

Age-Earnings and Age-Productivity Profiles of Self-Employed Workers in Thailand

Suthasinee Khunkarnrai

Abstract—This study aims to investigate the age-earnings and age-productivity profiles of self-employed workers in Thailand. The findings indicate that age has a significant concave effect on both earnings and productivity of the self-employed workers. Age has higher effect on earnings than productivity, except in the hotel and restaurant sector having closely similar effect of age on earnings and productivity. However, both of them reach their maximum at middle age and fall after that. On average, the self-employed workers could maintain their earnings for about two years longer than their productivity before the profiles started to decrease.

Keywords—Age, Earnings, Productivity, Self-employed.

I. INTRODUCTION

OVER the past several years, self-employment has emerged as an important aspect and there have been academic and political debates on the role of self-employment, not only in developed countries but also in developing countries. In 2009, 15.3 million individuals in the United States were self-employed which was about 10.9 percent of total employment [14]. Meanwhile, in Tanzania, there was roughly double the number of self-employed workers as wage-employed workers [23].

In less developed countries, whether self-employment is a choice or a necessity is centered on a controversial issue. Positive reasons include: self-employment absorbs a supply of entrepreneurial talent who need self-expression, independence or pecuniary advantage. On the other hand, self-employment may be viewed as an involuntary and transitory employment option that provides low earnings for survival since individuals have been pushed into self-employed because of the absence of any attractive alternative. In developed countries, self-employment was grown, reversing a trend of many decades and has begun to be regarded as an important potential source of new jobs and a way of employing persons with entrepreneurial ability while their countries confront a large and increasing unemployment rate [8], [21].

Self-employment is an individual status in the labor market which can be defined in various ways. [9] defined self-employed workers in his research as individuals who identify

themselves as self-employed in their own business and does not include unpaid family workers. From the wide range of meanings, self-employed workers may be inferred to be in various and flexible activity groups and may be creating new innovative jobs and products, and satisfied to make earnings for themselves. Because of the difference of characteristics and flexibility of jobs, they then can be their own boss and not face the agency problems from employers as do wage and salary workers. Many salaried workers would like to become self-employed. The previous study shows that the self-employed of OECD countries are more satisfied with their jobs than wage and salary workers [3]. For these reasons, self-employed workers have different characteristics from employees such as working hours, working incentive, working performance and income.

The definition of self-employed by National Statistical Office of Thailand refers to a person who works for his/her own profit or his/her family's benefit, in either monetary or non-monetary ways, and includes unpaid family workers who produce goods and services for his/her own family. In Thailand, the National Statistical Office (NSO) reported for 2008-2012 that the total labor force was about 40 million, self-employed in own-account business workers was 12 million and unpaid family business workers was 7-8 million which was approximately 50-52 percent of the total labor force. This shows that in Thailand self-employed is more than half of the total labor force, all of whom are creating products, sales, services and earnings helpful to Thailand's economic growth.

It has already been demonstrated that self-employment offers benefits for both the economy and individual [24]. Self-employment is an important source of jobs which keeps individuals in the labor force longer and offers an alternative to joblessness or to a person who faces other workers' discriminations, such as former criminals or the disabled, to have his/her own career and income and serves as a way of re-integrating displaced workers into the labor market and which helps to considerably decrease unemployment rate and poverty [8].

In addition, the previous studies in the United State and the United Kingdom show the difference in aging groups among self-employed; that is self-employed has more older workers than younger workers because the younger workers rarely

Suthasinee Khunkarnrai is a Master degree student with the Faculty of Economics, Thammasat University, Bangkok, Thailand, 10200 (corresponding author's phone: +66867387220, +66883678597 ; e-mail : suthasinee43@hotmail.com)

have accumulated the managerial skills and capital necessary to start a business, whereas older workers have more managerial skills and experience to drive their business and the necessary capital or access to credit. Furthermore, older workers who have retired from wage and salary jobs become self-employed to supplement their retirement income [14]. [12] shows that older Americans are staying in the labor force longer and self-employment can be an attractive option for many older workers because it provides opportunities not found in wage and salary jobs and real advantages, such as independence and flexible work hours. Similarly [14] indicated they may also have access to capital that makes self-employment possible and they have lifetime of experience to bring to a business venture. [11] snapshots the United States self-employment, and revealed that the tendency to be self-employed rises with age. In Thailand, we found the number of elderly still working as self-employed (own account workers and unpaid family workers) was 80% of total number of older workers in 2002 and 2007. Overall, this indicates that age may have relationship with the self-employment characteristics, self-employed productivity and self-employed earnings profile which is different from the general workers'. This study tries to investigate the relationship between age and self-employed income and productivity.

