THE EFFECT OF ENTREPRENEURSHIP ON GROWTH, INCOME INEQUALITY AND POVERTY IN THAILAND

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Abstrak

Keusahawanan memainkan peranan penting dalam pembangunan ekonomi. Aktiviti keusahawanan di Thailand telah mencatatkan jumlah yang tinggi berbanding negara-negara Asia yang lain. Namun, secara paradoksnya pembangunan ekonomi Thailand dari segi pertumbuhan, kemiskinan dan ketidaksamaan agak kurang memberangsangkan berbanding dengan negara-negara Asia yang lain. Justeru, melalui pemerhatian ini menimbulkan keraguan tentang peranan keusahawanan dalam pembangunan ekonomi di Thailand. Oleh itu, objektif kajian ini adalah untuk menyiasat kesan keusahawanan terhadap pertumbuhan, kemiskinan dan ketidaksamaan pendapatan di Thailand. Kajian ini mengguna pakai model regresi pertumbuhan untuk meneliti hubungan antara keusahawanan dan pertumbuhan ekonomi. Di samping itu, kajian ini mengguna pakai model regresi ketidaksamaan dan kemiskinan untuk meneliti hubungan antara keusahawanan dan kemiskinan, dan antara keusahawanan dan ketidaksamaan pendapatan. Bagi menentukan sebab akibat antara keusahawanan dan pertumbuhan, kajian ini menggunakan ujian "Granger Causality". Kajian ini menggunakan data panel bagi 76 buah wilayah di Thailand yang meliputi tempoh di antara tahun 1997 hingga 2008. Hasil dapatan kajian menunjukkan bahawa, keusahawanan mempunyai kesan positif yang ketara terhadap pertumbuhan ekonomi di Thailand. Keusahawanan juga didapati mempunyai kesan negatif yang ketara terhadap kemiskinan. Walau bagaimanapun, kajian ini gagal mendapatkan bukti mengenai kesan keusahawanan terhadap ketidaksamaan pendapatan dan pendapatan golongan miskin. Malahan, ujian Granger Causality menunjukkan bahawa hal ini boleh menjadi penyebab kepada pertumbuhan tetapi tidak sebaliknya. Secara keseluruhan, dapatan ini menyarankan bahawa walaupun keusahawanan mempunyai kesan yang diingini terhadap individu secara keseluruhan, manfaat keusahawanan nampaknya lebih dinikmati oleh individu kaya. Oleh itu, pembuat dasar disarankan untuk mengkaji semula dasar dan strategi yang sedia ada berhubung pembangunan keusahawanan di Thailand.

Kata kunci: Kemiskinan, Ketidaksamaan pendapatan, Keusahawanan, Pertumbuhan ekonomi.

Abstract

Entrepreneurship has been argued to play a key role in economic development. In this regard, Thailand has recorded remarkably high entrepreneurial activities compared to other Asian countries. Paradoxically, Thailand's economic development in terms of growth, poverty and inequality has been relatively dismal compared to other Asian countries. Accordingly, these observations cast doubts on the role of entrepreneurship in economic development in Thailand. Therefore, the objective of this study is to investigate the impact of entrepreneurship on growth, poverty and inequality in Thailand. This study employs the growth regression model to investigate the relationship between entrepreneurship and growth. In addition, this study employs the inequality and poverty regression model to investigate the relationship between entrepreneurship and poverty, and between entrepreneurship and inequality. Besides, to ascertain the causality direction between entrepreneurship and growth, this study employs the Granger Causality test. This study uses the panel data for 76 provinces in Thailand covering the period 1997–2008. The results of the study show that entrepreneurship has a significantly positive impact on economic growth in Thailand. Entrepreneurship also is found to have a negative significant impact on poverty. However, the study fails to find evidence on the impact of entrepreneurship on income inequality and income of the poor. Furthermore, the Granger Causality test shows that entrepreneurship Granger-causes growth but not vice versa. Overall, the results imply that while entrepreneurship has a favorable effect on individuals as a whole, the benefits of entrepreneurship appear to accrue more to the non-poor individuals. Therefore, it is imperative that the policy- makers review the existing policies and strategies with regard to entrepreneurship development in Thailand.

Keywords: Poverty, Income inequality, Entrepreneurship, Economic growth.

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Muhammadsuhaimee Yanya
September 30, 2015.

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CHAPTER ONE
INTRODUCTION

1.1 Background

Schumpeter (1934) contends that the role of entrepreneurship is a central factor that affects the evolution of capitalist societies based on the argument that new businesses drive economic and employment growth. Entrepreneurship is also believed to be an important tool needed to achieve the target of economic growth and development of a nation (Schumpeter 1934; Wennekers and Thurik 1999; Baumol 2002; Van Stel, Carree and Thurik, 2005). This claim is also supported by Anokhin, Grichnik and Hisrich (2008), who regard entrepreneurship to be the main vehicle of economic development by fulfilling roles that have been emphasized by Schumpeter (1934) and Romer (1994), on promoting prosperity in a particular region by creating new jobs (Birch, 1987; Fritsch and Mueller, 2004; Van Stel and Storey, 2004), reducing unemployment (Evans and Leighton, 1989), increasing the economic development and growth of a region (Carree, Van Stel, Thurik and Wennekers, 2002; Van Stel, Carree and Thurik, 2005; Acs, Desai and Hessel, 2008) and also increase life and job satisfaction (Noorderhaven, Thurik, Wenneker and Van Stel, 2004). Economic development benefits from increasing productivity through efforts driven by entrepreneurs, who bring innovation, speed up structural changes in the economy, force old existing businesses to reform and increase competition. The fact that entrepreneurship represents a significant variable in propelling development and growth in any given locality cannot be underestimated.

Since entrepreneurship has been considered to be a significant feature in initiating development, many measurements of entrepreneurship have been taken as indicators

such as small firms, self-employment, number of market participants, firm start-ups, small and medium-sized enterprises, young enterprises and patent.

The rate of entrepreneurship activity from The Global Entrepreneurship Monitor is taken to describe the state of entrepreneurship in Thailand. The GEM has employed Total Early-Stage Entrepreneurial Activity as the measurement used. Total Early-Stage Entrepreneurial Activity can be defined as the percentage of population aged 18-64 who are either actively involved in setting up businesses or they will own or co-own (i.e. nascent entrepreneurs) businesses, and who are currently an owner-manager of a new business (i.e. new business ownership). GEM 2005 reported that Thailand entrepreneurs constitute a large proportion of the adult workforce (Global Entrepreneurship Monitor (GEM), 2005).

According to the GEM 2002 report, Thailand has the highest rate of entrepreneurship activity in Asia (Reynolds *et al.*, 2002). The activities of entrepreneurs provide a major impetus for commercial activities. In 2005, Thailand had the highest Total Entrepreneurial Activity (TEA) index with over 20 percent of the adult population claiming to be engaged in some form of entrepreneurship. A further 14 percent of adults claimed to be owner-manager of businesses more than three and half years old. Even adults who are not active entrepreneurs themselves profess a positive attitude towards entrepreneurial activities. Some 86 percent of adults aged between18-64 say that they would be willing to start new businesses. In Thailand, most entrepreneurial activities are opportunistic with 68 percent of the population claiming to engage in this type of entrepreneurial activity (Bosma and Handing, 2006). This means that individuals with an entrepreneurial mindset perceive business opportunities and actively pursue these opportunities through some form of entrepreneurial endeavor.

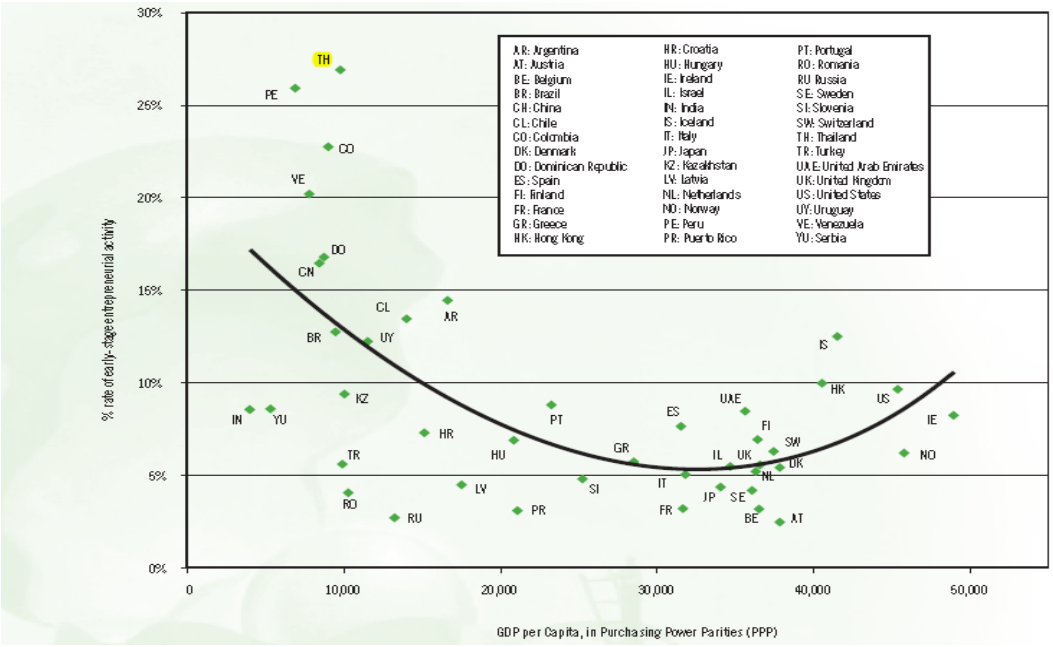

Figure 1.1
Rate of entrepreneurial activity of Thailand and several countries
Source: GEM's report year 2007

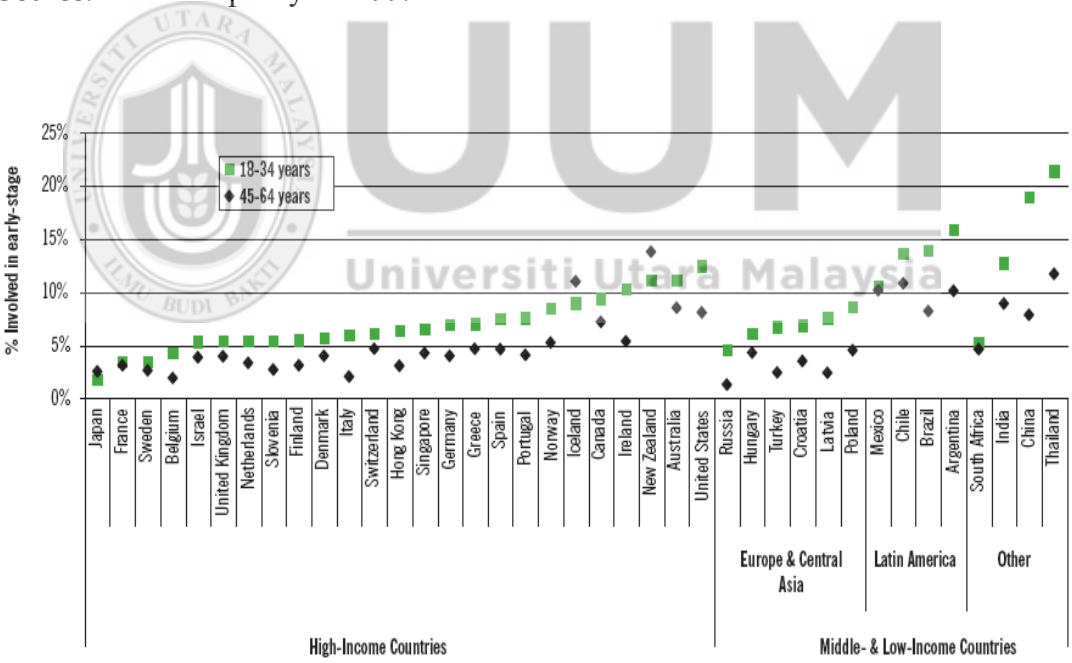

Figure 1.2
Percentage of population that involved in early stage of entrepreneurship of Thailand and several countries
Source: GEM's report year 2007

Furthermore, GEM's report in 2007 shows that the level of Total Early-Stage Entrepreneurial Activity in Thailand is significantly high, especially among the populations aged between 18 and 34 years (see Figure 1.1) if compared to India,

China, Japan and America. In the meantime, the rate of poverty and income inequality in Thailand remains at a high level.

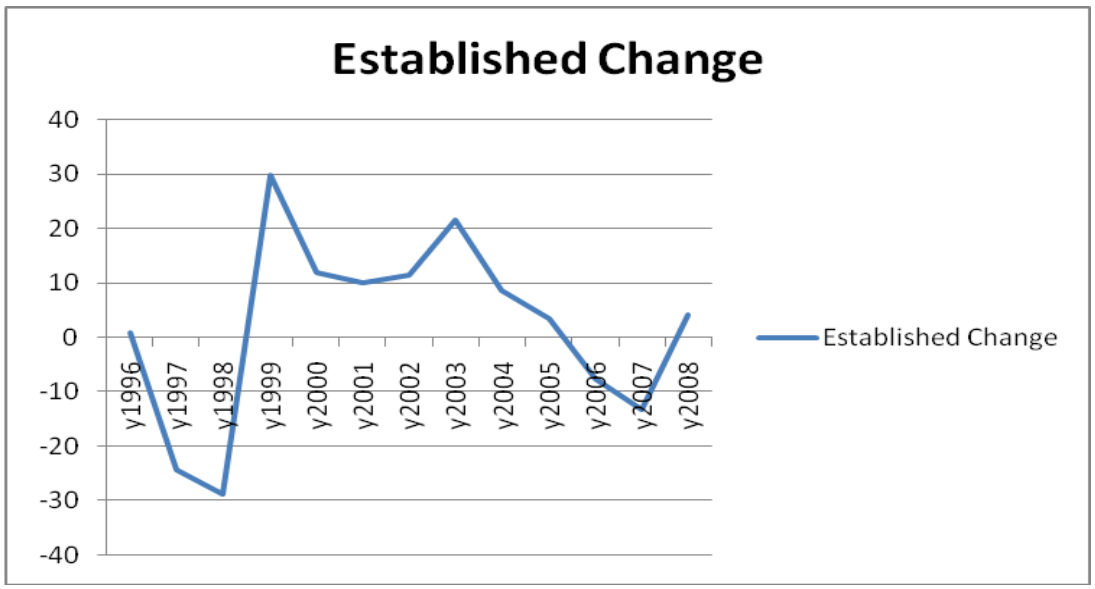

Figure 1.3
Rate of change in new firm establishment of Thailand.
Source: Calculated by author using data from Department of Business Development

The establishment of new firm is also one of measurements of entrepreneurship activity that is widely used. This measurement of entrepreneurship activity needs to be taken into consideration because it relates to the economy of Thailand since this measurement of entrepreneurship activity is the only proxy that is formally available. Based on Figure 1.3, starting from the period before the 1990s, about 10,000 new firms established are annually registered with the Ministry of Commerce. The rate of establishment of new firms is very high at the time of high economic growth rate such as the period between 1986 and 1995. At that particular period, the economic growth rate of Thailand is at the average of 8 percent per annum. The growth rate of the establishment of new firms registered in the year 1990 alone is about 11.2 percent. In relation to the overall growing economy, 10,777 new firm startups have registered in 1985 and this number increases to 37,988 in 1995. However, in 1997, at the start of

the economic crisis, the number of new firms registered are below 30,000 and this number continues to fall to 20,371 in 1998. In the period of crisis, a negative growth rate of Thai economy is for the first time recorded. The rate of new firm registration continuously decline till the aftermath of the crisis.

