The effect of job income on job satisfaction in Taiwan.

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1 Abstract

Improving employee job satisfaction has been the main goal of an enterprise for the past one to two decades. It can achieve competitive levels of quality that the organization cannot achieve. Job satisfaction is a pleasant feeling derived from work or work experience. This feeling is seen as an attitude or belief towards work (Azeem, 2010).

It is generally believed that high income produces high job satisfaction. This view has also been confirmed by some past studies (Puriene, Petrauskiene, Janulyte, Balciuniene, 2007; Fallahi, Mehrad, 2015; Maharjan, 2019). However, when discussing this point of view in the past, the data used was almost a cross-data type, and it was conducted for a certain industry or sector. And our research attempts to use national survey data, aiming at a wider range of industry sectors, and three waves (2012, 2014, and 2016) of longitudinal data, and use OLS regression model statistics to demonstrate the relationship between job income and job satisfaction.

The model specification of the regression model is described below:
$job\_satisfaction_{it} = \beta_0 + \beta_l(ln(job\_income)_{1it}) + \beta_2(ln(working\_hours)_{2it}) + \beta_3 age_{3it} + \beta_4 sex_{4it} + \beta_5 schoiling_{5it} + \varepsilon_{it}$

After confirming that there is no multiple collinearity between the variables, the three modes of pooled OLS, Fixed Effect, and Random Effect are compared. The results of F/Chow test, Hausman Test as well as Lagrange Multiplier Test (LM Test) show that RE The model is most suitable for explaining the relationship between this research variable. The homoscedasticity test for the random coefficient model shows that the null hypothesis of the model is rejected, so the model is Heteroskedasticity, so robust covariance matrix estimation to estimate robust standard errors is used. The final results are presented in Table 5.

Table 5 Robust estimates of Random effects Model

	Estimate	Std. Error	t value	Pr(>|t|)
Log of monthly income	0.133***	0.019	6.915	5.14E-12
Log of working hours	-0.091**	0.032	-2.834	0.004618
age	0.003**	0.001	2.584	0.009786
sex:male	0.037^{+}	0.020	1.895	0.058185
schooling	-0.006	0.004	-1.525	0.127201
intercept	1.849***	0.221	8.365	7.34E-17

The statistical results in Table 5 show that after controlling for log working hours, age, gender, and schooling, log monthly income significantly and positively affects job satisfaction. This result supports our research hypothesis. Since our data comes from multiple industries, it can be argued that the positive relationship between work income and job satisfaction is a common phenomenon in Taiwan's industry. Secondly, the use of panel data in this research is more able to take into account the stability and change of individuals than in the past studies using horizontal data, so it is more conducive to the causal inference of this research.

key words: Job satisfaction, job income, working hours.

2 Introduction

The epidemic has brought unprecedented challenges and impacts to companies and employees all over the world. The resulting transformation of the work environment has subverted our imagination and past working modes. In addition to an increase in employees working from home, an additional change is that human resources departments have become the focus of enterprises, because organizations need to guide employees and the organization itself through changes to ensure the safety and efficiency of each employee. Moreover, enterprises have to build a new way of working. For example, labor supply is no longer limited to the office and across countries or time zones. Therefore, job satisfaction is becoming more and more an important issue in modern society, not only because corporate organizations in the current society need it to achieve competitive levels of quality that organizations cannot achieve, but also because it highly connects with people's happiness in life.

Job satisfaction has been defined as a pleasant feeling derived from work or work experience,and this feeling is common seen as an attitude or belief towards work (Azeem, 2010). On the other hand, others had defined job satisfaction has two levels: affective job satisfaction and cognitive job satisfaction Maharjan (2019). The former refers to a person's emotional feeling about the job as a whole, while the later indicates how satisfied employees feel concerning some aspect of their job, such as pay, hours, or benefits.

Prior research indicates that there are a variety of factors that make people feel positive or negative about their job (Arnold and Feldman, 1996).