In this paper, I examine the Mincerian earnings equation in the context of self-employed worker. I compare this age-earnings profile with the age-productivity profile of self-employed workers. The data of self-employed workers' income and productivity in non-agricultural sector obtained from the Household Socio-Economic Survey (SES) of Thailand represent the household data. The survey covered all private, non-institutional households residing permanently in municipal areas, sanitary districts, and villages of all regions. It contains important information on social economic aspects of households such as income, expenditures, debt, and income distribution of households. To estimate the age profiles of self-employed workers' earnings and productivity, the individual data set will be firstly constructed. Then use the value of imputations to estimate the self-employed productivity and self-employed age-earnings profile. The empirical findings support for the concave effect of age on both self-employed earnings and productivity. Both of age-earnings and age-productivity profiles increase at a decreasing rate and reach their peaks at the workers' middle age before they slowly decrease.

II. RESEARCH METHODOLOGY

According to Mincer's model that presents the relationship between the individual earnings and their characteristics. The primary assumption behind this model is investment in human capital; such as foregone earnings through schooling and on-the-job training of whole lifetime work, which leads to increased labor productivity in the long run and therefore, increases labor wages [18]. Mincer modeled the natural logarithm of earnings as a function of years of education and

years of potential labor market experience. However, Mincer concerned not only experience effect, but also age effect on labor earnings. His study showed age profile which explains the relationship between labor age and earnings. Hence many researches such as; [2], [6], [7], [19] directly investigate the age effect on earnings.

In this paper, I use the data to estimate the self-employed age-earnings profile and age-productivity profile from the Household Socio-Economic Survey 2006-2011 of the National Statistical Office (NSO), compiled every other year. I simply estimate earnings and productivity equations as follows:

$$\ln E_{it} = \ln E_0 + a_1(age)_{it} + a_2(age)_{it}^2 + a_3(sex)_{it} + a_4(edu)_{it} + a_5(area)_{it} + a_6(year)_{it} + \varepsilon_{it} \quad (1)$$

$$\ln Y_{it} = a_0 + b_1(age)_{it} + b_2(age)_{it}^2 + b_3(sex)_{it} + b_4(edu)_{it} + b_5(area)_{it} + b_6(\ln(size))_{it} + b_7(\ln(size))^2_{it} + b_8(year)_{it} + \varepsilon_{it} \quad (2)$$

Where $i = 1, \dots, N$ and $t = 1, \dots, T$

Dependent variables

E_{it} denotes the self-employed real earnings or income at time t , using the imputed individual self-employed income because the household data does not directly collect the individual self-employed labor income. The household labor income was calculated from two-third of household profit [15]. Since there are unpaid family workers who contribute to the unincorporated household enterprises, the income and productivity are needed to impute to them as well as to other household members who are the employer, the own-account worker, and the member of co-operative group. Because of difficulties in accurately measuring the labor income of the self-employed and unpaid family workers, researchers, economists and statisticians have used various criteria to impute the labor income generated by self-employment. However, I choose to impute the self-employed income and productivity by following the work of [10], [16], [27]. Imputations for the labor incomes of the self-employed are carried out under the assumption that the average labor income of self-employed workers is equal to the average income of employees of the same age and sex, with the same levels of education and working in the same industry. In additionally, the individual average working time survey of NSO (2004 and 2009) indicate the unequal working time contribution of each type of workers. Thus, the imputation method in this paper also concerned about the unequal allocation of household labor income to each household's member.

Y_{it} denotes the productivity of self-employed workers, using the imputed individual self-employed productivity, as imputations of the self-employed incomes. According to [5] measured the productivity by the totals sale per labor unit then, in this study, the household productivity was representing by gross money receipt from household business in order to get the individual self-employed productivity.