However, the recovering of Thai economy starts from 1999 and 2000 with the growth rate at 4.4 and 4.6 percent, respectively. Again, in 2001, the world economy has slowed down and this consequently bring Thailand economic growth rate down to 1.8 percent. Corresponding to the economic rise of the country is the number of new firm being established and this is an indicator of an economic comeback. In 1999, the number of new firms registered rise to 25,818 and increase to 31,757 in 2001.

1.2 Economic Growth and Entrepreneurship in Thailand

Thailand was among the world's poorest countries after World War II with stagnant economy for at least a century (Manarungsun, 1989) (Ingram, 1971). Four decades later, Thai economy has improved and has been widely considered a champion of persistent development, with rapid economic growth, stable in macroeconomic and consistent in the number of declining poverty and not a single year of growth in real per capita income has shown a negative rate (Warr, 2007).

Thailand has been designated as a "fifth tiger" after Korea, Taiwan, Hong Kong and Singapore. The compositions of growth in output of the Thai economy in terms of total factor productivity shows that the prominent point is the rapid growth of the physical capital stock. This grew more rapidly than output in pre-boom and boom periods. The capital stock growth accounted for 71 per cent of the total output growth between the periods 1980–2002. Nevertheless, the growth rate of stock of human capital in terms of size of labor force contributed to the output of just about 15 per

cent. Increased improvements in the quality of the labor force made only less than 5 percent of the overall growth of the output (Warr, 2007). This composition had changed starting from 2000 to 2007, according to the study by Chuenchoksan and Nakornthab (2008) that reveals that the contribution of factors pertaining to the economic growth of Thailand have changed from mostly capital factors seen earlier to decreased capital factor contributions.

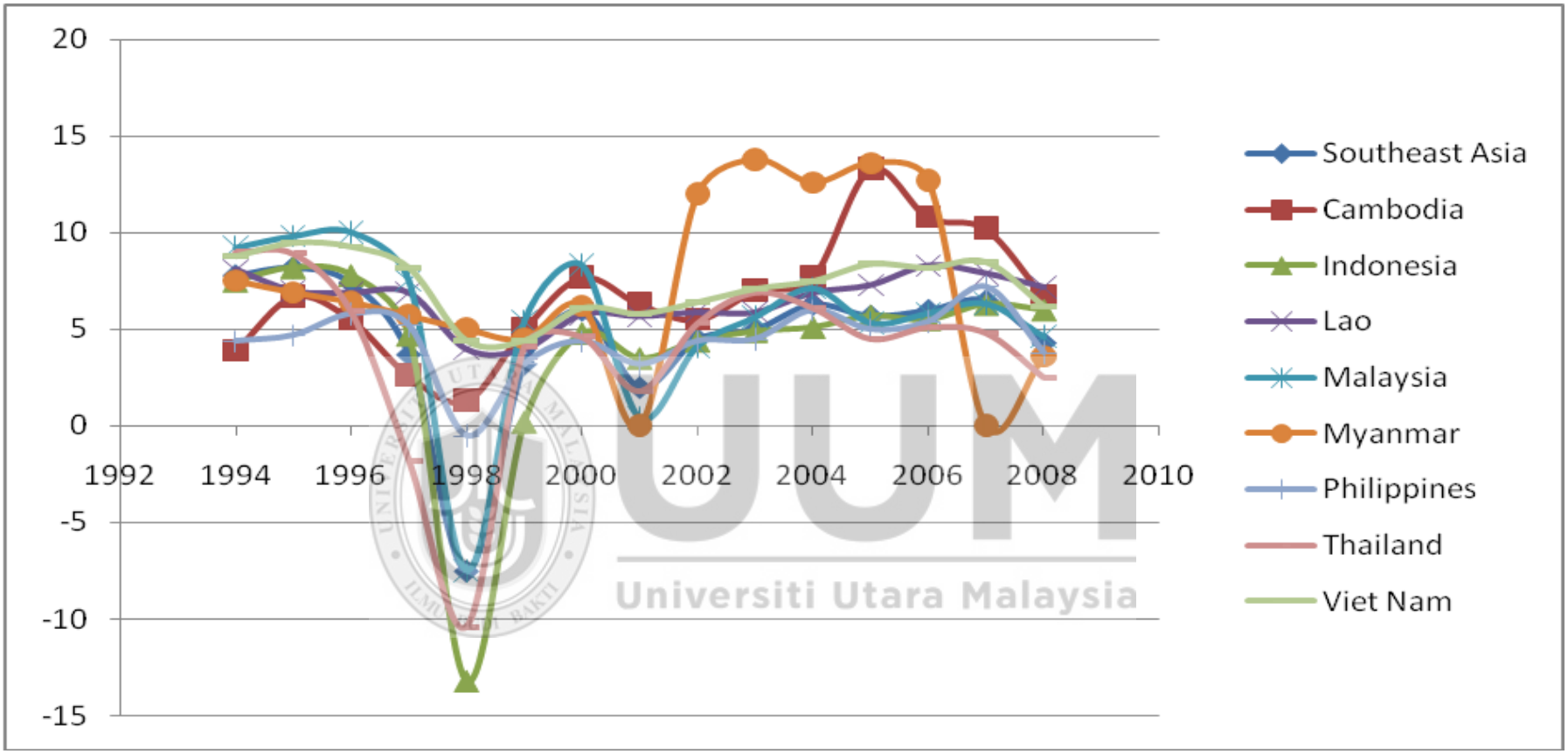

Figure 1.4
Economic growth rates of Thailand and Southeast Asia Countries between periods 1994 to 2008
Source: Calculated by author using data from World Development Report 2012

During the period 1997–1999, Thailand faces an economic crisis, as seen in Table 1.1 and Figure 1.4, which brings about severe contraction to the Thai economy with declining output and investment and rising poverty incidence (Warr, 2007). Subsequently Thailand's economy recovers moderately with the rate of growth of its output below its long-term trend rate. Since 2003, its economic growth rate has recovered to the pre-crisis level (Warr, 2007).

Poverty incidents in Thailand can be observed in two different periods of time, before and after the economic crises. In 1988 to 1996, poverty in Thailand are at a very high level especially in the earlier period and has sharply decline in the later period, concurrently with high rate of economic growth during that period. At the time of the economic crisis at the beginning of the year 1998, the economy is brought to a depressing state which pushes poverty to increase significantly. In the meantime, the rate of the establishment of new firms has fallen to the lowest rate during the economic crisis and increases to a very high rate after the crisis.

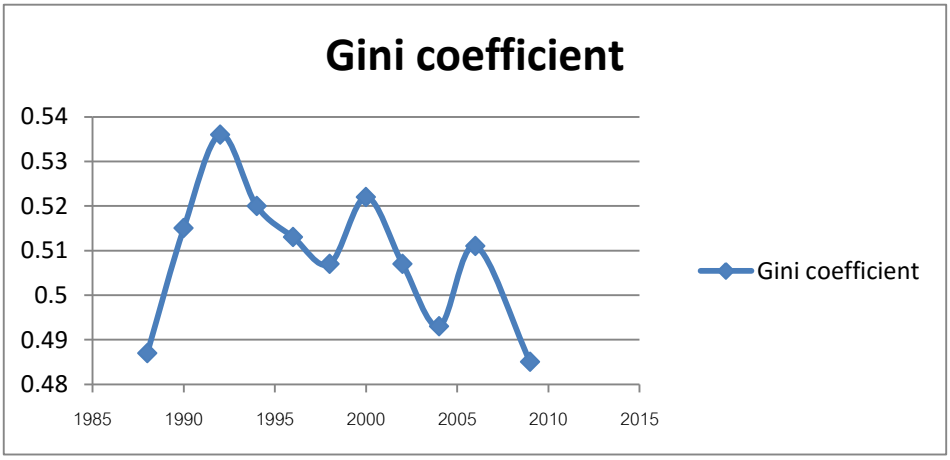

Figure 1.5
Gini coefficient trend of Thailand.
Source: Calculated by author using data from The National Economic and Social Development Board

Income inequalities in Thailand are currently at a high rate which are almost at the economic high rate of growth and slowly decreasing when the economy approaches the crisis and then continuously decrease. However, the current condition of income inequality remains consistently high.

Since entrepreneurship has been considered as a crucial mechanism to bring growth and to increase the economy of developed countries, yet in developing countries studies about the relationship between entrepreneurship and growth are inconclusive. Researchers who entrepreneurship focus mainly on developed countries, especially in Europe and America, and mainly concentrate on internal factors that influence entrepreneurial activity (Auzina & Pocs, 2008). While in developing countries, the studies about the effect of entrepreneurship on economic growth and development are few and far between (Tamvada, 2010). Autio (2008) argues that economists know very little whether entrepreneurship contributes significantly to economic growth in developing countries. In terms of poverty and inequality, in the developing countries there are more than a billion people who still live in extreme poverty who are described as the "bottom billion" by Collier (2007). This includes Thailand, although the poverty in Thailand has been considered to be comparatively reduced but there are still a significant number of people who still live in poverty. While the income inequality of Thailand population remains at the same level as the year 1985, the fluctuation of income inequality was also observed during the time of economic boom when the rate of new firm establishment was considerably high level. This brought the question that despite a high level of entrepreneurship in developing countries, especially in Thailand, whether entrepreneurship is able to increase the level of economic growth, reduce poverty and lessen income inequality among their population.

Therefore, the central focus of this study is to determine the importance of entrepreneurship in economic development and growth from a regional perspective, specifically in Thailand, through a growth regression model, which is based on the model of Mankiw et al. (1992). Consideration is focused on the effects of entrepreneurship on poverty and inequality. The study is based on growth regression method to analyze the relationship between entrepreneurship and economic growth of 76 provinces in Thailand by adapting the model of Beck et al. (2005). Hence, the entrepreneurship variable would be added to the production function which appears as the conceptual framework of the study. Lastly, the investigations are also include the two-way causal relationships between entrepreneurship and economic growth by using the model of Granger Causality Test.

1.3 Problem Statement

Entrepreneurship seems to play an important role in economic development. In Thailand, entrepreneurship activity seems to be high. In 2007, they were at 27% which was the highest rate in the world (Global Entrepreneurship Monitor, 2007). However, despite the pervasive entrepreneurial activities, Thailand's performance in terms of development is relatively unimpressive.

In terms of growth, it was observed that Thailand is still lagging behind most Asian countries. For example during 1994 to 2008 the average growth rate of Thailand was at 3.82 percent compared to Cambodia, Indonesia, Laos, Malaysia, Myanmar, Philippines and Vietnam which recorded 6.68, 4.09, 6.52, 5.46, 8.5, 4.45 and 7.25 percent growth rate, respectively (World Bank, 2012).

Although Thailand has made a significant progress in reducing poverty, it is still facing acute problems of poverty compared to ASEAN member countries such as Malaysia and Indonesia. For example, in the year 2012, the headcount measure of poverty was 13.2 percent for Thailand compared to Indonesia (12 percent) and Malaysia (1.7 percent). Moreover, income inequality remains high. For example, the Gini-coefficient index of Thailand in the year 1988 was 0.484 and remained high in the year 2011 (0.487). Ironically, other countries that recorded significantly lower entrepreneurial activities perform better in terms of growth, poverty and inequality.

All of these observations cast doubt on the role of entrepreneurship in economic development in Thailand with regards to growth, poverty and inequality. Therefore, investigating the relationship between entrepreneurship and economic development in Thailand is worth pursuing. Understanding the relationship is important for policy makers to design strategies and policies that will effectively address the problem of development in Thailand.

Previous studies on entrepreneurship seem to focus on issues related to growth, employment, productivity, and human capital to the neglect of socioeconomic issues such as poverty and inequality. This study is designed to fill such gap.

1.4 Research Questions

Understanding of the role of entrepreneurship in economic development entails investigation of some pertinent questions. The questions are as follows:

(1) Does entrepreneurship contribute to economic growth?

(2) Does entrepreneurship contribute to the reduction in income inequality?

(3) Does entrepreneurship contribute towards poverty alleviation?

(4) Is there any causal relationship between entrepreneurship and growth?

1.5 Research Objectives

The aim of this study is to investigate the effects of entrepreneurship on economic growth, income inequality and poverty. Specifically, the objectives of this study are:

(1) to evaluate the impact of entrepreneurship on economic growth.

(2) to estimate and evaluate the impact of entrepreneurship on income inequality.

(3) to estimate and evaluate the impact of entrepreneurship on poverty.

(4) to evaluate the causality and relationship between entrepreneurship and economic growth.

1.6 Significance of the Study

This study attempts to make several contributions to the literature on the relationship between entrepreneurship, economic growth, and development. First, this study attempts to provide an empirical test on the relationship between entrepreneurship, economic growth, and development in the context of developing countries, i.e. Thailand. Second, this study also attempts to contribute to current knowledge about the role of entrepreneurship in development of Thailand. Thus, this study may serve as the basis towards enhancing the role of entrepreneurship in improving the economic development in Thailand.

1.7 Organization of the Study

This study is divided into five chapters. Chapter I provides the background of the study, formulates the problem statement as well as stating the research questions and the objectives of the study. Chapter II provides concepts and definitions of several key terms in the study, research framework of the study, a brief overview of economic development in Thailand as well as a review of the relevant literature with regard to the relationship between entrepreneurship and economic development. Chapter III presents the methodology of the study and the data used in the study. Chapter IV discusses the results of the analysis, and finally, Chapter V summarizes and concludes the study.

1.8 Scope and limitation of the study

This study investigates the role of entrepreneurship in Thailand during the period of 1998 – 2007. The following limitation should be considered to improve the study. The first limitation is the proxy of the entrepreneurship variable. Using different proxy and different combinations of data for entrepreneurial activity measurement may obtain different estimated results. Using different measures of the factors linked to economic growth can help in comparing results towards a more robust estimation. The second limitation is the availability of data containing all the variables selected in the analyses. For example, the data used in this study are from the period of recovery from the economic crisis which may not reflect to the normal economic situation.

CHAPTER TWO
LITERATURE REVIEW

2.1 Introduction

This chapter is divided into two parts; the first part is about the literatures of entrepreneurship, concepts, definition of entrepreneurship and its relationship to economic growth and development. Concepts of income distribution and poverty will also be reviewed and the conceptual framework is presented in this part. The second part provides a brief review of Thailand, pertaining to related facts about entrepreneurship, economic growth, income distribution and poverty in Thailand. Previous studies about entrepreneurship and growth, income inequality and poverty are also discussed.

2.2 Concepts, definition and framework

2.2.1 Meaning of Entrepreneurship

The literatures on entrepreneurship can be dated back to the 17th century. The economic theory of entrepreneurship was first developed by an Irish-born French economist Richard Cantillon (1931), who lives between 1680-1734 in his book Essai Sur la Nature du Commerce en General (1755). He suggests that an entrepreneur is someone with a foresight to willingly take risks in order to make a profit. This definition was later translated into English as ‘undertaker’, someone who undertakes risk. In other words, the function of entrepreneurs can be defined as a risk-taker whose role is to facilitate an exchange of goods at a price to be later sold at an uncertain price.

