WAGE INEQUALITY IN MANUFACTURING SECTOR

Piyanan Suwanmana

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Piyanan Suwanmana

School of Development Economics

Associate Professor.......................................Major Advisor

(Adis Israngkura, Ph.D.)

Professor.......................................Co-Advisor

(Medhi Krongkaew, Ph.D.)

Lecturer.......................................Co-Advisor

(Somchai Jitsuchon, Ph.D.)

The Examining Committee Approved This Dissertation Submitted in Partial Fulfillment of the Requirements for the Degree of Doctor of Philosophy (Economics).

Associate Professor.......................................Committee Chairperson

(Isra Sarntisart, Ph.D.)

Associate Professor.......................................Committee

(Adis Israngkura, Ph.D.)

Professor.......................................Committee

(Medhi Krongkaew, Ph.D.)

Lecturer.......................................Committee

(Somchai Jitsuchon, Ph.D.)

Associate Professor.......................................Dean

(Adis Israngkura, Ph.D.)

April 18, 2011

ABSTRACT

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Author	Miss Piyanan Suwanmana
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This study adopts regression-based decomposition proposed by Fields on Thailand Labor Force Surveys to investtigate the wage inequality in the manufacturing sector in Thailand during 1985-2005. The included variables are workers' individual characteristics and their working status such as gender, marital status, family size, urbanization, education categories, experience, types of occupation, minimum wage zone, fringe benefit, domestic expenditure, and international trade.

Ordinary regression states the significance of all explanatory variables in all study periods. However, the log variance of inequality or the factor weight inequality indicates that there were only a few variables that accounted for large shares of the inequality level. In 1985, the significant variables were education, experience, and minimum wage zone. In 1995 and in 2005, education, occupation, and minimum wage zone accounted for large inequality shares.

With the regression-based decomposition, this study can examine the contribution of each variable to the change of the inequality. It has been found that an increase of the Gini during 1985-1995 was attributed to education, occupation, and minimum wage zone and was opposed by experience, marital status, and gender. A decrease of the Gini during 1995-2005 was explained by education, urbanization, and occupation. Since these explanatory variables dominated the opposing factors such as international trade, minimum wage zone, and gender, the Gini in 2005 is less than that in 1995.

It is noteworthy that the regression based decomposition can capture both level and dynamism of inequality. In all study periods, the elementary and lower

secondary education is an inequality-decreasing factor whereas the other education levels are inequality-increasing factors. However, the lower inequality share of all education levels in recent periods implies increased accessibility of education. In other words, although most of education levels are inequality-increasing factors, they can be a tool to improve inequality as well. With this more precise source of inequality, this study can propose more prioritization towards targeting the effectiveness of government budgeting policies.

ACKNOWLEDGEMENTS

TABLE OF CONTENTS

Page

LIST OF TABLES

CHAPTER 1

INTRODUCTION AND STATEMENT OF PURPOSE

1.1 INTRODUCTION

The relationship between economic growth, poverty, and income inequality is the core of development economics. Although high economic growth is a desirable objective for all countries as it can improve the poverty incidence, an impressed high economic growth does not generate a higher standard welfare for all. In other words, growth that is most effective at reducing poverty does not necessarily coincide with growth that reduces inequality[1], namely pro-poor growth. While inequality can hinder economic growth and slow down poverty reduction, pro-poor growth is able to reduce the poverty level and improve the income distribution; for that reason, the studies on poverty usually concern income distribution.

At present, we pay more attention to inequality because all countries, industrialized countries, developing countries, and even former communist regimes, are characterized by high and increasing income inequality, especially in the nineteenth century. Consequently, studies concerning income inequality became more popular in development economics since 1980s. For example, using data from Dollar and Kraay (2002) database which includes 92 countries across regions, Lopez (2006: 1) found that during 1990s a 1 percent growth rate was associated with an increasing range in the Gini coefficient of .3 to .5 percent while during the 1970s and 1980s the growth process was not accompanied by an increase in inequality. Stewart (2000: 20) supported that the worsening income distribution since the 1980s until present was a result of more free trade and changes in technological progress which lead to a constantly widening wage gap between skilled and unskilled workers. It seems that globalization era not only makes inequality worse but also spreads the perception of

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[1] In fact, there are many categories of inequality. With data limitation, we can measure only economic inequality such as inequality in income and wealth.

more inequality, especially in developing countries where the benefits of globalization are shared unequally amongst the citizens. (Stewart, 2000; IMF, 2007b; Direk Pattamasiriwat, 2008)

Since inequality is harmful for both economic and social status, why does it still exist and continue to thrive in many countries, including Thailand? It is suspected that the persistence of income inequality in Thailand may arise from government negligence. While the First Thai Social and Economic Development Plan, launched in 1961, adopted economic growth as a strategy for Thai economic development, it was the Fourth Plan which was the first to address the problem of income distribution. However, its monetary and fiscal instruments, such as inheritance tax and capital gains tax, have not been implemented as of yet (Pranee Tinakorn, 2002: 148). It wasn't until the Seventh Plan that poverty reduction was first targeted. In Thailand, it is obvious that economic growth successfully improved absolute poverty, but with the side effect of worsening income inequality. This is contrary to Kuznets (1955) who suggested that economic growth leads to inequality at the beginning of development stage, and then inequality will decline later. This evidence in Thailand may result from the test on Kuznets was done in long study periods or Thai economy may be in the rising part of the Kuznets curve. Adelman (1986) argued that an inverted U Shape does not propose an autonomous improvement in inequality, trickle down effect, as suggested by Kuznets, but it also depended upon development policies and strategies implemented in each country. This is because Kuznets' inverted U shape is just a hypothesis, not a theory; therefore, it is not guaranteed to exist in all countries. For example, Conceicao and Galbraith (2000: 5) found that while the evolution of inequality is consistent with Kuznets in Korea, it does not exist in the US, the UK, or Japan.

Market failure and inequitable institutions are also usually claimed as another major source of inequality in Thailand because they impede human capital accumulation, resulting in lacking of social dynamism (Somchai Jitsuchon, 2004; TDRI, 2007). These unequal opportunities and political power cause social inequalities to reproduce themselves over time and across generations, that is to say, we are living in a perpetuating cycle of inequality traps. To solve for these adverse effects of market failure, Narong Petchprasert (2003) suggested non-market

institutions to invest more public goods whereas World Bank (2006) advised government to focus on the distribution of assets, economic opportunities and to give more voice to their people.

In Thailand, some pilot studies of income inequality start from simple measurements like income gap. According to the data of income shares in 1963, 1969, and 1972, Medhi Krongkaew (1979: 26) found that while the top 20 percent gained absolutely and relatively, the top 1 percent of households probably gained the most. A later study by Pranee Tinakorn (2002: 166) also confirmed that the income gap between the twenty percent poorest, quintile 1st, and the twenty percent richest, quintile 5th, rose from 8.1 in 1975 to 14.9 in 2000. Her further examination in a smaller group, at 10 percent each, found that the richest 10 percent population earned 27.3 times more than the poorest 10 percent in 2000.

Once Kuznets' inverted U shape is not automatically obtained from economic development, the role of government in solving inequality is undeniable. However, the aggravated income inequality in Thailand is usually claimed as a result of ineffective government policies. Sawarai (2007: 93) suggested that the shares of tax revenue and expenditure to GDP are too small in Thailand, especially when compared to other countries with approximately the same levels of GDP, similar to Worawan Chandoevwit (2009) who criticized about the insufficient expenditure on social welfare. Moreover, the larger share of indirect tax in government revenue not only lessens the effectiveness of fiscal policies but also deteriorates income inequality in Thailand.

In summation, the imbalanced growth cannot offer Kuznets's inverted U shape automatically whereas globalization is presently aggravating inequality since the rich are more able to tolerate the fluctuation and earn more benefits arising from globalization in comparison to the underprivileged. Therefore, the role of government is undeniable, especially in developing countries that are usually faced with high inequality with an increasing trend. This situation challenges the government to solve for income inequality in the globalization era. At present, income inequality is

realized by all because it has become the barrier of sustainable growth[2] as well (TDRI, 1988; Dagdeviren, Hoeven, and Weeks, 2004; Medhi Krongkaew, 2007; Medhi Krongkaew, and Ragayah Hahi Mat Zin, 2007).

1.2 STATEMENT OF PURPOSE

There are many studies concerning poverty and income inequality in Thailand; most of them relate to the poverty incidence, sources of poverty and income inequality. In the early period, the studies relating to poverty were based on some poverty indexes such as headcount ratio, relative income shortfall, and Sen poverty index whereas the measures of income inequality adopted Gini coefficient, Theil index, and Atkinson index such as a study of Medhi Krongkaew and Pranee Tinakorn (1985). On sources of inequality, most studies concerned individual characteristics such as gender, age, education, and occupation. For example, Ikemoto (1991) found that the number of income earners and the age of the household head and an educational level higher than elementary were important factors in determining income inequality in Thailand.

Once Thailand became more industrialized, high economic growth and concentrated infrastructures in the Bangkok Metropolitan Region (BMR) have the enhanced immigration of workers from rural areas. Without adequate skills, these migrants become poor urban workers in the informal sector and, as a result, later studies were concerned urban poverty. For example, Suganya Hutaserani and Pornchai Tapwong (1990) examined characteristics of the poor including urban poverty. They recognized that the economic growth might reduce overall or rural poverty but it could not lessen the urban poverty incidence, especially in BMR.

It is obvious that high economic growth could reduce poverty in a certain level; however, this growth could not improve income distribution because the benefits arising from economic growth were not equally distributed to all people, indicating the non-existence of trickle-down effect. (Chu Ke-Young, Davoodi Hamid,

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[2] According to Warr and Isra Sarntisart (2005), the sustainable economic growth is a necessary condition for large-scale poverty alleviation.

and Gupta Sanjeev, 2000; Somchai Jitsuchon, Jaroenjit Pothong, and Jiraporn Plangpraphan, 2003) This is because the failure of the financial market offered more opportunities to the rich, especially the first 10 percent richest, to earn more benefits arising from economic growth. In addition, the increased access in the Thai economy led to worsening income distribution.[3] This circumstance made economists question the effectiveness of prior government policies. For example, Chu Ke-Young, Davoodi Hamid, and Gupta Sanjeev (2000) suggested that developing countries do not have adequate redistributive programs to achieve a post-tax, post-transfer income inequality in comparison to the success of income transfer in the industrial countries. Correspondingly, there were many studies that focused on the effectiveness of government policies, especially fiscal polices in Thailand. (Ammar Siamwalla, Suthad Setboonsang, 1988; Lae Dilokwitthayarat, 1993; Isara Santisart, 1999; Chu Ke-Young, Davoodi Hamid, and Gupta Sanjeev, 2000; Peter Warr, 2003; Warr and Isra Sarntisart, 2005; Son 2006)

According to a large share of the agricultural sector in the past, some studies concerned poverty and income distribution in agricultural and non-agricultural sectors. For example, Ammar Siamwalla and Suthad Setboonsang (1988) stated that the government policy implemented on the Thai agricultural sector was partly responsible to worsening income inequality because government interventions not only lowered the income of workers in agricultural sector but also raised income of workers in non-agricultural sector.

Isara Santisart (1999) found that raising the value added tax rate aggravated its regressive characteristics, and then exacerbated people living in the lower income class, especially in the rural area; the finding of regressiveness of value added tax (VAT) was also supported by Warr (2003). Based on the elasticity between the percentage change of tax burden and percentage change of income, he found that the only significantly progressive tax in Thailand was the personal income tax whereas the most regressive taxes were the VAT and state-owned enterprise profits. The burden of VAT in Thailand was also confirmed by Son (2006) who found that VAT

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[3] Chalongphob Susangkarn, Somchai Jitsuchon, and Yos watcharakoop (2002) suggested that globalization worsened the world income distribution, especially since 1980s.

burden on food items and other essential commodities was likely to be borne by the poor rather than by the non-poor. It is noteworthy that the interpretation of the tax impact must be done carefully because these studies concerned the impact of the policy during that instant or rather short term. Correspondingly, their study results might be amended when Thai tax structure has been changed. In addition, the marginal analysis could not take into account the externalities stemming from public policies or any of their possible indirect effects.

For government spending, Warr and Isra Sarntisart (2005) adopted the elasticity between per capita expenditure and provincial income to examine whether poverty-related expenditures were targeted to the poor or not. They found that expenditures per capita were higher in richer not poorer provinces. It meant that the distribution of government spending was regressive and not well targeted.[4] Although some prior studies claimed the income inequality within groups as the major determinant of national income inequality, these studies, according to the limitation of Socio Economic Surveys, could not provide benefits received by households from public expenditures and allocation of expenditures within provinces (Warr and Isra Sarntisart, 2005). Nevertheless, most studies concerning the government spending had similar limitations resulting from their focus on the cost to the public sector rather than the benefits received by the people. They could not clarify the quality of the facilities or the private cost spent to access them as well. For example, it is generally accepted that the higher quality of education is usually found in the richer provinces. Consequently, the net benefit received will be smaller if individuals living in rural areas have private funds to access the public facilities.

It is obvious that most of the prior studies concerning poverty and income inequality in Thailand usually involved the sources and the effect of fiscal policies on these problems. The studies usually decomposed economic sectors into broad categories such as agricultural and non-agricultural sectors, geographic region or sub-

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[4] According to Chu Ke-Young, Davoodi Hamid, and Gupta Sanjeev. (2000: 15), the progressive (regressive) spending benefits represents a smaller (larger) fraction of income or expenditure at higher income or expenditure quintiles. This definition means that if spending is well targeted, it will be progressive, but progressive spending may not be well targeted. It also implies that if spending is poorly targeted, it may be progressive or regressive. Therefore, targeting expenditure well is a much more demanding objective than making it progressive.

region, and rural and urban areas. (Ammar Siamwalla. and Suthad Setboonsang, 1988; Sukanya Hutaserani and Somchai Jitsuchon, 1988) While methodologies of preceding studies are useful and applicable, they cannot examine the dynamism of inequality. For example, the past studies measured the inequality in order to indicate an increase or a decrease of the inequality in each particular period. However, they cannot explain the factors that cause the change of the inequality. The data limitation may restrict the capability of the methodology used in earlier studies as well. In the past, the Household dataset of the Socio Economic Surveys did not allow the previous studies to examine the inequality resulting from government policies; however, at present, the National Statistical Office has started collecting longitudinal Socio Economic Survey data. With the more complete longitudinal dataset, we can expect the more dynamic studies to be able to clarify the impact of government policies on the inequality.

Note worthy that there are many studies concerning inequality in Thailand, however, comparing these similar studies must be done carefully and is not recommended because they probably utilize different data coverage such as concepts and units of observation. For example, in Thailand, some studies treated sanitary districts as rural area whereas some others included sanitary districts in the urban area.[5] The different coverage can mislead the study results, not only in Thailand, but in other countries as well. For example, Elbers, Lanjouw, Mistiaen, and Ozler (2005, 4-5) suggested that the difference between racial inequality in the United States, Brazil, and South Africa came from the difference in population shares of the racial groups and not from the difference in their mean incomes.

It is obvious that income inequality has been one of the most important problems in Thailand for several decades and many scholars have been offering arguments concerning this issue. This study questions that the persistence of inequality in Thailand may result from the limitations of the prior studies, based on their static measurements used to identify the accurate sources of inequality. Without accurate sources of inequality, the imprecise solving policies create substantial cost to

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[5] Urban area in Medhi Krongkaew and Pranee Tinakorn (1985) included municipal areas and sanitary districts. Sukanya Hutaserani and Porn Tapwong (1990) defined urban as municipal areas.

the society and lead the economy into an inequality trap. For example, it is believed that the market failure in the financial market offers more opportunities to the rich, especially the top 10 percent richest, to earn more benefits arising from economic growth. Therefore, the shortage of funds among the poor is usually claimed as a source of inequality in Thailand. If this reasoning is supported by empirical evidence, the village funds and people's bank programs should be able to solve for this problem. On the contrary, it was found that the poor had to borrow from other sources to pay back the debt borrowed from these two programs. Therefore, source of inequality may be the investment incapability of the poor instead of a shortage of fund. This example shows that lack of information or accurate sources of inequality can lead to improper policy recommendations.

From all of the above, the sources of inequality obtained from the prior studies are lack confidence in their accuracy. The findings of the prior studies may be affected by the adopted methodology. The conventional approaches of inequality decomposition, whether by population sub-group or by factor components, may suggest different policies because the importance of a particular attribute varies depending on the measure of inequality that is decomposed (Litchfield, 1999). For example, size of family may be an important factor in determining inequality under the Gini coefficient, but its effect may become moderate under the Theil index. Wan and Zhou (2005: 107-108) further suggested some drawbacks of the conventional decomposition as follows: firstly, the identification and measurement of a particular variable is impossible without the ability to control other factors, and secondly, it allows us to attribute total inequality to the income sources but not to the fundamental determinants.

The regression based decomposition, an alternative decomposition technique, contributes two advantages. The first one is this technique allows us to assess the contribution of each factor of the inequality without influencing the inequality measures used. In addition, this method offers more accurate identification of each factor in determining income inequality as well. For example, the income inequality according to gender may not be as pervasive as it suggested; in fact the lower wages of female workers results from their lower level of education in labor market, especially in developing countries. The second advantage is it offers dynamic tests on

inequality. The dynamic study on inequality enables us to examine the effectiveness of government policies.

However, the regression based decomposition has some limitations according to its sensitivity to inequality measure. For example, a study of Morduch and Sicular (2002) points out that while human capital and demographic variables are strongly inequality-reducing when using Theil-T index, these factors only moderately contributed to the inequality when they adopted the Gini.

The regression based decomposition technique starts from the ordinary regression to examine the factors influencing the income differential and to construct factor weight inequality and then the Gini coefficient and factor weight inequality will be integrated to identify the factors that cause the change in the inequality. The details of the model will be presented in Chapter 3.

1.3 OBJECTIVES OF THE STUDY

This study aims to investigate inequality with the regression based decomposition developed by Fields (2002), a new methodology at least in Thailand. Fields claims that his regression-based decomposition can answer two questions concerning the inequality. The regression based decomposition can quantify the contributions of various factors in accounting for not only the amount of the inequality at a point in time, the "levels" question, but also the change of inequality over time, the "differences" question. With this technique, the ordinary regression enables us to explain the income differential according to each variable. The levels decomposition can further clarify the inequality shares attribute to each explanatory factor, namely, factor weight inequality. In addition, if the variable is continuous, the components and the change of factor weight inequality can be further decomposed into a coefficients effect, a correlation effect, and a standard deviation effect. In the differences question part, these explanatory factors can be decomposed to examine the contribution of each factor to the change of the inequality over time.

The regression based decomposition enables this study to examine the sources of income inequality with more accuracy. Once we know the accurate sources, we can efficiently solve for inequality. However, the study focuses on the manufacturing

sector which is an important sub-sector transmitting Thai economy from agricultural-based to industrial-based economy. The manufacturing sector is selected because of its significance to the GDP since 1985, the time of its high growth. Even in 2005, the last period of this study, non-agricultural and agricultural sectors accounted for 89.7 percent and 10.3 percent, respectively, of GDP. Among the non-agricultural sector, the share of the manufacturing sector was greatest with 34.7 percent of GDP, more than three times of the agricultural sector. In addition, the manufacturing sector has more complete datasets available over long periods of time which is a requirement for the regression based decomposition technique when we measure the factors contributing to the change of inequality. Therefore, instead of decomposing income inequality, this study decomposes wage inequality, as the title suggests.

This study aims to answer the following questions: How individual characteristics and the state of working influences wage inequality in the manufacturing sector and how these factors account for the change of the inequality overtime?

Using the Thai Labor Force Surveys' dataset, this study is able to identify the sources or factors of wage inequality from ordinary regression, the influence of each factor on the log variance of monthly workers' income from each factor weight inequality, and the effect of each factor on the change in wage inequality from the years 1985-2005. The extension of study periods from 1985 to 1995 and to 2005 enables this study to examine both static and dynamic inequality. With more accurate identification of the factors as well as the stress of how important they are in accounting for inequality will support Thai government to implement more effective policies. Whether the study results are new findings and conform or contradict to the previous studies, this endeavor, at least, proposes more precise and dynamic view of the inequality in Thailand.

Following the introductory chapter, this study is organized into 6 chapters. Chapter 2 explores the review of related studies. The theoretical framework and methodology will be clarified subsequently. The results of this study will be presented in Chapter 4. Chapter 5 is the conclusion of the main findings. The final chapter presents contribution of the study and suggestion to the government policies.

CHAPTER 2

LITERATURE REVIEW

2.1 INTRODUCTION

High economic growth with neutral distribution has lead Thailand to a high income inequality economy. In the past, the income inequality was partly lured by rapid poverty reduction and was treated as a diminutive administrative mistake although it actually indicated the failure of economic development. At present, the wider income gap has been realized as a serious problem because it can be a source of other serious problems such as economic and social problems, investment fluctuation, and even political instability. Moreover, the improvement in income inequality is also a foundation of faster and more sustainable economic growth which is a necessary condition for large-scale poverty alleviation in the long run.

The provision of infrastructures initiated in the First National Economic Development Plan transmitted Thai economy from agricultural-based to be more industrialized and highly dependent on international markets as well. According to unequal distribution of benefits arising from world economic growth, the wider income gap became generally evident in both developing and developed countries, especially in the United States and OECD countries at the beginning of 1970s (Williamson, 1997). While income inequality in developed countries could be relieved by government policies, those mechanisms could not work well in developing countries. In Thailand, although the ambition to reduce the income inequality was initiated in the Third National Economic Development Plan launched in 1972, there was no deliberate attempt to figure out this problem. In addition, according to patronage with inadequate moral standards and transparency coupled with imperfect capitalism, the Thai society lacks socio-economic mobility. These constraints in human capital accumulation and short of intergeneration mobility are suspected to worsen in the globalization era.

Since this study tries to examine wage inequality with regression-based decomposition, the next section presents some studies using regression-based decomposition in other countries. Then, the inequality of some selected countries is cited. Some studies concerning poverty and inequality in Thailand are in the last section.

2.2 REGRESSION-BASED DECOMPOSITION STUDIES

According to Wan and Zhou (2005: 112), the regression-based decomposition methodology was proposed in the early 1970s such as the studies of Blinder (1973) and Oaxaca (1973); however, this methodology had not gained much attention until 2000 when it was adopted in many empirical studies. With some limitations, this study introduces only two common regression-based decomposition methods proposed by Fields (2002) and Morduch and Sicular (1998, 2002).

