，或是經由跨產業的交流活動，增進對於性別薪資差異的產業排序特徵之認識，有助於提升各產業就業者的性別意識，以促進不同產業就業者在薪資上都能獲得合理公平對待之發展。	說明計畫如何提供不同性別、性傾向或性別認同者平等機會獲取社會資源，提升其參與社會及公共事務之機會。
8-8空間與工程效益：軟硬體的公共空間之空間規劃與工程設計，在空間使用性、安全性、友善性上之具體效益。	本計畫之研究主題與內容不涉及空間規劃與工程設計之相關議題。	1.使用性：兼顧不同生理差異所產生的不同需求。 2.安全性：消除空間死角、相關安全設施。 3.友善性：兼顧性別、性傾向或性別認同者之特殊使用需求。
8-9設立考核指標與機制：計畫如何設立性別敏感指標，並且透過制度化的機制，以便監督計畫的影響程度。	本計畫之主要目標為藉由性別薪資差異的產業排序關係之研究發現，提供不同產業之雇主與就業者有關其所在產業的性別薪資差異程度之參考資訊。因此藉由定期的產業評比，應有助於提升各產業之雇主與就業者的性別意識與敏感度。	1.為衡量性別目標達成情形，計畫如何訂定相關預期績效指標及評估基準。 2.說明性別敏感指標，並考量不同性別、性傾向或性別認同者之年齡、族群、地區等面向。

＊ 本表所提專有名詞之定義及參考資料，請詳見「性別影響評估操作指南」（網址：http://www.gec.ey.gov.tw/cp.aspx?n=FC0CD59A5BF00232）。

科技部補助專題計畫出席國際學術會議報告

報告人：莊慧玲
國立清華大學經濟學系教授

計畫編號：MOST 106-2629-H-007-001

一、　參加會議經過

The International Congress on Insurance: Mathematics and Economics annual meeting holds every year and has been a very competitive conference over the last two decades. The 2017 annual conference aims to provide opportunities for industry professionals and academics from insurance and finance to exchange ideas on current developments. It was held during July3-5, at Vienna, Austria with the help of local host, Technology University of Vienna. The IME 2017 meeting has more than 200 papers or contributed talks and is followed by the IME Educational Workshop during July 6-7, 2017.

I arrived at Vienna on July 2nd and tried to locate the conference university and registration site, and registered early on that day before the conference. The conference starts on July 3rd with an opening keynote by Dr. Corina Constantinescu-Loeffen. The title of the keynote speech is "Ruin Probabilities in Insurance Risk Models." The keynote speech took place in the main lecture hall-Freihaus Hörsaal 1. The main content of the keynote speech is to present some exact and asymptotic ruin probability results in different insurance risk models.

After the keynote speech, 8 concurrent sessions start. I went to the "Statistics I" session which includes 4 presentations as the following: "A Bivariate Regression Model for Panel Count Data," "Hybrid Hidden Markov Models and GLMs for Auto Insurance Premiums," "Joint Modeling of Customer Loyalty and Risk in Personal Insurance," and "Multivariate Count Data Generalized Linear Models: Two Approaches Based on Sarmanov's Distribution." The lunch is at cafeteria of the university building, the food is humble but authentic.

The second round of concurrent sessions begins at 1:30 after lunch. My presentation is arranged at this round of concurrent session "Statistics II" at Room 4. This session contains 4 empirical studies related to insurance. The first paper is "Borrowing Information across Space and Time from Possibly Similar Data Generating Processes: Implications for Rating Crop Insurance Contracts" presented by Dr. Alan Ker from University of Guelph, Canada. Dr. Nugrahani from the Bogor Agricultural University of Indonesia presents the second paper "Assessment on Financial Performance of Indonesian Insurance companies." My paper entitled "The Impact of Financial Crisis on Skilled/Unskilled Wage Gap: Evidence from the Insurance Workers in Taiwan" is the third presentation. This study aims to examine the impact of 2008 financial crisis on skilled/unskilled wage gap with an emphasis on the insurance workers in the finance industry. The final paper in this session is "Confidence Intervals of the Premiums of Optimal Bonus-Mlaus Systems" presented by Dr. Tzougas from London School of Economics and Political Science, United Kingdom.