An assumption in the theory of entrepreneurship from Cantillon is that the entrepreneur would bring the market to equilibrium (Hébert and Link, 1988) while subsequent economists, such as Schumpeter (1934) who recognizes the function of entrepreneurship as the one that bring disequilibrium to the market. Some other economists such as Kihlstrom and Laffont (1979), on the other hand, consider entrepreneurship as just existing in an equilibrium market. Cantillon considers that term capital is not a requirement for entrepreneurship which contrasts with subsequent economists.

The second important economist that contributed to economic theory about entrepreneurship is Anne-Robert Jacques Turgot who lives between 1727 and 1781. Turgot (1766) does not distinguish between entrepreneur and capitalists but considers the capitalists as the driver of the market, the supplier of the capital and the employer of labors. In contrast, Cantillon (1931) does not consider entrepreneurs as capitalist and according to him; capital is also not a requirement of entrepreneurship.

The classical economists, such as the father of economist Adam Smith, who lives between 1723 to 1790, just neglects the function of entrepreneurship (Hébert and Link, 1988) by not equating the entrepreneurial decision maker with other kind of "industrial people" in the economy and essentially eliminates the entrepreneur from the stage. Furthermore, David Ricardo, who lives between 1772 and 1823, one of the prominent classical economists agrees with this by never including the term entrepreneur in his work. Walras (1870) publishes the book "Element of pure economics" that develops the model of competitive general equilibrium which eliminates the role of entrepreneurship in the economy as "taken for granted" (Cassis and Minoglou, 2005). However, Jean-Baptiste Say, who lives between 1767-1832,

introduces the theory of the entrepreneur in the book of "A treatise on political economy" (1845) who gives the meaning of entrepreneurship in English as adventurer who use the industry to direct and organize the factors of production to achieve the satisfaction of human wants that bring success to entrepreneurs which brings beneficial to the whole economy. Say (1880) considers entrepreneurs as the value creators and they are their own managers who raise their own capital in addition to organizing the production and distribution of goods and services (Say, 1880). Yet, not only are they managers, they are also forecasters and project appraisers.

In the Neo-classical view about entrepreneurship, some scholars try to reconcile the entrepreneur with an equilibrium model such as introduced by Marshall (1930). He adds to the definition of entrepreneurship by claiming that an entrepreneur must have the capabilities to manage with and through other people and must be constantly alert to seek opportunities or innovate in order to minimize costs and make progress. This definition comes in the mid 1800's with the environment of increasing the division of labor because during this era, the growth of small business owner give rise to middle-level managers and overall organizational development. Kihlstrom and Laffont (1979) also try to identify individuals who prefer to become entrepreneurs in a model that applies the equilibrium theories by basing them on uncertainty that people who choose to become entrepreneurs or employees depend on their taste (Shane, 2000).

Joseph Schumpeter, who lives between 1883 and 1950, introduces the well-known term of "economic destruction" in his book "Theory of Economic Development" by regarding the entrepreneur as a disruptive, disequilibrating force and suggesting that the way to identify an entrepreneurial venture is by whether an entrepreneur introduces new goods or new methods of production, opens new markets or new

sources of supply, or reorganizes an industry (Schumpeter, 1934). He also proclaims in his theory that the causes for innovative and leadership are critical and necessary components by identify in the model that the entrepreneurs are motivated intrinsically not by profit. He considers entrepreneurs as the driving force in economic development by being leaders in innovation not just imitators which discontinue economic system and would propel development in society. This concept of Schumpeter is in contrast to the neoclassical theory that emphasizes on equilibrium and the perfect competitive market and emphasizes entrepreneurs as the dynamics of competitive process (Schumpeter, 1942).

Entrepreneurship in the views of Austrian economics see the entrepreneur as the driver of the market economy. The founder of Austrian school, Menger (1871), who lives between 1840 to 1921, considers entrepreneur as the owner of capitalist who profits by actively trying to seek the most valuable uses for his property, be a risk bearer and a dynamic actor whose profit represents a reward for investing in risky ventures (Salerno, 1999). The most important function of entrepreneurship in the view of Menger (1871) is looking forward to future wants, estimating their relative important, attaining technical knowledge and knowledge of currently available means. Ludwig von Mises, who lives between1881 to 1973, considers entrepreneurship as fundamental and inherent in every action, indeed, it burdens every actor, a capitalist holder, the one who takes responsibility if losses occur and the one who sees the future in different ways based on his own opinion (Mises, 1949).

Friedrich Hayek (1945) tries to show that the information between people in the market would never be symmetrical because people possess imperfect information so participating in a market by an individual will be based on what he perceives to be

potential profitable opportunities. Conforming to Israel Kirzner (1979) who considers entrepreneur as a person who is sufficiently alert to perceived profit opportunities; they will make a profit if they receive the correct level of alertness. He concludes that Austrian economics consider the market as a process that may be tending towards but never fully reaching the equilibrium. The Austrian economists emphasize the role of entrepreneurship as vital to its framework by considering the entrepreneur as the driver of the market economy and given the concept of entrepreneur as alertness (Kirzner, 1973), discovery (Hayek, 1945), or gap filling (Leibenstein, 1968).

The summary about entrepreneurship in the historical view may be wrapped up by the work of Wenneker and Thurik (1999) who assigned that the role of entrepreneurship into thirteen distinctive roles that have been identified in the economic literature. These roles are:

1. The person who assumes the risk associated with uncertainty.

2. The supplier of financial capital.

3. An innovator.

4. A decision-maker.

5. An industrial leader.

6. A manager or a superintendent.

7. An organizer and coordinator of economic resources.

8. The owner of an enterprise.

9. An employer of factors of production.

10. A contractor.

11. An arbitrageur.

12. An allocator of resources among alternative uses.

13. The person who realizes a start-up of a new business.

In order to reach the objectives of this study, the definition of entrepreneurship is needed to provide focus. Beginning with the view of Schumpeter (1934), who defines entrepreneurship as the process that brings new combinations in the economy, this process has been considered as innovations that are new to the market. These innovations need innovators, which is the third role of entrepreneurship of the above definition, to innovate anything that are new to the market. The one who introduces innovation to the market is also the entrepreneurs. The imitations and recombination of resources that do not bring any improvement or innovation will not be considered as entrepreneurial activities (Schumpeter, 1934). Schumpeter describes the term of "the carrying out of new combinations" by characterizing the innovative activity into five groups: First, the introduction of new goods. Second, the introduction of new methods of productions. Third, the opening of new markets. Fourth, the conquest of new sources of supply of raw materials. Fifth, the accomplishment of the new organization (Schumpeter, 1934). While Kirzner (1973) considers entrepreneur as not only the one who brings innovation to the market but also brings about the actions that capture the exploitation of profitable opportunities in the market with explanation that the entrepreneurial opportunities exist when profitable opportunities utilization have been alerted by an individual or a team from discovering the unnoticed chances to make profit on the account of price difference.

According to Gartner (1989), entrepreneurship has been defined as the creation of new venture. With this definition, entrepreneurial activities involve the formation of new firms in a particular region which agrees with Hebert and Link (1989). They identify twelve roles of entrepreneurship and out of these twelve roles there are two major roles that relate to entrepreneurship and economic growth: the innovator and the founder of new business who transforms inventions and ideas in to economical unit and this procedure can be reposed in the innovation implemented by a firm start-up (Kirchhoff, 1994). This meaning is exactly coinciding with the thirteenth role of entrepreneurship of Wenneker and Thurik (1999) who state that entrepreneurs as the person who realizes a start-up of a new business. This definition is more inclusive as it considers both Schumpeter's and Kirzner's approaches to entrepreneurship. In the arguments developed above, Kirzner (1973) states that new ventures are created not only to exploit innovations, in the Schumpeterian terms, but also to exploit profitable opportunities that may not result from innovations. Furthermore, following Sharma and Chrisman (1999), the process of creating a new venture can be undertaken by an individual, a group of individuals, or an existing organization. In terms of the latter, an entrepreneurial activity may occur when an existing organization chooses to open a new venture that resides outside the organization's boundaries. This implies that a new organization is added to the population of existing businesses. Moreover, a particular owner, either individual(s) or an established organization, may create different organizations over time. To further clarify, the scope of the definition of entrepreneurship, for the purpose of this study, is concerned with the creation of new ventures. Moreover, the definition does not include acts of renewal or innovating activities that do not lead to the creation of a new venture (Sharma and Chrisman, 1999).

2.2.2 Measuring Entrepreneurship

With regards to the measurement of entrepreneurship in the empirical literature on entrepreneurship and economy, different kinds of measures are used to be the proxy of entrepreneurial variables such as, the relative share of small firms in economic activity, rate of self-employment, firm start-ups rate (Carree and Thurik, 2002; OECD, 1998).

While, Audretsch, Keilbach and Lehmann (2006) and Van Stel and Suddle (2008) use new firm start up rate as a proxy for entrepreneurship, new firm start up rate is considered in terms of an observable variable known as latent variable. A harmonized assessment of the level of national entrepreneurial activities from all countries that have participated are used to analyze the link between entrepreneurial activity and economic growth. The GEM uses the share of people among the labor force of a country who are involved in the process of starting a new business and/ or managing a firm of not more than 42 month old. The Total Entrepreneurial Activity (TEA) is used in the study of Vanstel et al. (2005) to investigate the effect of entrepreneurial activity on national economic growth while nascent entrepreneurship (Wennekers, Van Stel, Thurik and Reynolds, 2005; Van Stel, Storey and Thurik, 2007) and the number of business owners or the business ownership rate (Carree and Thurik, 2008) are used to measure the level of entrepreneurship.

Studies such as Carree and Thurik (2002), Audretsch et al. (2006), Reynolds, Storey and Westhead (1994) and Van Stel and Suddle (2008) use firms' startups as an indicator of entrepreneurial activities. This indicator can be used to highlight its relation to economic growth as used in the Wennekers and Thurik's Model (Wennekers and Thurik, 1999). They distinguish the level of analysis to three stages:

individual, firms and macro level. Entrepreneurship originates at the individual level and it can be traced to a single person who is the entrepreneur, realization of entrepreneurship is achieved at the firm level so innovations or startups (establishment) are vehicles for transforming personal entrepreneurial qualities and ambition into actions.

The data to measure entrepreneurship comes from the Department of Business Development. Using establishments rather than enterprises or companies implies that an existing firm may open a new location (establishment) that is added to the population of existing businesses operating in the region.

2.2.3 Entrepreneurship and Economic growth

Literatures about entrepreneurship and economic growth mostly use cross country data and focus on the area of developed economy especially in OECD countries and America. Ace, Arenius, Hay and Minitti (2005) find in their study about the impact of entrepreneurship and economic growth by using data at country level for years 1981-1998, that countries with higher degrees of entrepreneurial activities will have higher rates of economic growth. They explain this results as the transformation of knowledge to growth was caused by a mechanism of entrepreneurship. This is supported by the framework constructed by Wennekers and Thurik (1999) which shows the chain that link entrepreneurship to the national economy by explaining that the starting point of entrepreneurship is at the micro level about the characteristics and roles of individuals and the typology of entrepreneurship.

The entrepreneurs transform their skills, attitude and personal characteristics into action which take place at the firm level through freshness of new products,

innovation, entry to new market or new business start-ups. These entrepreneurs bring variety to the business, province and national economies and increase competition in the market which then transforms the provincial and national economies by switching outdated firms with new firms with greater quality and profitable productivity.

At the regional level, employment growth rate is used as a proxy to measure economic growth (Henderson, 2006) and they find that entrepreneurship makes a positive and statistically significant contribution to employment growth. This is supported by Folster (2000) who argues that entrepreneurship creates more jobs for the regions and also significantly affects the region's productivity (Audretsch and Keilbach, 2004). These studies confirm that entrepreneurship contributed positively to economic growth and plays a role as a driver for regional economic growth (Camp, 2005). Thus, the effect of entrepreneurship and economic growth were part of framework for this study (see figure 2.1).

In developing countries, limited literatures about economic growth and entrepreneurship are available as stated by Autio (2007) that "we actually know very little about whether and how entrepreneurship either contributes or does not contribute to economic growth in developing countries". Here, the literatures about entrepreneurship and economic development in developing countries would be reviewed.

Wennekers, et al. (2005) empirically find in their study a U- shaped relationship between entrepreneurship and economic development, which means that when a country has developed its economy, the prevalence of nascent entrepreneurship and of new business startup are about to decrease until a renewal occurs at the high end of economic development. Lucas (1978) explains this by using the terms of relationship

between the opportunity cost of self-employment and the expected return on investment. The entrepreneurial ability or managerial talent is assumed to be in uneven distribution, when rising in the real wage, the opportunity cost for self-employment will lead to increase which encourages the marginal entrepreneurs to become wage employees. This is affected by the number of self-employment and the increase in the size of an average firm.

The positive relationship between economic development and rate of entrepreneurship are shown at the right part of the U – curve. When a country is in a high level of economic development, the share of sectors in the country are mostly on service sector while manufacturing sector declines. At the same time, this increases the level of per capita income. In this situation, the entrepreneurial activities increase the potential of the entrepreneur. This is explained by Jackson (1984), who argues that increasing in the level of economic development will increase customers' demands for a variety of goods and services. This in turn provides more opportunities for (small) business ownership.

This U shaped relationship has been supported by the ideal of distinguishing the stages of economic development. Porter, Sachs and McArthur (2002) distinguish economic development between three stages and two transitions. Starting with the lowest level of economic development, at this level, primary factors such as land, unskilled labors and primary commodities are used, this level is designated as factor-driven stage. The second stage is investment driven stage, economic growth becomes more capital intensive. The key processes that move the economy to this stage are capital accumulation and technological diffusion. The third stage is the innovation driven stage, which requires the ability to generate and commercialize new

knowledge. These transitions had been described as one that moves from the managed to entrepreneurial economy (Audretsch and Thurik, 2004)

Empirical studies that show negative relationship between the entrepreneurship levels of economic development (Yamada, 1996 and Iyigun and Owen, 1998) come up with various reasons for the declining rate of entrepreneurship with the increase of per capita income. Among these reasons, Wenekers et al. (2005) explain that opportunities to minimize transaction cost are gained through larger enterprises that benefit from economies of scale in production due to moving from agriculture to manufacturing of the labor. Supported by this assumptions, Lucas (1978) stresses how entrepreneurs become employees is due to rising real wage will increase the opportunity cost of self-employment compared to the return. This is based on his assumption of the talents of the working population in terms of management are unequal. This is consistent with a distribution of risk aversion assumption of Iyigun and Owen (1998) who argues that when the income of professionals rises according to the rise in economic development, the risk to become an entrepreneur will be less taken by an individual. Wenekers et al. (2005) focus their study on positive relationship between business ownership level and start-up rate. At the high rate of business ownership, new firm will be established at high rate due to the level of business closure which is also high. However, business closure will be low at the low level of business ownership rate. At the same time, the business ownership rate also affects the opportunities for the displacement of the existing firms. And the incumbent business ownership rate controls the availability of entrepreneurial role models stimulating other members of a population to become entrepreneurs.

Global Entrepreneurship monitor (GEM) is one of a major project studies about entrepreneurship within a wide range of countries including developing countries. In the GEM 2002 report, statistical significant relationship between level of national entrepreneurial activity and subsequent economic growth level can be observed. Raynolds, Bygrave, Erkko and Hey (2002) who give a suggestion based the data of GEM assert that there is no country that experienced a situation where entrepreneurship is at high level and economic growth is at low. The data of GEM could be used to assume the relationship between entrepreneurship and economic growth is positive. However, the data about entrepreneurship for the GEM need to be viewed with caution.