Fields (2002) developed regression-based decomposition to analyze labor earnings inequality in the United States between 1979 and 1999. He found that the included variables such as gender, race, experience, schooling, occupation, industry, and region, were statistically significant at conventional levels, and together they could explain 41.5 percent of the variance of log-earnings in 1979 and 38.3 percent in 1999. Although all these explanatory variables were statistically significant determinants of earnings levels, the decomposition analysis through factor weight inequality indicated that a handful of variables, namely, schooling, occupation, experience, and gender, were important factors in determining the levels of inequality. Among these variables, schooling was about twice as important as each of the next three closest variables. Testing on the contribution to the change of two inequality measures, the Gini coefficient and the log-variance, he found that schooling accounted for 56 percent of the increase in the Gini coefficient and 34 percent of the increase in the log-variance. Occupation contributed 28 percent of the increase in the Gini coefficient and 18 percent of the increase in the log-variance. The remaining variables added nothing to the change in the inequality.

Cain, Hasan, Magsombol, and Tandon (2008) also adopted regression-based decomposition proposed by Fields (2002) on consumer expenditure surveys to

investigate the poverty and the inequality of 17 major states of India in 1983, 1993, and 2004. The explanatory variables were age, gender, social group, production sector, occupation, level of education, and state of residence. While poverty reduction was found in all study periods, the inequality had different patterns. Between 1983 and 1993, both the Gini coefficient and generalized entropy class decreased in the rural sector, but these inequality measures increased in the urban one. In the next decade, 1993 and 2004, the inequality marginally increased in the rural sector and more substantially increased in the urban sector; therefore, they further identified the factors accounting for the inequality and its changes between 1993 and 2004. The states of residence and education were the most important factors of inequality in both rural and urban sectors, but with enormously different shares. In the rural areas, states of residence and education accounted for 7.83 percent and 6.57 percent of the inequality in 1993, and slightly increased to 8.81 percent and 7.93 percent in 2004. While the share of education was 20.72 percent and that of state was only 4.83 percent of the inequality in 1993, the values rose to 22.66 percent and 6.01 percent in 2004, respectively. These two variables were the most important factors accounting for the change in the inequality as well when education attainment accounted for 47 percent of the total change in the Gini coefficient between 1993 and 2004 in the rural sector, corresponding to 45 percent in the urban sector. The state accounted for 37 percent of the inequality in the rural sector, but it was around 20 percent in the urban sector.

Morduch and Sicular (2002) adopted the regression-based approach[6] to decompose the inequality of the average income of 259 farm households of 16 villages in Zouping Country during 1990-1993. The variables were grouped into regional segmentations, human capital accumulation, and political variables. This study decomposed four inequality measures, namely, Theil-T, squared CV/variance, alternative CV, and the Gini coefficient, to quantify the sources of the inequality. They found that the contribution of political variables was relatively small whereas the contributions of spatial characteristics were large in all decompositions.

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[6] While Fields' regression-based decomposition quantifies the factors causing the change of the inequality measures from time to time, the regression-based approach done by Morduch and Sincular decompose the inequality measure of the average income during a certain period, e.g., four years.

However, the relative contribution of each factor was highly sensitive to the decomposition rule. This sensitivity became a limitation of the Morduch and Sicular (2002) method. For example, while Theil-T indicated that human capital and demographic variables were strongly inequality-reducing; the Gini decomposition stated that these factors contributed moderately to the inequality.

There are some studies which followed Morduch and Sicular (1998, 2002) to investigate the inequality in rural areas or farm household income. For example, Adams (2002) followed the regression-based decomposition proposed by Morduch and Sicular (1998) to examine the income inequality in rural Egypt. The sources of income composed of non-farm, agricultural, transfer, livestock, and rental income. With 1,301 rural households in 1997, he found that although agricultural income was the second leading income source, it accounted for the highest share of the inequality, 40.2 percent, whereas nonfarm income, the largest income source in the rural Egypt, contributed 29.7 percent of the inequality. In addition, non-farm, transfer, and livestock were inequality-decreasing sources of income. Since non-farm income was the most important source of inequality-decreasing, its four sub-income sources: government employment, private sector, unskilled labor, and self-employment were further examined and found that only government employment, private sector, and unskilled labor were decreasing-inequality sources of non-farm income. Among these sub-income sources, the unskilled labor which was the second share of non-farm income was recommended as a tool to improve welfare in the rural Egypt. The relationship between landownership, non-farm income, and the poor confirmed the importance of non-farm income in rural Egypt. The landownership, unevenly distributed toward the rich, positively related to agricultural income, but was negatively linked to non-farm income. For that reason, non-farm income was more important to the poor in Egypt.

Similar results were found by Arayama, Kim, and Kimhi (2006) who also extended the regression-based decomposition method suggested by Morduch and Sicular (2002) to estimate regime-specific income-generating functions of Korean farm household with a micro dataset collected in 2003. They found that family size and its composition as well as land ownership were the main determinants of the inequality in Korean farm household. While non-farm labor income was an equalizing

source of income, farm income was disequalizing. Therefore, a continued increase in the variability of landholding distribution could worsen income inequality among farm households in Korea. In addition, since education also contributed to income inequality through its effect on non-farm labor income, an equalizing source of income, the inequitable expansion of rural education could increase rather than decrease farm household income inequality.

Note that there are many studies concerned with the inequality in rural China specifically with its high economic growth and high inequality since the late 1970s economic reform. Wan and Zhou (2005) combined both Shapley value framework of Shorrocks (1999) and the regression-based decomposition proposed by Morduch and Sicular (2002) to examine the determinants and the changes of income inequality in rural China with household-level datasets during 1995-2002. To represent the level of development, they selected three villages from each of three provinces; Guangdong, Hubei, and Yunnan and found that geography contributed the largest share of the inequality but with decreasing roles whereas the share of capital input, another significant determinant, steadily increased. Since the share of cropping patterns accounted for larger impacts than those of labor and human capital inputs in the rural areas, the Chinese government should improve rural credit services and raise returns for grain-cropping in order to reduce the income inequality in this region. They also suggested that even the impact of education on inequality was rather small but its role would be higher in the near future because of more skill-demanding labor. Consequently, equal education access is needed or else education could be a major factor to raising the inequality.

2.3   INCOME AND WAGE INEQUALITY

2.3.1   The United States

Studies of wage inequality of American male workers during 1963-1989, Juhn, Murphy, and Pierce (1993) found that workers in the top 10 percent of the wage distribution had gained almost 40 percent whereas workers in the bottom 10 percent had lost over 5 percent in real terms. This enormous wage inequality came from both observable (education, experience, and occupation) and unobservable dimensions of

skill, especially since 1970 when the returns to unobservable skills steadily increased. While the rapid increase in the demand for skilled workers could explain the rising in skill premium; the source of this increase in demand was suspected to be a result of the biased rates of technological progress and the changes in the world economy.

A more recent study by Steelman and Weinberg (2005) supported that the best explanation for the increase in wage inequality in the United States was skill-biased technical change. They stated that a decline in demand for less skilled labor put forward pressure on their wages whereas an increase in large business raised the demand for workers with higher education, and then wage inequality in the United States grew rapidly during the first quarter of the twentieth century. Technology innovation has significantly affected the wage distribution, particularly the introduction and access to information technology which has caused wage dispersion since the 1970s. Therefore, the skill-biased technical change has benefitted the more-skilled workers over the past 30 years. The skill-biased change means that advancements in technology have boosted the productivity of skilled labor relative to that of unskilled labor; therefore, it has lead to worsening wage distribution. Nevertheless, they stated that international trade and immigration were not primary factors behind growing wage inequality in the United States.

2.3.2   Singapore

Some studies focus on the achievement of education in Singapore where human resources are the key to its economic growth performance. This human resource has been nurtured through education and training together with selective immigration. The major sources of wealth generation in Singapore are through success in business ventures, astute investment strategies, and high earnings of the highly skilled labor force. Correspondingly, Singapore has a high degree of upward social mobility because a household in the lowest quintile or decile can rise to the top quintile or decile within one generation. As Singapore society matures, accumulated wealth passed on to the next generation will become an increasingly important factor of income inequality in the near future. Moreover, the offspring of the rich also have better access to education, not just in Singapore, but also to the best educational institutions around the world, giving them an advantage in the job market.

According to Chia and Chen (2003), although high and sustained economic growths of the past four decades have led to the near-elimination of poverty in Singapore, the evidence of income inequality is mixed. Income inequality was improved in the 1970s but has generally worsened again in the 1990s. The intensification of globalization has been suspected of raising the demand for skills and making workers with low and unmarketable skills into the losers in the new economy; consequently, intensification of globalization will worsen the income distribution. To ensure continuing broad-based growth and upward social mobility, they also suggested that education should be accessible for all and should be affordable to the low income groups.

2.3.3 Indonesia

Chu, Davoodi, and Gupta (2000) found that unlike other developing countries whose tax reform and government transfer usually worsened the income inequality, Indonesia's tax reform during the 1980s was aimed towards raising revenues and enhancing the efficiency and simplicity of the tax system without causing an adverse impact on the poor. These tax reforms and social spending policies reinforced each other in reducing the after-tax Gini. Consequently, Indonesia achieved sustained economic growth, improved income distribution, and reduced poverty during 1970s-1980s.

2.3.4 Colombia

Including education, age, and place of residence in the income function of Colombia, Fields and Schultz (1982) found that education and age accounted for about 29 percent of the log variance of incomes. While the incomes in the urban area varied largely with education and age, the incomes in the rural area varied according to regions. In addition, the overall level of income was higher in urban than rural areas in all levels of education; moreover, education successfully raised income proportionately more in urban areas, 19 percent per year of schooling, compared to only 8 percent in rural areas.

2.4 POVERTY AND INCOME DISTRIBUTION IN THAILAND

Although poverty and income distribution are not the same issue, they are closely related because economic growth that is well-targeted to the poor, pro-poor growth, efficiently mitigates both poverty and income inequality. For that reason, the studies on poverty usually concern income distribution.

In the early period, most studies concerning poverty usually mentioned poverty incidence as an inadequate income of the poor. The popular measures of poverty incidence such as poverty line, head count ratio, and relative shortfall income were commonly found in the prior studies. More recently, many studies include economic and social living status as the meaning of poverty, rather than inadequate income as defined in the past. For example, Krisda Boonchai (1998) defined poverty as powerless people with no right to choose their destiny. Narong Petchprasert (2003) further classified poverty into four inadequate capabilities; asset, opportunity, power, and prestige. Similarly, Warr and Isra Sarntisart (2005) described dimensions of poverty into three types; opportunity, security, and community. Sen (1995) mentioned poverty as the lack of real opportunities to have minimally adequate lives. Sen (2007) suggested a broader meaning of poverty with his capability approach, focusing on human's freedom in choosing the way of life, including implications for ethics, morality and public policy such as why the seriously disabled should receive a greater claim to social attention and public assistance. Somsak Samakketham (1998) mentioned that the meaning of poverty may differ according to vocation and region. From all above, poverty among labor should be defined as workers who lack sufficient things for well-being such as security in job position, working in safe conditions, and powerful negotiation.

While high economic growth in Thailand succeeded in poverty reduction, the success of poverty reduction varied according to regions. For example, Sukanya Hutaserani and Pornchai Tapwong (1990) found that in the mid 1980s while the overall and rural poverty declined, urban poverty incidence increased, especially in Bangkok Metropolitan Region (BMR). Therefore, urban poverty is regularly mentioned in recent studies. At present, the socio-economic inequality, especially poverty is suspected of exacerbating the unrest in the three southern provinces of

Thailand; namely, Narathiwat, Pattani, and Yala. Isra Sarntisart (2005: 84) suggested that when education harmonizes with religion, language, culture, and history it can relieve the unrest; the sustainable tourism can improve the employment and income of the area, leading to ecological, social, and economic sustainability.

2.5 SOURCES OF INCOME INEQUALITY IN THAILAND

Although there are many studies concerning income inequality in Thailand, this section will present only some studies related to sources of income inequality.

2.5.1 The Structure of Thai Economy and Economic Development

The drastic change of the Thai economy started during 1950s & early 1960s when government concentrated on encouraging private investment and private enterprise instead of expanding state capitalism as done before. This transition enhanced the growth of the private sector, especially the industrial expansion (Pranee Tinakorn, 1995: 226-227). Moreover, the low growth and unfavorable demand elasticities in agricultural products supported the industrially lead growth strategy as well. At the beginning of the industrialization era, the Thai economy implemented import-substitution policies which could reduce the import of consumer products; however, it raised the import of capital goods and raw materials which; consequently, led to consecutive trade deficit. In response to the trade deficit and the inability of the domestic market to maintain industry expansion, the export-oriented industrial promotion was launched in 1972. It was found that the export promotion was supporting both the growth of the manufacturing sector and its export share, especially since 1985 when the value of manufacturing exports surpassed agricultural exports whereas its share in GDP was about 20.6 percent (TDRI, MEP, HRS, 1987: 7, 21, 27). The rapid export growth of Thailand in that period was a result of penetration in many new products such as textiles and clothing, jewelry, electronics, and processed food etc. (Dapice and Flatters, 1989: 38)

The other principal of export expansion achievement was caused by the success of the "Gang of Four"[7] and Japan, the revaluation of the yen, and the rising labor costs in these countries. All of which have led to the rapid transfer of labor intensive industries to Thailand and the other ASEAN "junior NIC's"[8] because of the more favorable economic policies, adequate infrastructure, and supplies of trainable and low-cost labor of these destination countries.

The transfer of labor intensive and high technology and medium technology production of Japanese firms to these countries was commonly found in that period (Dapice and Flatters, 1989). These foreign direct investments also influenced the employment in the manufacturing sector of these countries. Mingsan Kaosaard (1993: 10-11) found that while the real wage remained relatively low and stable, attributed to the low price of rice and labor supply expansion in Thailand, the employment rate of the manufacturing sector rose from 8 percent in 1985 to 11 percent in 1991.

However, the benefits from economic expansion were not equally distributed to all, but were earned by the non-agricultural households (Bandid Nijathaworn, 1985: 101). When the employment rate in the non-agricultural sector could not keep pace with its high output growth, the Thai economy was faced with a gap of per capita income in the agricultural and non-agricultural sector after a few years of implementing the export promotion, 1975-1985 (Sukanya Hutaserani and Somchai Jitsuchon, 1988: 21). This income gap led to an influx of labor into the industrial sector as well. However, the absorption of labor in the industrial sector was rather limited according to government industrialized supporting policies. To expand the industrial sector, the Thai government offered import tax relaxation on machines and equipment. As a result, we implicitly adopted labor-saving technology production to our labor abundant economy. Moreover, according to the lack of adequate skill and negotiation power, most immigrant workers had to work in informal sector instead (Lae Dilokwitthayarat, 1993: 353-354).

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[7] They are Hong Kong, Korea, Singapore, and Taiwan.
[8] They are Thailand, the Philippines, Malaysia, and Indonesia.

The concentration of infrastructure at the beginning stage of development caused some problems in the Thai economy. While the concentration and economic boom in the late 1980s offered urban employment opportunities for workers, limited working skills, inadequate basic social provisions, and the higher consumer urban price index raised the number of urban poor among the migrants (Sukanya Hutaserani and Pornchai Tapwong, 1990: 21). It has become worse since the urban poor situation is more serious than the rural poor in the sense that they cannot find consumption goods from natural resources. As a result, the relative income shortfall of urban poor is worse than the rural poor (Medhi Krongkaew and Pranee Tinakorn, 1985).

Without targeting policies to the poor, the benefits arising from the economic transition were not only unequally distributed but also highly concentrated among the rich, especially the top 10 percent; therefore, the imbalance of growth can be denounced as a source of income inequality.

2.5.2 The Government Policies

In any economy, the role of government can be classified into three main functions; allocation, distribution, and stabilization. In developing countries, governments have tried to achieve and maintain sustainable economic development in order to raise the well-being for all (Pranee Tinakorn and Chalongphob Susangkarn, 1997:1). It is obvious that government policies, especially fiscal policies play an important role in improving the income distribution because a more equitable tax and expenditure system can lead to a more equal distribution of the incomes deriving from economic growth. However, the role of Thai government in improving income distribution was limited, because of ignorance in improving income distribution. For example, while the investments of infrastructure in the first two Social and Economic Development Plans could raise GNP and per capita GNP, the investment unlikely improved the well being of the poor (Somluckrat Wattanavitukul, 1978). According to this imbalanced development, the inequality among regions and occupations was commonly found in Thailand; therefore, the social equity and regional development was mentioned in the Third Plan and the reduction of income inequality was stated in the Fourth Plan. However, there were no concrete government policies implemented for solving these problems.

2.5.2.1 Government Revenue

Unlike developed countries where tax and government spending can improve the income distribution, developing countries, including Thailand, cannot relieve this problem by fiscal policies. There are some studies concerning the tax burden in Thailand. For example, Medhi Krongkaew (1979) found that the burden of taxes and other public revenues had caused the distribution of household income to become more unequal in three study periods, 1963, 1969, and 1972, according to the Thai pro-rich tax system. Warr (2003: 35-36) supported that only personal income tax is progressive in the Thai tax system whereas the most regressive taxes are the value-added tax and state-owned enterprise profits. Moreover, an increase in the share of indirect taxes-in particular, value-added taxes or state-owned enterprise profits, lead to more regressive distributional impact. Son (2006) stated that while government revenue relies on indirect taxes; especially value added tax and excise tax, the effects of the indirect taxes on poverty incidence depends upon the type of the products. For example, an increase of tax on food will hurt the poor much more than the non-poor. On the contrary, the raising of indirect taxes on communication service and equipment, recreation and reading materials hurt the non-poor more than the poor. In addition, the effect of indirect tax varied among regions, as stated by Isra Sarntisart (1999), and raising VAT rate lead to higher tax burden on the people in the lower income class, especially the poor in rural area.

2.5.2.2 Government Expenditures

The expenditure side of the budget has offered better opportunities than the tax side in redistributing income but the income inequality may arise from ineffective government expenditure policies because the ability of government in redistributive programs varies from country to country. Chu, Davoodi, and Gupta (2000: 34-36) found that weak tax administration, corruption, and poor governance in developing countries limits the effectiveness of taxes and transfer as redistributive instruments. Therefore, although the income inequality of developing and transition countries is lower than that of the industrial countries before the implementing of redistributive programs, the inequality is higher after the redistributive policies were executed.

It seems that spending on social welfare is a crucial factor to redistribute income in developing countries. The IMF suggested that spending on health and education can offer better opportunities in reducing income inequality over the long term. Similarly, Van De Walle Dominique (1995) mentioned that public services such as basic schooling and health care would accumulate human capital. In Thailand, however, the expenditure on social welfare was quite small, 2.3 percent of GDP in 2006 (Worawan Chandoevwit, 2009). Moreover, most of the expenditures were allocated to Bangkok and surrounding provinces. According to Medhi Krongkaew (1979: 122-123), the effects of fiscal policies on income distribution were quite small and quite neutral. The role of the government's budgetary policies on income distribution was neutral at best, and at worst, it could be income disequalizing, depending upon how public deficit was financed. Nevertheless, the role of non-budgetary policies should not be overlooked because they can improve or worsen the income distribution.

We may expect that the government's investment always leads to the improvement of income distribution; however, this belief is not always true. Bandid Nijathaworn (1985) found that the investment expansion in the agricultural sector worsened income distribution in the rural area. Additionally, the inappropriate allocation of government expenditure such as urban-dominated provinces could enlarge the income inequality in Thailand. For instance, Warr and Isra Sarntisart (2005) found that provinces with higher incomes per person received higher total government expenditures per person.

In more recent periods, the Thai government moved toward populism through micro-credit to the poor. However, many Thai economists mentioned the failure of the programs as "programs for the poor are the poor programs". Unlike microfinance, which can relieve the problem of lacking credit in other developing countries, micro-credit, without adequate consideration, makes the debt of Thailand's poorest sharply rise (Kobsak Pootrakool, 2007). Similarly, Bowornpan Atchakul and Worawan Chandoevwit (2007) found that while village fund program could raise income and consumption at the beginning of its implementation, most of the debts were spent on non-productive activities which meant that the poor had to borrow from other sources to pay back the debt. Since the failure of the program may be attributed

by the incapability of the poor, there are some suggestions for solving micro-credit such as offering credit with investment capability to the poor (Chaiyasit Anuchitworawong, 2007) and even finding market for their products (Ammar Siamwalla, 1993).

To spend the limited budget effectively, some economists argued on the targeting of government policies. However, the anti-targeting group further argues that finely targeted problems have usually failed in either fully covering the poor or in avoiding leakage to the non-poor. Therefore, if governments effectively promote economic growth and invest in basic social services for all through broad targeting of budgetary allocations, there should be no need for more finely targeted programs (Van De Walle Dominique, 1995: 29). Like other developing countries, Thailand needs external borrowing to bridge the domestic saving-investment gap; therefore, non-targeting policies which requires huge government budget may raise debt burden or waste resources. At this point, this study suggests that providing basic social services must be done under effective prioritization.

2.5.2.3 Government Policies and Industrialization Development

We have to accept the potential role of Thai government in influencing the economic growth. While the expenditure on infrastructure, tax relaxation, and investment promotion are the key factors of the industrial lead growth, they cause some serious problems in this economy. For example, tax reduction on importing machines and equipment encourages labor saving technology. Consequently, the share of employment in the industrial sector is rather small compared to its share in GDP. In addition, the reduction of imports on consumer goods were more than offset by the imports of capital and intermediate goods and, for that reason, the import substitution policy cannot solve for the trade deficit (Atchana Wattananukit and Teerana Bhongmakapat, 1989: 10). The concentration of infrastructure in Bangkok and its surrounding provinces also encouraged large scale firms to operate in the Bangkok Metropolitan Region (BMR). Pranee Tinakorn (1988) stated that once the benefits of economic development targeted the BMR, the gap of income inequality between the BMR and the other regions would widen. Nevertheless, while the imbalanced economic development created job opportunities in the big cities, the inadequate labor absorption, arising from labor saving technology, caused a new

problem in Thailand, namely, urban poverty. Sukanya Hutaserani (1990: 5) stated that these urban poor workers had lower-status jobs, lower level of education, and lower tenure status compared to the non-poor. In addition, the urban poor are worse than the rural poor because the former cannot find food from natural resources.

There is some evidence indicating that government policies worsened income inequality. Ammar Siamwalla and Suthad Setboonsang (1988: 48) found that while the rich in both agricultural and non-agricultural sectors earned more benefits from government intervention, farmers' income was reduced by the intervention.

It's not only fiscal policies but monetary policies can also influence the economic growth and income distribution as well. Pakorn Vichyanond (1988) found that the impacts of monetary policies on income distribution, through Credit Allocations and Refinancing Facilities, are ambiguous because the effects of monetary policies on income distribution are treated as by-products of typical stabilization measures undertaken in the short run.