Independent variables

- Age denoted the current age in years of observations. When the self-employed get older, the accumulation of managerial skill must be higher; this also makes their earnings and productivity higher.

- Age² denoted the square of self-employed workers' age in years and presented the notion that when age is higher, the self-employed must face deterioration of the physical condition and this effect leads to lower earnings and productivity.

- Sex denoted the gender of self-employed workers. The previous papers expected that females would have lower earnings and productivity than male self-employed workers [1], [17].

- Edu denoted the level of education attainment. Mincer (1974) expected that self-employed workers who had a higher education level would have higher earnings and productivity than those who had a lower education level.

- Area denoted the area where observations lived. The area may have had a relationship with self-employed productivity. This study expected that self-employed workers who lived in municipal areas would have higher earnings and productivity than those who lived in non-municipal areas.

- ln (Size) denoted the natural log of the number of workers in each self-employed business and represented the size of the business. An increase in the number of workers should let the self-employed worker become more productive though the higher output that the firm produced.

- Square of ln(size) showed the law of diminishing returns, which states that in all productive processes, adding more of one factor of production while holding all others constant will at some point yield lower per-unit returns and let self-employed productivity decrease. Thus the coefficient of square of ln (size) would be negative.

- ε is an error term.

The overall age-earnings of self-employed workers was estimated first, and then were estimated separately in each economic sector; including Manufacturing sector, Wholesale and retail sector, Hotel and restaurant sector, and Transport and storage sector. Moreover, we use the dummy of years into the estimation too.

III. EMPIRICAL RESULTS

This part reports on the empirical results of this study. A Socio Economic Survey from the National Statistical Office of Thailand (2006, 2007, 2009 and 2011) was used as the source of data in this empirical study. Since the data is a pool of four years of this survey, the models based on equation (1) and (2) in sections 2 were estimated by Pooled OLS regression with [28] accounted for heteroscedasticity-consistant standard errors in order examine the effects of age and other variables on workers' earnings and productivity of self-employed

workers in Thailand. Then, the age-earnings profiles and age-productivity profiles from the variable coefficients of the regression results could be plotted. The regression results are reported as follows:

In Table I, the regression results of the earnings function for overall sector show that age has a positive effect at a decreasing rate on self-employed earnings. Female earns less than half of males' income. With regard to education level, higher education levels have greater effects on earnings. Self-employed workers who stay in municipal areas have higher income than workers who live in non-municipal areas. Moreover, for each economic sector are compared, it shows that self-employed females in the manufacturing sector show the greatest effect from gender differentiation. Their earnings differ from those of men in the same sector by about 70%, while in other sectors females have 40% lower earnings than male workers. For the hotel and restaurant sector, the effects of completing either high school or vocational education are similar.¹

TABLE I
EARNINGS FUNCTION FOR SELF-EMPLOYED WORKER IN THAILAND, 2006-2011, ROBUST STANDARD ERROR

Variables	ln (earnings)				
	Overall	Manu.	Wholesale	Hotel	Transport
Male	Reference				
Female	-0.450*** (0.013)	-0.694*** (0.041)	-0.393*** (0.016)	-0.340*** (0.029)	-0.362*** (0.037)
Age	0.105*** (0.003)	0.130*** (0.008)	0.091*** (0.004)	0.102*** (0.007)	0.078*** (0.008)
Age ²	-0.001*** (0.000)	-0.002*** (0.000)	-0.001*** (0.000)	-0.001*** (0.000)	-0.001*** (0.000)
Lower than high school	Reference				
High School	0.264*** (0.018)	0.397*** (0.061)	0.273*** (0.024)	0.196*** (0.038)	0.152*** (0.049)
Vocational Education	0.378*** (0.033)	0.635*** (0.076)	0.372*** (0.048)	0.209*** (0.063)	0.320*** (0.053)
University	0.622*** (0.022)	0.724*** (0.077)	0.625*** (0.028)	0.593*** (0.054)	0.487*** (0.070)
Non-municipal	Reference				
Municipal	0.504*** (0.013)	0.759*** (0.035)	0.407*** (0.016)	0.470*** (0.029)	0.386*** (0.032)
Constant	8.361*** (0.068)	7.703*** (0.204)	8.678*** (0.086)	8.355*** (0.155)	9.061*** (0.177)
Observations	62405	8623	34654	12284	6836
R ²	0.2071	0.3124	0.1818	0.1756	0.1382
Adjust R ²	0.2067	0.3117	0.1812	0.1747	0.1364
F (.....)	F(10,62394)=599.97	F(10,8612)=190.41	F(10,34643)=308.61	F(10,11273)=82.93	F(10,6825)=52.40