They have made some conclusions about the relationship between entrepreneurship and per capita GDP levels in their 2006 report. Among those assumptions are, there are predominance of numerous very small firms that are characterized in industrial structure at the stage of GDP per capita while the existing and larger firms try to increase their relative roles through industrialization and economies of scale. The number of new established firms would decline due to employees trying to find stable jobs in larger firms. However, entrepreneurial sectors increase their significance again after they experienced an increase in income per capita. Therefore, when the income of the populations increases, it implies that people have more opportunities to have resources for business.

In relation to the motivation of entrepreneurial behavior, there are two kinds of motivational entrepreneurship which are opportunity and necessity entrepreneurship. The GEM (2006) also concludes that the motivation in developing countries that necessitate entrepreneurship is relatively more common in middle income countries.

Necessity entrepreneurship starts with small firms and operated in small and informal sector due to lower income level of entrepreneurs that start their business to survive and they will increase their income while opportunity entrepreneurs decide to start business to pursue opportunities with a relatively high level of income to meet the cost of basic needs as well as the cost associated with starting the business (Wenekers, Van Stel, Carree and Thurik, 2010)

There are empirical studies using variety indicators of entrepreneurship which support the above assumption such as Nickell (1996) and Nickell, Nicolitsas and Dryden (1997). They use data of 600 manufacturing firms in UK between 1972–1986 and 1982– 1994 to study the effects of market competition and development in productivity performance of companies. The results show the evidence that when market competition increases, productivity performance of the company also increases.

On the other hand, the relationship between the share of small firms and industrial output growth had been studied by Caree and Thurik (1998) using 14 manufacturing industries in European countries as samples. The result shows that entrepreneurship, measured by share of small enterprises, have positive effects on output growth during the subsequent 3 to 4 years. This relationship shows evidence of economic activity transformation that shifts away the large to smaller enterprises as seen happened between 1970s and 1980s. This transformation is referred as from a "managed economy" to an "entrepreneurial economy" (Thurik and Wenekers, 2001; Friijis, Thomas and Charlie, 2002).

Smaller enterprises seem to have higher flexibility and tend to have the ability to adopt new innovations and technologic which make it easy for them to response to

entrepreneurial ambitions of an individual (Caree and Thurik, 2002). The best conclusion to the result of economic development on increasing the importance of entrepreneurship could be expressed by the words of Michael Porter who claims "Innovation and entrepreneurship are at the heart of national advantage" (Porter, 1990).

Literatures have consistently accepted that entrepreneurship, have many ways of being measured such as according to self-employment (ILO) or opportunity entrepreneurship (GEM), which is already high in developing countries as mentioned by Leff (1979). He argues that the demands for entrepreneurship in economic development would be particularly high and consistent with the findings in the empirical study by Naude (2009). Naude stresses that there are evidence in developing countries that the needs for entrepreneurship and higher number of entrepreneurial opportunities are equal to the higher number of entrepreneurs who are opportunity-motivated entering the market. This is supported by the conclusion in the study by Ho and Wong (2007) that claim that in developing countries, entrepreneurial opportunities are more available.

Furthermore, two ways relationship between self-employment and unemployment have been investigated by Thurik, Carree, Van Stel and Audretsch (2008) by using two-equation Vector Autoregressive (VAR) model to estimate changes in unemployment and self-employment. As a dependent variable in these two equations, the lagged dependent variables as independent variables are then used weighted least square (WLS) to evaluate the two models simultaneously. Results of the study show that the business ownership rate is affected by the lagged levels of unemployment for both directions. They explain that this result indicates the direction of positive effect

of unemployment rate on the lagged of business ownership rate because when the rate of unemployment are high, it will drive individuals to become self-employed, this is so called "the refugee effect". In the opposite direction, when the rate of self-employment is at a high level, the subsequent unemployment rate will be reduced and this is called "the entrepreneurial effect". Furthermore, they conclude that the entrepreneurial effect is stronger than the refugee effect. However, this study could not identify other factors that have effects on self-employment and unemployment rate due to the fact that they did not take into account any control variable in the model.

To get rid of the limitation, Audretsch and Keilbach (2004) have taken into account the control variable, in order to investigate the two way relationship between GDP and entrepreneurship (at regional level). Based on the three stages least square (3SLS) to estimate two simultaneous equations, the results show a positive impact of entrepreneurship capital on economic output and the "spatially specific entrepreneurship capital is shaped by regional specific factors". Finally, they found that the magnitude of these factors are different between entrepreneurship capitals (that are knowledge-based compared to non-knowledge based entrepreneurship). Therefore, this study takes into account both a one way and two way relationships between entrepreneurship and economic growth (refer figure 2.1).

2.2.4 Entrepreneurship and Physical capital

The infrastructure has been defined as the basic facilities and services of a community that include transportation and communications systems, power plants, waterworks, wasted disposal facilities, police, schools, prisons, etc. (Maki and Lichty, 2000). To

provide new goods, service and jobs in order to revitalize the economy, new firms need the physical capital or infrastructure.

However, in underdeveloped countries the problem of lacking infrastructure facilities, resources and services are widespread and become the obstacle to the establishment of new firms. Entrepreneurs like to find another place for their business if the condition of infrastructure is unsatisfactory (Bull and Winter, 1991). Supported by the study of Reynolds et al. (1994) that the rate of new firm establishment tend to be lower in less developed than more developed regions. In line with the suggestion from the study of Wennekers et al. (2005) that in less developed countries, improvement in competiveness are needed for the existing firm while in developed countries the entrepreneurial activity tend to play important role in the economy. This evidence suggests that less developed areas may need to import resources and get involved in developing better infrastructure facilities to attract entrepreneurs to create new ventures.

In terms of the static elements of existing infrastructure, Gartner (1985) argues that environments that present availability of services, accessibility to transportation, facilities, and good living conditions are more conducive to new firm formation. Birch (1987) indicates that entrepreneurs are attracted to locations that offer higher educational resources, quality of labor and government, access to telecommunications, and a quality of life. These locations provide a knowledge base that can spill over to create new ventures. Availability rather than costs, he says, will direct entrepreneurs to the establishment of businesses in particular regions because entrepreneurs require infrastructure to operate and compete in the region. In that regard, Specht (1993) argues about the influence that infrastructure munificence, the

amount of infrastructure resources available in the region (Castrogiovanni, 1991), has on the rate of new firm formation. These arguments are complementary to Porter's (1990) notion of the competitive advantage that some regions may develop over others. Certain locations will attract firms and create opportunities for new venture creation as long as they offer a good infrastructure system that can support them (Porter, 1990).

In terms of the dynamic aspect of infrastructure, investments in existing or new facilities represent improvements that make the region more attractive to locate new firms. These investments can increase the knowledge base of the region. Porter (1990) suggests that improvements in infrastructure increase the competitive advantage of the firms operating in a region. To support that contention, Sanders (1993) acknowledges that investing in core infrastructure is a function that local and national governments must do. Such improvements may also provide incentives for new firms to consider operating in the region and provide capability or new ways to accessing resources which bring profits to the firms. Therefore, the suggestions from these authors imply that regions have to develop a system of facilities that allows the formation of new firms. Krugman (1991) explained that regions with higher levels of manufacturing activities present opportunities for the location of new firms**.** Thus, the relationship between entrepreneurship and physical capital will be part of the present study (see figure 2.1).

2.2.5 Entrepreneurship and Human capital

Armington and Acs (2002) argue about the importance of education in a particular region. They obtain evidence about a positive relationship between college graduates

and firm birth rates. As a result, it can be seen that a variety of demographical factors have a positive effect on new firm formation.

Lucas (1988) mentions that the survival of new firm is affected by not only the level of schooling but by knowledge spill over which are components of location specific human capital. This is supported by Acs (2006) who stresses that the higher the rate of education attainment of a particular region, the higher the surviving rate of the firms are expected to be. However, evidence shows that low level of new firm survival rate may not necessarily be concerned with low level of education attainment of a region. Acs, Audretsch, Braunerhjelm and Carlsson (2006) explain the importance of education in order to initiate and sustain new firm start-up knowledge spill over. The environment needs to be created from educated people that compounds to be human capital. Van Praag (1996) and Pena (2002) also consider human capital, which is measured by educational attainments of entrepreneurs, as important invisible factor that effects new firm survival.

In addition, the level of education in the region (Minnitti and Bygrave, 1999) may indicate the level of human capital available in the region to carry out entrepreneurial activities. Proponents of the endogenous growth model (Lucas, 1988; Romer, 1986) establish that knowledge is the engine that generates economic growth and development in a region. Individuals use the existing knowledge available in the region to increase capacity and production. Romer (1986) explains that growth results from the activities that profit-maximizing individuals do in the region. Begley, Tan and Schock (2005) argue that skilled labor is critical for the feasibility and success of new ventures. Skilled labor can be interpreted in terms of human capital that is

defined as those technical skills required to perform a job in the economy or start a new business (Armington and Acs, 2002)

Empirical results suggest that attaining a college degree will accelerate the intentions of the individuals to pursue self-employment positions and open new businesses (Evans and Leighton, 1989) and education attainment levels are positively associated with new business formation (Bates,1999). Moreover, Armington and Acs (2002) find a significant correlation between possessing a college degree and the formation of new firms. Lee, Florida and Acs (2004) report similar results as they find a significant relationship between college education and firm births per 1 million people in metropolitan areas.

The productivity may be increased by individuals as their skills improve with knowledge that exists (Lucas, 1988). Mathur (1999) suggested that an individual with entrepreneurial aspiration may receive knowledge from other who already have knowledge and the one who have knowledge will also create more knowledge which can be used to create new firms. In fact, regions with the sophisticated skill levels and research activities offer the best opportunities for further knowledge creation that attracts new economic activity, such as new firms (Bathelt, 2001). Empirical evidence also suggested that the presence of new knowledge in a particular region is captured by the availability of skilled labor indicating that regions can benefit from the actions undertaken by skillful individuals as new knowledge circulates within the population (Audretsch and Feldman, 1996). Evidences from a cross country study also indicated that talented people tend to organize businesses and make their skills available to spread knowledge, while others use their skills to develop a rent seeking behavior by opening new businesses (Murphy, Shleifer and Vishny, 1991). Acs et al. (2006)

suggested that human capital stock play an important role in formation of new firm and firm dynamics. Human capital stock is provided by educated populations which are embodied in their general and specific skill that will provide new idea for establishing and sustaining new business, at the same time creating a rich knowledge environment spillover that supports another to create new firms. Therefore, the increased availability of educated people should initiate have more start up activities. A breakthrough innovation also comes from knowledge that is used in new and smaller firms to compete with exiting and larger firm (Baumol, 2004). He also explains that individual entrepreneurs have developed most of the revolutionary ideas brought to the market in the last two centuries. Therefore, this study takes the relationship between entrepreneurship and human capital in to the framework of the study (see figure 2.1).

2.2.6 Entrepreneurship and Labor

Folster (2000) noted that, unemployed individuals in Sweden viewed entrepreneurship as an alternative opportunity to being employed through an existing organization. He established that individuals can be pushed or pulled to entrepreneurial activities because of their current status. In studies conducted in the U.S., Evans and Leighton (1989) report a relationship between unemployment and small business formation; however, their evidence implies that unemployed individuals who became entrepreneurs experience a drop on earnings compared to those who returned to be employees. Bull and Winter (1991) report a negative relationship between unemployment and firm births. Also, Reynolds, Miller and Maki (1995) report that the formations of new businesses tend to decrease when there are higher levels of unemployment. Armington and Acs (2002) find that unemployment rates can have

effects on new firm formation in specific industrial sectors like manufacturing and retail. Brixy and Grotz (2006) argued that, if a growing number of employees are associated with an increase in population, the supply side might be improved as well. They concluded that the number of possible entrepreneurs increases even more and acknowledged the unemployment rate is generally seen as a sign of quantitative and structural problem on the labor market, leadings to lower level of purchasing power and thus lower level of demand. Therefore, the relationship between entrepreneurship and labor are part of the framework for this study (refer figure 2.1).

2.2.7 Studies used framework of Mankiw, Romer, and Weil (1992)

One of the most influential and widely-cited work in the empirical growth literature is an article by Mankiw, Romer and Weil (1992). They augment the Solow (1956) growth model by including a proxy for human-capital accumulation in their cross-country regressions using the Penn World Tables. They find that the Solow model can be augmented by including accumulation of human capital and physical capital and this could provide an excellent description of the cross-country data.

There are many authors who adopt the framework of Mankiw, Romer and Weil (1992) to study the significance of addition factors to growth. In the paper by Park and Brat (1996), the variable of R&D has been introduced into the MRW model in order to explain international economic divergence and it is found that there is an increase in returns in a cross country difference in factor accumulation matter for aggregate economic growth and the differences in domestic research help explain international divergence.

Isfahani, Akhlagh, Masouleh, and Nemati. (2011) and Henry, Barkley, and Li (2004) have studied the impact of human capital expenditures on economic growth of provinces in Iran by using the model of Mankiw, Romer, and Weil for panel data in Iran. In addition, Masouleh, Gashti, Kavosi, and Kakaee (2011) have added the quantitative indexes of education in the model. Li and Huang (2010) consider health as one of human capital variables by adding health variable into the model. Taxes also add in the model by Konopczynski (2014) to investigate how taxes and spending on education influence economic growth in Poland.

The framework has also been used not only to investigate relationship between human capital and growth but another field of study also uses this framework. In the study of Frankel and Romer (1999), they use the Mankiw, Romer, and Weikl's framework to investigate causality between trade and growth while Petrakis (2014) studies the construction of opportunity entrepreneurship function and Coulombe (1999) studies the relationship between economic growth and provincial disparity.

2.2.8 Growth Accounting with Entrepreneurship

There are two explicit factors included in the Solow's growth accounting framework that are physical capital and labor and also the technological change which is consider as implicit factor. In Solow's growth accounting model, the technical change is considered as "an unexplained residual" that also have some effects on economic growth. However, public policy had been considered to be constant.

In the study of Audretsch (2007), Solow's growth accounting framework is used to make comparison with a central focus of growth policy and to use as lens to focus on the relationship between entrepreneurship and economic growth by facilitating the

knowledge spillover in a firm endogenously and for a different application, entrepreneurship gives a significant contribution to economic growth. Acs, Audretsch, Braunerhjelm and Carlsson (2004) and Audretsch et al. (2006) introduce the knowledge filter that is the barrier to the knowledge spillover from the originally generated firm for commercialization by the third party firms. Economic growth may not be adequately generated by public policy instrument which is used to promote investment in knowledge. Entrepreneurship is the missing link between economic growth and investment in new knowledge if one considers entrepreneurship as a conduit for knowledge spillover Audretsch et al. (2006). The Solow model considers the residual as a factor that explains the most variation in economic growth and explained by other factors, such as the physical capital and labor, only limited account. So if the knowledge factor is not included in as a factor that effects economic growth, that could be a mistake in the view of Audretsch (2007). This conforms to the conclusion of Nelson (1981) that productivity difference between firms could not be accounted for in the neoclassical variables. In the endogenous growth model such as in the macroeconomic model of Romer (1986) and Lucas (1993), the importance of knowledge has been introduced by assuming knowledge to spillover automatically from the generated firm to the third party firm for commercialization.