From all the factors mentioned above, government policies significantly affected economic growth; however, the benefits of growth are unequally shared. While capitalists and politicians earned a large proportion of benefits, most of the adverse effects were born by the poor. This evidence was obvious in the financial crisis in 1997.

2.5.3   Market Failure, Globalization, Technology, and Skill Premium

Not only did the structure of the Thai economy and its government policies affect the income inequality but there were some other factors which worsened income inequality in Thailand. While market failure has been claimed as a persistent source originating from the past, some other sources such as globalization, technology, and skill premium are more recognized in recent periods.

2.5.3.1 Market Failure

Since market strategy does not support the more equal income distribution, Thai economy lacks the dynamism of economic and social status. Therefore, children of the poor will remain poor in their generation. Consequently the failure of market strategy needs the fiscal policies implementation on basic services such as education, health care, and risk insurance.

2.5.3.2 Effects of Globalization

There are two points of views on the effect of globalization[9] on income inequality. The optimistic stance states that globalization leads to higher income inequality at the initial phases of industrial development, but the inequality will decline as the transition to industrialization is completed. The opposing school argues that globalization worsens income inequality because the benefits are unequally shared among the citizens of a country (IMF, 2007b: 31). There are some studies concerning the effect of globalization on income inequality. For instance, Stewart (2000) recognized that the worsening income distribution in the 1980s and 1990s in both developed and developing countries arose from trade liberalization, technological change, and the impact of liberalization and globalization. The technological change made the income of the educated skill workers increase more than that of the unskilled workers, and then lead to the rising of the wage gap.

Chalongphob Susangkarn, Somchai Jitsuchon, and Yos Watcharakup (2002: 3-4, 24) suggested that although globalization can lessen the absolute poverty, it enhances the trend of income inequality in the world. Globalization means high dependency on the world market and accepting more external shock or fluctuation. Therefore, when the low capability group cannot take the benefit of globalization, they encounter with higher inequality.

In Thailand, the studies concerning the impacts of globalization on income distribution started from international trade, especially the impact of export on income distribution. According to Atchana Wattananukit and Teerana Bhongmakapat (1989), export expansion offered the highest growth rate of the non-agricultural households' nominal income. However, the simulation with an increase in consumer price index suggested that the export growth lead to lower real income of agricultural, low-income state enterprise and low-income government households. Moreover, the export growth with inflation could adversely affect the real income of upper-middle-income or high-income government households. For the impact on income

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[9] Adis Israngkura (2007:2) classifies globalization into five categories, namely, trade liberalization in goods and services, liberalization in capital flow, liberalization in labor migration, liberalization of information flow, and pervasive natural resource and environmental impacts.

distribution, agricultural exports favor the lower-income classes, particularly farmers, whereas manufactured exports slightly worsen the country's income distribution. It is also noteworthy that the impacts of globalization are not unique but vary according to the different forms of globalization. Based on the Thailand Social Accounting Matrix, Israngkura (2000 quoted in Adis Israngkura 2007: 9) found that while financial liberalization caused the worst impact, agricultural export yielded the smallest adverse impact on income distribution. These findings are similar to a study by the IMF (2007b) which stated that while trade liberalization and export growth are found to be associated with lower income inequality; increased financial openness is associated with higher inequality. The IMF also claimed that the positive effect of trade on reducing income inequality is particularly noticeable for agricultural exports, especially in developing countries where the agricultural sector still employs a large share of the workforce. Correspondingly, an increase of agricultural export shares had been associated with declining inequality in Algeria, Brazil, Nicaragua, and Thailand.

Piriya Pholphirul (2007: 9-14) mentioned that globalization did not support the well being of all Thai workers because it widened the wage gap between workers in the formal and informal sectors. Workers in the formal sector, especially workers in industries relating to export expansion or foreign direct investment, earn more benefits than those in the agricultural sector, particularly, female workers in the agricultural sector. Moreover, the imports used to substitute for domestic products can lead to insecurity in job position or even a decline in the wage rate.

At present, globalization is unavoidable for all. Furthermore, the imposing barriers to globalization will worsen the economy. Steelman and Weinberg (2005: 2) stated that trade restrictions will lower aggregate income and overall social welfare. Therefore, to make globalization improve or at least not worsen the income distribution, we should increase the access to education for less-skilled and low-income groups to capitalize on the opportunities from both technological progress and the ongoing process of globalization. Having more skill, these workers will be more adaptable to advanced technology, capable to earn higher income, and this may reduce wage inequality. Dapice and Flatters (1989: vii) suggested that fiscal policies play an important role in determining economic development in the globalization era. However, inadequate public investment, especially in human capital, and excessive

domestic protectionism could slow future progress and become major constraints of continued rapid development in Thailand. In addition, the effective public policies can alleviate the unpleasant impacts of globalization (Direk Pattamasiriwat, 2008).

The strength of institutions also plays a crucial role in the globalization era. The IMF (2007b: 46, 56) stated that the net impact of financial globalization is influenced by the quality of financial sector institutions. Strong institutions may allow better consumption smoothing and lower volatility for the poor but if institutions are weak, financial access is biased in favor of those with higher incomes and assets and then financial globalization will exacerbate income inequality. As a result, policy reforms aimed at broadening access to finance, such as by improving institutions that promote pro-poor lending, could improve the overall distribution of income and support overall growth.

2.5.3.3 Technology and Skill Premium

According to the IMF (2007b), globalization and technology are interdependent because technological advances have helped to deepen trade and financial linkages between countries whereas globalization has helped spread the use of technology. Additionally, technological progress has had a greater impact than globalization on inequality within countries.

In Thailand, the government policies are partly responsible for these limited technological capabilities. According to Westphal (1989: 40), the promotional incentives of Board of Investment offered firms too little incentive to utilize technology transfer effectively. Mingsan Kaosaard (1993: 6, 13) supported that the government policies act as tools for seeking economic rent not for technology development in industrial sector. Suwit Mesinsee (2006: 191) confirmed that the Thai export manufacturing sector does not appear to possess technological capabilities such as in South Korea. Even when compared to other Asian countries like Singapore and Malaysia, the Thai enterprises have low capabilities in technology absorption because their productions adopted the first two stages of production technology, labor intensive process and subcontractors in more skill intensive sectors.

The quality of local workers is also a crucial key for technology transfer. While the capabilities of local workers are needed to accomplish technology transformation, Thai workers are an ineffective powerful factor because of their

inadequate knowledge, technology, and skill. There are some studies which have suggested that education can relieve the problems of ineffective technology transfer and wide-gap skill premium. Dapice and Flatters (1989: 28), for instance, suggested that investing more in education, training, and infrastructure could help the poor and remove constraints of sustainable growth in Thailand. A study by Sukanya Hutaserani and Somchai Jitsuchon (1988: 35) also supported that better education among the population helps to improve income distribution. The IMF (2007b: 55-56) recommended that the ease of accessibility to education would allow less-skilled and low-income groups to capitalize on the opportunities from both technological progress and the ongoing process of globalization, shortening the length of disequalizing impacts arising from foreign direct investment (FDI). However, education cannot guarantee an improvement of income distribution. Isara Santisart (1997: 150, 153) found that educational expansion can be both an income-equaliser and an income-disequaliser, depending on the level of education and the elasticities of demand for labor. He suggested that the expansions of secondary and vocational levels deserved the most support because jobs for labor in these two categories could be actively created without any unfavorable impact on income distribution.

There are some suggestions to develop technology in Thailand. Suwit Mesinsee (2006: 171) advised that the enhanced capability of the private sector through productivity and innovation expansion is needed to lessen the fluctuations arising from globalization. Somkiat Tangkitvanich (1999) mentioned that a tight cooperation between public and private sectors is needed for creative imitation, another strategy for Thai technology development. The IMF (2007b: 31, 52) recommended that policies aimed at reducing barriers to trade and broadening access to education and credit can allow the benefits of globalization to be shared more equally.

The wide-gap of skill premium exists in developed countries as well. Maoz and Moav (2004) explained that the non-monotonic skill premium in the United States and other western economies is a result of the difference in the decision to purchase education. The high skilled wage associated with a relatively low supply of skilled workers can further limit the access of individuals into skilled occupations, potentially increasing both the duration and magnitude of periods in which the skill

premium increases but when the supply of skilled workers is relatively high, the wage of skilled workers and; therefore, the cost of education are low, easing further access to skilled occupations and increasing the duration and magnitude of periods in which the skilled premium declines.

Westphal (1989: 41) stated that the impressive industrial growth in Thailand primarily resulted from favorable short-to-medium term trends in world markets and in the factors determining the location of direct overseas investment and not from the well conceived technological strategies that formed one of the requisites for self-sustaining industrial development. Therefore, inadequate attention to technological development and effective technological strategies in the industrial sector will raise its dependency on the world market and become easily affected by globalization. Therefore, the next issue for the Thai government is to search for a strategy to lessen the unpleasant impact of globalization on income distribution.

2.6 INCOME INEQUALITY ALLEVIATION IN THAILAND

Poverty and income inequality are directly related because effective poverty reduction can improve income distribution as well. Therefore, poverty reduction is usually mentioned in the studies concerned with the improvement of income inequality.

Most economists stated that economic growth could reduce poverty but it could not equalize income distribution in both developed and developing countries. However, using both cross-country and Thai datasets, Sawarai (2007) found an inverse relationship between economic growth and income inequality, i.e. a relatively high inequality resulted in a relatively low economic growth. These two factors also have indirectly interacted through other factors such as economic, social, and political factors or, namely, education, health, investment, international trade, credit market, fiscal policies, political institutional environment and cultural diversity. Bigsten and Levin (2004: 258) mentioned pro-poor growth as a tool to equalize income distribution because its strategy focuses on economic growth coupled with active policies of income redistribution. However, the success of pro-poor growth was limited in Thailand. According to The World Bank's Public Expenditure Review

(2001 quoted in Warr and Isra Sarntisart, 2005: 199), there are three limitations of Thailand's growth. These limitations are small government expenditure on poverty-related activities, the non-poor targeting and budget allocation across provinces according to their population, and inadequate coordination and little effort to evaluate the effectiveness of the programs.

Since market failure is usually claimed as a source of income inequality, government policies are needed to solve for the failure. Therefore, most Thai economists suggest similar government policies to alleviate poverty and to improve income inequality resulting from market failure. For example, Sukanya Hutaserani (1990: 18) advises welfare and non-welfare policies to solve for poverty and income distribution. Non-welfare policies, such as enhancing their human capital through skill development or vocational training programs, can promote productivity of the poor whereas welfare policies such as education, low-cost housing, tenure security, family planning, health and nutritional care can improve their quality of life. Chalongphob Susangkarn (1996: 4) supports that enhancing the human capability, including social safety net, is the best intervention in liberalism. Narong Petchprasert (2003: 73-74) similarly proposes the investment of public goods to promote the capability and productivity of the poor. Medhi Krongkaew (2007: 6-7) also recommends three main government strategies. They are enhancing competition, poor- targeted fiscal policies, and raising capability and opportunities of the poor through education, human capital accumulation, which includes pensions to the old and incapable people. It seems that education is the chief key to encourage human capital accumulation. The role of education in determining income distribution in Thailand is confirmed by Sukanya Hutaserani and Somchai Jitsuchon (1988: 27). They found that while sex or age of the households' head was insignificant to income difference, the education of households' head; however, explained a substantial part of the total income inequality. According to the IMF (2007b), education acts as a tool to achieve sustainable growth because the greater accessibility to education and a shift in employment from agriculture to industry and services enables the support of the improvement of income distribution. Dagdeviren, Hoeven, and Weeks (2004: 147) also claim that the poor in all countries suffer from poor health and inadequate education compared to the non-poor; therefore, education and health are two great practical advantages for poverty

reduction without any controversy. In Thailand, it is suspected that an inadequate secondary education could be a serious impediment to acquiring the advantage of technological transfer.[10] Since most of the poor in the urban area are unskilled workers, education can reduce urban poverty of the new poor in recent periods.

From all above, we can conclude that education is an important strategy leading to the social and economic dynamic of the poor and then can also lessen poverty and income inequality. Education expansion cannot be avoided when the Thai economy becomes more globalized and moves toward knowledge-base society. However, the education expansion in Thailand is rather limited which attributable to the poor targeting of education accessibility. The Education Loans Program, set in 1997, may not be considered sufficient poverty targeting because institutions lack the information to define who the poor students are (Warr and Isra Sarntisart, 2005: 199).

At present, the Thai government implements more populism policies. Populism policies are necessary in a recession period because they can encourage consumption and investment faster than the other regular government policies. However, while populism cannot alleviate social inequality, it can lead to the inequality among groups because these particular groups of people will earn benefits from populism (Veerathai Santiprabhob. 2006 and Prapart Pintobtang, 2009). Therefore, the more appropriate policy should be in the form of productive populism that enhances efficiency and transparency (Somchai Jitsuchon, 2006).

When the lack of credit to access earning activities is suspected to be a source of poverty, implementing credit to the poor is quite popular under populism. However, the government needs more careful consideration in approving credit for the poor. In Thailand, Kobsak Pootrakool (2007) found that credit made the poorest households accrue higher debt and negative savings which leads to more fragility and more sensitivity to economic fluctuation. This result is consistent with Son (2006: 448) who suggested that while the in-kind income subsidies benefit the poor more than the non-poor, the money income subsidies benefits the non-poor more than the poor and then the government policies will worsen income inequality.

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[10] Depice and Flatters (1989) stated that the secondary enrollment in Thailand was more 25 years behind Taiwan, Indonesia, and the Philippines.

CHAPTER 3

METHODOLOGY AND VARIABLE EXPLANATIONS

3.1 METHODOLOGY

This study adopts the income generating function to apply for wage inequality in Thailand's manufacturing sector. In theory, income generation functions are statistical tools used to explain the differences in personal income which may be interpreted as a framework accounting for income inequality and may be employed to infer the effect of income opportunities on a variety of economic and demographic behaviors. In addition, these income functions can assist in the more adequate evaluation of the partial association between personal income and other factors underlying the distribution of income such as location by geographic region or factor market, ownership of land and physical capital, and distinctions among workers by industry, occupation, sex and ethnic group.

In the past, the conventional inequality decomposition, whether by population sub-group or by factor components, were quite popular to assess the contribution of factors to inequality. However, the importance of a particular attribute varies depending on the measure of inequality that is decomposed (Litchfield, 1999). For example, size of family may be an important factor in determining inequality under the Gini coefficient, but its effect may become moderate under the Theil index. Wan and Zhou (2005: 107-108) suggested some drawbacks of the conventional decomposition as follows: firstly, the identification and measurement of a particular variable is impossible without the ability to control other factors and secondly, it allows us to attribute total inequality to the income sources but not to the fundamental determinants; therefore, the sources of inequality obtained from prior studies may be lacking in their accuracy.

The regression based decomposition, an alternative decomposition technique, allows us to assess the contribution of each factor of inequality without influencing

the inequality measures used. In addition, this method offers more accurate identification of each factor in determining income inequality as well. For example, the income inequality according to gender may not be as pervasive as it suggested; in fact the lower paid of female workers results from their less educated in labor market, especially in developing countries. Accordingly, this study will examine the sources of the inequality with regression based decomposition instead of the conventional one.

With regression based decomposition developed by Fields (2002), this study aims to answer the following questions: which factors determine the wage inequality in manufacturing sector in Thailand and how does each factor account for the change of the inequality during 1985-2005. This technique enables us to answer these two questions which are the so-called levels question and differences question. The levels question refers to how much wage differential can be accounted for by various individual characteristics whereas the differences question concerns to what extent these characteristics account for the change in wage inequality over time.

To examine the income generating function, we have to start from a standard regression function such as equation (1)

$$\mathbf{Y} = \mathbf{X}\beta + \qquad\qquad (1)$$

where:

$\mathbf{Y}$ is (n x 1) vector of income;

$\mathbf{X}$ is [n x (K+1)] matrix of individual or household characteristics such as age, education, household size, residence, including the constant;

β is [(K + 1) x 1] vector of coefficients and   is (n x 1) vector of residuals and a sample of observations {y_i, x_i, i = 1, 2, …, n} can be used to estimate the model.

To answer the first question, the model is specified in the form of log monthly income and then is regressed on various characteristics:

$$\ln (Y_{it}) = \alpha_t + \beta_t X_{it} + \varepsilon_{it} \qquad\qquad (2)$$

where the subscript i refers to each worker, t denotes years 1985, 1995, and 2005, Y refers to worker's monthly income and X is a vector of explanatory variables of relevant individual characteristics. The regression provides $\hat{\beta}_j X_{ji}$ which is the part of individual i's monthly income due to his/her endowment of X_j or observable

characteristics such as gender, size of family, education, experience, occupation, working residence, capital intensity, and international trade intensity. Note that with the semi-log income-generating function, the contribution of the residual term can be easily computed as the difference between total inequality and the sum of contributions of all explanatory variables.

The estimated coefficients on the various explanatory terms are used to derive the relative contribution of the jth covariate or the share of the log variance of monthly income attributable to each of the j individual characteristics, commonly named as the factor inequality weights, s_{j},:

$$s_j (\ln Y) = \frac{\text{cov}[\beta_j X_j, \ln Y]}{\sigma^2 (\ln Y)} = \frac{\beta_j * \sigma(X_j) * cor(X_j, \ln Y)}{\sigma(\ln Y)} \qquad (3)$$

where β_j is the estimated coefficient of the jth individual characteristic, and X_j is the value taken on by the jth individual characteristic. $\sigma(X_j)$ and $\sigma(\ln Y)$ are the standard deviation of X_j and of $\ln Y$, respectively and $cor(X_j, \ln Y)$ is the correlation between factor j and $\ln Y$. Therefore, $s_j (\ln Y)$ indicates the share of inequality attributing to the fact that x_j is unequally distributed across workers. The positive s_j implies that j is an inequality-increasing factor whereas the negative s_j means that factor j decreases the inequality. The zero s_j entails that factor j is distributed as equal or unequal as total monthly income. For example, the factor weight inequality (s_j) of workers with bachelor degree is 0.1815 in 1995 indicating that bachelor degree accounts for 18.15 percent of the log variance of workers' monthly income in 1995. However, the value of -0.0572 for workers with elementary and lower secondary degree means that these two levels of education attainment can reduce the log variance of workers' monthly income for 5.72 percent in 1995. The value of -0.0002 for export intensity in 1995 implies that export sector insignificantly decreases the log variance of workers' monthly income. The s_j are summed to one, $\Sigma s_j + s = 1$, where s is the inequality arising from the omitted variables. Equation (3) clearly clarifies that factor inequality weights will be large if (i) $\hat{\beta}_j$ is large, i.e. characteristic x_j has a large return; (ii) x_j varies highly relative to monthly income; or (iii) there is a high correlation between the characteristic j and monthly income.

To answer the second question, the difference in inequality or how these characteristics account for the change in wage inequality, we require at least two comparable household survey datasets which are usually done in different time periods. Denoted I as any inequality measure, the difference in inequality can be written in terms of each period's inequality index and factor inequality weights:

$$I_2 - I_1 = \sum_j (s_{j,2} I_2 - s_{j,1} I_1) + (s_{\varepsilon,2} I_2 - s_{\varepsilon,1} I_1) \qquad (4)$$

where $s_{j,1}$ and $s_{j,2}$ denote the factor inequality weights of factor j in period 1 and 2, respectively. Therefore, the percentage contribution of factor j to the difference in inequality becomes

$$II_j(I) = \frac{s_{j,2} I_2 - s_{j,1} I_1}{I_2 - I_1}, \text{ where } \sum_j II_j(I) + II_\varepsilon(I) = 1. \qquad (5)$$

Equation (5) shows the quantitative importance of each factor for the observed change in inequality index I.

Adopting the Labor Force Surveys (LFS) of Thailand in 1985, 1995, and 2005, this study measures Gini coefficients of wages in the manufacturing sector. Once these Gini coefficients have been figured out, we can indicate how factor j accounts for the change in the wage inequality.

Suppose s_{j85} and s_{j95} represent the shares of jth individual characteristic in the log variance of monthly incomes in 1985 and 1995, respectively. The change in the Gini coefficient across the two years will be computed as:

$$II_{j95}(I) = [s_{j95}*Gini_{95} - s_{j85}*Gini_{85}] / [Gini_{95} - Gini_{85}] \qquad (6)$$

Similarly, $II_{j05}(I) = [s_{j05}*Gini_{05} - s_{j95}*Gini_{95}] / [Gini_{05} - Gini_{95}]$ indicates how the jth characteristic contributes for the change in inequality between 1995 and 2005.

3.2 DERIVATION OF THE MODEL

According to the regression based decomposition proposed by Fields (2002), we start from the estimates of comparable income generating functions of two periods. Equations (7) and (8) represent income and its determinants in periods 1 and 2, respectively.

$$\ln (Y_{i1}) \;=\; \alpha_1 + \sum_j \beta_{j1} X_{ij1} + \varepsilon_{i1} \tag{7}$$

$$\ln (Y_{i2}) \;=\; \alpha_2 + \sum_j \beta_{j2} X_{ij2} + \varepsilon_{i2} \tag{8}$$

The decomposition is based on the income-generating function, equation (7), which can be rewritten in matrix form as

$$\ln (Y_{it}) \;=\; a_t^{/} Z_{it} \tag{9.a}$$

where

$a_t^{/}$ is a transpose matrix of a_t

$$a_t \;=\; [\alpha_t \quad \beta_{1t} \quad \beta_{2t} \;...\beta_{Jt} \quad 1]_{1x\,(j+2)} \tag{9.b}$$

$$Z_{it} = [1 \quad X_{i1t} \;\; X_{i2t} \;...\; X_{iJt} \quad it]_{1x\,(j+2)}$$
(9.c)

Let $A_1, ...,A_P$ and and $B_1, ..., B_Q$ be two sets of random variables, and $a_1,...,a_p$ and $b_1,...,b_Q$ be two sets of constant. Then, the covariance between A and B can be rewritten as equation (10),

$$\mathrm{Cov} \left[\sum_{p=1}^{P} a_p A_p \, , \; \sum_{q=1}^{Q} b_q B_q \right] = \sum_{p=1}^{P} \sum_{q=1}^{Q} a_p b_q \, \mathrm{Cov} \left[A_p, B_q \right] \tag{10}$$

Suppose we apply this theorem in the context of a single random variable in Y such that

$$\ln Y = \sum_{j=1}^{J+2} a_j Z_j \, ,$$

the covariance for this single variable in Y is obtained as in equation (11).

$$\mathrm{Cov} \left[\sum_{j=1}^{J+2} a_j Z_j , \ln Y \right] = \sum_{j=1}^{J+2} \mathrm{Cov} \left[a_j Z_j , \ln Y \right] \tag{11}$$

But because the left-hand side of equation (11) is the covariance between lnY and itself, it is simply the variance of lnY. Thus, equation (11) can be rewritten as

$$\sigma^2 (\ln Y) = \sum_{j=1}^{J+2} \mathrm{Cov} \left[a_j Z_j , \ln Y \right] \tag{12.a}$$

Dividing equation (12.a) through by $\sigma^2 (\ln Y)$, equation (12.b) is obtained as

$$100\% = \sum_{j=1}^{J+2} \frac{Cov[a_j Z_j , \ln Y]}{\sigma^2 (\ln Y)} = \sum_{j=1}^{J+2} s_j (\ln Y) \tag{12.b}$$

where each s_j (ln Y) is called the relative factor inequality weight given by

$$s_j \, (\ln Y) = \text{Cov} \, [a_j \, Z_j, \, \ln Y] \, / \, \sigma^2 \, (\ln Y) \tag{12.c}$$

Note that if the last element of Z is excluded, the remaining relative factor inequality weights, $\displaystyle\sum_{j=1}^{J+1} \frac{Cov[a_j Z_j, \ln Y]}{\sigma^2 (\ln Y)}$, is exactly R^2 (ln Y).