Notes: ***/*** indicates statistical significance at the 10/5/1% level. ln (earnings) is ln of annual real wage earnings in 2007 prices. The values are in parenthesis show the Robust standard error.

As shown at Table II, compares the productivity function of self-employed workers. Overall, the table shows the finding that age also has a positive effect at a decreasing rate on self-employed productivity. The productivity of self-employed

¹ This study also estimate the interaction model between age and education (age*education) but the result did not support our hypothesis and the coefficient of variable did not significant, then we consider only the main model.

women was lower than of men. Higher education levels have greater effects on workers' productivity. Self-employed workers who stay in municipal areas have higher productivity than workers who live in non-municipal areas. Firm size has a positive effect on productivity; when the number of staff increases, the workers' productivity also increases at a decreasing rate.

In each economic sector, females have lower productivity than self-employed males. Only in the manufacturing sector, females have productivity higher than males. In the hotel and restaurant sector, a vocational education level has a slightly lower effect on productivity than completion of high school.

TABLE II
PRODUCTIVITY FUNCTION FOR SELF-EMPLOYED WORKER IN THAILAND, 2006-2011, ROBUST STANDARD ERROR

Variables	ln (productivity)				
	Overall	Manu.	Wholesale	Hotel	Transport
Male	Reference				
Female	-0.310*** (0.015)	-0.574*** (0.048)	-0.250*** (0.020)	-0.319*** (0.031)	-0.308*** (0.040)
Age	0.094*** (0.004)	0.112*** (0.010)	0.075*** (0.004)	0.103*** (0.008)	0.072*** (0.009)
Age ²	-0.001*** (0.000)	-0.001*** (0.000)	-0.001*** (0.000)	-0.001*** (0.000)	-0.001*** (0.000)
Lower than high school	Reference				
High School	0.310*** (0.021)	0.458*** (0.069)	0.287*** (0.027)	0.206*** (0.043)	0.196*** (0.052)
Vocational Education	0.405*** (0.036)	0.765*** (0.085)	0.344*** (0.052)	0.202*** (0.062)	0.276*** (0.062)
University	0.697*** (0.025)	0.907*** (0.079)	0.626*** (0.031)	0.555*** (0.056)	0.578*** (0.080)
Non-municipal	Reference				
Municipal	0.455*** (0.015)	0.791*** (0.039)	0.287*** (0.019)	0.407*** (0.031)	0.342*** (0.035)
ln(size)	0.474*** (0.035)	0.724*** (0.096)	0.269*** (0.043)	0.133 (0.084)	0.430*** (0.088)
(ln(size)) ²	0.062*** (0.023)	0.036 (0.053)	0.178*** (0.026)	0.195*** (0.065)	0.026 (0.057)
Constant	10.010*** (0.082)	8.935*** (0.231)	10.642*** (0.098)	9.911** (0.176)	10.336*** (0.196)
Observations	62405	8623	34654	12284	6836
R ²	0.1951	0.3652	0.1647	0.1785	0.1453
Adjust R ²	0.1948	0.3663	0.1640	0.1775	0.1431
F (...,...)	F(12,62392) =476.95	F(12,8610) =225.93	F(12,34641) =246.63	F(12,12271) =70.08	F(12,6823) =47.11

Notes: */**/** indicates statistical significance at the 10/5/1% level. ln (productivity) is ln of yearly real gross receipts in 2007 prices. The values are in parenthesis show the Robust standard error.