In Growth accounting model, Audretsch (2007**)** mentions that the degree of essential entrepreneurship of regions will influence the ability of an economy to create entrepreneurial behavior. The new firms start-up rates is used by Audretsch *et al*. (2006) to be a proxy for underlying an observable variable. Higher rate of new firm establishments reveals the higher level of entrepreneurship capital. To estimate a production function for German in the 1990s, Audretsch *et al*. (2006) put together determinant of entrepreneurship capital, physical capital, knowledge capital and labor

and come up with the results that show positive relationships between physical capital and output, and labor and output which is in line with the Solow model (1956). This is similar to the Romer model (1986) about a positive relationship between knowledge capital and output. Furthermore, the results show a positive relationship between entrepreneurship capital and economic growth. After a fixed the physical capital, knowledge capital, and labor are constant, the results still reveal the positive relationship between entrepreneurship capital and economic growth of the German regions.

Link between economic growth and entrepreneurship extend has been studied by Acs and Armington (2006) by using the data of regions in the United Stated years 1990s. Results show that at high rate of entrepreneurship growth of the economy is also at high levels though the effect of agglomeration has been controlled in the study. At the country level, Acs et al. (2004) try to examine the relationship between these two variables by using data from OECD countries in 1990s. The finding shows that the rate of entrepreneurship would be high at those countries with high rates of economic growth.

Therefore, entrepreneurship is considered as an important mechanism that pervades the filter of knowledge; accelerate the knowledge to spillover and finally increasing the growth of the economy. In terms of policy implications to promote growth of the economy, it could be interpreted as a policy to generate more entrepreneurship capital or increase the rate of new firm establishments. Audretsch *et al.* (2006) and Acs *et al.* (2004) translate the knowledge filter as "the gap between knowledge that has a potential commercial value and knowledge that is actually commercialized**".**

2.2.9 Concept and definitions of Poverty and Inequality

To understand relationship between poverty and inequality with some other factors, it is important to understand the concept of poverty and its relative definitions. Thought, developmental experts and policy maker have no clear consensus on how to define, measure and eradicate poverty (Meehan, 1999) for different experts view and give definitions in different ways.

The concept and definition of poverty and inequality could be considered from different views of experts. Normally poverty could be understood primarily as material of hardship, low income and low level of consumption which could be characterized by low nutrition and low living conditions which are known as income poverty. This type of poverty will lead to human poverty due to its result due to low level of health and education. According to the classical definition of poverty which was described by World Bank in their 1990 report is that poverty is the inability to attain a minimum standard of living (World Bank, 1990). The characteristic of poverty may be considered as the failure to satisfy basic needs of the individual, family or even communities from getting the sufficient resources.

The definition of poverty can also be considered from the views of many economists such as Hulme and Mosley (1996) who consider the definition of poverty as inadequate and incomplete while Torado (2000) considers an easier term by mentioning that the world is characterized by the definition of "have" and "have nots" that leads to suffering from lower level of health, productive life and decent standard of living. Holcombe (1995) considers poverty as not only lack of material needs but also vulnerability and powerlessness. In the World Bank report year 2002, there are at least four dimensions of poverty which include the lack of income, low level of

achievement in education and health, vulnerability to risks and some sort of insecurity and voicelessness.

The definition of poverty could be concluded here as a situation of a shortage of having enough food to eat, low life expectancy, high rate of infant mortality, low educational standard, low enrollment and opportunities, poor drinking water, in adequate health care and housing condition, lack of participation in a decision-making process, vulnerability to risk and insecurity and lack of adequate power.

2.2.10 Measures of poverty

The starting point to analyze poverty is at the "poverty line" which is a line that has been constructed to consider the income or expenditure level that can sustain a minimum standard of living. If the income of an individual is below the poverty line, which is considered as the minimum basic needs, s/he would be considered as poor. Getahun (1999) defines the poverty line as the cross cutting level that is created from estimating the minimum monetary while World Bank (1990) defines poverty line as a beginning level of participation in terms of economy in a given society and a given point in time. Thus, the poverty line of a society would be different from another society and people below this line is said to be poor.

There are two different approaches to estimate poverty line. First, the absolute poverty considers the poverty of people who exist without any comparison with others. However, World Bank tries to make international comparison by establishing an international poverty line of 1 US dollar a day per person in 1993 PPP prices. Second is the relative poverty that brings consideration on comparing the poverty conditions of people with others which is referred to a relative income differential of distribution. Torado (2000) explains that the relative poverty is considers the poor in relation to

others. Thailand poverty line is calculated by taking food and non-food components into account to embrace all the basic needs which are necessary due to changes in price of both commodities have affected the poor differently (Kakwani, 2003). Hence, Thailand poverty line varies across rural and urban areas and across the five regions of Thailand due to the variation in the cost of living and food consumption patterns of Thai people across various areas and regions (Kakwani, 2003).

The measurement of poverty, normally use the class of poverty indices derived from Foster, Greer and Thorbeke (1984):

$$P_\alpha = \sum_i a_i I_i (y_i - Z_i)^\alpha$$

Where,

yi = the per capita income of the ith household

Zi = the poverty threshold for that household

ai= the population weight attached to the ith representative household

Ii = 1 if yi<Zi

= 0 otherwise

= 0; 1; 2

2.2.11 Poverty headcount ratio

The most basic indicator that used to measure poverty is the Headcount ratio. From the formula of poverty indices, the headcount ratio is given when α's value is 0

$$P_0 = \sum_i a_i I_i (y_i - Z_i)^0 = \sum_i a_i I_i$$

The Headcount ratio shows the percentage of the population with income level lower the specific poverty line.

2.2.12 Inequality

There are two indicators of income distribution that are used in this study, the Gini coefficient and Income quintile index, to find relationship between income inequality and entrepreneurship.

Income quintile is an index to measure income inequality in an area by dividing the population into five income quintiles beginning from the lowest income to the highest income so each group within the population will be twenty percent.

The Gini coefficient is used to measure inequality in income distribution which is developed by Italian statistician Corado Gini in his published paper year in1912 with the title of "Variability and Mutability". The Gini coefficient index is calculated by using the area between a Lorenz curve and the line of absolute equality and is shown as a percentage of the triangle under the line. The index can range from 0 to 1 or 0 to 100 or expressed as percentages. The area between Lorenz curve of the distribution and the uniform distribution line is between 0 in the case of perfect equality and if the value of the area became 100, income distribution is completely unequal. Therefore, the lower value of Gini coefficient index shows a more equal distribution of income than the higher one. The Gini coefficient index can be calculated by using a ratio of the area on the Lorenz curve diagram. If A is the area between the Lorenz curve and the perfect equality line and B is the area below the Lorenz curve, the Gini coefficient can be calculated by A/(A+B). Since A+B equal to 0.5, the Gini coefficient would be

$$G = 2A = 1-2B$$

Consider the Lorenz curve in term of function Y =L(X) the value of the area B can be calculated by using integration, so the Gini coefficient would be

$$G = 1 - 2\int_0^1 L(X)dX$$

2.2.13 Entrepreneurship and Poverty

The literatures on entrepreneurship and poverty are widespread and extensive. However, the number of work which emphasizes the relationship between entrepreneurship and poverty are very small, especially in developing economies (Naude, 2009). Relationship between entrepreneurship and poverty is believed to be such that the country with a high rate of entrepreneurship will be consistent with the high rate of poverty as described by Banerjee and Duflo (2007). According to them, " a substantial fraction of the poor act as entrepreneurs in the sense of raising capital, carrying out investment, and being the full residual claimants for the resulting earning." Shane (2009) agrees and argues that "if you want to find countries where there are a lot of entrepreneurs, go to Africa or South America".

In the work of Singer (2006) and Naude (2007), the types of entrepreneurship have been described and explained as the growth of economy is contributed by entrepreneurial activities which does not result in significant level of poverty reduction. Entrepreneurship can be divided into two categories: necessity and opportunity-based (Acs et al., 2005). However, these two types of entrepreneurship could not be judged as successful or unsuccessful. According to Block and Sandner (2009), necessity entrepreneurs are not necessarily successful. Subsequently, not all opportunity-based entrepreneurs create flourishing business enterprises with high impact on job creations and growth of the economy. Williams (2009) insists that when

an individual try to start a new business, the reason may be concerned with the push and pull factors. Hence, some entrepreneurs who are opportunity driven could be categorized in an overly simplistic approach. Nevertheless, there are many cases that show the relevance between necessity entrepreneurship and economic growth due to productive small scale business. This is supported by the Couyoumdjian and Larroulet (2009) who insist that "necessity based entrepreneurship can be important to the development of a country because they represent a form of human resource fullness"

The necessity based entrepreneurship could be contributing to society and to the reduction of poverty though they might not have significant effect on the growth of economy. At least, they could help the poor to generate some income and to prevent poverty from increasing (Sandy, 2004). This argument is supported by Barnerjee and Duflo (2007) in developing the fragile economy of the entrepreneurs who informally survived. This could be crucial even though they have been considered as unproductive.

According to Powel (2008), in terms of policy implication, entrepreneurship played a crucial role to help the poor in underdeveloped countries, while Shane (2009) and Wennekers et al., (2005) argued that entrepreneurship was not a good policy and should not be used as a policy to promote new firms in low income countries. Therefore, it is also important to consider the relationship between entrepreneurship and poverty in the framework of the present study (see figure 2.1).

2.2.14 Entrepreneurship and Inequality

Literature about income inequality and entrepreneurship mainly try to support or refute the Kuznet (1955) inverted-U hypothesis which declares that income inequality

increases between early level of development and later this will decrease (Barro 2000; Lundberg and Squire 2003;). By using a cross-country data set Deutsch and Silber (2004) conclude that the income composition of various sources have some effects on the relationship between development and income inequality by explaining that the rising Kuznets curve is mainly due to the increase in the importance of income from wage labor and the decreasing curve is due to the decrease in importance of income from entrepreneurship.

In the study by Martin et al. (2010), they analyze the relationship between entrepreneurship, income distribution and economic growth following the ideas developed by Schumpeter and they conduct empirical test using data from 25 countries in the year 2000-2006. They conclude that entrepreneurship has an indirect positive effect on economic growth through investment while there is no significant evidence about relationships between entrepreneurship and income distribution. While some economists consider the association between entrepreneurship and inequality as not straight forward and the "conventional wisdom' has been considered, the association between entrepreneurship and inequality is highly positive. Quadrini (1999) suggests in his study, using data from the US as empirical evidence, that when entrepreneurs have higher savings, the wealth concentration will be led by entrepreneurship. This claim is supported by the theoretical models of Meh (2005) and Cagetti and De Nardi (2006). Rapoport (2002) and Naudé (2008) state in their study that income inequality could encourage entrepreneurship in developing countries, but the opposite direction has not been explored much.

However, a study on entrepreneurship and inequality in southern Ethiopia by Kimhi (2009) concluded that a uniform increase in entrepreneurial income reduces per capita

household income inequality, but increasing the number of entrepreneurs does not really affect overall inequality. Thus, it is worth to consider the relationship between entrepreneurship and income inequality in the framework of this study (refer figure 2.1).

2.2.15 Research Framework

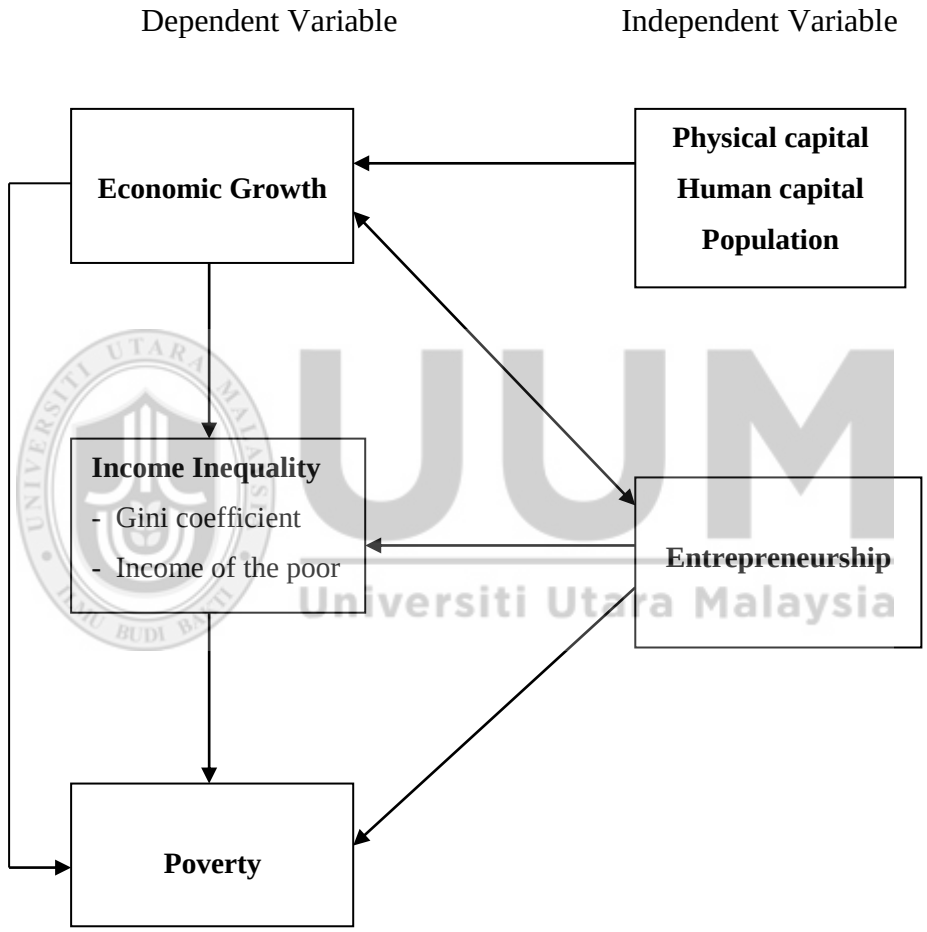

Figure 2.1 Research Framework

2.3 A brief review about Thailand

To understand the relationship between entrepreneurship, economic growth, income distribution and poverty in Thailand, some background of Thailand and her economic growth, income distribution and poverty are needed. Analyzing the historical background of Thailand can improve understanding of the situation in each period of the Thai economy.