Generally, these factors can be separated into two main categories: personal determinants and organizational factors. Personal determinants mainly include age, gender, educational level, and number of years on the job (Nel, 2004). Organizational factors could be grouped into five aspects: pay or total compensation, The work itself, promotion opportunities, relationship with supervisor, interaction and work relationship with coworkers (Maharjan, 2019). Although there are many factors that affect job satisfaction, it is generally believed that high income produces high job satisfaction. In other words, income is widely recognized as an important organizational factor affecting job satisfaction. This view has also been confirmed by some past studies (Bakan, Buyukbese, 2013; Puriene, Petrauskiene, Janulyte, Balciuniene, 2007; Fallahi, Mehrad, 2015; Maharjan, 2019). Regardless, one of the main purposes of people's work is to earn income, so pay must play an important role in people's work.

As I reviewed the past research on pay and job satisfaction, I found that the data used was almost cross-sectional data, and it was collcected from only a certain industry or sector. For example, Puriene. et al. (2007) focuses on dentistry, and Maharjan (2019) focuses on teachers. From the point of view of causal inference, cross-sectional data cannot overcome a particular kind of omitted variable bias compared to longitudinal data, so it will be weaker in causal inference. In addition, analysis based on specific industries or sectors is also weak in general applicable inferences. Based on the deficiencies of these studies in the method of argumentation, our study attempts to use national survey data from the Panel Study of the Family Dynamics (PSFD), which collects data from a wide range of industry sectors. This data has three waves (2012, 2014 and 2016) of longitudinal data that includes the data points needed to verify the relationship between job income and job satisfaction.

3 Data

The The Panel Study of the Family Dynamics (PSFD) is the main data source used in our research analyses. The PSFD starts from 1999 in Taiwan and continues each year until 2012. After 2012, it collects data each two years. Therefore, due to the limitation of the data, we decide to choose 2012, 2014 and 2016 data for this study. The PSFD data is mainly used to collect panel survey data on families and to investigate the patterns and changes of families in Chinese societies. In fact, the variables can be used for the research are not too many. However, it concludes two variables that can be used to test the hypothesis of this study: job satisfaction and job income.

3.1 Job satisfaction

Job satisfaction constitutes the dependent variable of this study and it is the basis for the statistical tests. According to the questionnaire, job satisfaction is captured by the following survey question: "How satisfied are you with your current job?" It is assessed on a scale from 1 (very dissatisfied) to 4 (very satisfied). Finally, job satisfaction was collected in the 2012, 2014, and 2016 surveys.

3.2 Job income

Job income is the central independent variable in this research and captured by the following survey question: "How much is your monthly work income? " The same as job satisfaction, this variable also was collected in the 2012, 2014, and 2016 surveys.

3.3 Other control variables

Except above two variables, we also utilize working hours per week, age, schooling, and sex in our model. These variables are included to act as control variables and to explain job satisfaction that cannot be solely explained by work income. One things we should notice is that we excludes monthly work incomes of those who are lower than NT$18780, because NT$18780 is monthly minimum wage in 2012 in Taiwan. Furthermore, we also drop those who have missing value on working hours per week, age, schooling, and sex. The final sample size is 2051.

4 Model

4.1 Analytical Framework

The analytical framework for this paper builds upon the theoretical framework presented in the previous section, where we are interesting in testing the hypothesis regarding the relationship between job income and job satisfaction. From the hypothesis, we expect that job income has positive influence on job satisfaction. In this research, ordinary Least Square (OLS) is a suitable statistical technique. This study has deployed the OLS regression model comprising with pooled regression, fixed effect and random effect regression analysis done by R studio.