On July 4th, I went to attend the "Longevity" session mainly for the presentation of Dr. Jin-Ping Lee on "Hedging and Valuation of Longevity Swap with Counterparty Risk." I also attended Dr. Chou-Wen Wang's presentation on "Annuity Portfolio Management with Correlated Age-Specific Mortality Rates." The conference dinner is held at Vienna City Hall. It is a wonderful and impressive castle building. The dinner hall is more than 100-meter long and 20-meter wide, great enough for any major ceremonies. On the final day of the conference, the IME Editor Dr. Rob Kass gave the closing remarks to end the conference on July 5, 2017.

二、 與會心得

參與國際會議之主要目的除了在多瞭解國外相關研究之發展與現況，以及收集最新資料之外，更能讓國外人士對台灣有較深入之認識，對台灣國際地位之提升亦有助益，因此參加國際會議之價值不只限於與會者本人而已，亦可擴及社會整體。本人此次參加第 21 屆 The International Congress on Insurance: Mathematics and Economics (IME-2017)即深有此感。經過三天與會，大家都收穫豐碩。除了相互肯定研究方向外，研究心得的交換與友誼的建立使此行更具意義，與會學者均期待日後再有機會互相討論，作進一步的學術交流。整體而言，此次與會對本人研究深度與廣度之進展，皆有相當之助益。

三、 參訪活動

本人藉此次出國參與國際學術會議之機會，除了參觀主辦學校 Technology University of Vienna 之外，也去參觀了現存最古老的德語大學 University of Vienna。University of Vienna 建立於 1365 年，歷史悠久且相當有規模，學生人數有九萬之多，是奧地利最大的教學與研究機構。該校環境優美，教學設施先進，有許多值得學習之處，參訪之後令人印象深刻。

四、 建 議

本人認為參與國際性之研討會應是值得鼓勵的，除了可以藉由國際交流收集最新資訊外，亦可讓國外人士認識國內之學術研究水準亦不落人後。筆者參與此次研討會後，深覺國內學者應更為積極的參與國際學術研討會，使國內學術研究水準更為提昇並有更大的國際影響力。

五、　攜回資料名稱及內容

本人此次與會攜回之資料主要包括大會議程，與會人員名冊，及研討會論文摘要。其中大會議程及與會人員資料皆可透過 https://fam.tuwien.ac.at/ime2017/網址取得。另 IME-2017 會議頒發的證書如附件。

21st International Congress on Insurance: Mathematics and Economics - IME 2017

Vienna, Mon–Wed, July 3–5, 2017

IME Educational Workshop

Vienna, Thu–Fri, July 6–7, 2017

Confirmation of Presentation

Vienna, July 10, 2017

To Whom it May Concern:

We herewith confirm that

Hwei-Lin CHUANG
(National Tsing Hua University, TW)

presented the following talk

"The Impact of Financial Crisis on Skilled/Unskilled Wage Gap: Evidence from the Insurance Workers in Taiwan"

at the

21st International Congress on
Insurance: Mathematics and Economics
Vienna, Mon–Wed, July 3–5, 2017.

With best regards,

Sandra Trenovatz
Conference & Workshop Secretary

106年度專題研究計畫成果彙整表

計畫主持人：莊慧玲	**計畫編號：**106-2629-H-007-001-
計畫名稱：臺灣高科技製造業之性別薪資差異與就業區隔之實證研究	

成果項目					量化	單位	質化（說明：各成果項目請附佐證資料或細項說明，如期刊名稱、年份、卷期、起訖頁數、證號...等）
國內	學術性論文	期刊論文			1	篇	此計畫之相關研究成果，部分成果已經寫成學術論文，即將發表於International Review of Economics and Finance 國際期刊
		研討會論文			1	篇	此計畫之相關研究成果，部分成果已經寫成學術論文，於2017年 7月舉辦的IME Conference 發表
		專書			0	本	
		專書論文			0	章	
		技術報告			0	篇	
		其他			0	篇	
	智慧財產權及成果	專利權	發明專利	申請中	0	件	
				已獲得	0	件	
			新型/設計專利		0	件	
		商標權			0	件	
		營業秘密			0	件	
		積體電路電路布局權			0	件	
		著作權			0	件	
		品種權			0	件	
		其他			0	件	
	技術移轉	件數			0	件	
		收入			0	千元	
國外	學術性論文	期刊論文			0	篇	
		研討會論文			0	篇	
		專書			0	本	
		專書論文			0	章	
		技術報告			0	篇	
		其他			0	篇	
	智慧財產權及成果	專利權	發明專利	申請中	0	件	
				已獲得	0	件	
			新型/設計專利		0	件	
		商標權			0	件	
		營業秘密			0	件	