Thailand is a Buddhist country with abundance of land and low level of urbanization. The economy of Thailand is characterized by a dualistic economy with high migration between rural and urban areas, increasing the gap between the rich and poor. Politically, it is currently going through an unstable phase. In the year 2012, the population of Thailand was about 66.79 million with the income category of upper-middle income countries (World Bank, 2012). The economy of Thailand before the economic crisis of 1997 was a country with a fastest growing economy and a successful economic development pertaining to continuously high rate of economic growth, at the average of 8–9 percent per annum. However, at the time of economic crisis between years 1997 – 1998, the economic growth rate sharply decreases and after that crisis the economic growth return to a high level but not as high as the time before the crisis. (See figure 2.2)

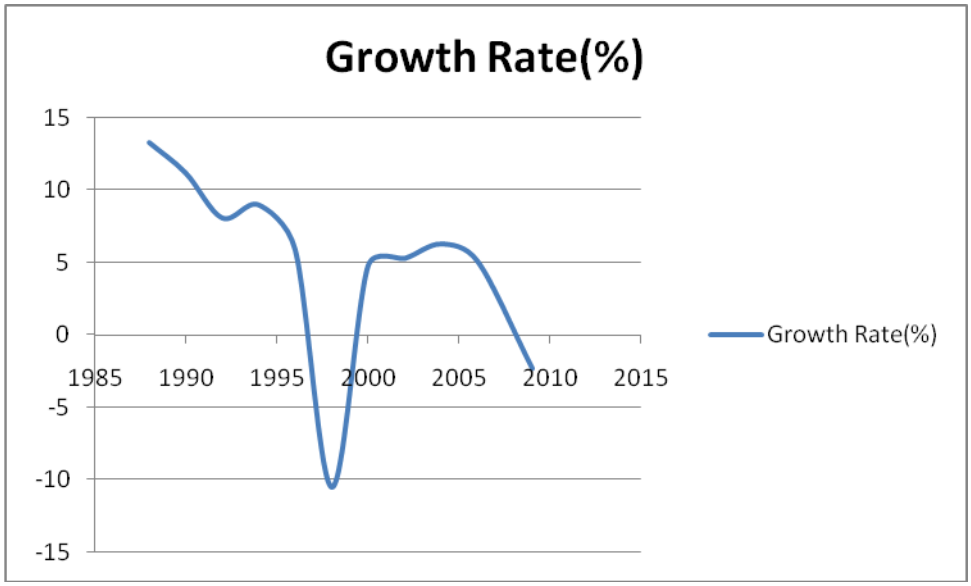

Figure 2.2
Thailand economic growth rate
Source: Calculated by Authur using data from World Development Report 2012

2.3.1 Thailand before the twentieth Century

In the year 1976, the capital of Thailand has been relocated from Ayutthaya to Bangkok due to the termination by the Burmese. From 1782, Bangkok had become an important regional center for trading and ship building which brought wealth to Thailand. Bangkok had become the largest and most powerful city in South East Asia (Dixon, 1999).

The trade made Thailand to create connections with English and various colonial countries such as the Dutch and French. The rules and regulations had been set through the Burney Treaty in 1826 and the Bowring treaty in 1855 which solidify the relationship between the Thai economy and the British. However, the majority of Thai people outside the capital remain as rice and traditional farmers that not affect by the expansion of trade in the Thai economy.

2.3.2 Period 1900-1950

In this period, agriculture was the foundation of society and economy of Thailand (Phongpaichit and Baker, 1995). The economic growth of Thailand was considered as remarkably high due to the high rate of export from the central plain region north of Thailand which constitutes 98 percent of the total export of the country (Phongpaichit and Baker, 1996). In comparison, the growth rate of the economy in other parts of the country is about 0.4 percent per annum in the year 1870 to 1913 (Sompop, 1989 as cited in Dixon, 1999). From 1913 to 1950, an increase in the population of Thailand brings a small growth in national income per capita. Between year 1950 to 1960, the national income per capita has increased by the average of 4.5 percent per year while other parts of the country remain unchanged due to the low level of transformation and development (Dixon, 1999). The trade policy had been set up to protect traders from the world's economic depression in the year 1929. After that in 1932, the policy to end poverty had been designed (Phongpaichit and Baker, 1995)

2.3.3 Period 1951-1973

In the year 1958, the National Economic Development Board (NEDB) has been established and it became the National Economic and Social Development Board (NESDB) in order to guarantee and develop domestic and foreign private enterprises created by the government and take responsibility to provide a secure environment and encourage private investments. The National Economic Development Board had developed the first National Development Plan for the period 1961-1966 with the main objective of achieving economic growth. In this period, the rate of economic growth was at average rate of 7 percent per annum due to the stable political

environment, favorable international trading conditions and also the investment in infrastructure and large project from the government (Lal and Myint, 1996).

During this period, agriculture was still the main source of export goods while the manufacturing goods were started to be exported because agricultural activity were the main occupation of the Thai population. However, the Thai economy gained benefit from increasing the export rate due to the increased in its input not because of productivity (Jitsuchon, 2006). In order to protect the national industry, the tariff had been continuously increased during the period.

2.3.4 Period 1970 – 1985.

The economic growth of Thailand between 1973 and 1974 were at 5 percent per annum which was considered low compared to the previous period due to the problem caused by the international economic climate brought about by petroleum crisis, the collapse of Bretton-wood system that brought down the price of world commodity as well as the local economic conditions such as the obstacle in agricultural sector and the political instability. These economic hardships affected the balance of payment, raised overseas debt and created higher deficit due to the increase in government expenditure to subsidize fuel prices (Dixon, 1996). In the meantime, with the well-educated labor force and lower labor cost, Japan and other newly industrializing countries (NICs) moved their low level manufacturing industries to Thailand. During this period, the third (1971-1976), the fourth (1977-1981) and the fifth part of the national economic and development plan (1982-1986) were promulgated with the objective of reducing income disparities and disperse policy of import substitution as well as reducing the tariff. However, despite the fact that the above objectives were implemented and achieved very little.

The economic structure, domestic economy, the composition of exports and labor force had changed very little (Dixon, 1999), labor force were still employed in the agricultural sector (Phongpaichit and Baker, 1995). However, the commercial modes of the agricultural sector and wage labor became more common instead of small holder peasantry that was the dominant feature of the paddy regions. While the composition of the port sector had also changed from primary to secondary and now able to produce value added goods.

During this period, there were many factors that attract foreign and domestic investment such as low industrial cost, devaluation of Thai Baht, reduction of the trade restriction, the end of economic crisis and stability in political conditions (Phongpaichit and Baker, 1995; Kakwani and Krongkeaw, 1997).

2.3.5 Period 1986 – 1996.

The economic growth rates in this period were significantly high between 1985 and 1992. The gross domestic product of the country increased to double the amount compared to the previous period. In the year 1987 alone, the rate of economic growth was at 11 percent (Phongpaichit and Baker, 1995). Due to this rapid growth rate of the economy, this period had been considered as the golden age of the Thai economy as mentioned by Vines and Warr (2000). According to them, during this period Thailand was known as a country with the fastest growing economy in the world. This rapid growth can be explained by many positive factors such as the economic depression that have affected the world and the local economy had ended and brought back the world economy to a strong growth, increasing of its exports due to the cheaper price of exports goods because of the devaluation of Thai currency and reducing the price of petroleum product. In this period, the sixth economic

development plan had also begun for the year 1987 to 1991 in order to facilitate and adjust the structural system of the economy.

The policy of the sixth plan tried to sustain growth of the economy rather than initiate new policies such as removing rice taxes, subsidy in fuel and transport price, tariff, apply foreign exchange program and support privatization. The Thai economy during this period was also benefited from the reallocation of industrial productions through foreign direct investment from Japan, Hongkong and Taiwan (Jitsuchon, 2006).

However, the rapid growth rate of the Thai economy between this periods had been attributed not to the right economic policy of the country itself but from the external condition as mention by Dixon (1999). It was difficult to accept the view of the World Bank that Thailand is one of the success stories of formal structure adjustment. The people of Thailand were facing increasing rate of poverty particularly in the rural areas. Though the government expenditure was increased it did not have any effect on alleviating society's poverty (Kakwani and Krongkeaw, 1997).

2.3.6 Period 1997 – 2000.

This is the period of economic crisis that was the most challenging time in Thai economic history. Since 1996, the income growth from the export sector became stagnant at 0% while the deficit of balance of payment continued to increase. These problems brought the Thai economy to crisis state in 1997 that caused the rapid growth of the previous years to suddenly stop (Dixon, 1999). Krongkeaw (2002) points out that the factor that led Thai economy to the crisis that are: first, the mismanagement of financial sector to dealing with cheap and abundance of foreign money, imprudent and excessive lending were spent on the non-productive property and stock market. Second, the deficit of current account due to over spending on

investment and consumption of the Thai economy. Third, high rate of domestic interest and inflows of capital were uncontrollable. Thai export were affected by the appreciation of Thai currency because of excess inflows of foreign capital due to the rate of interest in the domestic market were higher than the foreign market. Fourth, the fixed exchange rate policy led to speculation in the currency of Thailand because of its over values. Fifth, the dilemma of economic administration system, the system before the Thai currency was floated had been keeping out the leader of the country from making decisions about using the resources to defend the currency. Sixth, declining export performance, the over value of Thai currency and the increase in the cost of production inflated the price of export commodity which had effected the price competitiveness.

Many policies had been introduced to tackle the economic crisis involving both external and internal policies. The external policy had been set by the lender, such as IMF and Japan, which asked the Thai government to spend less on expenditure and increase income by rising the Value Add Tax (VAT) from 7 to 10 percent. Supported with internal policy such as changing from fixed to floated exchange rate system and a keen observation over fluctuation of the currency, Financial Sector Reconstructuring Authority (FRA) had been set to deal with the problem of mismanagement of financial sectors, public funding were provided to the bank that were having problem and stringent policy were used for financial sector.

The first sign of recovery was shown within a few months after the crisis that came from external sector where exports had increased subsequently plunging the amount of imports that affected to the current account to be in surplus.

2.3.7 Period 2001 – Present.

Thai economy has been well recovered from the economic crisis in the previous period. The rate of economic growth started to reach a high rate of 7.5 percent during the third quarter of year 2000 which depended mainly on export.

In 2001, the "Dual Tracks" economic policy was embraced that combined increased domestic activity with Thailand's traditional promotion of open market and foreign investment. However, due to the slowdown in the world economy the economic growth rate in this year seems to be sluggish at around 2.2% which was affected by weak export demand in the year 2001. Increasing in domestic activity and export performance caused the real GDP growth to increase at 5.3%, 7.1% and 6.3% in the year 2002, 2003 and 2004, respectively. In the year 2005, the rate of economic growth was reduced to only 4.5% due to many difficulties such as deficit of trade, rise in oil prices, droughts and flood in various areas, insurgency in Southern Thailand, political uncertainty and the Tsunami on 26 December 2004

In 2006, the current account begun to record a surplus due to strong export growth. However, since 2006, the Thai economy has fallen into big troubles which come from political uncertainty in the country.

2.3.8 The effects of Economic Growth on Thailand

Advantages of economic growth benefits Thailand in many aspects, GDP per capita had increased more than twenty times since 1960, improving standards of living and social welfare of Thai people, and many other indicators that showed the economic growth of Thailand. Other indicators include the health indicators which show improvement in infant and maternal mortality, malnutrition and immunization levels,

and also improvement in Social indicators such as increase in school enrollment rate, average life spans, access to clean water and access to government services. These advantages have been experienced at all levels of Thai society though not all the population get equal shared (Clarke, 2001).

There are many negative effects of the economic growth in Thailand such as income inequality of Thai people that did not coincide with the decrease in absolute poverty over the last few decades (Warr, 2001). Pollution is also another problem that comes with the economic growth such as the reduction in water quality as unregulated industries dump water in to waterways, the majority of the canals in Bangkok have been filled and clogged and polluted and the remaining are also polluted and hazardous (Poungsomlee and Ross,1992). Social problem comes with economics growth of Thailand in increasing marriage breakdowns, commercial sex work and prostitution (Phongpaichit, Piriyarangsan and Treerat, 1998), HIV/AIDS, social dislocation and child abuse.

2.3.9 Poverty in Thailand

Poverty incidence and inequality in Thailand could be traced back to the two periods before the economic crisis and the economy affected by the crisis. In 1988 – 1996, the percentage of poverty compared to total population of the country was 32.6 percent, constituting 17.9 million. However, this incident had decreased to 11.4 percent of the total population or about 6.8 million in 1996 concurrently with higher rate of economic growth during that period (See Appendix C). It may be concluded that the high rate of economic growth was the main cause that effects to reduction in the rate of poverty among the Thai people which is supported by the work of Kakwani (1999) by using a dataset of poverty and provincial per capita GDP. The study showed that

every one percent increase in per capita GDP growth will decrease 1.38 per cent of poverty among Thai people.

In the study of Kakwani (1999) also had divided poverty into two groups which is defined by considered the poverty line, first is "Ultra Poor" if income is lower than 80 percent of the poverty line and second is "Marginal Poor" if income fall in between 80 to 100 percent of the poverty line. A group of population with income higher than poverty line 100-120 percent is also taking into consideration as "Near Poor" which easily falls into poverty because of low income and uncertain job prospects which may need more support (See Appendix D and E).

At the regional level, each region of Thailand have different problems of poverty. The highest rate of poverty is at the North-East region with the percentage of poverty per total population at 48.4 percent in 1988 compared to poverty at the country level 32.6 percent at the same point in time. However, the rate of poverty had been continuously decreasing with higher rate compared to other region. In 1996, the time before the economic crisis, the rate of poverty in this region decreased to 19.4 percent but it is still considered high when compared to other regions. Central region is the lowest rate of poverty with 6.3 percent per total population next to northern region and southern region with rate 11.2 and 11.5 percent per total population respectively (See Appendix F).

The area of poverty in terms of rural and urban areas (shown in the Figure 2.3), 90 percent of poor people live in rural areas and the rate of poverty decreased at a slower rate in the rural area compared to urban area. In 1988, 40.3 percent are poor people from a total population in rural area. Meanwhile, the total number of poor people per total population was at 32.6 percent. Poverty in municipality and sanitation district

were about 8 and 21.8 percent respectively. Although poverty of every area decreased rapidly, most of the poor people still lived in rural areas more than urban and sanitation districts with 14.9, 1.6 and 5.8 respectively in the year 1996 (See Appendix G).

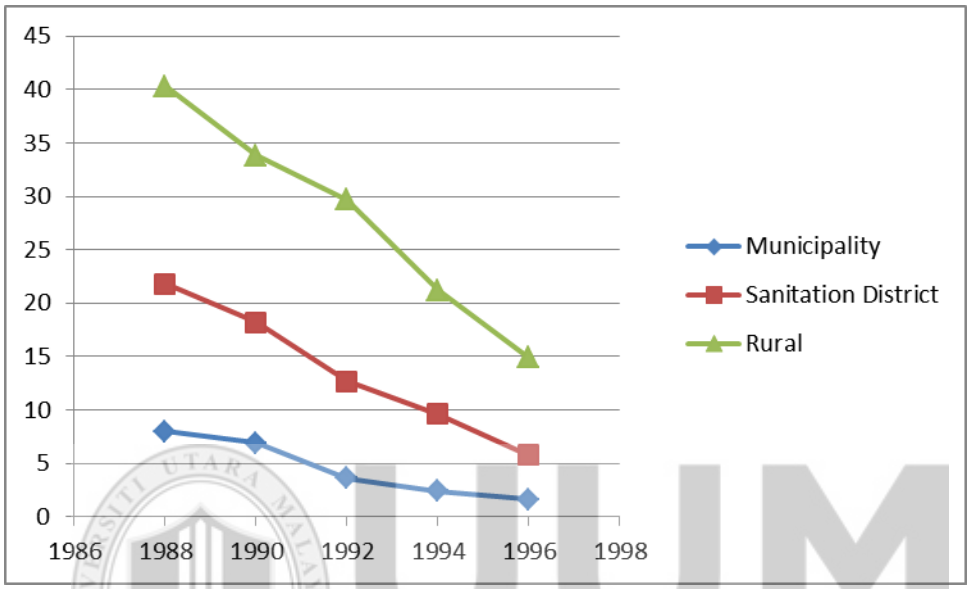

Figure 2.3
Percentage of Poverty at area level

Poverty of Thailand at the provincial level is established by considering the data about poverty at the provincial level in 1996, the year before the economic crisis. The province with the highest rate of poverty is Meahongson from the Northern area of Thailand with 43.06 percent of poverty. The second highest rate was the Kalasin province from North-Eastern area and the lowest rate of poverty was Angtong province from central Thailand. In 1998, the year of crisis, the highest rate of poverty was at observed in Narathiwas from the southern region and the lowest poverty was at Samutprakarn and Nontaburi.