The model specification of the regression model is described below:
$job\_satisfaction_{it} = \beta_0 + \beta_l(ln(job\_income)_{1it}) + \beta_2(ln(working\_hours)_{2it}) + \beta_3 age_{3it} + \beta_4 sex_{4it} + \beta_5 schoiling_{5it} + \varepsilon_{it}$

In this model, β_0 is the unknown intercept. β_i is regression coefficient (i = 1,..,5). ε_{it} is the error term capturing the "idiosyncratic errors" or "idiosyncratic disturbances". Furthermore, We follow Schwarze and Wunder's specification of model (Schwarze Wunder, 2006), using logarithm of monthly work income and logarithm of working hours per week in our model.

These three models need to be analyzed to determine the most appropriate model in predicting job satisfaction. In other words, we have to select the best model via the following test. The most proper model test is done by F/Chow test, Hausman Test as well as Lagrange Multiplier Test (LM Test). F test is used to choose between fixed effects model and pooled OLS model. Its null hypothesis is pooled OLS model better than fixed effects model. If the p-value is < 0.05 then the fixed effects model is a better choice. On the other hand, the Hausman test is applied to select whether the Fixed Effect or Random Effect model is most appropriately used. The null hypothesis is random effects model better than fixed effects model. Similarly, if the p-value is less than 0.05 then the fixed effects model is better than random effects model. Eventually, LM test helps us decide between random effects regression and a simple OLS regression. The null hypothesis in the LM test is that variances across entities is zero. This is, there is no significant difference across units (i.e. no panel effect), therefore pooled OLS is better. If the p-value is less than our criteria, 0.05, then the random effects model is better than pooled OLS model.

4.2 Results

4.2.1 Multicollinearity

It is important to examine the potential presence of multicollinearity for OLS regression model before we start running the regression. To do this, a matrix accounting for the correlation between each independent variable has been established. If the independent variables are too highly correlated, revealing that they may largely explain the same concept and could conceivably be redundant to include in the models. Table 1 presents the results of the correlation matrix. Generally, the correlation between variables should not exceed 0.8 to avoid inappropriate levels of multicollinearity. According to the table 1, the correlation between variables are between -0.373 and 0.313, indicating multicollinearity is not a problem in this study.

Table 1. Correlation matrix for the independent variables

variable	Sex	Schooling	Age	Log of monthly Income	Log of Working hours	Job satisfaction
Sex	1.000					
Schooling	0.1***	1.000				
Age	-0.029*	-0.373***	1.000			
Log of monthly Income	-0.216***	0.313***	0.147***	1.000		
Log of Working hours	-0.183***	-0.097***	-0.064***	0.057***	1.000	

4.2.2 Descriptive statistics

Table 2 presents descriptive statistics over each variable used in the analysis for this study. These variables comprise data from 6153 observations. The panel is balanced since for those who are missing were deleted from the dataset. Therefore, these variables have the same number of observations. In our setting, job satisfaction acts as the dependent variable and job income is a central variable for answering the underlying research question.

Showing in the table 2, the mean of job satisfaction is 3.027, with a standard deviation of 0.557. The scores could vary from 1 to 4, and they set 1 as a minimum score and 4 as a maximum score. The mean of monthly income (job income) is 50,949.529, with a standard deviation of 53,721.924. The

minimum income is NT$19,000 since we select those who had minimum wage in 2012 in Taiwan, and the maximum is NT$1500,000. The minimal score for working hours per week is 1 and the maximum score is 130. We can find that there are an obvious differences among individuals in working hours per week. The mean years of schooling is 10.478, with a standard deviation of 2.945. The minimal years of schooling are 3 and the maximum years of schooling are 15. The mean of age is 37.563, with a standard deviation of 8.391. The minimal age is 26 and the maximum age is 77. For sex, there are 3783 males and 2370 females.