Since the ordinary correlation coefficient is related to the covariance as in equation (13).

$$\text{Cor} \, [a_j \, Z_j, \, \ln Y] = \text{Cov} \, [a_j \, Z_j \, , \, \ln Y] \, / \, \sigma(a_j \, Z_j) \, \sigma(\ln Y) \tag{13}$$

Therefore, given the income-generating function (9.a-9.c), let s_j (ln Y) denotes the share of the log-variance of income that is attributable to the j'th explanatory factor and R^2(lnY) be the fraction of the log-variance that is explained by all of the Z's taken together. Then the log-variance of income can be decomposed as equation (14.a).

$$s_j \, (\ln Y) = \text{Cov} \, [a_j \, Z_j, \, \ln Y] \, / \, \sigma^2 \, (\ln Y)$$

$$s_j \, (\ln Y) = \frac{a_j * \sigma(Z_j) * Cor[Z_j, \ln Y]}{\sigma(\ln Y)} \tag{14.a}$$

where

$$\sum_{j=1}^{J+2} s_j \, (\ln Y) = 100\% \tag{14.b}$$

and

$$\sum_{j=1}^{J+1} s_j \, (\ln Y) = R^2 \, (\ln Y) \tag{14.c}$$

Equation (14.c) is similar to equation (14.b), except that it excludes the residual term. Therefore, we can rewrite the fraction that is explained by the j'th explanatory factors, P_j (ln Y), as

$$P_j \, (\ln Y) \equiv \frac{s_j (\ln Y)}{R^2 (\ln Y)} \tag{14.d}$$

Equations (14.a-14.d) provide a full and exact decomposition of the log-variance which will be figured out in Chapter 4.

3.3 VARIABLES

Prior studies are based on household income which consists of income from many sources, namely, wages and salaries, non-farm profit, farm profit, property income, transfer income, and other income. However, among these income sources, only wages and salaries are the most appropriate representative to measure the individual income inequality, especially for workers in the manufacturing sector, because these types of income are more closely related to market prices of human capital. For that reason, the observations included in this study are only the employed workers named in Labor Force Surveys in 1985, 1995, and 2005.

Since there are many explanatory variables in this study, it will be more convenient for readers if all included variables are briefly introduced in Table 3.1.

Table 3.1 Brief Description of Including Variables

Variable Names	Definition
Ln Y	Natural logarithm of workers' monthly income.
MALE	Dummy variable of gender (equal to 1 if male, 0 otherwise).
FEMALE	Dummy variable of gender (equal to 1 if female, 0 otherwise).
SINGLE	Dummy variable of marital status (equal to 1 if single, 0 otherwise).
MARRIED	Dummy variable of marital status (equal to1 if married, 0 otherwise).
WDS	Dummy variable of marital status (equal to1 if widowed, divorced, separated, 0 otherwise).
MEMB	Number of household members
MUNICIPAL	Dummy variable of working place (equal to 1 if in municipal, 0 otherwise).
OUT_MUNICIPAL	Dummy variable of working place (equal to 1 if out municipal, 0 otherwise).

Table 3.1 (Continued)

Variable Names	Definition
LESS	Dummy variable of education attainment (equal to 1 if less than elementary, 0 otherwise).
ELE_LOWSEC	Dummy variable of education attainment (equal to 1 if elementary and lower secondary, 0 otherwise).
HISEC_LOWVO	Dummy variable of education attainment (equal to 1 if higher secondary and lower vocational, 0 otherwise).
HIVO_OTH	Dummy variable of education attainment (equal to1 if higher vocational and others, 0 otherwise).
BACHELOR	Dummy variable of education attainment (equal to 1 if bachelor, 0 otherwise).
EXP	Years of experience.
EXPSQ	Year of experience square.
PRO_ADMIN	Dummy variable of occupation type (equal to 1 if professional and administration, 0 otherwise).
CLERK	Dummy variable of occupation type (equal to 1 if clerk, 0 otherwise).
TRAN_COM	Dummy variable of occupation type (equal to 1 if transportation and communication, 0 otherwise).
CRAFT_PRO	Dummy variable of occupation type (equal to 1 if craftsman and production, 0 otherwise).
SAL_SER_OTH	Dummy variable of occupation type (equal to 1 if sales, services, and others, 0 otherwise).
HIGH	Dummy variable of working place (equal to 1 if high minimum

wage zone, 0 otherwise).

Table 3.1 (Continued)

Variable Name	Definition
MEDIUM	Dummy variable of working place (equal to 1 if medium minimum wage zone, 0 otherwise).
LOW	Dummy variable of working place (equal to 1 if low minimum wage zone, 0 otherwise).
FRINGE	Dummy variable of receiving fringe benefit (equal to 1 if receiving, 0 otherwise).
NOT_FRINGE	Dummy variable of receiving fringe benefit (equal to 1 if not receiving fringe benefit, 0 otherwise).
CAP_INTENSE	Values of capital service intensity (share of depreciation to total value added)
CON_INTENSE	Values of consumption intensity (share of private consumption expenditure to total value added)
EX_INTENSE	Values of export intensity (share of export to total value added)
IM_INTENSE	Values of import intensity (share of import to total value added)

3.3.1 Monthly Income

Gross monthly income[11] of employed workers, 15 years and above, from the Thai Labor Force Surveys datasets in 1985, 1995, and 2005 are the main data source

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[11] Although the expenditure approach is claimed as more accurate measure, this study adopts the income approach to measure the inequality because the employees' main income sources are labor earnings.

for the analysis of this study. Note that the monthly income is in the individual unit. The monthly income, defined in this study, includes all types of received income from working; regular working wage or monthly wage, bonus, overtime, and other money income. Since Labor Force Surveys (LFS) in 1985 and 1995 do not offer the approximation of monthly wage; therefore, monthly wage is approximated for each type of worker as follows. Monthly wage for hourly wage workers is defined as hourly wage rate multiplied by principal occupation working hours per week and 4.2.[12] Daily wage workers receive daily wage rate multiplied by working day per week and 4.2. Weekly wage workers get 4.2 times of their weekly wage rate. Other workers, receiving baht per day, obtain daily wage rate multiplied by working days per week and 4.2.

Note that the monthly income is based on the principal occupation working hours and number of working days occurring in a week before the survey has been done and some workers are not employed 4.2 weeks a month as well; therefore, the monthly income of workers who are employed under an hourly, daily, and weekly basis may have been overestimated or underestimated in 1985 and 1995. This study checked for the influence of wage type on wage differential and found inconsistency among their monthly income. For example, hourly and daily workers' earnings are greater than those of weekly and monthly workers in some periods but reversed in some periods; therefore, the wage type variable is omitted in this study. The error of monthly wage estimation became less serious in 2005 when the LFS offered the approximations of monthly wage or salary for all types of workers in the LFS, the given approximation were treated as monthly wage category.

The other types of monthly incomes, bonus, overtime, and other money income, were all converted into monthly intervals for all three study periods. Note that the value of incomes in kinds is excluded from this study because its dataset is available only in LFS 2005. All of these incomes are summed and converted into the natural logarithm of monthly income which is the dependent variable of this study.

3.3.2 Gender

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[12] The National Statistical Office recommends that workers work 4.2 weeks per month.

In order to examine the wage differential and wage inequality arising from gender, this study includes MALE and FEMALE to represent male and female workers, respectively.

3.3.3 Marital Status

The marital status is classified into three categories; single, married, and widowed, divorced, and separated, named as SINGLE, MARRIED, and WDS, respectively.

3.3.4 Size of Family

MEMB, the number of family members in each household, is adopted to test the effect of family size on the wage differential and wage inequality.

3.3.5 Urbanization

MUNICIPAL includes working in sanitary district and municipal areas. This variable can test whether the worker earns any advantage from urbanization.

3.3.6 Education

Education is classified into five categories according to each worker's highest graduation; less than elementary, elementary and lower secondary, higher secondary and lower vocational, higher vocational and others, and bachelor degree and above. These variables are defined as LESS, ELE_LOWSEC, HISEC_LOWVO, HIVO_OTH, and BACHELOR.

3.3.7 Experience

Experience, EXP, cannot be obtained directly from the Labor Force Surveys. This variable is generated from subtracting (schooling years plus six years) from the age of each worker. The negative year of experience will be treated as zero. Moreover, since the schooling years datasets are not available in the Labor Force Surveys, this variable is constructed as four years for less than elementary and six years for elementary education. Nine years is assigned for lower secondary whereas twelve years is defined for higher secondary and lower vocational education. Diploma and bachelor degrees are positioned at fourteen and sixteen years,

respectively. Note that this generating formula is likely to overestimate experience according to unemployed period of each worker. To examine whether the return to experience increases at a decreasing rate as suggested in the human capital theory, experience square or EXPSQ is included in the regression model.

3.3.8 Occupation

This study classifies the occupation into five groups; (1) Professional and Administrative or PRO_ADMIN, (2) Clerk or CLERK, (3) Transport and Communication or TRAN_COM, (4) Craftsman and Production or CRAFT_PRO, and (5) Sales, Services, and Others or SAL_SER_OTH.[13]

3.3.9 Minimum Wage Zone

Following the minimum wage policy launched in June 2008; this study sets the minimum wage zone into three categories. The high minimum wage zone, HIGH, includes the workers in the Bangkok Metropolitan Area, Phuket, Chon Buri, Saraburi, Chachoengsao, Phra Nakhon Si Ayuttaya, and Rayong where the minimum wage ranges from 173 baht to 203 baht per day. The medium minimum wage zone, MEDIUM, is set for workers in the provinces with wage ranges from 160 baht to 170 baht per day, namely, Nakhon Ratchasima, Ranong, Phangnga, Chiang Mai, Krabi, Kanchanaburi, Phetchaburi, Ratchaburi, Chanthaburi, Prachin Buri, Lop Buri, Loei, Sing Buri, Ang Thong, Prachuap Khiri Khan, Samut Songkhram, and Sa Kaeo. Similarly, the workers in the remaining provinces where the minimum daily wage ranged from 148 to 158 baht are defined as working in low minimum wage zone, LOW.

3.3.10 Non-monetary compensation

It is believed that workers in large companies also earn non-monetary compensation such as having a labor union and working in good conditions. However, these variables are incomplete in the Labor Force Surveys dataset; therefore, this

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[13] Note that before the third quarter of years 2001, Thailand adopted International Standard Classification of Occupation (ISCO) 1958 and followed International Labor Organization, ISCO 1988, after that.

study treats fringe benefit or FRINGE as the proxy of gain from non-monetary. Fringe benefits include cloth, free transportation, and living.

3.3.11 Capital Service Ratios

The wages and salaries, depreciation, total value added and control total, which are quoted in Input-Output Tables as codes 201, 203, 209, and 210, are adopted to figure out three types of capital service ratio of each sub-manufacturing sector, according to its ISIC. The K_Service_Def1, K_Service_Def2, and K_Service_Def3 are defined as the proportion of depreciation over total value added, control total[14], and wages and salaries, respectively. These three capital service ratios will be assigned to each worker according to his/her working sector as the proxy of technology implemented. The Input-Output Tables 1985 and 1995 will be accommodated with the study for periods 1985 and 1995. However, the Input-Output Table 2000 is the most recently launched and, as a result, it will be adopted for the study in 2005.

According to the economic theory, capital labor ratio, K/L, is the best proxy for worker's skill. However, the number of labors is not available in the Input-Output Tables; therefore, this study had to adopt the previous three types of capital intensity as the proxy for worker's skill. Since the K_Sevice_Def1 or the ratio of depreciation and value added is the best proxy for the regression estimation as a whole, this study includes only the estimation of K_Sevice_Def1 or the proportion of depreciation to total value added, called capital intensity or CAP_INTENSE in the model.

3.3.12 Consumption Expenditure

CON_INTENSE or consumption intensity is defined as the ratio of private consumption expenditure and total value added quoted as code 301 and 209 of the Input-Output Tables. Since the industrial development in Thailand started from import substitution strategy, this variable is included to examine whether working in high consumption intensity sub sector offers benefit to workers in the manufacturing sector.

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[14] Control total composes of total intermediate transaction and total value added.

3.3.13 International Trade

The international trade expansion is a source of manufacturing growth, especially after 1985. However, the trickle-down of the benefits to the workers is questionable. To examine this effect; therefore, this study includes the export and import intensities. EX_INTENSE or export intensity is defined as the proportion of exports to total value added, quoted as codes 305 and 209 in the Input-Output Tables. IM_INTENSE or import intensity is defined as the share of imports to total value added, quoted as codes 401, and 209 in the Input-Output Tables.

It is noteworthy that, except MEMB, EXP, EXPSQ, CAP_INTENSE, CON_INTENSE, EX_INTENSE, and IM_INTENSE, the remaining regressors are dummy variables. To avoid the dummy variable trap, we have to treat one category of each dummy variable as a reference or omitted category. The categories that are supposed to earn the lower or the lowest monthly income are chosen as the reference. For example, the reference categories are as follows: FEMALE for gender, WDS for marital status, OUT_MUNICIPAL for urbanization, LESS for education, SAL_SER_OTH for types of occupation, LOW for minimum wage zone variable, and NOT_FRINGE for non-monetary compensation. However, readers should bear in mind that the different reference groups do not influence the regression result, for example, a female worker with the given qualitative and quantitative variables will earn the same monthly income whether female or male is treated as a reference group.

This study examines the wage inequality in the manufacturing sector in 1985, 1995, and 2005. According to its relative economic stability and high growth in the manufacturing sector, 1985 was chosen as the base year of this study and then 1995 and 2005 were treated as comparison years to capture changes in wage inequality over each ten year period.

CHAPTER 4

ESTIMATION RESULTS

4.1 THE ESTIMATION OF COEFFICIENTS

The regression estimation results derived from equation (2) for the manufacturing sector in all three study periods which are presented in Table 4.1. Based on a large number of observations, the adjusted R^2 is quite close to the ordinary R^2. The values of adjusted R^2, which are good enough for cross section datasets, indicate the conventional goodness of fit in that the independent variables can explain about 51-65 percent of the variation of the dependent variable. Additionally, the values of F-statistics are high enough to conclude that the explanatory variables have an effect on the dependent variable, the natural logarithm of workers' monthly income. The explanatory variables are individual worker's characteristics and their states of working. Examining individually, this study finds that all of the estimated coefficients are significant when their p-values approach zero.

Table 4.1 reveals that most of the coefficients have positive trends as expected. As a whole, this study can conclude that education, professional, and high minimum wage zone are important determinants of wage differential during 1985-2005. In 1985, the variable BACHELOR indicates that workers with bachelor's degree earn highest income whereas HISEC_LOWVO means that workers with higher secondary and workers with lower vocational degrees are slightly lower paid. In 1995, high economic growth led to high demand for skilled workers. Therefore, the income of workers with high vocational degree, HIVO_OTH, is greatest in 1995 although their earnings follow workers with bachelor degree, the most significant factor, in 2005. Among occupations, as expected, professional and administrative workers or PRO_ADMIN, is the highest income group whereas clerks' earnings, CLERK, are in the second. Over 1985-2005, all types of occupation earnings are greater than the reference group, SAL_SER_OTH or sales, service and others, except

in 1995 when TRAN_COM and CRAFT_PRO become negative values, meaning that workers in transportation, communication, craftsmen, and production are paid less than workers in the occupational reference group. As expected, workers also acquire some advantages from working in the minimum wage zone. Variables HIGH and MEDIUM indicate that workers in the high and medium minimum wage zones earn higher income than those working in the low minimum wage zone or the reference group. Compared those working in the low minimum wage zone, the wage differential arising from working in the high minimum wage zone had increased from 0.3235 in 1985 to 0.3454 in 1995 and to 0.4264 in 2005 whereas the wage differential of those working in the medium minimum wage zone had decreased from 0.1747 to 0.1528 and to 0.1144 in corresponding years. This similar advantage is found in those working in the municipal area as well. According to the concentration of infrastructure in urban areas at the beginning period of industrial development, workers in the municipal area, MUNICIPAL, earned higher income than those in the rural area over 1985-1995, the period of high growth in the manufacturing sector. However, unlike agricultural farms that are always attached to land, new factories can move towards facilities or industrially promoted area. Therefore, when infrastructures were more dissipated to other industrial zones, the advantage of working in municipal areas has become insignificant in the recent period, 2005.

Table 4.1 The Estimation of Coefficients during 1985-2005

Variables (X_j)	1985	1995	2005
CONSTANT	5.5244	6.4897	7.4532
MALE	0.2815	0.1017	0.2161
SINGLE	0.3157	0.3215	0.1020
MARRIED	0.5290	0.3324	0.1266
MEMB	0.0294	0.0177	-0.0049
MUNICIPAL	0.1184	0.1657	0.0334
ELE_LOWSEC	0.2128	0.4170	0.1653
HISEC_LOWVO	1.0315	0.7270	0.4081

Table 4.1 (Continued)

Variables (X_j)	1985	1995	2005
HIVO_OTH	0.8954	1.2487	0.6119
BACHELOR	1.0638	1.1352	1.0051
EXP	0.0480	0.0562	0.0349
EXPSQ	-0.0006	-0.0008	-0.0006
PRO_ADMIN	0.5758	0.5813	0.3593
CLERK	0.2963	0.0221	0.2450
TRAN_COM	0.2037	-0.4019	0.1826
CRAFT_PRO	0.1020	-0.2411	0.0001
HIGH	0.3235	0.3454	0.4264
MEDIUM	0.1747	0.1528	0.1144
FRINGE	0.2571	0.0856	0.1801
CAP_INTENSE	0.2680	2.1531	-0.5109
CON_INTENSE	-0.0305	0.0772	0.0339
EX_INTENSE	-0.0723	-0.0715	-0.0078
IM_INTENSE	-0.0514	-0.0041	-0.0527
Adjusted R^2	0.5270	0.6500	0.5110
F-Statistics	54350	243468	199385
N	1073489	2879895	4188746

Source: Calculated from the 1985, 1995, and 2005 Labor Force Surveys (NSO) and
Input-Output Tables in 1985, 1995, and 2000 (NESDB).

Note: All variables are significant at 1% level.

The other individual characteristics such as gender, marital status, experience, and family size were less important in the recent period as well. Value 0.2815 of MALE means that male workers earned higher income than female workers in 1985; however, its value fell to 0.1017 in 1995. Although, this wage differential according to gender starts rising again in 2005, its magnitude is rather small when compared to other factors. In all study periods, the positive values of MARRIED and SINGLE

denote that married and single workers earn more than their referenced group, widowed-divorced-separated workers or WDS; however, their advantage sharply drops in 2005. Even though the estimated coefficients of experience and its square, EXP and EXPSQ, imply that these two variables significantly determine workers' monthly income, their magnitudes are rather small compared to other explanatory variables. A similar pattern is found in the family size variable, MEMB, while workers living in larger families received slightly higher income in 1985, the advantage decreased in 1995, and became slightly worse for workers living in smaller families in 2005.

It is believed that the states of working probably influence the workers' income; therefore, the degree of intensities in capital service, consumption, export, and import was adopted in this study. The capital intensity, CAP_INTENSE, was included with the belief that the high capital intensive sector employs more skilled workers; therefore, workers in this sector should receive higher income. It was found that working in high capital intensity boosted workers' monthly income, especially in 1995; however, it may be that the substitute of capital for unskilled workers lessened the workers' monthly income in 2005. In other words, most Thai workers tend to be unskilled and are easily replaced by capital. Since the development of the industrial sector started from import substitution, working in the high domestic consumption industry should offer some benefits to workers; therefore, private consumption expenditure or CON_INTENSE is included in this study. The role of private consumption expenditure in determining workers' monthly income has fluctuated in rather small increments. While this consumption expenditure worsened workers' income in 1985, it has offered some benefits to workers in the recent periods of 1995 and 2005.

It is also obvious that the growth of the industrial sector in Thailand is a result of import substitution and export promotion; therefore, this study includes export and import intensities, EX_INTENSE and IM_INTENSE, to examine whether the benefits from international trade has trickled down to workers or not. Since import is the leakage of the economy, it is unsurprising that the import intensity, IM_INTENSE, worsens worker's monthly income in all study periods. Contrary to the economic theory suggesting that export offers some benefits to workers, the negative sign of

EX_INTENSE indicates that the benefit of export promotion has not trickled down to workers. It is also believed that large companies usually offer some fringe benefits to their workers. With positive values of FRINGE, this study confirms that workers receiving fringe benefits are better off than the non-receiving group; however, the magnitudes of fringe benefits are rather fluctuated.

Since the estimation equation is semi-log or log-lin model, as explained in Chapter 3, the slope coefficients of the quantitative regressors indicates the semi-elasticity or the percentage change in the regressand for a unit change in the regressor. However, if the regressors are category or dummy variables, we cannot interpret the regression results with the ordinary estimated coefficients but we have to take the anti-log of coefficients to obtain the median of the regressand as suggested by Gujarati (2003). Halvorsen and Palmquist (1980) suggest that the dummy variable should be interpreted as $\hat{g}$ = {exp (c) − 1} 100. However, Kennedy (1981)[15] recommends g^*, which has even bias but it is more efficient than $\hat{g}$. According to Kennedy, g^* is defined as exp $\{\hat{c} - \frac{1}{2}\hat{V}(\hat{c})\}$ − 1, where $\hat{c}$ is an unbiased estimator of c and $\hat{V}(\hat{c})$ is an estimate of the variance of $\hat{c}$. In other words, instead of using the ordinary estimated coefficients, we have to use g^* or $\hat{g}$ to interpret the impacts of explanatory variables on the dependent variable. If the estimated coefficient is derived from a continuous explanatory variable, g^* or $\hat{g}$ indicates the growth of monthly workers' income according to that variable and if the estimated coefficient is derived from a dummy variable, g^* or $\hat{g}$ denotes the wage differential in comparison to its reference group. The Kennedy approach has become more popular in interpreting the meaning of the regressed coefficients when the regressors are dummy variables. The $\hat{V}(\hat{c_i})$ in this study is not substantial and $\hat{g}$ insignificantly differs from g^*, so this study adopts the Kennedy g^*.

