The Impact of Mandarin Proficiency on Thai Labor Force

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Abstract. The income effect of Mandarin proficiency on Thai labor force is analyzed by using questionnaire data. The study finds that: firstly, Mandarin proficiency has a significant positive impact on the income of Thai labor force, the effect of males on income is significantly higher than that of females, age is negatively correlated with income and health status is positively correlated with income; secondly, the mechanism of this influence is that Mandarin helps to reduce the cost of labor transfer between different regions and sectors, increase the successful migration, and thus obtain better economic returns; thirdly, enterprises and institutions, self-employed enterprises in non-agricultural sector have the most significant return on investment in Mandarin in the central region. Based on this, Thailand should enhance the Mandarin proficiency and human capital level of its workforce to increase labor income and meet the growing demand for economic and trade cooperation between China and Thailand.

Keywords: Mandarin Proficiency, income effect, labor transfer, Thai labor force

1 Introduction

Proficient language skills can enhance the vocational skills and literacy of the workforce, broaden income channels, promote job transfer, and also expand the scope of communication, form market scale effects, and create certain economic value for individuals and society. Since the 1980s, scholars have been exploring the relationship between language proficiency and income, with research in this field mostly focusing on the impact of language proficiency on immigrant income. Numerous studies have shown that language proficiency in the workforce has a significant positive impact on individual income. Dustmann (1994) conducted empirical analysis on the relationship between immigrant language proficiency and income based on data from West Germany, and found that language proficiency has an income increasing effect on labor[1]. This conclusion was further validated in more researches. Chiswick (2002)[2] and Solati (2022)[3] analyzed English skills complement other forms of immigrants' human capital in English-speaking countries, promoting labor income growth. Yao (2015)[4], Budría (2017)[5] and Li (2022)[6] revealed that Dutch, Spanish and English are important factors

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contributing to the income gap in non-English-speaking countries respectively. Most existing literature focuses on the English proficiency and income of immigrants, with less research on the foreign language proficiency of their own citizens, and even fewer studies on speaking Mandarin as a foreign language in other countries except in China.

In recent years, industrial upgrading in Thailand has accelerated the process of industrialization and urbanization. Labor has been constantly flowing from the agricultural sector to non-agricultural sectors and from economically underdeveloped areas to developed areas in order to obtain higher incomes; meanwhile, developed regions have broader development prospects and employment opportunities, making it easier for migrant populations to benefit from the spillover of human capital, thereby achieving their own income growth and career success. Therefore, this article believes that the improvement of Mandarin proficiency has a positive impact on the income of Thai labor force, and labor migration has become the driving force for Mandarin proficiency to promote income growth. Based on the above analysis, the following assumptions are proposed.

Assumption 1: The improvement of Mandarin proficiency has a significant effect on the income of Thai labor force.

Assumption 2: Promoting labor migration is an important channel for Mandarin proficiency to increase labor income in Thailand, among which the migration from the agricultural sector to the non-agricultural sector and from other regions to the central region are the main ways of labor income spillover.

2 Data

The questionnaire was distributed to Mandarin learners in Thailand by the Sino-Thailand Chamber of Commerce which trained Thai people to learn Mandarin. The information included gender, age, health status, religious belief, marital status, education level, Mandarin proficiency, occupation, work location, and average annual income. Out of 413 respondents, the study excluded outliers with annual income below 78000 Thai baht per year (not lower than the national minimum living allowance standard), resulting in 387 valid samples. The annual income of Thai people is the dependent variable. To eliminate the heteroscedasticity caused by data unit's differences, the income is expressed in logarithmic form. The most important explanatory variables are Mandarin proficiency and education level. Mandarin proficiency is categorized into five levels: "very good", "quite good", "average", "quite poor" and "completely incomprehensible/unable to speak." Respondents rate their Mandarin proficiency on a scale of 1-5, with higher scores indicating better proficiency. The education level is divided into 6 levels, "no education received", "primary school", "junior middle school", "senior middle school", "bachelor" and "graduate degree or above", and is assigned values within the range of 1 to 6. The higher the score, the higher the education level of the labor. By reviewing the relevant researches in existing literature, the control variables are divided into four parts: personal characteristics, social capital, industry, and region. Among them, personal characteristic variables include gender, age, health status, religious belief, and marital status; social capital variables include parental education level;