Table 2 Descriptive statistics of study variables

	n	mean	s.d.	min	max
years of schooling	6153	10.478	2.945	3	15
age	6153	37.563	8.391	26	77
Income per month	6153	52,816.600	53,721.924	19,000	1500,000
Working hours per week	6153	47.647	12.076	1	130
Job satisfaction	6153	3.027	0.557	1	4

4.2.3 Model selection

Table 3 reveals the summary of pooled OLS, fixed effects, and random effects model. The results obtained in Table 3 tells us to reject the null hypothesis of pooled OLS model that all, are zero ($F(5, 6147) = 24.802$, $p<0.001$). Considering fixed effect model, the null hypothesis is also rejected ($F(3, 4099) = 6.469$, $p<0.01$). The null hypothesis of random effects model is also rejected ($= 85.137$, $df = 5$, $p<0.001$). The results shows that these three models could be used to analyzed our data. But, we still have to test which one is best. F test in Table 3 tells us that Fixed effects model is better than pooled OLS model ($F = 2.467$, $p<0.001$). LM test shows that random effects model is better than pooled OLS model ($= 660.43$, $p<0.001$). Hausman test presents that random effects model is better than fixed effects model($= 2.795$, $p<0.05$). As as results, depends on these comparisons, we finally decide that random effects model is best for this study.

Table 3 the summary of pooled OLS, fixed effects, and random effects regression

	Pooled OLS		FE		RE	
	coefficient	s.e.	coefficient	s.e.	coefficient	s.e.
Log of monthly income	0.142***	0.017	0.103***	0.029	0.133***	0.019
Log of working hours	-0.105***	0.027	-0.064^{+}	0.036	-0.091**	0.028
age	0.003**	0.001	0.004	0.004	0.003*	0.001
sex: male	0.038*	0.015			0.037^{+}	0.019
schooling	-0.007*	0.003			-0.006	0.004
intercept	1.816***	0.195			1.849***	0.216
F value	24.802***		6.469**			
χ^2					85.137***	
DF	(5, 6147)		(3, 4099)		5	
F test			2.467***(p < 0.001)			
Hausman test			2.795 (P = 0.424)			
LM test			660.43***(p < 0.001)			

$^{+}$ p < 0.10; * p < 0.05; **p < 0.01; ***p < 0.001

4.2.4 Heteroskedasticity

The Breusch-Pagan test was performed to investigate if there is heteroskedasticity in the random effects model. The null hypothesis for the Breusch-Pagan test is that the variance of the regression errors is constant, that is, homoscedasticity exists. According to the Table 4, the high BP value generated a low p-value of 2.2e-16 which is by far enough to reject the null hypothesis. Consequently, by rejecting the null hypothesis, it can be concluded that the random effects model is affected by heteroskedasticity. This will be adjusted for by including robust covariance matrix estimation to estimate robust standard errors.

Table 4 Breusch-Pagan test for heteroskedasticity

Breusch-Pagan test	
BP(2053)	6948.1
p	2.2e-16

Adjusting the model for heteroskedasticity did not affect the results tremendously. The robust random effects model shows that logarithm of monthly income has a significant positive relationship with job satisfaction while controlling for logarithm of working hours, sex, age, and schooling. Our research hypothesis was supported.

Table 5 Robust estimates of Random effects Model

	Estimate	Std. Error	t value	Pr(>|t|)
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sex:male	0.037^{+}	0.020	1.895	0.058185
schooling	-0.006	0.004	-1.525	0.127201
intercept	1.849***	0.221	8.365	7.34E-17

5 Conclusion

This study constructed three models, including pooled OLS, fixed effect, and random effect. After analyzing the data, the results showed random effects can best explain our data. Gender, schooling, and log of monthly income significantly and positively affect job satisfaction. These results supports the research hypothesis. In addition, the results are also consistent with the outcome of some past studies, especially Schwarze, J. and Wunder, C. (2006). Since data comes from multiple industries, it can be argued that the positive relationship between job income and job satisfaction is a common phenomenon in Taiwan's industry. Secondly, the use of panel data in this research is more able to take into account the stability and the change of individuals than past studies using horizontal data. As a result, the research is more conducive to the causal inference.

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