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[15] Kennedy Peter E. 1981. Estimation with Correctly Interpreted Dummy Variables in Semilogarithmic Equation. **American Economic Review.** 71(Sept):801.

Tables 4.2-4.4 present the calculation of g* and g^ of the estimated coefficients during 1985-2005.

Table 4.2 Interpretation of the Estimated Coefficients in 1985

Variables	c	exp {c - 1/2 V(c)}	g*	g^
MALE	0.2815	1.3251	0.3251	0.3251
SINGLE	0.3157	1.3712	0.3712	0.3712
MARRIED	0.5290	1.6973	0.6973	0.6973
MEMB	0.0294	-	-	-
MUNICIPAL	0.1184	1.1257	0.1257	0.1257
ELE_LOWSEC	0.2128	1.2371	0.2371	0.2371
HISEC_LOVO	1.0315	2.8052	1.8052	1.8052
HIGHVO_OTH	0.8954	2.4483	1.4483	1.4483
BACHELOR	1.0638	2.8972	1.8972	1.8973
EXP	0.0480	-	-	-
EXPSQ	-0.0006	-	-	-
PRO_ADMIN	0.5758	1.7784	0.7784	0.7785
CLERK	0.2963	1.3448	0.3448	0.3448
TRAN_COM	0.2037	1.2259	0.2259	0.2259
CRAFT_PRO	0.1020	1.1074	0.1074	0.1074
HIGH	0.3235	1.3820	0.3820	0.3820
MEDIUM	0.1747	1.1909	0.1909	0.1909
FRINGE	0.2571	1.2931	0.2931	0.2931
CAP_INTENSE	0.2680	-	-	-
CON_INTENSE	-0.0305	-	-	-
EX_INTENSE	-0.0723	-	-	-
IM_INTENSE	-0.0514	-	-	-

Source: Calculated from the 1985 Labor Force Survey (NSO) and Input-Output Table
in 1985 (NESDB)

Table 4.3 Interpretation of the Estimated Coefficients in 1995

Variables	c	exp{c - ½ V(c)}	g*	g^
MALE	0.1017	1.1070	0.1070	0.1070
SINGLE	0.3215	1.3792	0.3792	0.3792
MARRIED	0.3324	1.3943	0.3943	0.3943
MEMB	0.0177	-	-	-
MUNICIPAL	0.1657	1.1802	0.1802	0.1802
ELE_LOWSEC	0.4170	1.5174	0.5174	0.5174
HISEC_LOWVO	0.7270	2.0688	1.0688	1.0688
HIVO_OTH	1.2487	3.4858	2.4858	2.4858
BACHELOR	1.1352	3.1118	2.1118	2.1118
EXP	0.0562	-	-	-
EXPSQ	-0.0008	-	-	-
PRO_ADMIN	0.5813	1.7884	0.7884	0.7884
CLERK	0.0221	1.0224	0.0224	0.0224
TRAN_COM	-0.4019	0.6691	-0.3309	-0.3309
CRAFT_PRO	-0.2411	0.7858	-0.2142	-0.2142
HIGH	0.3454	1.4126	0.4126	0.4126
MEDIUM	0.1528	1.1651	0.1651	0.1651
FRINGE	0.0856	1.0893	0.0893	0.0893
CAP_INTENSE	2.1531	-	-	-
CON_INTENSE	0.0772	-	-	-
EX_INTENSE	-0.0175	-	-	-
IM_INTENSE	-0.0041	-	-	-

Source: Calculated from the 1995 Labor Force Survey (NSO) and Input-Output Table
in 1995 (NESDB).

Table 4.4 Interpretation of the Estimated Coefficients in 2005

Variables	c	exp{c - ½ V(c)}	g*	g^
MALE	0.2161	1.2413	0.2413	0.2413
SINGLE	0.1020	1.1074	0.1074	0.1074
MARRIED	0.1266	1.1350	0.1350	0.1350
MEMB	-0.0049	-	-	-
MUNICIPAL	0.0334	1.0340	0.0340	0.0340
ELE_LOWSEC	0.1653	1.1797	0.1797	0.1797
HISEC_LOWVO	0.4081	1.5039	0.5039	0.5039
HIVO_OTH	0.6119	1.8439	0.8439	0.8439
BACHELOR	1.0051	2.7321	1.7321	1.7321
EXP	0.0349	-	-	-
EXPSQ	-0.0006	-	-	-
PRO_ADMIN	0.3593	1.4324	0.4324	0.4324
CLERK	0.2450	1.2776	0.2776	0.2776
TRAN_COM	0.1826	1.2003	0.2003	0.2003
CRAFT_PRO	0.0001	1.0001	0.0001	0.0001
HIGH	0.4264	1.5318	0.5318	0.5318
MEDIUM	0.1144	1.1212	0.1212	0.1212
FRINGE	0.1801	1.1973	0.1973	0.1973
CAP_INTENSE	-0.5109	-	-	-
CON_INTENSE	0.0339	-	-	-
EX_INTENSE	-0.0078	-	-	-
IM_INTENSE	-0.0527	-	-	-

Source: Calculated from the 2005 Labor Force Survey (NSO) and Input-Output Table in 2000 (NESDB).

Tables 4.2-4.4 denote that the values of g* are slightly greater than their correspondence estimated coefficients; therefore, the importance of each variable in determining wage differential is unaffected whether we look at estimated coefficients, c, or Kennedy's interpretation, g*. The main explanatory variables are still education, professional, and minimum wage zone.

4.1.1 Education

It is obvious that education is the most significant factor in determining wage differential over all study periods from 1985-2005. The g^* of BACHELOR indicates that workers with a bachelor degree earn highest the income in 1985 and 2005 but not in 1995. In 1985, workers with a bachelor degree received income of 189.72 percent higher than the reference group, workers with less than elementary education or LESS. The value rose to 211.18 percent in 1995 but fell to 173.21 percent in 2005.

The value 1.4483 of HIVO_OTH means that income of workers with higher vocational was 144.83 percent higher than that of the reference group in 1985. Their earnings sharply rose to 248.58 percent and became the first rank among education categories in 1995. The high economic growth together with a high demand for manufacturing products since 1985 raised demand for workers with higher vocational education. As a result, the workers with higher vocational were paid more than workers with a bachelor degree in 1995. However, this group became the second highest rank again as its g* dropped to 0.84 in 2005, meaning that their earnings were 84 percent higher than workers with less than elementary education.

The direct investment from developed countries, especially from Japan, to Southeast Asia, including Thailand, raised demand for unskilled workers at the beginning of the industrial expansion. The g^* of HISEC_LOWVO denoted that earnings of workers with higher secondary and lower vocational education in 1985 were 180.52 percent higher than workers with less than elementary education, slightly less than the earnings of workers with a bachelor degree education. However, the earnings of this group sharply dropped to 106.88 percent and 50.39 percent in 1995 and 2005 when skilled workers were needed in the more advanced state of industrial development.

As presumed, workers with low education should earn lower income. When compared to the earnings of workers with other education, the earnings of workers with elementary and lower secondary education was the lowest. The returns to workers with elementary and lower secondary education, ELE_LOWSEC were higher than those of workers with less than elementary education, LESS, by 23.71 percent in 1985, rising to 51.74 percent in 1995, but sharply falling to 17.97 percent in 2005.

4.1.2 Occupation and Experience

Among occupations, the values of PRO_ADMIN signify the highest returns of professional and administrative workers in all study periods. In 1985, professional and administrative workers earned 77.84 percent higher than workers in sales, services and other occupation, the reference group. Their earnings slightly increased to 78.84 percent in 1995, but sharply dropped to 43.24 percent in 2005.

The values g^* of CLERK saw rather high fluctuation. Compared to the workers in the reference group, clerical workers' median income was higher by about 34.48 percent in 1985, sharply fell to 2.24 percent in 1995, and rose again to 27.76 percent in 2005.

Values TRAN_COM in Table 4.2 and Table 4.3 denote that the income of worker in the transportation and communication sector was 22.59 percent and 20.03 percent higher than those of the reference group in 1985 and 2005, respectively. However, according to high growth of the service sector since 1990s, workers in the transportation and communication sector were paid 33.09 percent less than workers in the service sector in 1995.

The returns to craftsmen and production workers were questionable. With value 0.1074 of CRAFT_PRO in 1985, the earning of craftsmen and production workers was 10.74 percent higher than the reference group. Note that, the effect of this occupation on wage differential was relatively small in comparison to other factors in 1985. In more recent periods, their incomes were 21.42 percent less than the reference group in 1995 but were slightly better, only 0.01 percent, in 2005. The lower income of this occupation, when compared to the reference group, implies that most Thai workers were unskilled; therefore, craftsmen and production workers cannot earn advantages arising from economic growth.

According to positive g^* of FRINGE, workers receiving fringe benefits earn higher income than workers not-receiving fringe benefits. In 1985, the workers receiving fringe benefits earned 29.31 percent higher than workers not receiving fringe benefits. However, their earnings were 8.93 percent higher than those of the reference group in 1995 and then rose again to 19.73 percent higher in 2005.

Since the EXP represents years of experience, its estimated coefficient indicates growth of monthly income. The second column of Tables 4.2-4.4 reveals 3-6 percent of the income growth, according to the experience factor. One year experience offered 4.8 percent growth of monthly income in 1985, 5.62 percent in 1995, and 3.49 percent in 2005. Since experience square is derived from experience, the negative estimated coefficients of experience square, EXPSQ, indicates that the workers' monthly income increases at a decreasing rate with an additional year of experience, consistent to the human capital theory. The estimated coefficients of experience square were -0.06 percent, -0.08 percent, and -0.06 percent in 1985, 1995, and 2005, respectively.

4.1.3 Individual Characteristics

Over 1985-2005, we cannot refute the wage differential according to gender. However, this discrepancy has declined in recent periods. The g^* of MALE denotes higher worker's median monthly income of male workers compared to that of their female counterpart by about 32.51 percent, 10.70 percent, and 24.13 percent, in 1985, 1995, and 2005, respectively. It was probably caused by the growth of the manufacturing sector since 1985 which has led to higher demand for unskilled workers which then offered more opportunity to female workers in getting jobs.

Marital status indicates that the income of married workers, MARRIED, was the highest over the study periods. Married workers earned 69.73 percent, 39.43 percent, and 13.50 percent higher than those of the reference group or namely the workers with widowed or divorced or separated status, WDS. Similarly, the positive g^* of SINGLE shows that earnings of single workers were better than those of the reference group as well. Single workers were paid 37.12 percent, 37.92 percent, and 10.74 percent higher than the reference group, in 1985, 1995, and 2005, respectively.

Note that the influence of marital status on wage differential has weakened in recent periods.

The fluctuation of MEMB meant that living in a larger family supported the income growth at the beginning of the study period but with a declining trend and even deteriorating growth in recent periods. One additional member increased the growth of monthly income by 2.94 percent in 1985 and by 1.77 percent in 1995. Contrary to 2005, its estimated coefficient of -0.49 percent indicated a mild shortcoming of living in a large family.

4.1.4 Regional Factors

According to industrial expansion since 1985 and high concentration of infrastructure and facilities in the Bangkok Metropolitan Region (BMR) at the beginning of economic development in 1960s, the workers in the urban area were taking some advantages of urbanization. Variable MUNICIPAL shows that workers in the municipal area received higher income than workers outside the municipal area by 12.57 percent in 1985, and their earnings sharply rose to 18.02 percent higher than the outside group in 1995. When the greater dispersion of infrastructure and facilities had spread the advantages of urbanization to the outside municipal, the higher earnings sharply dropped to only 3.4 percent in 2005.

The minimum wage zone also influenced the wage differential. According to the variables HIGH and MEDIUM, wage differential arising from working in the high minimum wage zone was an increasing trend whereas the wage gap from working in the medium wage zone was a decreasing trend. In 1985, wages of workers in high the minimum wage zone and medium minimum wage zone were higher by about 38.2 percent and 19.1 percent, respectively, when compared to wages of workers in the low minimum wage zone, LOW. The earning of workers in the high minimum wage zone kept on rising to 41.26 percent and 53.18 percent higher than the reference group in 1995 and 2005, respectively. Workers in the medium minimum wage zone were paid 16.51 percent and 12.12 percent higher than workers in the low minimum wage zone in 1995 and 2005, correspondingly.

4.1.5 Domestic Expenditure

CAP_INTENSE in Table 4.2 indicates that a unit of capital service intensity escalated the growth of monthly income by 26.8 percent in 1985. According to the growth of the manufacturing sector since 1985, the growth of monthly income arising from the use capital sharply rose to 215.31 percent in 1995; however, the growth experienced a seriously downturn to -51.1 percent in 2005. It seemed that the implementation of tax policies encouraged the capital intensive production technique and led to high economic growth; however, the policies were detrimental to the worker's income growth. In other words, capital goods could substitute for labor in 2005. This result is consistent to that of craftsmen and production workers whose earnings were not significantly greater than the reference group in 2005. It is also implies that Thai workers were so unskilled that could be easily replaced.

An additional unit of consumption intensity lessened the growth of monthly income by 3.05 percent in 1985. The high economic growth led to higher domestic consumption in recent periods. Consequently, the income growth arising from consumption intensity rose to 7.72 percent and 3.39 percent during the next two decades.

4.1.6 International Trade

It is surprising that export intensity had an adverse factor, although with rather a small magnitude of EX_INTENSE, in determining the growth of monthly income over the study periods. An additional unit of export intensity reduced the growth of workers' monthly income by 7.23 percent, 1.75 percent, and 0.78 percent, in 1985, 1995, and 2005, respectively. This study's results confirm that workers in the manufacturing sector do not receive any benefits from export promotion because export enterprises consist of large production scale with capital intensive technology. In other words, export growth can make income distribution become worse since most of its benefits are shared among the rich.

As expected, the import intensity, IM_INTENSE, deteriorated the worker's income growth. However, its adverse effect rather fluctuated within a narrow range, -5.14 percent in 1985, -0.41 percent in 1995, and -5.27 percent in 2005.

In conclusion, education, professional and administrative, and the minimum wage zone explain the wage differential well over 1985-2005. The other variables are rather insignificant with large fluctuations. For education, although workers with higher secondary and lower vocation earned relatively high income in 1985, the earnings of this group declined according to an increase in demand for more skilled workers since the 1990s. For the same reason, the income of workers with higher vocational and bachelor degrees was quite high over the study periods. Among occupations, the median income of professional and administrative workers was highest, especially in 1985 and 1995. Earnings of clerks were higher than the reference group, especially in 1985 and 2005. The income of transportation and communication, craftsmen and production workers was ambiguous because their earnings were higher than that of the reference group in 1985, but they were lower in 1995. In 2005, the incomes of transportation and communication workers were more than those of sales and service workers whereas the income of craftsmen and production workers was approximately equal to the reference group. The income of workers obtaining fringe benefits fluctuated about 9-30 percent higher than that of workers who were not receiving fringe benefits.

In general, individual characteristics cannot explain wage differential well, especially in recent periods. Although male workers earn more than female workers, the importance of gender on wage differential fluctuated with a declining trend. Similar patterns were found in marital status and family size as well. Married workers earned the highest median income in all the study periods, but with a declining trend. The income of single workers was slightly less than that of married workers in recent periods. The large family offered some advantages in the income growth in 1985 and 1995, but weakened income growth in 2005. The importance of experience in determining the growth of income fluctuated within a narrow range.

For the region factor, the wage differential from working in the urban area was relatively high over 1985-1995, but it sharply dropped in 2005. For all study periods, minimum wage zone significantly determined wage differential. Note that while the differential from working in the high minimum wage zone was an increasing trend, the differential from working in the medium minimum wage zone was a decreasing

trend, so we can expect for greater wage differential according to the minimum wage zone.

The benefits arising from international trade expansion did not trickled down to workers in the manufacturing sector when both export and import intensities worsened the income growth in all the study periods. For domestic expenditure, the magnitude of capital service intensity was a bit greater than that of consumption intensity. Capital service intensity supported the income growth in 1985 and 1995; however, it deteriorated the income growth in 2005.

4.2 THE ESTIMATION OF FACTOR WEIGHT INEQUALITY

The regression-based decomposition technique proposed by Fields (2002) enables this study to measure how much the inequality level in monthly income is accounted for by various individual characteristics of each worker. To answer this question, the study computes the estimated coefficients, as shown in Section 4.1, and calculates the factor weight inequality, s_j, or the share of log variance of monthly income attributed to each of the j individual characteristics as explained in Chapter 3.

$$s_j (\ln Y) = \frac{\beta_j * \sigma(X_j) * cor(X_j, \ln Y)}{\sigma(\ln Y)} \qquad (3)$$

For the individual characteristics captured by more than one dummy variable such as marital status, education, experience, types of occupation, minimum wage zone, domestic expenditure, and international trade, the interpretation is based on a consolidated share factor weight inequality or the sum of the individual shares of the sub-categories.

Tables 4.5-4.7 present how the factor weight inequality of each variable has been figured out. The positive s_j means that variable j is an inequality-increasing factor whereas its negative s_j denotes that variable j is an inequality-decreasing. Note that while the estimated coefficients done in Section 4.1 indicate the significance of all variables in determining workers' monthly income or wage differential, factor weight inequality in this section reveals that there are a few variables that significantly determined the log variance of monthly income or the inequality level.

4.2.1 The Examination on Factor Weight Inequality In 1985

Table 4.5 presents the factor weight inequality of each variable in 1985. As a whole, the included variables accounted for 47.86 percent of the log variance of monthly income. The positive s_j in the last column reveals that most variables are inequality-increasing factors. We can conclude that education, experience, and the minimum wage zone are the major inequality-increasing factors with their consolidated shares of 11.88 percent, 8.92 percent, and 6.47 percent, respectively (Table 4.9).

4.2.1.1 Individual Characteristics

Among individual characteristics, MARRIED and MALE were inequality-increasing factors whereas SINGLE and MEMB were inequality-decreasing ones. Married workers contributed 10.23 percent to the log variance of the inequality whereas single workers lessened the inequality by 5.32 percent. The share of MALE was about 5.3 percent of the log variance of monthly income. The negative factor weight inequality, -0.31 percent, indicated that the large family slightly reduces the log variance of monthly income. These individual characteristics, in total, accounted for 10 percent of the inequality in 1985.

4.2.1.2 Education

All education levels worsened the inequality level, except elementary and lower secondary or ELE_LOWSEC that slightly lessened the inequality by 1 percent. Note that the higher educational level had the greater inequality share. The higher secondary and lower vocational contributed 3.04 percent whereas higher vocational supplemented 4.73 percent to the inequality level. Among education levels, bachelor degree took the greatest share of log variance by 5.11 percent. The level of education attainment contributed almost 12 percent of the total inequality in 1985.

4.2.1.3 Experience and Occupation

Among all the factors in 1985, the share of experience or EXP was highest at almost 16 percent. Since the return to experience increased at a decreasing rate, experience square contributed -7.07 percent to the log variance of monthly income. Note that the share of experience may be overestimated because this variable was not obtained directly from the Labor Force Survey, but it is derived from subtracting (schooling years plus six years) from the age of worker.

Among occupations, CRAFT_PRO indicates that only workers in craftsmen and production sectors slightly lessened the inequality by -1.51 percent. Professional and administrative workers' inequality share, represented by PRO_ADMIN, was 1.45 percent whereas that of transportation and communication workers was rather small at 0.57 percent. When compared to other occupations, clerks contributed the highest share of the inequality at 2.38 percent. Note that in 1985, types of occupation were not the major factors in determining the log variance of monthly income because all types of occupation contributed only 2.89 percent of the inequality.

Table 4.5. Factor Weight Inequality of Manufacturing Sector in 1985

Variables (X_j)	β_j	Standard Deviation of X_j	Correlation (X_j,Ln Y)	Factor Weight Inequality (s_j)
MALE	0.2815	0.4932	0.2848	0.0530
SINGLE	0.3157	0.4905	-0.2560	-0.0532
MARRIED	0.5290	0.4962	0.2906	0.1023
MEMB	0.0294	2.3263	-0.0340	-0.0031
MUNICIPAL	0.1184	0.4704	0.2612	0.0195
ELE_LOWSEC	0.2128	0.4541	-0.0769	-0.0100
HISEC_LOWVO	1.0315	0.1636	0.1345	0.0304
HIVO_OTH	0.8954	0.2066	0.1905	0.0473
BACHELOR	1.0638	0.1592	0.2250	0.0511
EXP	0.0480	10.8029	0.2299	0.1599
EXPSQ	-0.0006	498.8787	0.1629	-0.0707
PRO_ADMIN	0.5758	0.1014	0.1856	0.0145
CLERK	0.2963	0.2401	0.2493	0.0238
TRAN_COM	0.2037	0.1931	0.1080	0.0057
CRAFT_PRO	0.1020	0.3484	-0.3168	-0.0151
HIGH	0.3235	0.4875	0.3792	0.0802

Table 4.5 (Continued)

Variables (X_j)	β_j	Standard Deviation of X_j	Correlation (X_j,Ln Y)	Factor Weight Inequality (s_j)
MEDIUM	0.1747	0.3714	-0.1785	-0.0155
FRINGE	0.2571	0.4915	0.2220	0.0376
CAP_INTENSE	0.2680	0.0216	0.0899	0.0007
CON_INTENSE	-0.0305	1.1509	0.0682	-0.0032
EX_INTENSE	-0.0723	0.5422	-0.0954	0.0050
IM_INTENSE	-0.0514	1.2177	-0.2167	0.0182
Ln Y		0.7455		
Residual				0.5214

Source: Calculated from the 1985 Labor Force Survey (NSO) and Input-Output Table in 1985, (NESDB).

With positive estimated coefficient and positive correlation, fringe benefits or FRINGE was an inequality-increasing factor. FRINGE accounted for 3.76 percent of the log variance of monthly income and this contributed to a larger share of inequality than any other occupation share.

4.2.1.4 Regional Factors

While the estimated coefficient in Section 4.1 denotes that working in the municipal area significantly determined wage differential, its factor weight inequality revealed that MUNICIPAL was not a major factor determining the log variance of monthly income in terms of its small contribution, 1.95 percent.