industry variable is work type; the variable for regional characteristic is the work location. Age is the year. Health status is the range of 1 to 5 and the higher the score, the healthier. Others are dummy variable. For gender, female=1. For religious belief, non-religion=1. For marital status, married=1. parental education is assigned the same levels as respondents. For work type, agricultural sector=0, self-employed=1, enterprise=2, social organization=3, educational sector=4, government=5, others=6. For work location, northeast Thailand=0, northern Thailand=1, central Thailand=2, southern Thailand =3.

3 Model

The impact of Mandarin proficiency on the income of Thai labor force belongs to the research of human capital. As one of the human capital models, the Mincer equation has obvious characteristics of simplicity and controllability, and plays an important role in studying the impact of labor forces' income. Therefore, the modified Mincer income model is adopted

$$lny = c + \alpha_1 Mandarin + \alpha_2 edu + \sum \alpha_i X + \varepsilon$$

y is the dependent variable, representing the annual income of Thai labor force in logarithmical form, Mandarin indicates Mandarin proficiency, edu refers to the level of education received. α_1 and α_2 are the coefficients of the explanatory variables Mandarin and edu, respectively, representing the impact of each level of improvement in Mandarin and education on income lny. X represents the control variables and ε is random error term.

Before the analysis, three issues should be noted: first, measurement errors caused by respondents overestimating their own language abilities; second, heterogeneity caused by sample selection bias; and third, endogeneity caused by reverse causality. The problem of measurement error can be solved through a "strict definition", which divides Mandarin proficiency into two levels: good and bad. Among them, "very proficient" and "relatively proficient" are defined as strong Mandarin ability, while others are defined as poor Mandarin ability. To address the conclusion bias caused by strong individual heterogeneity in the sample, this paper introduces propensity score matching (PSM) method for heterogeneity testing to determine the model robustness. Generally speaking, endogeneity in cross-sectional data are mainly solved by introducing appropriate instrumental variables. However, the selection of instrumental variables in this paper is difficult and challenging. Through studying a large number of relevant literature, although endogeneity do exist, it doesn't have a significant impact on the research result. Therefore, the study directly uses OLS estimation on the model.

4 Empirical Results

4.1 OLS Regression Analysis

Multicollinearity test showed that the VIF values of each variable were all less than 3, indicating that the model does not have multicollinearity. The regression results of the impact of Thai labor force's Mandarin proficiency on income are shown in Table 1.

Table 1. Results of estimation.

Variables	(1)	(2)	(3)	(4)	(5)
Constant	6.2352***	6.3065***	6.8173***	6.8244***	6.8014***
Mandarin proficiency	0.1427***	0.1137***	0.1124***	0.0786***	0.0804***
Education	0.2542***	0.1856***	0.1545***	0.1256***	0.1357***
Gender		-0.2391***	-0.2278***	-0.2673***	-0.2665***
Age		-0.0086***	-0.0057***	-0.0071***	-0.0062***
Health		0.0593***	0.0619***	0.0548***	0.0573***
Religion		-0.4312	0.0335	-0.0134	-0.0129
Marital status		0.0146	-0.0412	0.0578	0.0748
Father's education level			0.0181		0.0192
Mother's education level			0.0316		0.0045
Work type				0.0789***	0.0761***
Work location				0.2165***	0.2047***
R-squared	0.3027	0.3465	0.3574	0.4318	0.4321

Overall, in the regression of columns (1) - (5) of Table 1, the regression coefficient of Mandarin proficiency is positively significant, indicating that Mandarin proficiency has a significant effect on Thai labor income. This may be due to the fact that Mandarin can enhance the vocational skills and literacy of the workforce, and promote the accumulation of human capital, thereby helping individuals obtain positions with more opportunities and income returns. In addition, the impact of education and Mandarin proficiency on income is consistent, and the income effect of education is greater than that of Mandarin proficiency. This indicates that in promoting the growth of labor income in Thailand, the improvement of education is equally important as the improvement of Mandarin proficiency.