2.3.10 Effects of economic crisis on poverty of Thailand

At the time when the economic growth was at its peak, the problem of poverty also dwindled rapidly but when the economy suffered from the crisis it brought the economy to a depress state, subsequently affecting the poverty rate. The financial crisis saw the economic growth rate in 1998 pummeled to 9.4 percent which consequently pushed the rate of poverty from 11.4 percent in 1996 to 13 percent in 1998. This means that the number of poor people increased to 7.9 million within that period. Economic crisis highly affect the ultra-poor than any other groups of the poor with an increased rate of 18.6 percent (See Appendix H). The data shows the effects of the economic crisis on the percentage of poverty and number of poor people. However, considering the data changes only during the period between 1996 and 1998, which was the period of the crisis, it may not reflect the real effect of the crisis. The crisis index had been developed by Kakwani (1999) by comparing the possible long trend with the situations that occurred and the difference between them is the crisis index. The index shows the effect of economic crisis that increases the number of poor people to 1.7 million or 22.3 percent.

The crisis also had an effect on the status of the poor, the group of the ultra-poor suffered the greatest impact from the crisis which increased to 26.6 percent while the marginal poor and near poor increased to 17.7 and 2.2 respectively (See Appendix I and Appendix J) .

The crisis also effect poverty in every region of Thailand, increasing the rate of poverty especially in the North-Eastern region which saw the rate of poverty increased to 24 percent of the region's population compared to 13.0 percent for the whole country. Poverty in the southern region became the second highest next to the

North-Eastern region with the rate of poverty at 14.6 percent in 1998 while Central region recorded poverty at 7.6 percent whilst Bangkok was only at 0.6 percent.

The crisis index shows the clear picture of the regions that were affected by the crisis, the highest crisis index is southern region was 34.4 percent, Central 30.0 percent and North-Eastern region was 29.9 percent while in the Northern region, the effects of the crisis decreased poverty to 14.3 percent (See Appendix K).

The effects of economic crisis at the area level also effect rural areas which saw the rate of poverty increased from 14.9 percent in 1996 to 17.3 percent in 1998. In the sanitation district, poverty increased from 5.8 in 1996 to 7.2 in 1998 whilst poverty in the urban area had lightly decreased from 1.6 percent in 1996 to 1.5 percent in 1998 (See Appendix L).

The poverty level in Thailand has reduced significantly as shown by the poverty headcount index which fell from 51.9 percent in 1990 to 26.2 percent in 2002 (See Appendix M). Krongkaew (2002) claimed that the reduction of poverty did not come about as a result of any specific poverty alleviation plan.

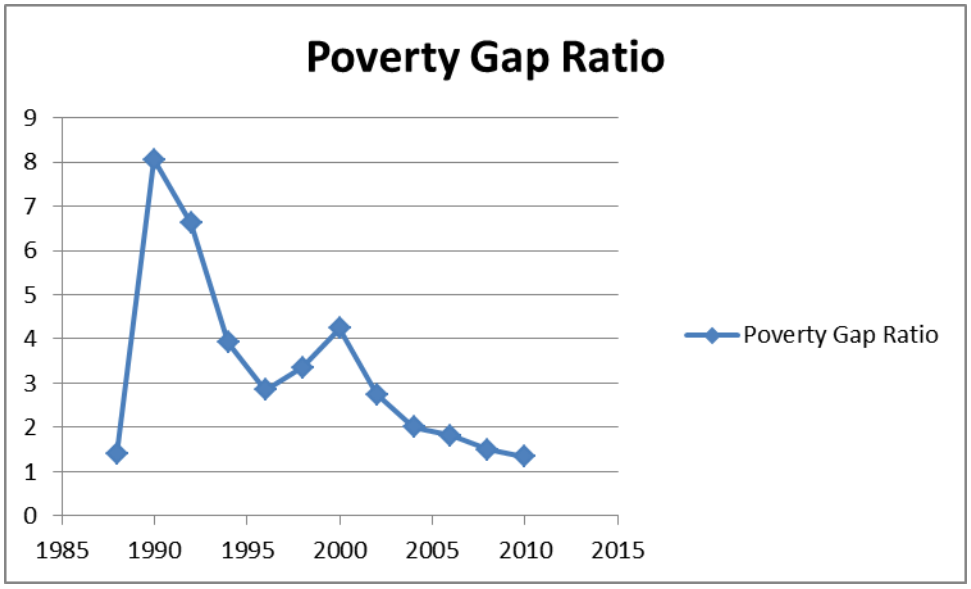

Figure 2.4
Thailand poverty gap ratio between year 1988 – 2010

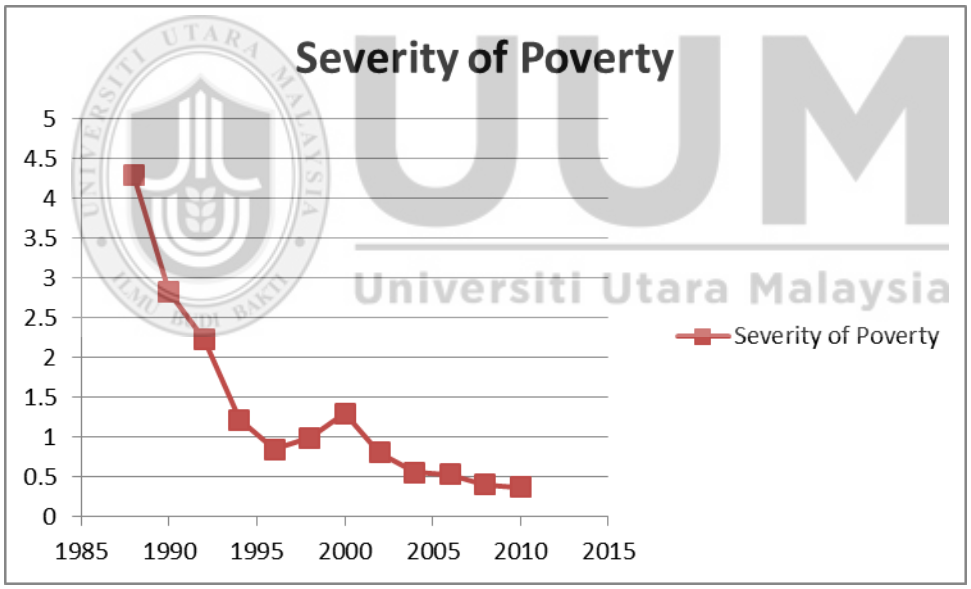

Figure 2.5
Severity of poverty in Thailand between year 1988 – 2010

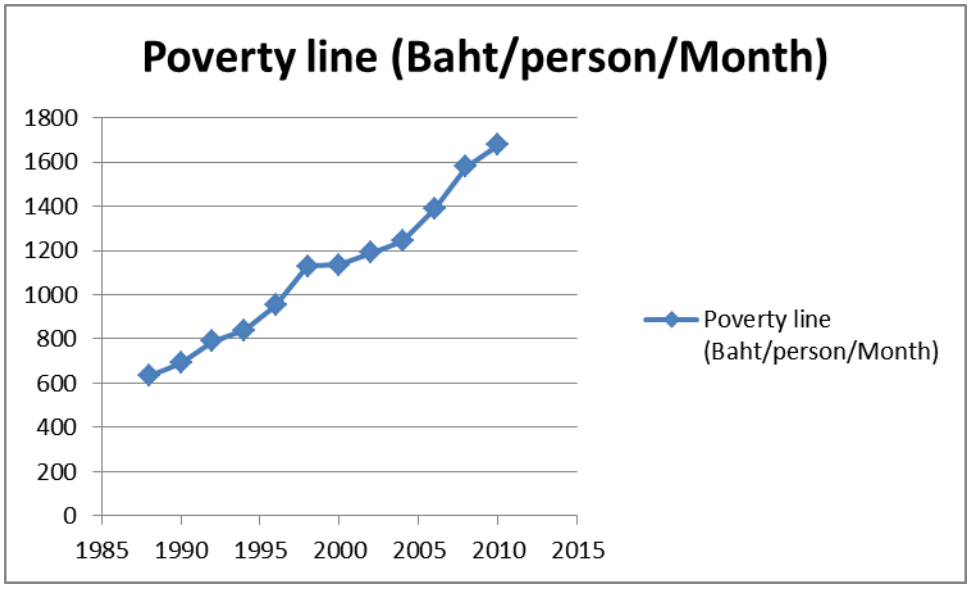

Figure 2.6
Poverty line of Thailand between year 1988 – 2010

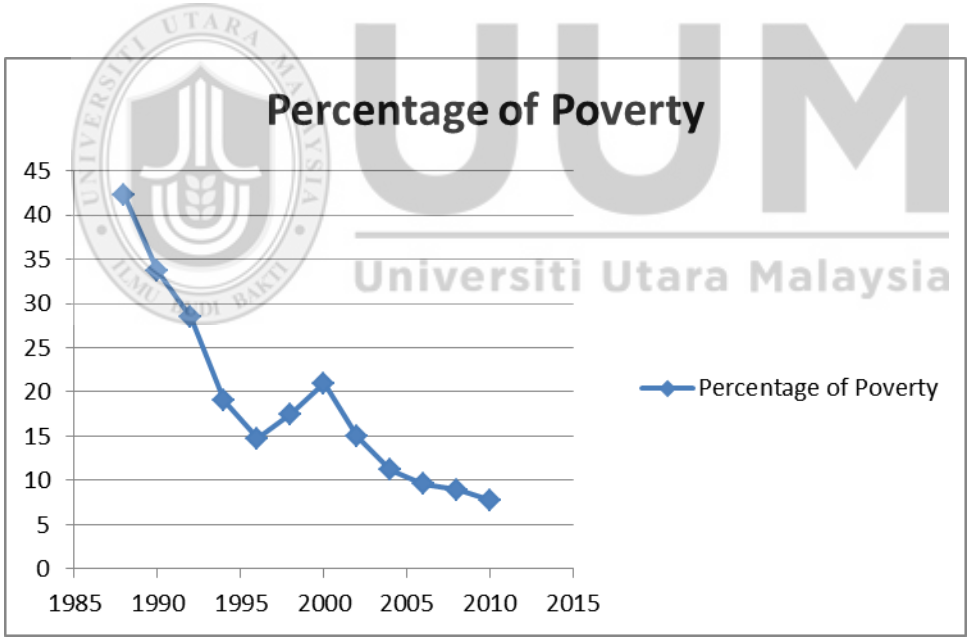

Figure 2.7
Percentage of poverty in Thailand between year 1988 – 2010

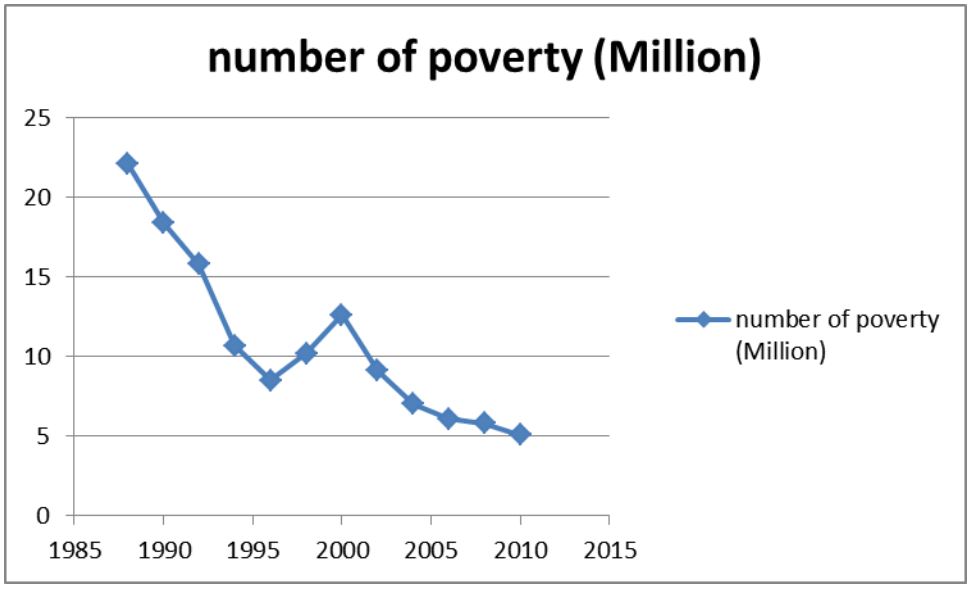

Figure 2.8
Number of poverty in Thailand between year 1988 – 2010

Figure 2.4 – 2.8 emphasize the poverty gap ratio, the poverty line, percentage of poverty per total population and the number of poverty. As a normal measure of poverty incidence which can be acknowledged, poverty has been significantly reduced as can be seen in the figures where the severity of poverty has decreased to 0.37 in year 2010 from 4.3 in 1988, in accordance to the decrease in the number of poverty which was 22.1 million in year 1988 and remaining to only 5.1 million people in the year of 2010, as in the percentage per population is 8.48 percent (See Appendix M). Finally, to consider an individual to be poor the Poverty line index would be used to take into account his or her income or expenditure compared to minimum income or expenditure that are considered necessary to fulfill basic needs. Hence, the starting point of any poverty analysis is starting at poverty itself.

2.3.11 Income distribution in Thailand

The most popular measure of inequality, the Gini coefficient index, places greater weight around the mean. A higher a Gini coefficient index, the more unequal the distribution within a country. It ranges from zero (when everyone has the same income) to 100% (when the richest person has all the income). This index potentially takes values between 0 and 1, with the higher values indicating greater inequality.

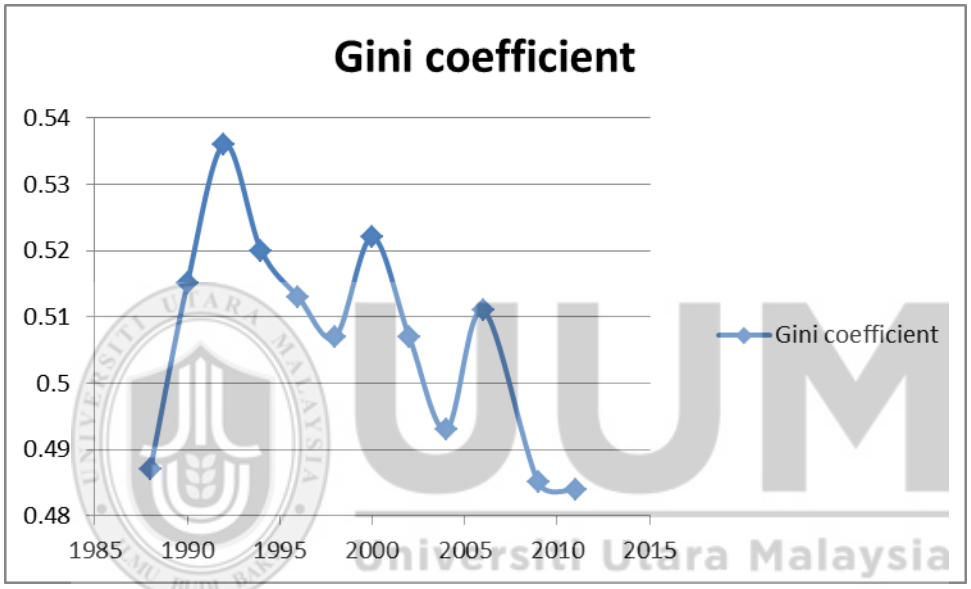

Figure 2.9
Gini-coefficient in Thailand between year 1988 – 2011

Figure 2.9 shows that Thailand's Gini coefficient remained high from 1988 to 2009. It shows that within the 20 years period there is no improvement in the income distribution in Thailand because from year 1988 to 2009 the Gini coefficient remain almost the same number that are 0.487 in 1988 and 0.485 in 2009.