The value of ln(earnings) and ln(productivity) by using coefficient of age and age-squared were then drawn to get the average age-earnings and age-productivity profiles over the sample as shown in Fig.1. Fig.1 shows the difference between age-earnings and age-productivity in each sector. On average, age has higher effect on earnings than productivity, except in the hotel and restaurant sector having closely similar effect of age on earnings and productivity. In overall, the age of peaked earnings comes after the age of peaked productivity, a maximum of the self-employed earnings reach at age 43 and productivity reach at age 41 years old, before falling after that age. While the peak of the age-earnings profile lasts approximately two years longer than that of the age-

productivity profile in the manufacturing sector and in the wholesale and retail sector. In the hotel and restaurant sector, the age-earnings and age-productivity profiles are nearly identical in shape and peak at the same age. Similarly, in the transport and storage sector both profiles peak at the same age, with the age-earnings profile a little higher than the age-productivity profile.

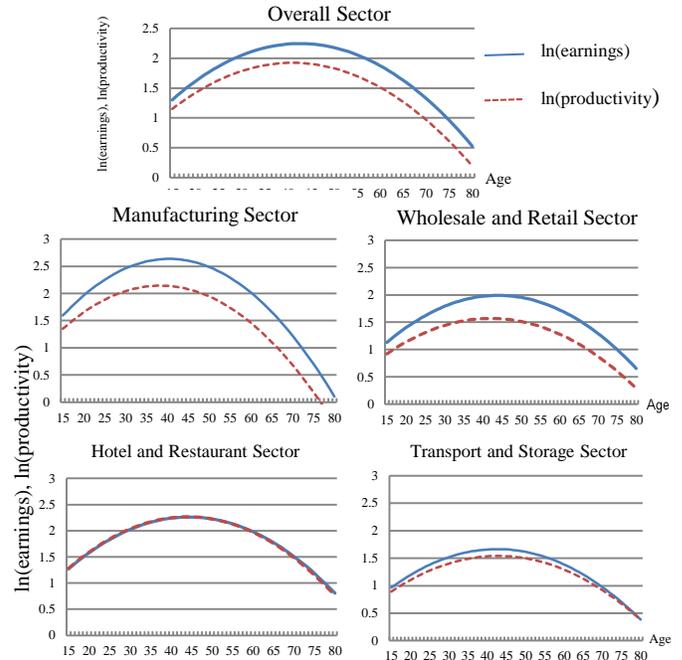


Fig.1 Age-earnings and Age-productivity Profiles of Self-employed Workers in Thailand, 2006-2011

IV. CONCLUSIONS

Self-employment is an important source of jobs, which keeps individuals in the labor force longer and offers both an alternative to joblessness and an opportunity to those who face discrimination in the workplace. Previous studies show differences in age groups among self-employed workers; that is, the groups of older workers are more than the group of younger workers because older workers have greater managerial skills and experience to drive their business and also have the necessary capital or access to credit. Moreover, the studies stated that self-employment has a tendency to rise with age. This paper investigates the relationship between age and self-employed earnings and productivity under the Mincerian earnings equation framework.

The results show that all of the variables respond to the research hypotheses. The age-earnings and age-productivity profiles of the self-employed increase at a decreasing rate. Self-employed females have both lower earnings and lower productivity than males; however, in relative terms, female productivity is much higher than female earnings. That is, females are a little less productive than males, but their earnings are disproportionately much lower. As expected, higher education attainment has a significant positive effect on both self-employed earnings and productivity.

The age-earnings and age-productivity profiles of self-employed workers in Thailand show a concave shape. The age effect on earnings and productivity allows the profiles to increase at a decreasing rate until middle age; after that the profiles slowly decrease. It implies that the middle aged self-employed workers are more productive than young and old workers, then, they earn more.

V. IMPLICATIONS

The age effect allows self-employed workers to maintain their earnings for a period even after their productivity starts decreasing. Self-employed earnings and productivity usually maximize in middle age and after that the profiles slowly decrease. Self-employed workers accumulate skills; such as learning by doing and managerial skill, when they get older that makes their productivity and earnings of their own business higher. The age-earnings profile of self-employed workers does not decrease quite as quickly as age-productivity even though the higher age effect on earnings is larger than the age effect on productivity. Although self-employed workers do not face a retirement program as employees do, both self-employed earnings and self-employed productivity also decrease as the workers become older after middle age. This implies that self-employment is an alternative job which allows workers who get old to stay in the labor force longer, even though their earnings and productivity decrease, albeit slowly.

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