Specifically, the regression in column (1) only involves Mandarin proficiency and education. However, due to the absence of control variables in the regression, the coefficients of Mandarin proficiency and education on income are biased, and the explanation of the regression is insufficient.

The regression in column (2) includes personal characteristics control variables, and the results show that the coefficient of influence on Mandarin proficiency undergoes a significant change, because the R-squared in the model increases. It can be seen that personal characteristic variables play an important role in explaining the impact of

Mandarin proficiency on Thai labor income. Gender, age, and health status are significantly correlated with the income of Thai. The spillover effect of males on income is significantly higher than that of females, which has the similar conclusion with Yao & Ours (2015)[4]. The reason would be that 71% respondents are senior financial executives, financial analysts, software developers, engineers, doctors, and teachers and the respondents in these professions are mostly male and have higher incomes. And age is negatively correlated with income and health status is positively correlated with income.

The regression in column (3) includes social capital control variables, and the results show that the income effect of parental education level is not significant. It can be inferred that the education level of parents has a limited effect on the income of Thai labor force.

The regression in column (4) includes industry and regional control variables, and the results show that the coefficients of work type and work location on income are 0.0789 and 0.2165 respectively. It can be seen that in addition to personal characteristics, work type and work location are also key factors affecting the income of Thai labor force. Based on this, it is necessary to encourage Thai labor force with strong Mandarin proficiency to move across industries and regions, especially by strengthening Mandarin training and actively promoting non-agricultural transfer of Thai labor force, in order to achieve the economic value of Mandarin proficiency.

The regression in column (5) takes into account all control variables, and the income effects of Mandarin proficiency are 0.0804, the income effect of education level is 0.1357. There is no significant difference in the coefficient of each variable and R-squared compared to column (4).

In summary, the Mandarin proficiency of Thai labor has a significant promoting effect on individual income. Assumption 1 has been validated, which also confirms the economic significance of promoting Confucius Institutes and Mandarin teaching in Thailand.

In addition to differences in proficiency in Mandarin, it is necessary to consider the heterogeneity of the sample to prevent biased conclusion. Therefore, this study verifies the robustness of conclusion by introducing PSM. PSM is a matching method originating from the Rubin causal model, which mitigates the effects of endogeneity by matching similar samples. Considering that probability score is the matching basis for PSM method, before conducting PSM analysis, samples with strong Mandarin proficiency (above level 3) were selected as the experimental group, and samples with weak Mandarin proficiency (level 3 and below level 3) were selected as the control group for estimation. The analysis results are shown in Table 2.

Table 2. PSM estimation results.

		Coefficient	Standard error
ATE level	Nearest neighbor matching	0.1534***	0.0542
	Kernel matching	0.1765***	0.0422
	Radius matching	0.1654***	0.0446

After using three matching methods in PSM, it was found that the average treatment effect (ATE) coefficients for Mandarin proficiency were 0.1534, 0.1765, and 0.1654, respectively, with significant p-value at the 5% level, demonstrates the robustness of the model, indicating that Mandarin proficiency does indeed have a positive impact on the income of Thai labor.

4.2 The Impact of Thai Labor Transfer on Income

The improvement of foreign language can increase the probability of successful migration, mainly reflected in reducing communication barriers and psychological barriers between employers and migrant employees, promoting the sense of identity and social integration of the labor force and in the context of information asymmetry in job market, sending signals about individual potential to employers and having an advantageous position in the job search process[7]. The improvement of Mandarin proficiency will promote the transfer of labor between different industries and regions, improve the efficiency of labor resource allocation, and promote individuals to obtain higher returns. To examine whether this transfer mechanism is valid, the mediation effect between regions and industries is tested. For the convenience of analysis, the work types are divided into agricultural and non-agricultural sectors to explore whether the transfer of labor between different sectors and regions is an important way to improve the income of Thai labor by enhancing their Mandarin proficiency.