There was a conflict between high and medium minimum wage zones in determining the inequality level. While HIGH represented 8.02 percent of log variance coming from the high minimum wage zone, MEDIUM or the medium minimum wage zone lessened the inequality by 1.55 percent. The negative factor weight inequality of the medium minimum wage zone resulted from its negative correlation with the monthly income. Since the share of increasing factor is greater

than that of decreasing factor, the minimum wage zone contributes 6.47 percent of the inequality.

4.2.1.5 Domestic Expenditure

The inequality share of domestic expenditure was insignificant. Although the estimated coefficient of 0.268 was rather high and significantly differed from zero, the standard deviation and the correlation of capital service intensity, CAP_INTENSE, were so small that its factor weight inequality contributed only 0.07 percent of the inequality. With its negative share, -0.32 percent, CON_INTENSE slightly improved the log variance of monthly income.

4.2.1.6 International Trade

Similar to the share of domestic expenditure, the shares of international trade were about 2.32 percent of the inequality in 1985. Both export and import intensities were inequality-increasing factors with shares of 0.5 percent and 1.82 percent, respectively. It can be concluded that the adverse effect of international trade on log variance of workers' monthly income was insignificant.

4.2.2 The Examination on Factor Weight Inequality In 1995

When compared to 1985, a slight decrease of residual in 1995 indicated a more powerful explanation of the included variable on the log variance of monthly income. In 1995, the included variables could explain 51.63 percent of the inequality. Most variables were inequality-increasing factors, indicated with positive s_j. The most inequality-increasing factors were education, occupation, and minimum wage zone, with the shares of 23.43 percent, 9.66 percent, and 9.36 percent, respectively. (Table 4.9)

4.2.2.1 Individual Characteristics

The total inequality share of individual characteristics accounted for only 2 percent of the inequality. The inequality arising from gender and marital status in 1995 was significantly less than those in 1985. MALE contributed 1.58 percent of the log variance of monthly income in 1995, in comparison to its 5.3 percent in 1985. SINGLE and MARRIED accounted for an almost equal share but in opposite directions. While single workers lessened the inequality level for 2.03 percent, married workers contributed 2.84 percent to the log variance of monthly income. The

negative share of MEMB, -0.4 percent, indicated greater ability of the large family in lessening inequality, when compared to -0.31 percent in 1985.

4.2.2.2 Education

When compared to 1985, education worsened the inequality while the elementary and lower secondary education attainment enabled a further decrease in the inequality, from its values of -1 percent in 1985 to -5.72 percent in 1995; the other higher education levels significantly worsened the inequality, especially bachelor degree. The factor weight inequality of higher secondary and lower vocational, HISEC_LOWVO, rose to 3.69 percent. Similar to higher vocational education, the factor weight inequality of HIVO_OTH increased to 7.31. Among all of the included variables in 1995, BACHELOR accounts for the highest share of the inequality, 18.15 percent. In total, education contributes 23.43 percent which was the highest inequality share in 1995. This greatest effect of education in 1995 resulted from an increase in demand for skilled workers since 1985.

Table 4.6. Factor Weight Inequality of Manufacturing Sector in 1995

Variables (X_j)	β_j	Standard Deviation of X_j	Correlation (X_j,Ln Y)	Factor Weight Inequality (s_j)
MALE	0.1017	0.4998	0.2062	0.0158
SINGLE	0.3215	0.4907	-0.0854	-0.0203
MARRIED	0.3324	0.4973	0.1139	0.0284
MEMB	0.0177	1.8380	-0.0807	-0.0040
MUNICIPAL	0.1657	0.5000	0.2903	0.0362
ELE_LOWSEC	0.4170	0.4998	-0.1823	-0.0572
HISEC_LOWVO	0.7270	0.2452	0.1375	0.0369
HIVO_OTH	1.2487	0.2079	0.1868	0.0731
BACHELOR	1.1352	0.2568	0.4132	0.1815
EXP	0.0562	10.9650	-0.0202	-0.0187

Table 4.6 (Continued)

Variables (X_j)	β_j	Standard Deviation of X_j	Correlation (X_j,Ln Y)	Factor Weight Inequality (s_j)
EXPSQ	-0.0008	502.6340	-0.0591	0.0355
PRO_ADMIN	0.5813	0.1570	0.3403	0.0468
CLERK	0.0221	0.2907	0.2843	0.0028
TRAN_COM	-0.4019	0.1799	0.0695	-0.0076
CRAFT_PRO	-0.2411	0.3815	-0.3941	0.0546
HIGH	0.3454	0.4950	0.4017	0.1035
MEDIUM	0.1528	0.3558	-0.1208	-0.0099
FRINGE	0.0856	0.4961	0.1902	0.0122
CAP_INTENSE	2.1531	0.0401	0.0214	0.0028
CON_INTENSE	0.0772	0.7970	0.0140	0.0013
EX_INTENSE	-0.0175	0.7831	0.0079	-0.0002
IM_INTENSE	-0.0041	2.3937	-0.1922	0.0028
Ln Y		0.6637		
Residual				0.4837

Source: Calculated from the 1995 Labor Force Survey (NSO) and Input-Output Table in 1995 (NESDB).

4.2.2.3 Experience and Occupation

It is surprising that experience, EXP, slightly reduced the inequality in 1995. Because of its negative correlation with monthly income, experience lowered the inequality by 1.87 percent in 1995. Nevertheless, according to the negative estimated coefficient and the inverse correlation between Experience Square and monthly income, the factor weight inequality of experience square, EXPSQ, equaled 3.55 percent in that period. Therefore, experience factor accounted for 1.68 percent of the inequality share in 1995, which accounts for a sharp drop from 8.92 percent in the previous decade.

Among types of occupation, only transportation and communication or TRAN_COM, slightly lessened the inequality level with 0.76 percent. CLERK denoted that the contribution of clerks sharply dropped from 2.38 percent in 1985 to 0.28 percent in 1995. The inequality share of professional and administrative sharply rose from 1.45 percent in 1985 to 4.68 percent in 1995. Although craftsmen and production had reduced the inequality to 1.5 percent in 1985, its inequality share rose to 5.5 percent in 1995.

The steep fall of the estimated coefficient, and a slight decrease of positive correlation, lowered the factor weight inequality of FRINGE from 3.76 percent in 1985 to 1.22 percent in 1995. This meant that receiving fringe benefits rarely influenced the log variance of monthly income in the recent periods.

4.2.2.4 Regional Factors

High economic growth since 1985 together with the concentration of facilities in the urban area raised the factor weight inequality of those working in municipal, MUNICIPAL, to 3.62 percent, compared to 1.95 percent in 1985.

The Minimum wage zone also played an important role in determining the inequality level. In 1995, the inequality share of HIGH rose to 10.35 percent, compared to its counterpart, 8.02 percent in 1985. On the contrary, the ability of the medium minimum wage zone, MEDIUM, in lessening the inequality fell from -1.55 percent in 1985 to -1 percent in 1995.

4.2.2.5 Domestic Expenditure

Although the estimated coefficients of domestic expenditure indicated that these factors were important in determining wage differential, their shares in the log variance of monthly income were relatively minor. Each variable of domestic expenditures accounted for less than 0.3 percent of the inequality. CAP_INTENSE presented an increase in the share of capital service intensity from 0.07 percent in 1985 to 0.28 percent in 1995. CON_INTENSE indicated the changing role of consumption intensity from an inequality-decreasing factor in 1985 to an inequality-increasing factor in 1995 with its small inequality share of 0.13 percent.

4.2.2.6 International Trade

Similar to domestic expenditure, the estimated coefficients of export and import intensities were significant in determining wage differential as mentioned in

Section 4.1; however, their inequality shares were relatively insignificant. The -0.02 percent of EX_INTENSE meant that export intensity could reduce the inequality level, although on a small scale, in 1995. The factor weight inequality of import intensity also showed an improvement in log variance when values of IM_INTENSE decreased from 1.82 percent in 1985 to 0.28 percent in 1995.

4.2.3 The Examination on Factor Weight Inequality In 2005

When compared to 1995, a slight increase of the residual in 2005 indicated a less powerful explanation of the included variables in the log variance of monthly income. In 2005, the included variables could explain 51.03 percent of the log variance of monthly income. The most inequality-increasing factors were education, minimum wage zone, and occupation whose shares were 20.91 percent, 12.06 percent, and 9.01 percent, correspondingly. (Table 4.9)

4.2.3.1 Individual Characteristics

In 2005, all of the individual characteristics were inequality-increasing factors with a total share of 3.5 percent. Among these factors, MALE was the largest contributor with 3.04 percent. SINGLE lessened the inequality by 2.03 percent in 1995 but it raised the inequality by 0.32 percent in 2005. On the contrary, the inequality share of MARRIED sharply dropped from 2.84 percent in 1995 to 0.04 percent in 2005. The share of MEMB slightly increases from -0.4 percent in 1995 to 0.08 percent in 2005. This meant that large family became an inequality-increasing factor in 2005.

4.2.3.2 Education

Although more wide spread education accessibility in recent periods can relieve the adverse effects of education, education still accounted for the largest share of inequality in 2005 with its value of almost 21 percent. Among education levels, only the elementary and lower secondary education attainment, ELE_LOWSEC, could reduce inequality. However, its ability to lessen inequality dropped from -5.72 percent in 1995 to -2.64 percent in 2005. Variable HISEC_LOWVO or the share of the higher secondary and lower vocational education attainment slightly decreased from 3.69 percent in 1995 to 2.26 percent in 2005. Similar to HIVO_OTH, the share of higher vocational also fell from 7.31 percent in 1995 to 4.18 percent in 2005.

Table 4.7 Factor Weight Inequality of Manufacturing Sector in 2005

Variables (X$_j$)	β$_j$	Standard Deviation of X$_j$	Correlation (X$_j$,Ln Y)	Factor Weight Inequality (s$_j$)
MALE	0.2161	0.4992	0.1946	0.0304
SINGLE	0.1020	0.4562	0.0478	0.0032
MARRIED	0.1266	0.4786	0.0048	0.0004
MEMB	-0.0049	1.9583	-0.0544	0.0008
MUNICIPAL	0.0334	0.4948	0.2361	0.0056
ELE_LOWSEC	0.1653	0.4997	-0.2211	-0.0264
HISEC_LOWVO	0.4081	0.3950	0.0970	0.0226
HIVO_OTH	0.6119	0.2574	0.1836	0.0418
BACHELOR	1.0051	0.2716	0.4336	0.1710
EXP	0.0349	11.6420	-0.1471	-0.0864
EXPSQ	-0.0006	564.6055	-0.1902	0.0940
PRO_ADMIN	0.3593	0.3339	0.4457	0.0773
CLERK	0.2450	0.2493	0.1262	0.0111
TRAN_COM	0.1826	0.1718	0.0384	0.0017
CRAFT_PRO	0.0001	0.4773	-0.2857	0.0000
HIGH	0.4264	0.4946	0.4283	0.1306
MEDIUM	0.1144	0.3979	-0.1517	-0.0100
FRINGE	0.1801	0.4334	0.1623	0.0183
CAP_INTENSE	-0.5109	0.0742	0.1321	-0.0072
CON_INTENSE	0.0339	0.7619	-0.0522	-0.0020
EX_INTENSE	-0.0078	1.6829	0.1273	-0.0024
IM_INTENSE	-0.0527	2.1665	-0.2170	0.0358
Ln Y		0.6919		
Residual				0.4897

Source: Calculated from the 2005 Labor Force Survey (NSO) and Input-Output Table
in 2000 (NESDB).

Although the share of workers with bachelor education decreased from 18.15 percent in 1995, share of BACHELOR was still the greatest when compared to the other variables in 2005, with a value of 17.11 percent.

4.2.3.3 Experience and Occupation

An increase of inverse correlation between experience and monthly income and a decrease of its estimated coefficient raised the influential of experience or EXP in lessening the inequality from 1.87 percent in 1995 to 8.64 percent in 2005. As a result, the contribution of experience square, EXPSQ, the derivative of experience, increased from 3.55 percent to 9.4 percent of the log variance of monthly income. The experience factor in total accounted for only 0.76 percent of the inequality in 2005.

Among types of occupation, PRO_ADMIN signified that professional and administrative occupation contributed to the largest inequality share in both 1995 and 2005 when its shares increased from 4.7 percent to 7.73 percent. The share of inequality according to clerk occupation, denoted by CLERK, slightly increased from 0.28 percent to 1.11 percent. Transportation and communication could reduce the inequality by -0.76 percent in 1995 but it contributed 0.17 percent to the inequality level in 2005. Note that craftsmen and production, though accounting for 5.46 percent of the inequality level in 1995, did not influence the inequality level in 2005 when its contribution became -0.002 percent. The role of fringe benefits in the inequality was slightly more important when its share accounted for 1.83 percent in 2005, compared to 1.22 percent in 1995.

4.2.3.4 Regional Factors

Urbanization plays a less important role in determining the inequality level in recent periods. The three components of working in the municipal area decreased compared to those in 1995. Consequently, the contribution of MUNICIPAL to log variance of monthly income sharply dropped from 3.62 percent to 0.56 percent in 1995 and 2005, correspondingly.

The minimum wage zone still leads to an unfavorable effect on the inequality. The share of the high minimum wage zone or HIGH rose to 13.06 percent in 2005, compared to 10.35 percent in 1995. According to MEDIUM, the role of medium minimum wage zone in lessening the inequality was relatively stable, around

1 percent in both 1995 and 2005. In total, minimum wage zone is the second greatest inequality share with value of 12.06 percent in 2005.

4.2.3.5 Domestic Expenditure

For domestic expenditure, variables CAP_INTENSE and CON_INTENSE indicated that capital service and consumption intensities slightly diminished the log variance of monthly income in 2005 with their inequality shares of -0.72 percent and -0.2 percent, respectively.

4.2.3.6 International Trade

While the ability of export intensity, EX_INTENSE, lessened the inequality which increased from -0.02 percent in 1995 to -0.24 percent in 2005, the inequality share of import intensity or IM_INTENSE sharply increased from 0.28 percent in 1995 to 3.58 percent in 2005. Since the inequality share, according to IM_INTENSE, dominated the lessening inequality share which arose from EX_IMPORTY; therefore, international trade did not help to improve the log variance of monthly income for workers in the manufacturing sector.

4.2.4 The Comparison on Factor Weight Inequality during 1985-2005

The previous sub-sections have shown factor weight inequality of each variable and its components over 1985-2005. In this sub-section, the comparison of factor weight inequality or the log variance of monthly income of each variable in the three study periods are presented in Table 4.8.

Among individual characteristics, MALE and MARRIED are the two largest inequality shares, especially during the beginning period. The inequality, according to MALE, peaked at 5.3 percent in 1985, then dropped to 1.58 percent in 1995, and rose again to 3.04 percent in 2005. The inequality share of MARRIED steadily decreased from 10.23 percent in 1985, sharply fell to 2.84 percent in 1995, and then further declined to only 0.04 percent in 2005. SINGLE was an inequality-decreasing factor with values of -5.32 percent and -2.03 percent shares in 1985 and 1995, respectively, but it became an inequality-increasing factor in 2005 with its 0.32 percent inequality share.

Table 4.8. Contribution to Inequality Level during 1985-2005

	Factor Weight Inequality (s_j)		
Variables (Xj)	1985	1995	2005
MALE	0.0530	0.0158	0.0304
SINGLE	-0.0532	-0.0203	0.0032
MARRIED	0.1023	0.0284	0.0004
MEMB	-0.0031	-0.0040	0.0008
MUNICIPAL	0.0195	0.0362	0.0056
ELE_LOWSEC	-0.0100	-0.0572	-0.0264
HISEC_LOWVO	0.0304	0.0369	0.0226
HIVO_OTH	0.0473	0.0731	0.0418
BACHELOR	0.0511	0.1815	0.1710
EXP	0.1599	-0.0187	-0.0864
EXPSQ	-0.0707	0.0355	0.0940
PRO_ADMIN	0.0145	0.0468	0.0773
CLERK	0.0238	0.0028	0.0111
TRAN_COM	0.0057	-0.0076	0.0017
CRAFT_PRO	-0.0151	0.0546	0.0000
HIGH	0.0802	0.1035	0.1306
MEDIUM	-0.0155	-0.0099	-0.0100
FRINGE	0.0376	0.0122	0.0183
CAP_INTENSE	0.0007	0.0028	-0.0072
CON_INTENSE	-0.0032	0.0013	-0.0020
EX_INTENSE	0.0050	-0.0002	-0.0024
IM_INTENSE	0.0182	0.0028	0.0358
Explanatory Variables	0.4786	0.5163	0.5103
Residual	0.5214	0.4837	0.4897
Total	1.0000	1.0000	1.0000

Source: Calculated from the 1985, 1995, and 2005 Labor Force Surveys (NSO) and Input-Output Tables in 1985, 1995, and 2000 (NESDB).

MEMB had the same pattern as SINGLE but with a smaller share, size of family was an inequality-decreasing factor over 1985-1995. Living in a large family gradually lessened the inequality to 0.31 percent in 1985 and 0.4 percent in 1995, but it contributed 0.08 percent of the log variance of monthly income in 2005.

Education was the most inequality-increasing factor during 1985-2005. Among education levels, only elementary and lower secondary, ELE_LOWSEC, was an inequality-decreasing factor in all the study periods, especially in 1995 when it had reduced the inequality by 5.72 percent. On the contrary, the other higher education levels, especially bachelor education attainment, raised the inequality in all the three periods. While HISEC_LOWVO, HIVO_OTH accounted for 3-7.3 percent of the inequality share, BACHELOR was credited for 5-18.2 percent of the log variance of monthly income. Note that the return to education, represented by the estimated coefficient, was unnecessary to have the same pattern on the inequality share. For example, the return to higher vocational and others was greater than the return to bachelor degree, the inequality share of the former was less than that of the latter in 1995.

It is unsurprising that experience accounted for a large percentage share of inequality, 16 percent, at the beginning of the study period, 1985. However, its role in determining the inequality was doubtful when it became an inequality-decreasing factor over 1995-2005 when EXP had lessened the inequality by -1.87 percent and by -8.64 percent in 1995 and 2005, respectively. According to an increase at a decreasing rate of return to experience, the sign of experience square must be opposite to those of experience. Table 4.9 shows that the consolidated factor weight inequality, summation of all variables in the same category, and of experience factor accounts for 9 percent, 1.68 percent, and only 0.76 percent, in 1985, 1995, and 2005, respectively. In other words, experience factor does not play an important role in determining the inequality in recent periods. The study result may be affected by the overestimation of experience or EXP because experience was unavailable in the Labor Force Survey dataset; it had to be constructed from age of each worker – (schooling years plus 6 years).

Among types of occupation, professional and administrative or PRO_ADMIN, was the first or the second largest inequality share. The shares of PRO_ADMIN

steadily increased from 1.45 percent in 1985 to 4.68 percent in 1995 and to 7.73 percent in 2005, respectively. The other occupations contributed less than 2.4 percent of the inequality, except craftsmen and production in 1995 when inequality share of CRAFT_PRO was 5.46 percent. Compared to other occupations, the inequality shares of transportation and communication were quite small, with value of TRAN_COM around -0.76-0.57 percent. The shares of craftsmen and production fluctuated with values of -1.51 in 1985, rose to 5.46 in 1995 and approached zero in 2005.

The importance of fringe benefits or FRINGE also fluctuated with a declining trend. The value of FRINGE was about 3.8 percent in 1985, dropped to 1.22 percent in 1995, and then slightly increased again to 1.83 percent in 2005. Since the fringe benefits were usually offered in large companies, its relatively small inequality share denoted a good signal.

Role of the urbanization in determining the inequality oscillated quite a bit. MUNICIPAL contributed 1.95 percent and 3.62 percent of the inequality in 1985 and in 1995, respectively. According to the more decentralized of the facilities, its inequality share sharply dropped to only 0.56 percent in 2005. Compared to urbanization, minimum wage zone played an important role in determining the log variance of monthly income in all the study periods. Over 1985-2005, the high minimum wage zone was a significant inequality-increasing factor whereas the medium minimum wage zone was a minor inequality-decreasing factor. While the shares of HIGH steadily increased from 8.02 percent to 10.35 percent to 13.06 percent, the share of MEDIUM had slightly lessened the inequality from -1.55 percent to -0.99 percent to -1 percent in 1985, 1995, and 2005, respectively. Since an increasing factor dominated a decreasing factor, as a result, the minimum wage zone contributed a large share of the log variance in all the study periods.

Domestic expenditure was not the important factor in determining the log variance of monthly income; both CAP_INTENSE and CON_INTENSE accounted for less than 1% of the inequality over the study periods. In addition, each variable was both an inequality-increasing factor and an inequality-decreasing factor. For example, CAP_INTENSE accounted for 0.07 percent, slightly rose to 0.28 percent, and then dropped to -0.72 percent of the inequality level in 1985, 1995, and 2005, respectively. It means that capital service intensity was an inequality-increasing

factor in 1985 and in 1995, but it became an inequality-decreasing factor in 2005. The shares of CON_INTENSE were quite small and fluctuated as well. The values of -0.32 percent, 0.13percent, and -0.2 percent means that consumption intensity was an inequality-decreasing factor in 1985 and in 2005, but it was an inequality-increasing factor in 1995.

The shares of export intensity, EX_INTENSE, were insignificant in all the study periods. In 1985, export intensity was an inequality-increasing factor and became an inequality-decreasing factor over 1995-2005. The shares varied from 0.5 percent in 1985, -0.02 percent in 1995, and -0.24 percent in 2005. IM_INTENSE denoted that import intensity was an inequality-increasing factor over 1985-2005. The inequality shares of import intensity fluctuated from 1.82 percent in 1985, to 0.28 percent in 1995, and to 3.58 percent in 2005.

As mentioned earlier for dummy variables with more than one category, this study needs to calculate the consolidated factor weight inequality as presented in Table 4.9, a summary of Table 4.8. Subtracting the residual from one, the power of how the included variables in explaining the inequality were obtained. This study found that the included explanatory variables could explain 48-52 percent of the inequality level during the study periods.

The inequality according to gender was highest in 1985, 5.3 percent, sharply dropped to 1.6 percent in 1995, and rose again to 3 percent in 2005. The inequality share of marital status was at its highest value in 1985. The lessening of the inequality according to SINGLE was dominated by the MARRIED inequality share over the study periods. As a result, the inequality share of marital status was at 4.92 percent in 1985, steadily decreased to 0.81 percent in 1995 and 0.36 percent in 2005. The falling of its consolidated factor weight inequality meant that marital status became less important in determining the inequality among workers. We can ignore the shares of family size because they accounted for around -0.4-0.08 percent of the inequality in all the study periods.