		積體電路電路布局權	0		
		著作權	0		
		品種權	0		
		其他	0		
	技術移轉	件數	0	件	
		收入	0	千元	
參與計畫人力	本國籍	大專生	0	人次	
		碩士生	0		
		博士生	0		
		博士後研究員	0		
		專任助理	0		
	非本國籍	大專生	0		
		碩士生	0		
		博士生	0		
		博士後研究員	0		
		專任助理	0		
其他成果 （無法以量化表達之成果如辦理學術活動、獲得獎項、重要國際合作、研究成果國際影響力及其他協助產業技術發展之具體效益事項等，請以文字敘述填列。）					

科技部補助專題研究計畫成果自評表

請就研究內容與原計畫相符程度、達成預期目標情況、研究成果之學術或應用價值（簡要敘述成果所代表之意義、價值、影響或進一步發展之可能性）、是否適合在學術期刊發表或申請專利、主要發現（簡要敘述成果是否具有政策應用參考價值及具影響公共利益之重大發現）或其他有關價值等，作一綜合評估。

1. 請就研究內容與原計畫相符程度、達成預期目標情況作一綜合評估
   ■達成目標
   □未達成目標（請說明，以100字為限）
      □實驗失敗
      □因故實驗中斷
      □其他原因
   說明：

2. 研究成果在學術期刊發表或申請專利等情形（請於其他欄註明專利及技轉之證號、合約、申請及洽談等詳細資訊）
   論文：■已發表 □未發表之文稿 □撰寫中 □無
   專利：□已獲得 □申請中 ■無
   技轉：□已技轉 □洽談中 ■無
   其他：（以200字為限）
   無

3. 請依學術成就、技術創新、社會影響等方面，評估研究成果之學術或應用價值（簡要敘述成果所代表之意義、價值、影響或進一步發展之可能性，以500字為限）
   台灣的高科技製造業除了產值高之外，該產業就業者也享有高於其它產業就業者的薪資報酬。兩性在高科技製造業雖然都享有較高薪資的優勢，但是性別薪資差異現象在高科技製造業卻更為明顯，因此值得針對高科技製造業就業者的性別薪資差異現象進行探討。基此，本計畫的主要目的，即是藉由對於產業間的性別薪資差異實證分析，以瞭解高科技製造業的性別薪資差異現象。本計畫以1978-2013期間主計處「人力運用調查」資料為研究對象，應用Horrace and Oaxaca (2001) 根據Oaxaca-Blinder差異分解方法所延伸發展出來的產業間差異排序法，實證探討性別薪資差異在不同產業間的特徵。本計畫之主要發現指出: 在涵蓋大多數高科技製造業的製造產業中，女性就業者的平均薪資低於男性就業者14-32%之多；各產業中對於女性就業者相對有利的產業為金融業，在金融業就業的女性，其平均薪資低於男性就業者約3-20%，此性別薪資差異比例相較於高科技製造業所屬之製造產業的14-32%為低。此研究成果即將發表於International Review of Economics and Finance 國際期刊。

4. 主要發現

本研究具有政策應用參考價值：□否　■是，建議提供機關勞動部, 經濟部,

（勾選「是」者，請列舉建議可提供施政參考之業務主管機關）

本研究具影響公共利益之重大發現：■否　□是

說明：（以150字為限）

本計畫之主要目標為藉由性別薪資差異的產業排序關係之研究發現，提供不同產業之雇主與就業者有關其所在產業的性別薪資差異程度之參考資訊。因此藉由定期的產業評比，應有助於提升各產業之雇主與就業者的性別意識與敏感度，因而本計畫之研究成果雖然具有參考價值，但是並不會對於公共利益造成重大影響。