Table 3. Mediation effect test results.

	Work location	income	Whether in non-agricultural sectors	income	income
Mandarin proficiency	0.2175***		0.0573*		0.0795***
Work location		0.2748***			0.2083***
Whether in non-agricultural sectors				0.4381***	0.3781***
R-squared	0.2092	0.3675	0.2586	0.3763	0.4169

The results of the mediation effect test on the impact of Mandarin proficiency on income are shown in Table 3. The results show that, without considering the mediator variables of employment region and sector, the impact of Mandarin proficiency on Thai labor income is positively significant. After adding the mediator variables, the coefficient of Mandarin proficiency on work location is 0.2175, the coefficient of work location on Thai labor income is 0.2748, and the coefficient of Mandarin proficiency on income is 0.0795. The p-values of these three coefficients reached a significant level. This indicates that the work location plays a partial mediating role in the impact of Mandarin proficiency on the income of Thai labor, and regional mobility is an important mechanism for increasing income from Mandarin proficiency. Similarly, it can be concluded that the work location also plays a partial mediating role in the impact of

Mandarin proficiency on Thai labor income. Therefore, labor migration (including sectors and regions) is a mediator variable for the impact of Mandarin proficiency on income, and assumption 2 has been confirmed. The improvement of Mandarin proficiency is beneficial for the accumulation of human capital in the labor force, thereby gaining greater advantages in the migration of different regions and industries. Specifically, the Mandarin proficiency of Thai labor force is helpful for learning other skills and improving productivity. At the same time, labor transfer itself is also a way of personal investment, which is conducive to the accumulation of individual human capital and social capital, and promotes the acquisition of higher income and advantageous positions.

5 Conclusions

For Thai labors, Mandarin has gradually become a more common way of communication with important economic significance. Thai labor force with strong Mandarin proficiency has shown greater advantages, by promoting psychological identification and social integration, reducing migration costs, and reducing friction in labor mobility, accelerating the transfer of labor across sectors and regions, and enabling labor force to enjoy more benefits from the spillover of human capital. Therefore, the implications of this study are as follows:

Firstly, Thailand should attach great importance to Mandarin education, as not only do Chinese people make up a large proportion in Thailand, but Chinese companies' investments in Thailand continue to grow. Enhance the language communication skills of Thai labor force, promote economic and trade exchanges between China and Thailand, and improve the adaptability and occupational compatibility of labor force to the Thai job market.

Secondly, provide Mandarin training tailored to the different needs of Thai labor force to enhance their Mandarin proficiency. Training should be targeted, with different requirements and objectives for different groups. On the one hand, the Thai government should improve the Mandarin proficiency of the Thai labor force at the middle- and low-income levels, combined with vocational skills training, in order to increase the individual human capital of the labor force. On the other hand, we should pay attention to the role of Mandarin as a language tool and enhance the labor productivity of Thai labor in non-agricultural employment. Especially in Thailand, Chinese-funded enterprises should be aware of the mechanism by which Mandarin proficiency plays a role in improving production efficiency. They should combine Mandarin training with vocational skills training to enhance the Mandarin proficiency and vocational skills of the Thai labor force.

Thirdly, actively promote the departmental and regional transfer of Thai labor force with high Mandarin proficiency, and focus on the role of Mandarin proficiency in promoting labor mobility and income growth. Mandarin proficiency can promote the transfer of labor between different sectors and regions, and the reasonable flow of labor in the market is a key factor in income growth. Therefore, Thai government should further improve the employment service system, and promote the flow of labor force from the

agricultural sector to the non-agricultural sector and from other regions to the central region.

Those need to be further analyzed in future research. Firstly, data sources are limited. It is possible to continuously observe the income changes of definite Mandarin learners in more vacations as longitudinal data. Secondly, there is a lack of in-depth interviews with Thai labors. Interviews can be conducted with language skills, career experience, and income changes to understand their learning motivation and difficulties that the Mandarin brings to their work.

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