Table 4.9 Consolidated Share to Inequality Level during 1985-2005

Variable Group	1985	1995	2005
Gender	0.0530	0.0158	0.0304
Marital Status	0.0492	0.0081	0.0036
Size of Family	-0.0031	-0.0040	0.0008
Urbanization	0.0195	0.0362	0.0056
Education	0.1188	0.2343	0.2091
Experience Factor	0.0892	0.0168	0.0076
Occupation	0.0289	0.0966	0.0901
Minimum Wage Zone	0.0647	0.0936	0.1206
Fringe Benefit	0.0376	0.0122	0.0183
Domestic Expenditure	-0.0025	0.0041	-0.0092
International Trade	0.0232	0.0026	0.0334
Explanatory Variables	0.4786	0.5163	0.5103
Residual	0.5214	0.4837	0.4897
Total	1.0000	1.0000	1.0000

Source: Calculated from the 1985, 1995, and 2005 Labor Force Surveys (NSO) and
Input-Output Tables in 1985, 1995, and 2000 (NESDB).

Education accounted for the highest inequality shares in all the study periods with its value of 11.88 percent in 1985, which sharply increased to 23.43 percent in 1995, and slightly declined to 20.91 percent in 2005. While experience was an important factor in determining the inequality at the beginning of the study period, it became an insignificant factor in the more recent ones. Experience factor contributed 8.92 percent of the inequality in 1985, sharply dropped to 1.68 percent and 0.76 percent in 1995 and 2005, respectively. Occupation was another significant inequality-increasing factor. Although share of occupation started from a relatively small value of 2.9 percent in 1985, it sharply increased to 9.7 percent in 1995 and gradually decreased to 9.01 percent in 2005. This study found that the share of fringe

benefits, another factor relating to occupation, reached its highest value of 3.76 percent in 1985; however, the shares were less than 1.9 percent in both 1995 and 2005.

Although MUNICIPAL or urbanization accounted for 1.95 percent of the inequality share in 1985 and became 3.62 percent in 1995; the decentralization of facilities and infrastructures sharply reduced the inequality share of MUNICIPAL to 0.56 percent in 2005. The other regional factor, the minimum wage zone, contributed a larger inequality share over 1985-2005. Although the medium minimum wage zone, MEDIUM, was an inequality-decreasing factor, its role was dominated by an inequality-increasing factor or the high minimum wage zone, HIGH. Consequently, the consolidated share of minimum wage zone steadily increased from 6.47 percent in 1985 to 9.36 percent in 1995 and to 12.06 percent in 2005. The consolidated shares of minimum wage zone obviously indicated the advantages of working in high minimum wage zone.

According to its minor inequality shares, domestic expenditure could not explain the wage inequality in the manufacturing sector. The shares were -0.25 percent in 1985, 0.41 percent in 1995, and -0.92 percent in 2005, respectively. For international trade, the factor weight inequality of export intensity, EX_INTENSE, implied that the export growth could not explain the inequality in the manufacturing sector in Thailand during 1985-2005. Although the Thai economy had high export growth since 1985, the export intensity or EX_INTENSE contributed only 0.5 percent to the inequality in 1985. Nevertheless, the intensity slightly lessened the inequality by -0.016 percent and -0.24 percent in 1995 and 2005, respectively. Compared to export intensity, the shares of import intensity were higher over the study periods. The import intensities or IM_INTENSE accounted for 0.28-3.58 percent of the inequality. As a whole, while domestic expenditure could not explain the log variance of monthly income, the import intensity could only explain the inequality in 2005 when IM_INTENSE share rose to 3.58 percent, making the consolidated share of international trade reach its highest value of 3.34 percent.

In conclusion, although the estimated coefficients of all included variables could explain the wage differential as mentioned in Section 4.1, the factor weight inequality indicated that there were only a few variables which could explain the

inequality level or the log variance of workers' monthly income. This study found that the significant inequality-increasing factors were education, minimum wage zone, and occupation. The shares of other factors were fluctuating and sometimes they switched their roles between inequality-increasing and inequality-decreasing factors. Experience, gender, and marital status were important factors in determining the inequality at the beginning study period, 1985. Urbanization was a significant factor in 1995, but not in 1985 and 2005. The other two variables, occupation and international trade, should not be overlooked. Occupation was a main factor in 1995 and 2005 whereas international trade became more important in 2005.

Compared to other variables, education was the most important factor in determining the log variance of monthly income because it accounted for the highest share of the inequality in all of the study periods. Its inequality share started from 12 percent in 1985, sharply increased to 23 percent in 1995 and slightly decreased to 21 percent in 2005. In 1985, the share of experience was the second in rank followed by education with its value of 8.92 percent. However, experience could be ignored in the next two decades when its shares became 1.68 percent and 0.76 percent in 1995 and 2005, respectively. The types of occupation could explain the inequality well, especially in the recent periods. While the inequality share of occupation was 2.89 percent in 1985, its shares rose to more than 9 percent in both 1995 and 2005. The minimum wage zone was also the important source of the inequality in the manufacturing sector. Its shares steadily increased in all the study periods, starting from 6.47 percent to 9.36 percent, and 12.06 percent in 1985, 1995, and 2005, respectively.

According to the high growth in the manufacturing sector since 1985, this study expected to find the greatest impact of domestic expenditure and international trade on the inequality level. Surprisingly, both domestic expenditure and international trade were unable to explain the log variance of monthly income in this sector and in that period. For instance, we expected that workers with more ability in using capital would earn higher income i.e., workers with higher skills should have received higher income than the unskilled workers but this study found that capital service intensity was a minor factor in determining the inequality over the study periods. Capital service intensity accounted for 0.07 percent and 0.28 percent of the

inequality in 1985 and 1995 but it helped to reduce the inequality level for -0.72 percent in 2005. Similarly, consumption intensity could have either lessened or enhanced the inequality level but its shares were quite small, around -0.32-0.13 percent of the inequality for all the study periods.

In accordance with the high growth of export in the Thai economy since 1985, export intensity was expected to be the source of inequality in the manufacturing sector. Contrary to our expectations, factor weight inequality suggested that export intensity did not influence the inequality because shares of EX_INTENSE were quite small. Export intensity accounted for only 0.5 percent of the inequality in 1985. Later in 1995 and 2005, it lessened the inequality for -0.02 percent and -0.24 percent, respectively. Compared to export intensity, import intensity accounted for greater inequality share. The import intensity or IM_INTENSE worsened the inequality in all study periods with its fluctuating shares of 1.82 percent in 1985, 0.28 percent in 1995, and 3.58 percent in 2005.

The relatively lower inequality shares of gender, marital status, family size, urbanization, and fringe benefits indicated good signal in economic development. Since wage inequality should not be determined by inborn individual characteristics or working place but rather, it should depend on the productivity of each worker. Female workers should earn equally to male workers if they possess the same ability and work in the same occupation. Marital status should not influence the productivity of workers and at present, when the Thai society began moving towards a single-family, the size of family should not have influenced the income inequality.

In addition, the increased decentralization of developments in all regions has made the advantage of working in the urban area less significant in recent periods, 2005. It is believed that workers in large companies had received more advanced fringe benefits than those in small ones. Therefore, to lessen the inequality arising from this factor, the government should have offered basic welfare to low-income workers, workers in small enterprises, and especially to workers in the informal sector.

Although education was found as the most important source of the log variance of monthly income, restricting the education to reduce the inequality was a shortsighted policy. On the contrary, the government should have offered more easily

and widely accessible education to all workers. The formal or in-school education may lessen the inequality for the next generation if all workers have more education. To reduce inequality among workers who are currently in the labor force, the informal education is more appropriate. Training programs designed for and operated by each company help the workers receive more appropriate skills for their jobs. In addition, the successful training programs are not necessary done by the government but the government should have initiated the programs through tax breaks. With more education or more skills, we could have expected a lower share of inequality from education and occupation among workers in the manufacturing sector.

Wage inequality from the minimum wage zone should not be overemphasized. According to the different costs of living in each province, the real value of the baht is not identical for the whole Kingdom. The minimum wage rate is determined by the cost of living whereas this study could not exclude the effect of cost of living from this variable. Therefore, wage inequality, according to minimum wage zone, probably represents the different cost of livings in each area.

4.3 THE CONTRIBUTION TO CHANGE IN INEQUALITY

Not only should this study be able to quantify how much the inequality in monthly income can be accounted for by various individual characteristics of each worker, so-called "levels questions" as examined in Section 4.2, but the regression-based decomposition technique also enables this study to clarify how these characteristics accounted for the change in the inequality over time. The second question of this technique which is usually known as the "difference question" is to answer whether this study has to compute the inequality measure first. Since the study results obtained from the regression-based decomposition are unaffected by the inequality measure, this study adopts the most well-known inequality measurement, Gini coefficient, to measure the wage inequality for the whole of the study periods. Using equation (5) and the values of Gini, this study can assess the contribution of each factor to the change in wage inequality.

$$II_j(I) = \frac{s_{j,2} I_2 - s_{j,1} I_1}{I_2 - I_1}, \text{ where } \sum_j II_j(I) + II_\varepsilon(I) = 1. \tag{5}$$

Equation (5) shows the quantitative importance of each factor for the observed change in inequality index I, Gini. Compare to 1985, the inequality slightly increased in 1995 and sharply decreased in 2005 (Table 4.10).

Table 4.10 Gini Coefficients during 1985-2005

Year	Gini Coeficients
1985	0.3926
1995	0.4058
2005	0.3772

Source: Calculated from the 1985, 1995, and 2005 Labor Force Surveys (NSO).

According to the Gini, the inequality of the manufacturing sector increased around 0.0132 in the first decade and decreased around 0.0286 in the second one. The monthly income inequality of workers in the manufacturing sector slightly worsened in the first decade, 1985-1995 when Gini increased from 0.3926 in 1985 to 0.4058 in 1995. However, the inequality slightly improved in the second decade, 1995-2005, when the Gini fell to 0.3772 in 2005.

Tables 4.11-4.12 describe the change of the Gini in the first decade, 1985-1995. While Table 4.11 presents the contribution to the change in the Gini according to each explanatory variable; Table 4.12 shows the consolidated contribution to the change in the Gini. Similar to consolidated share of factor weight inequality in Section 4.2, the consolidated contribution was derived from the summation of the contribution of each variable when there was more than one variable in the same category, such as education. The first two columns of Table 4.11 present factor weight inequality (s_j) as calculated in Section 4.2, and then these s_j were weighted by the Gini of its corresponding period as shown in the third column. The last column describes how the change in the Gini between 1985 and 1995 was accounted for by each variable.

When compared to the factor weight inequality or s_j in 1985, the lower value of factor weight inequality of variable X in 1995 indicated the greater ability of the variable X in lessening the log variance of monthly income and vice versa. The negative value of s_j was interpreted in the same manner. In other words, the positive or negative value of s_j just denoted the direction of contribution to the inequality level. A variable with a positive factor weight inequality was called an inequality-increasing factor whereas a variable with a negative factor weight inequality was called an inequality-decreasing factor. For example, according to the negative factor weight inequality, single workers or SINGLE could reduce the inequality level in both 1985 and 1995 as mentioned in Section 4.2; however, its ability in lessening the inequality level in 1995, -2.03 percent, was not as good as in 1985, -5.32 percent. Similar to MEMB, large family lessened the inequality slightly more in 1995 than in 1985 when its shares fell from -0.31 percent in 1985 to -0.40 percent in 1995.

Compared to those in 1985, the lower values of s_j in 1995 indicated higher contribution to the lower the inequality level. In 1995, these variables were MALE, MARRIED, MEMB, ELE_LOWSEC, EXP, CLERK, TRAN_COM, FRINGE, EX_INTENSE, and IM_INTENSE. On the contrary, the variables enhancing inequality level in 1995 were SINGLE, MUNICIPAL, HISEC_LOWVO, HIVO_OTH, BACHELOR, EXPSQ, PRO_ADMIN, CRAFT_PRO, HIGH, MEDIUM, CAP_INTENSE, and CON_INTENSE.

The negative values of the factor weight inequality, s_j, weighted by Gini, are denoted in the third column of Table 4.11 which indicate the variables that contribute to lowering the Gini in 1995 and vice versa. For that reason, the factors which improve the Gini are MALE, MARRIED, MEMB, ELE_LOWSEC, EXP, CLERK, TRAN_COM, FRINGE, EX_INTENSE, and IM_INTENSE.

The last column of Table 4.11 describes how the change in the Gini coefficient was accounted for by each variable. The contribution to the change in Gini was defined as the ratio of factor weight inequality weighted by the Gini and the change of the Gini during 1985 and 1995. Since the Gini worsened in 1995, 0.4058, compared to that in 1985, 0.3926, the negative values in the last column indicate the variables that accounted for lessening of the Gini whereas the positive ones denote the variables accounted to worsening the Gini.

Table 4.11 Contribution to Changes in Gini Coefficients during 1985-1995

Variables (X_j)	Factor Weight Inequality (s_j)		s_j weighted by Gini	Contribution to Change in Gini
	1985	1995	$s_{j1995}Gini_{1995}-s_{j1985}Gini_{1985}$	1985-1995
MALE	0.05304	0.01579	-0.01441	-1.09200
SINGLE	-0.05317	-0.02031	0.01263	0.95699
MARRIED	0.10232	0.02836	-0.02866	-2.17143
MEMB	-0.00312	-0.00395	-0.00038	-0.02859
MUNICIPAL	0.01952	0.03623	0.00704	0.53342
ELE_LOWSEC	-0.00996	-0.05724	-0.01931	-1.46326
HISEC_LOWVO	0.03044	0.03694	0.00304	0.23036
HIVO_OTH	0.04726	0.07306	0.01110	0.84057
BACHELOR	0.05112	0.18153	0.05360	4.06038
EXP	0.15987	-0.01871	-0.07036	-5.33014
EXPSQ	-0.07067	0.03551	0.04216	3.19358
PRO_ADMIN	0.01453	0.04678	0.01328	1.00609
CLERK	0.02379	0.00276	-0.00822	-0.62276
TRAN_COM	0.00570	-0.00757	-0.00531	-0.40229
CRAFT_PRO	-0.01511	0.05460	0.02809	2.12784
HIGH	0.08022	0.10351	0.01051	0.79612
MEDIUM	-0.01553	-0.00989	0.00208	0.15778
FRINGE	0.03763	0.01217	-0.00984	-0.74520
CAP_INTENSE	0.00070	0.00278	0.00085	0.06465
CON_INTENSE	-0.00321	0.00130	0.00179	0.13536
EX_INTENSE	0.00502	-0.00016	-0.00204	-0.15433
IM_INTENSE	0.01819	0.00281	-0.00600	-0.45452
Explanatory Variables	0.47858	0.51630	-	1.63862
Residual	0.52143	0.48370	-	-0.63863
Total	1.00000	1.00000	-	1.00000
Gini	0.39260	0.40580	-	-

Source: Calculated from the 1985 and 1995Labor Force Surveys (NSO) and Input-Output Tables in 1985, and 1995 (NESDB).

The last column of Table 4.11 revealed that the improving factors were MALE, MARRIED, MEMB, ELE_LOWSEC, EXP, CLERK, TRAN_COM, FRINGE, EX_INTENSE, and IM_INTENSE. Among these factors, experience or EXP accounted for 533 percent of a decline in the Gini. MARRIED takes about 217 percent, whereas ELE_LOWSEC accounts for 146 percent. MALE's share in reducing the Gini is about 109%. The rest of the variables accounted for less than 100 percent of a decline in the Gini. They were FRINGE (74.5 percent), CLERK (62.3 percent), IM_INTENSE (45.5 percent), TRAN_COM (40.2 percent), EX_INTENSE (15.4 percent), and MEMB (2.9 percent).

The factors which worsened the Gini were SINGLE, MUNICIPAL, HISEC_LOWVO, HIVO_OTH, BACHELOR, EXPSQ, PRO_ADMIN, CRAFT_PRO, HIGH, MEDIUM, CAP_INTENSE, and CON_INTENSE. Among these factors, the share of BACHELOR, 406 percent, was the greatest in enhancing the Gini whereas the EXPSQ was the second with 319 percent. It was surprising that CRAFT_PRO accounted for a higher share in raising the Gini compared to PRO_ADMIN. The shares were 213 percent and 101 percent, respectively. The rest of the variables accounted for less than 100 percent in enhancing the Gini as follows: SINGLE (96 percent), HIVO_OTH (84 percent), HIGH (80 percent), MUNICIPAL (53 percent), HISEC_LOWVO (23 percent), MEDIUM (16 percent), CON_INTENSE (13.5 percent), and CAP_INTENSE (6.5 percent)

Table 4.12 is a summary of Table 4.11. The first two columns denote the variable share or consolidated share of factor weight inequality. With lower s_j, variables or the variables group improving the log variance of monthly income are gender, marital status, family size, experience factor, fringe benefit, and international trade. In column 3, the negative sign of s_j weighted by the Gini confirms that the variables contributing to lowering the Gini are gender, marital status, family size, experience factor, fringe benefits, and international trade. The last column of Table 4.12 indicates that during 1985-1995, the Gini was improved by experience, marital status, gender, fringe benefit, international trade, and family size. Among these variables, experience accounted for 214 percent of decline in the Gini. Marital status, gender, fringe benefits, international trade, and family size accounted for 121 percent, 109 percent, 75 percent, 61 percent, and 2.9 percent, respectively. However, these

factors could not offset the larger increase in the Gini from education, types of occupation, minimum wage zone, urbanization, and domestic expenditure. These factors accounted for 367 percent, 211 percent, 95 percent, 53 percent, and 20 percent, respectively. As a result, the Gini in 1995 was higher than that of 1985.

Table 4.12. Consolidated Contribution to Changes in Gini Coefficients during 1985-1995

Variables Group	Factor Weight Inequality (s_j)		s_j weighted by Gini	Contribution to Change in Gini
	1985	1995	$s_{j1995}Gini_{1995}$-$s_{j1985}Gini_{1985}$	1985-1995
Gender	0.05304	0.01579	-0.01441	-1.09200
Marital Status	0.04916	0.00805	-0.01603	-1.21444
Family Size	-0.00312	-0.00395	-0.00038	-0.02859
Urbanization	0.01952	0.03623	0.00704	0.53342
Education	0.11885	0.23430	0.04842	3.66805
Experience Factor	0.08920	0.01680	-0.02820	-2.13657
Occupation	0.02891	0.09656	0.02784	2.10888
Minimum Wage Zone	0.06469	0.09362	0.01259	0.95390
Fringe Benefit	0.03763	0.01217	-0.00984	-0.74520
Domestic Expenditure	-0.00251	0.00408	0.00264	0.20001
International Trade	0.02321	0.00265	-0.00804	-0.60885
Explanatory Category	0.47858	0.51630	-	1.63862
Residual	0.52143	0.48370	-	-0.63863
Total	1.00000	1.00000	-	1.00000

Source: Calculated from the 1985 and 1995 Labor Force Surveys (NSO) and Input-Output Tables in 1985 and 1995 (NESDB).

Tables 4.13 and 4.14 present the contribution of explanatory variables to the change of Gini during 1995-2005. As mentioned earlier, the lower values of factor weight inequality equals the greater ability of that variable in reducing the log variance of monthly income or the inequality level. The first two columns of Table 4.13 denote that the factors improving the inequality level are MARRIED, MUNICIPAL, HISEC_LOWVO, HIVO_OTH, BACHELOR, EXP, CRAFT-PRO,

Table 4.13 Contribution to Changes in Gini Coefficients during 1995-2005

Variables (X_j)	Factor Weight Inequality (s_j)		s_j weighted by Gini	Contribution to Change in Gini
	1995	2005	$s_{j2005}Gini_{2005}-s_{j1995}Gini_{1995}$	1995-2005
MALE	0.01579	0.03036	0.00504	-0.17629
SINGLE	-0.02031	0.00322	0.00945	-0.33058
MARRIED	0.02836	0.00042	-0.01135	0.39685
MEMB	-0.00395	0.00075	0.00189	-0.06601
MUNICIPAL	0.03623	0.00564	-0.01258	0.43972
ELE_LOWSEC	-0.05724	-0.02638	0.01327	-0.46415
HISEC_LOWVO	0.03694	0.02260	-0.00647	0.22616
HIVO_OTH	0.07306	0.04179	-0.01388	0.48544
BACHELOR	0.18153	0.17105	-0.00915	0.31979
EXP	-0.01871	-0.08639	-0.02500	0.87397
EXPSQ	0.03551	0.09398	0.02104	-0.73559
PRO_ADMIN	0.04678	0.07729	0.01017	-0.35553
CLERK	0.00276	0.01114	0.00308	-0.10785
TRAN_COM	-0.00757	0.00174	0.00373	-0.13040
CRAFT_PRO	0.05460	-0.00002	-0.02216	0.77499
HIGH	0.10351	0.13056	0.00724	-0.25330
MEDIUM	-0.00989	-0.00998	0.00025	-0.00878
FRINGE	0.01217	0.01830	0.00197	-0.06877
CAP_INTENSE	0.00278	-0.00724	-0.00386	0.13490
CON_INTENSE	0.00130	-0.00195	-0.00126	0.04412
EX_INTENSITY	-0.00016	-0.00240	-0.00084	0.02938
IM_INTENSITY	0.00281	0.03584	0.01238	-0.43281
Explanatory Variables	0.51630	0.51032	-	0.59526
Residual	0.48370	0.48968	-	0.40476
Total	1.00000	1.00000	-	1.00000
Gini	0.40580	0.37720		

Source: Calculated from the 1995 and 2005 Labor Force Surveys (NSO) and Input-Output Tables in 1995 and 2000 (NESDB).

MEDIUM, CAP_INTENSE, CON_INTENSE, and EX_INTENSE. On the contrary, the higher values of factor weight inequality in 2005 indicate variables enhancing the inequality level. These variables are MALE, SINGLE, MEMB, ELE_LOWSEC, EXPSQ, PRO_ADMIN, CLERK, TRAN_COM, HIGH, FRINGE, and IM_INTENSE.

The negative values of the factor weight inequality, s_j, weighted by the Gini denoted in the third column of Table 4.13 indicate the variables that contribute to lowering the Gini in 2005 and vice versa. Therefore, for these periods, the variables improving the Gini were MARRIED, MUNICIPAL, HISEC_LOWVO, HIVO_OTH, BACHELOR, EXP, CRAFT_PRO, CAP_INTENSE, CON_INTENSE, and EX_INTENSE. Note that an insignificant decrease in factor weight inequality of MEDIUM was so trivial that it did not contribute to lowering the Gini in 2005.

The last column of Table 4.13 describes how the change in the Gini coefficient is accounted for by each variable. Since the Gini improved from 0.4058 in 1995 to 0.3772 in 2005, the positive values in the last column identify the variables that account for lessening the Gini, whereas the negative ones denote the variables accounting for enhancing the Gini. For that reason, the variables that help to improve the Gini are MARRIED, MUNICIPAL, HISEC_LOWVO, HIVO_OTH, BACHELOR, EXP, CRAFT_PRO, CAP_INTENSE, CON_INTENSE, and EX_INTENSE. However, unlike the study results in 1985-1995, all of these variables accounted for less than 100 percent in reducing the Gini. Among these variables, EXP accounts for the highest share with 87.4 percent of decline in the Gini. CRAFT_PRO accounted for about 77.5 percent; HIVO_OTH accounted for 48.5 percent. The share of MUNICIPAL in reducing the Gini was about 44% whereas that of MARRIED was about 40 percent. BACHELOR accounted for 32 percent while HISEC_LOWVO accounted 23 percent. CAP_INTENSE share was about 13.5 percent whereas the share of CON_INTENSE was about 4.4 percent. The EX_INTENSE share, the lowest contribution in lessening the Gini, was about 3 percent.

The negative values of the last column in Table 4.13 indicated variables worsening the Gini. These variables were MALE, SINGLE, MEMB, ELE_LOWSEC, EXPSQ, PRO_ADMIN, CLERK, TRAN_COM, HIGH, MEDIUM, FRINGE, and IM_INTENSE. Similar to the shares of the variables improving the Gini, the shares of

all variables enhancing the Gini were less than 100 percent during 1995-2005. The most important variable worsening the Gini was EXPSQ whose share was 74 percent. ELE_LOWSEC was second highest rank with its share of 46.4 percent; IM_INTENSE accounted for 43.3 percent in raising the Gini. The share of PRO_ADMIN is about 36 percent. SINGLE contributed 33 percent to the worsening Gini. All of the rest of the variables contributed to less than 30 percent in enhancing the Gini; HIGH (25.33 percent), MALE (17.6 percent), TRAN_COM (13 percent), CLERK (11 percent), FRINGE (6.9 percent), MEMB (6.6 percent), and MEDIUM (0.9 percent).

Table 4.14 summarizes the contribution to Gini according to consolidated factor weight inequality over 1995-2005. As stated by lower values of factor weight inequality in the first two columns of Table 4.14, the factors lessening the log variance of monthly income were marital status, urbanization, education, experience factor, occupation, and domestic expenditure. The negative values of factor weight inequality weighted by the Gini in the third column confirm the role of these variables in lessening the inequality. The last column of Table 4.14 reveals that during 1995-2005, the Gini was improved by education, urbanization, occupation, domestic expenditure, experience factor, and marital status. Among these variables that reduced the Gini in 2005, the share of education was greatest at 56.72 percent. Urbanization, occupation, domestic expenditure, experience factor, and marital status accounted for 44 percent, 18.1 percent, 17.9 percent, 13.8 percent, and 6.6 percent of the Gini respectively. Nevertheless, these factors could offset an increase in the inequality with international trade, minimum wage zone, gender, fringe benefit, and family size with their contributions of 40.3 percent, 26.2 percent, 17.6 percent, 6.9 percent, and 6.6 percent, respectively. As a result, the Gini was improved in 2005, in comparison to that of 1995.

Table 4.14 Consolidated Contribution to Changes in Gini Coefficients during 1995-2005

Variables Group	Factor Weight Inequality (s_j)		s_j weighted by gini	Contribution to Change in Gini
	1995	2005	$s_{j2005}Gini_{2005}-s_{j1995}Gini_{1995}$	1995-2005
Gender	0.01579	0.03036	0.00504	-0.17629
Marital Status	0.00805	0.00364	-0.00190	0.06627
Family Size	-0.00395	0.00075	0.00189	-0.06601
Urbanization	0.03623	0.00564	-0.01258	0.43972
Education	0.23430	0.20906	-0.01622	0.56724
Experience Factor	0.01680	0.00758	-0.00396	0.13838
Occupation	0.09656	0.09015	-0.00518	0.18120
Minimum Wage Zone	0.09362	0.12059	0.00750	-0.26208
Fringe Benefit	0.01217	0.01830	0.00197	-0.06877
Domestic Expenditure	0.00408	-0.00919	-0.00512	0.17902
International Trade	0.00265	0.03344	0.01154	-0.40344
Explanatory Category	0.51630	0.51032	-	0.59524
Residual	0.48370	0.48968	-	0.40476
Total	1.00000	1.00000	-	1.00000

Source: Calculated from the 1995 and 2005 Labor Force Surveys (NSO) and Input-Output Tables in 1995 and 2000 (NESDB).

CHAPTER 5

CONCLUSION

According to the fact that the high economic growth in Thailand is not pro poor, the benefit of the growth does not trickle down to the poor. In addition, the market failure neither makes the growth equally distributed nor encourage the social dynamic in the Thai society. Moreover, the previous government policies may succeed in poverty reduction but they cannot solve for the income inequality. While Thai tax revenues based on the indirect taxes such as value added tax and excise tax which are regressive, the investment promotion encourages the import of capital machines and equipment. Therefore, the investment promotion leads to labor saving production technique, whereas Thailand is a labor abundant country. From all the above reasons, the income inequality persistently worsens in the Thai economy.

In Thailand, the adverse effects arising from income inequality have been realized since the 1970s. At present, it is recognized that income inequality is a source of serious instability such as economic, social and even political instability. It has also been recognized that the improvement of income inequality will lead to faster and more sustainable economic growth which is also a necessary condition for large-scale poverty alleviation in the long run.

According to the dualism of the Thai economy, the previous studies concerning poverty and income distribution concentrated the problems in the agricultural sector. At present, Thai economy has become more open and is moving towards a more industrialized economy. Therefore, the industrial sector has become an important sector in the GDP. This study suspects that the benefits arising from the industry growth is unequally distributed among workers in the manufacturing sector because poor workers working in informal sectors with bad working conditions are generally found in the Thai economy. In addition, a more globalized economy may worsen the income inequality among them. To answer this question, this study tries to

examine the wage inequality among workers in the manufacturing sector which is an important sub-sector of the industrial sector.

Since the conventional decomposition has some drawbacks, the sources of inequality obtained from prior studies are being questioned about their accuracy. Without precise sources of inequality, the government policies become ineffective, waste limited government budget, and lead to an inequality trap. Because of that reason, this study implements an alternative approach, regression-based decomposition proposed by Fields (2002), to investigate the wage inequality in the Thai manufacturing sector in 1985, 1995, and 2005. Using this technique, this study can investigate the sources of inequality with more accuracy. In addition, this technique offers both the influence of factors in determining the log variance of income and the impact of these factors on the change of inequality. The examining on the effect of each factor on the change of inequality enables this study to verify the effectiveness of government policies such as the education expansion program.

The operating data are the Labor Force Surveys collected by the National Statistical Office and the Input-Output Tables compiled by the Office of the National Economic and Social Development Board. The dependent variable is the natural logarithm of workers' monthly income; the explanatory variables are individual workers' characteristics and their working status. The variable categories are gender, marital status, family size, urbanization, education, experience, types of occupation, minimum wage zone, fringe benefit, domestic expenditure, and international trade.

The estimated coefficients of all variables significantly differ from zero in all study periods. The significance denotes that all variables can explain the wage differential among workers in the manufacturing sector. Since the dependent variable is in log form and most of explanatory variables are category variables, this study needs to interpret the regression results carefully with g* for these dummy variables. The interpretation of g^* is similar to the ordinary estimated coefficient β. If the estimated coefficient is derived from continuous explanatory variable, g^* indicates the growth of monthly workers' income according to that variable and if the estimated coefficient is derived from dummy variable, g^* denotes the wage differential compared to its reference group.

Although all factors can determine the wage differential, this study denotes only the important factors here. Among all variables, education, occupation, marital status, minimum wage zone, and fringe benefits were important factors determining wage differential in 1985. All education levels, except elementary and lower secondary, can explain the wage differential better than the other variables. The next factors are professional and administrative, married, high minimum wage zone, single, and fringe benefits. As in 1985, all education levels, professional and administrative, high minimum wage zone, married, single, and transportation and communication are powerful factors in determining wage differential in 1995. Education influences more on the wage differential in 1995 than it did in 1985. Education, occupation, and minimum wage zone are still important factors in 2005 as well. A Bachelor degree has the greatest impact on the wage differential. The next factors are higher vocational level, high minimum wage zone, higher secondary and lower vocational level, and professional and administrative.

The factor weight inequality is employed to examine the inequality share of each variable to the log variance of monthly income, the so-called "the levels question". Variables with positive factor weight inequality are called an inequality-increasing factor whereas variables with negative factor weight inequality are called an inequality-decreasing factor. In 1985, the categories education, experience factor, minimum wage zone, and marital status were inequality-increasing factors. The inequality shares of these factors are experience (16 percent), married (10.23 percent), high minimum wage zone (8.02 percent), male (5.30 percent), bachelor (5.11 percent), and higher vocational level and others (4.73 percent). A similar pattern is found in 1995 and 2005, but with different order. In 1995, bachelor accounts for the greatest inequality share (18.15 percent). The next factors are high minimum wage zone (10.35 percent), higher vocational level and others (7.31 percent), and professional and administrative (4.68 percent). A bachelor degree was still the greatest inequality share in 2005 with factor weight inequality of 17.10 percent, followed by high minimum wage zone (13.06 percent). Note that the factor weight inequality of experience is -8.64 percent, denoting that experience can reduce the inequality level in 2005. Professional and administrative occupation accounts for 7.73

percent of the log variance on monthly income. The inequality shares of other factors were rather small.

The trickle down effect according to industrial growth and international trade expansion was uncertain. The inequality shares of capital intensity and consumption intensity were insignificant, implying no trickle down from the industrial growth to workers. The inequality shares of export intensity and import intensity were rather insignificant, except the inequality share of import intensity that reaches 3.58 percent of log variance in 2005.

The regression based decomposition allows this study to examine the effect of these factors on the change of the inequality, Gini coefficient, as well. The Gini in 1985 was 0.3926, slightly better than that in 1995, 0.4058. During 1985-1995, the factors improving the Gini were experience (533 percent), married (217 percent), elementary and lower secondary (146 percent), and male (109 percent). The other variables accounting for less than 100 percent of decline in the Gini were fringe benefit (74.5 percent), clerk (62.3 percent), import intensity (45.5 percent), transportation and communication (40 percent), export intensity (15.4 percent), and number of household members (2.9 percent). On the contrary, the factors enhancing the Gini are bachelor (406 percent), experience square (319 percent), craftsman and production (213 percent), professional and administrative (101 percent). The other variables accounting for less than 100 percent in raising the Gini were single (96 percent), high vocational and other (84 percent), high minimum wage zone (80 percent), municipal (53 percent), higher secondary and lower vocational (23 percent), medium minimum wage zone (16 percent), consumption intensity (13.5 percent), and capital intensity (6.5 percent). According to share or consolidated share contribution to the change of the Gini during 1985-1995, experience factor was the greatest factor in improving the Gini, 214 percent, followed by marital status (121 percent), gender (109 percent), fringe benefit (75 percent), international trade (61 percent), and family size (2.9 percent). In contrast, the share or consolidated shares contribute to worsening the Gini are education (367 percent), occupation (211 percent), minimum wage zone (95 percent), urbanization (53 percent), and domestic expenditure (20 percent).

The inequality slightly improved, during 1995-2005, when Gini fell from 0.4058 in 1995 to 0.3772 in 2005. Note that all factors account for less than 100 percent in improving or in worsening the Gini during 1995-2005. Experience accounts for the highest share with its 87.4 percent of a declining in the Gini, followed by craftsman and production (77.5 percent), higher vocational and others (48.5 percent), municipal (44 percent), married (40 percent), bachelor (32 percent), higher secondary and lower vocational (23 percent), capital intensity (13.5 percent), consumption intensity (4.4 percent), and export intensity (3 percent). On the contrary, the factors worsening Gini are experience square whose share is 74 percent, followed by elementary and lower secondary (46.4 percent), import intensity (43.3 percent), professional and administrative (36 percent), single (33 percent), high minimum wage zone (25.33 percent), male (17.6 percent), transportation and communication (13 percent), clerk (11 percent), fringe benefit (6.9 percent), numbers of household member (6.6 percent), and medium minimum wage zone (0.9 percent). The share or consolidated share contribution to lower the change of the Gini during 1995-2005, education is about 56.72 percent of a declining in the Gini, followed by urbanization (44 percent), occupation (18 percent), domestic expenditure (17.9 percent), experience factor (13.8 percent), and marital status (6.6 percent). Nevertheless, these factors can over offset the larger increase in the inequality according to international trade (40.3 percent), minimum wage zone (26.2 percent), gender (17.6 percent), fringe benefit (6.9 percent), and family size (6.6 percent). As a result, the Gini was improved in 2005, when compared to 1995.

While education, occupation, and urbanization worsened the Gini during 1985-1995, these factors improve the Gini during 1995-2005. The increased to access education and decentralization of infrastructures were the answer of this inequality improvement. Therefore, the expansion of compulsory education should be credited to the Thai government.

This study has some limitations from using secondary data. Although the included variables can explain the wage inequality in the manufacturing sector, some explainable variables are intentionally excluded from this study. For example, the size of company and the existing of labor union should affect the wage inequality; however, this incomplete dataset does not allow us to include these variables in this

study. Wage type of workers should affect the wage inequality as well; however, the data of approximate monthly income was not available for 1985 and 1995. Therefore, our own estimation of workers' monthly income leads to overestimated or underestimated workers' income. Consequently, the regression result is inconsistent to rational belief when hourly workers earn more than monthly workers in some periods. Moreover, the result of experience should be interpreted carefully. Since the variable is not available in the Labor Force Survey dataset, the approximation of this variable tends to overestimate its value.

It is recognized that this study will be more powerful in explaining wage inequality if the dataset is more complete in the future. In addition, the result will be more concise when the study periods are shortened, for example every five years instead of every ten years, especially in the recent period. Nevertheless, the methodology can be adopted to study the sources of inequality in other economic sectors.

CHAPTER 6

CONTRIBUTIONS AND SUGGESTIONS

This study examines the sources of inequality in Thailand with an alternative decomposition, regression-based decomposition. Using this technique, this study can quantify the sources of inequality with more accuracy, in both the static and dynamic sense. For example, while it is generally accepted that education is a source of income inequality in Thailand. This study has shown that the elementary and lower secondary education can lessen the inequality level at 1 percent in 1985, 5.72 percent in 1995, and 2.64 percent in 2005. The other higher educational levels are inequality-increasing factors in all study periods; however, their lower factor weight inequality during 1995-2005 support a falling of Gini in the corresponding period. It means that although education category is defined as an inequality-increasing factor according to its positive consolidated factor weight inequality, its lower positive value in recent period, 1995-2005, reveals an ability of education in improving inequality. In this sense, policies concerning education accessibility can be a tool to improve inequality as well. Therefore, the achievement of the expansion on compulsory education and education loans should be credited to Thai government. This study can also quantify how individual characteristics such as size of family, gender, and marital status have become unimportant factors in recent periods.

According to the regression based decomposition, this study is able to investigate the effect of each variable on the change of the Gini in any particular period. Consequently, these implicitly dynamic results can represent the effectiveness of government policies, especially when complete longitudinal datasets are unavailable at present. For example, while education, occupation, and minimum wage zone are inequality-increasing factors over 1985-2005, these three factors contribute to an increase of Gini during 1985-1995. However, while education and occupation support a decrease of Gini, minimum wage zone is still an opposing factor to the falling of Gini during 1995-2005. It means that the inequality according to

working in different minimum wage zone is not removed from manufacturing sector. With more accurate focus on sources of inequality, this study enables us to propose more prioritization towards targeting effective government policies.

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APPENDIX A

Decomposition on the Components of Factor Weight Inequality

APPENDIX A

Decomposition on the Components of Factor Weight Inequality

The examination of factor weight inequality (s_j) in Section 4.2 identifies how each factor accounted for the inequality of log variance of workers' monthly income. This section further investigates the components of the change in factor weight inequality. However, decomposition on the components of the change in s_j is applicable only to value explanatory variables. Since education is an important factor in both inequality level, s_j, and in contribution to the change of inequality as mentioned in previous sections, this study repeats the regression on the income generating function again. Once education categories are replaced by schooling years, experience variables must be excluded, according to their multicollinearity.[16]

In addition, the other value explanatory variables: capital service intensity, consumption intensity, export intensity, and import intensity, are decomposable to find their components in s_j as well.

Fields (2002) proposed that we can decompose s_j into four components: the estimated coefficient and standard deviation of Xj, correlation between Xj and dependent variable, and standard deviation of dependent variable as in equation (15).

$$1 \approx \frac{\%\Delta(\beta)}{\%\Delta s_j(\ln Y)} + \frac{\%\Delta \sigma(X_j)}{\%\Delta s_j(\ln Y)} + \frac{\%\Delta Cor(X_j, \ln Y)}{\%\Delta s_j(\ln Y)} - \frac{\%\Delta \sigma(\ln Y)}{\%\Delta s_j(\ln Y)} \qquad (15)$$

The limitation of decomposing of s_j is that the sum of the four components approaches one if the factor of each component has changed slightly (localized). For example, if the estimated coefficient sharply increases, the first component will largely dominate the other three components; therefore, the sum of all four components does not approach one. This limitation is found in the decomposition of capital service intensity, consumption intensity, export intensity, and import intensity.

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[16] Since experience variable is unavailable in Labor Force Survey; therefore, it is constructed from age of worker – (schooling years + 6 years).

For this reason, only the decomposition of education's factor weight inequality is presented in this section.

Table1. Decomposing the Contribution of Years of Education to Changing of Factor Weight Inequality during 1985-2005

	Components of Education's Factor Weight Inequality			Percentage of Change in Education's Factor Weight Inequality explained by	
	1985	1995	2005	1985-1995	1995-2005
Factor Weight Inequality of Education	0.0795	0.1527	0.1303	-	-
Coefficient on years of education	0.0588	0.0563	0.0479	-0.0449	1.0236
Standard deviation of years of education	3.1409	3.6381	3.7394	0.1720	-0.1894
Correlation between workers' income and years of education	0.3212	0.4946	0.5037	0.5863	-0.1255
Standard deviation of workers' income	0.7455	0.6637	0.6919	-0.1192	-0.2894

Source: Calculated from the 1985, 1995, and 2005 Labor Force Surveys (NSO).

The positive values of education's factor weight inequality of education, s_j, in Table 1 indicates that education was an inequality-increasing factor over 1985-2005. The positive estimated coefficients means that the Mincerian returns to education increased according to schooling years over the study periods. The rising trend of standard deviation of years of education indicates the more inequality of education attainment among workers. The positive correlation between worker's income and years of education, implicit return to education, means that workers with more

education can earn higher income. Standard deviation of worker's income is the denominator of s_j or, mathematically speaking, a higher standard deviation will lower s_j. In fact, it is difficult to interpret the standard deviation of worker's income because we do not know the actual pattern of incomes in the two periods. In other words, standard deviation cannot represent society welfare. A greater standard deviation can indicate both better off or worse off situations. For example, suppose we have four workers with income 11, 13, 9, and 7, then their incomes change to 15, 13, 7, and 5. In this case, someone is better off and someone is worse off and standard deviation increases. If income changes from 10, 10, 11, and 11 to 14, 14, 16, and 16, all are better off with higher standard deviation. Moreover, the relationship between inequality and standard deviation is questioned when incomes change from 10, 10, 12, and 12 to 9, 9, 11, and 11. These two sets have the same standard deviation but they have different inequality. This study suggests that we can look at the proportion of percentage changes between standard deviation of years of education and standard deviation of worker's income. If the proportion is greater than one in absolute terms, the ratio supports an increase of s_j and vice versa.

Table 1 presents an increase of education's factor weight inequality, s_j, in 1995 compared to that in 1985. Consequently, we have a positive percentage change of s_j during this decade. It also means that the increasing components must over compensate the offset of the falling components of education's factor weight inequality. These four components of education's weight inequality must respond to an increase of s_j. During 1985-1995, the positive coefficients mean that workers with higher education earn more. However, a five percent decrease of the estimated coefficient over 1985-1995 implies the lower bias of return to education toward the highly educated workers; therefore, this component is against the rising of s_j. The negative percentage of change of the estimated coefficient to the percentage change of s_j means that the change in the returns is equalizing. An increase in standard deviation of years of education in this decade, reflecting the greater inequality of educational attainment among workers, supports an increase of s_j as well. The similar pattern is found in the correlation between worker income and years of education. An increase of positive correlation means the greater bias of worker income towards the workers with more education; therefore, this component raises s_j. The lower standard deviation

of worker's income encourages an increase of s_j or, in other words, the proportion of the two standard deviations is greater than one in absolute terms, indicating the supporting components of the rise in s_j, given other components remain unchanged. The positive values in the fourth column indicate the supporting components whereas the negative values are the opposing components of an increase in s_j over 1985-1995. Since increasing components dominate the falling ones, the education's factor weight inequality increases about 92 percent over 1985-1995.[17] In summary, we can claim that schooling years contributes to an increase of s_j largely because of an increase in correlation between worker's income and years of education.

In contrast, during 1995-2005 the percentage change of education's factor weight inequality, s_j, became negative. The last column of Table 1 presents two supporting components and two opposing components of the fall in s_j. A decrease of estimated coefficient, the falling of return to education, helps to reduce the education's factor weight inequality. However, a higher standard deviation of years of education in 2005, reflecting the greater inequality of educational attainment among workers, resists the falling of s_j. The similar pattern is found in the correlation between worker's income and years of education. A positive correlation means that workers with more education earn higher income whereas an increase of positive correlation implies more favor to workers with high education; therefore, this component opposes the falling of education's factor weight inequality. An increase of standard deviation of worker's income supports the falling of s_j.[18] Since decreasing components dominate the rising ones, the education's factor weight inequality declines about 14.7 percent over 1995-2005. We can claim that years of education contribute to falling of s_j entirely because of the falling in the return to education.

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[17] We should not be surprised by the rapidly increase of s_j in this decade because factor weight inequality of education categories in Table 4.9 also presents the great increase of s_j from 11.88 percent in 1985 to 23.43 percent in 1995.

[18] The proportion between standard deviation of years of education and that of worker income is less than one in absolute term. The ratio should reduce the s_j, given other two components.

BIOGRAPHY

NAME   Piyanan Suwanmana

ACADEMIC BACKGROUND   Bachelor of Arts (Economics)

                                  Thammasat University, 1990

                                  Master of Arts (Economics)

                                  Thammasat University, 1993

PRESENT POSITION   Lecturer

                                  School of Management and Economics

                                  Assumption University

EXPERIENCES   1993-1995, Reasearcher

                                  Thailand Development Research Institute

                                  1995-Present, Assumption University