Warr (2007) had observed that while the Thai government has been successful in generating economic growth and reducing the incidence of poverty, higher income inequality is also observed during the fast growth period. During 1990 to 2002, income inequality, as measured by the Gini coefficient, remained high around 0.53 -

0.57. Even after the Thailand economic crisis in the year 2000-2009 the rate of Gini-coefficient index is still at the average of around 0.5 which is high with the same number that was recorded twenty years back (See Appendix N).

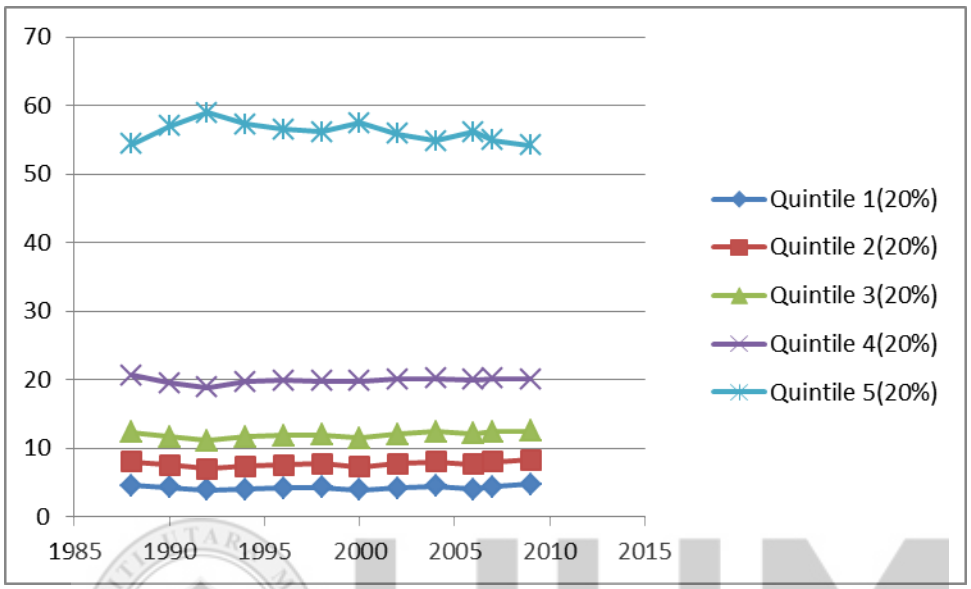

Figure 2.10
Percentage of income of Thai population between year 1988 – 2010

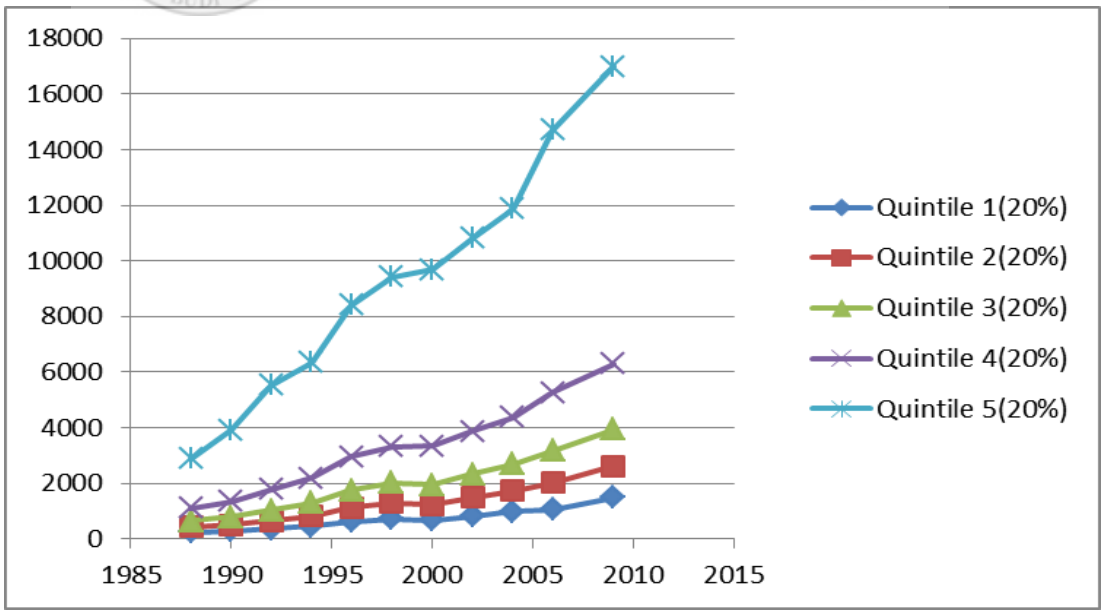

Figure 2.11
Average income of Thai population between year 1988 – 2009

Figure 2.10 and Figure 2.11 show the mean household per capita income of different income groups and the share of total income of households in each income quintile. Overall, income inequality has remained consistently high in Thailand. Household income in the bottom quintile remained very low. Household in that quintile earned about 20 times less than the richest 20 percent of the households averaging over the period. Households in the bottom, second, and third quintile, on average, were adversely affected by the economic crisis while we see a positive movement of average income of the rich households after the economic crisis. Households in the bottom quintile shared only about 3 percent of the country's income while 58 percent of the country's income went to households in the top quintile. However, there was a little improvement towards a more equal income distribution as the share of the top quintile income dropped a little throughout the period and it was replaced mostly by a slightly bigger share of income from the bottom and the second quintiles. The households in the bottom quintile earned about 20 times less than the households in the richest quintile during that period. (See Appendix O and Appendix P).

2.4 Past Studies

2.4.1 Literature on Entrepreneurship in Thailand

There are limited number of literatures concerning pertaining to entrepreneurship in Thailand, especially in the field of economics. Some of them are Paulson and Townsend (2004) who study about entrepreneurship and financial constraints by using data from rural and semi-urban population in Thailand, Their findings indicate that financial constraints play an important role in shaping the pattern of entrepreneurship in Thailand and wealthier households are more likely to start a business and invest more in their business and face fewer constraints.

A seminar on Entrepreneurship and Socio-economic Transformation in Thailand and Southeast Asia in 1993 was held by the Chulalongkorn University Social Research Institute and French Institute of Scientific Research for Development in Cooperation. They divided their papers into five main sections by starting with the introduction of economic and cultural context for entrepreneurship in Southeast Asia, the second part was about rural enterprises, the third part was concerned with self-employment, the fourth was about entrepreneurs in modern industries and the last was about cultural context for entrepreneurs. In each part of the seminar papers, a study about Thailand was included, such as, in the first part of his paper, Knippenberg (1993) gave an introduction about conditions required for a successful transition to an industrialized country, using Thailand as the case study. The second section drew pictures about Thailand rural enterprises in the study of Phelinas (1993) comprising empirical evidence on rice entrepreneurs and land constraints and in the comparative study of Kermel-Torres and Schar (1993) between Southern India and North-Eastern Thailand, entrepreneurship and dynamics of rural systems were discussed. Third, Oudin (1993) studied the education and career patterns among small scale entrepreneurs in Thailand, while Charoenloat (1993) paid particular attention to the economy of the poor by focusing on informal sector in Thailand. Similarly, Igel (1993) looked at the economy of survival in the slums of Bangkok whilst a comparative study between Thailand, Ecuador and Tunisia about micro and small enterprises and institutional framework had been taken up by Bunjongjit (1993). In the field of modern industries there was no study about Thailand and for in the last section most studies were based on the history of Chinese enterprises in Thailand (Pongsapich, 1993; Baffie, 1993 and Chantavanich, 1993).

2.4.2 Literature on economic growth in Thailand

There is an abundance of literatures on economic growth in Thailand about relationship of various kinds of variables that have affected the economic growth of Thailand. Some of them are about economic growth and productivity, Bosworth (2005) had studied the economic growth in Thailand in the macroeconomic context, by reviewing many literatures about various sources of growth in the Thai economy. The National Economic and Social Development Board (NESDB) discovers that the labor share takes very low estimation, about 31 percent, when compared to the fast growing capital output, about 68 percent, and in terms of TFP, capital accumulation accounts for more than 80 percent. Meanwhile, the contribution of labor is just about 10 percent, and improvements in TFP account is for less than 10 percent since 1980. And in the period of 1980 to 2002, the contribution of capital accounts for 72 percent of the output growth in industry and 90 percent in services. This is recorded in the Thailand Development Research Institute (TDRI) study in the period 1977-1990 and published in 1996. The study establishes that the GDP growth is averaged at 7.6 percent annually, and 38 percent is attributed to the increase in capital and land, 46 percent is attributed to labor input (originates from the quality improvement of 20 percent) and 16 percent comes from improvement in TFP. Asian productivity organization (APO) conducted a similar study with TDRI and the result seems more plausible. Furthermore, Fiscal Policy Research Institute (FPRI) and Bank of Thailand (BOT) also examine economic growth of Thailand by focusing on the productivity of the economy. Meanwhile, Brimble (1987) studies the industrial development and productivity change in Thailand during the period of 1975-1983, then concludes that the main sources of growth comes from the factors of production (60.2 percent), the labor factor (0.7 percent), capital factor (10.7 percent), from an intermediate factor

(48.7 percent), and from TFP growth (39.9 percent). Chandrachai, Bangorn and Chockpisansin (2004) also study the economic growth of Thailand from 1977-1999 in terms of TFP and conclude that the main contribution to economic growth for the last ten years during the period of the study is from capital. Finally, Chuenchoksan and Nakornthab (2008) exhibit in their study that the contributive factors to the economic growth of Thailand has changed from mostly capital factor in the initial years to a reduced capital factor contribution in later years (2000-2007).

In other strands of literature on economic growth of Thailand, Thungsuwan and Thompson (2003) conduct empirical study on exports and economic growth in Thailand by examining the causal relationship between these two variables over period from 1969 to 2000 and find that exports have been an engine of growth of Thai economy during that period and their findings are supported by the result of Jansen (1995). Jansen argues that export-oriented DFI has a positive effect on private investment and growth. Jiranyakul (2007) studies the relationship between government expenditures and economic growth in Thailand by testing the Granger causality and concluded that the aggregate government expenditure causes economic growth of Thailand. Pholphirul (2005) concludes his study about the long run evidence of competitiveness, income distribution and growth in Thailand that Thai economy might be considered as a wage led growth economy. Furuoka (2009) studies the population growth and economic development in Thailand, resulting in a deduction about the positive impact of population growth on economic growth. There are also many literatures that study economic growth and poverty in Thailand, for example, Kakwani (1997), Kakwani and Krongkaew (1998), Krongkaew and Kakwani (2003), Tinakorn (2002), Warr (1998), and Krongkaew, Chamnivikorn and Nitithanprapas (2006).

2.4.3 Literature on Poverty and Inequality in Thailand

Studies about income distribution in Thailand mostly focus on the role of agricultural sector such as in the study of Deaton (1989), Ikemoto (1991) and Krongkaew, Tinakorn and Suphachalasai (1996). In 1974, the share of agricultural sector was at 27 percent of the total gross domestic product of Thailand then decreases to 12 percent in the year 1998. While labor force in the agricultural sector (per total labor force) is at 51 percent in 1998, the value of the output from agriculture is directly affected by farm price and harvesting which brought the level of income in the agricultural sector to be lower than other sector. In the study of Kuznet (1955), the agricultural sector is shown to have an effect on Thailand's income distribution.

Deolalikar (2002) focuses his study on the effects of poverty on income distribution and other determinants by using data at the provincial level. The study shows negative relationship between income inequality and poverty. In the study of Deaton (1989), the relationship between prices of rice and rural household income is positive though other determinants of income inequality are not taken into account. In a detailed and complex study about income inequality of Thailand between 1960s and 1980s further focuses on the accurate explanation about the changes in income inequality rather than the component of the change (Ikimoto, 1991).

Warr (2007) studied the long-term economic performance of Thailand in many aspects such as the reflection of Thailand's long-term economic growth on life expectancy, infant and maternal mortality, and literacy, environmental problem, the performance of education system. The most important areas that are needs to reform is suggested in the study. The poverty incidence and economic inequality are also

discussed and it is found that the poverty incidence has declined intensely, however economic inequality has increased.

CHAPTER THREE
RESEARCH METHODOLOGY

3.1 Introduction

This chapter provides a discussion of three empirical models that are used to investigate the relationship between entrepreneurship and economic growth and development. First, the empirical model which is used to estimate the relationship between entrepreneurship and economic growth is discussed. Second, the empirical model which is used to estimate the relationship between entrepreneurship and income distribution is presented. Third, the empirical model which is used to estimate the relationship between entrepreneurship and income inequality is offered. Finally, the method of finding a causal relationship between entrepreneurship and economic growth is discussed. A description of data used in the analyses and the sources of the various datasets are given in the chapter.

3.2 Entrepreneurship and Growth: Model Specification

The first objective of the study is to evaluate the relationship between entrepreneurship and economic growth in Thailand. In this study, we follow a standard growth regression model developed by Mankiw et al. (1992). In their work, they investigate the effects of physical and human capital investment on economic growth. Later studies on economic growth such as Park and Brat (1996), Henry et al. (2004), and Konopczynski (2014) employ this standard model in their studies. For the purpose of this study, the model is augmented to include the entrepreneurship variable as follows:

$$\ln y_{it} = \beta_1 + \beta_2 \ln s_{kit} + \beta_3 \ln s_{hit} + \beta_4 \ln \lambda_{it} + \beta_5 \ln E_{it} + \varepsilon_{it}, \quad (1)$$

where,

y is the real GPP per capita,

s_k is the saving per real income,

s_h is the gross enrollment rate,

λ is the sum of the population growth rate (n), the rate of technological progress (g), and the depreciation rate of capital (d) (i.e. $\lambda \equiv n + g + d$),

E is entrepreneurship measured by the number of new firm establishments,

ε is the error term,

β's are the parameters,

it refers to a specific i province during a given year t.

3.2.1 Data

This study uses secondary sources of information from databases that are derived from many sources of official reports and databases. The data were derived from four main sources: The National Statistical Office (NSO), Office of Small and Medium Enterprise Promotion (OSMEP), Department of Business Development (DBD), Bank of Thailand, Office of the National Economic and Social Development Board and Human Development Report from the United Nation Human Development Program (UNDP). Data for all variables are at the provincial level of Thailand, which are available annually from the years 1996 to 2008 for 76 provinces of Thailand but there

are some data constraints on human capital which are available only for the years 2000 and 2005.

To mitigate the effects of business cycle fluctuations and serially correlation of yearly data, the five-year time intervals are opted as in Islam (1995). Thus, now two data (time) points exist for each province: 2000 and 2005.

Table 3.1:
Description of Data

Variable	Measure	Description	Data Source
Y	Per capita of Real Gross provincial product at 1988(Unit: Million baht)	Gross Provincial Product (in millions of Thai Baht) per Population of each province	The National Statistic Office
E	New Firm establishment	Number of firm Established in each province	Department of Business Development
S_k	Saving per Real GPP	Saving of commercial bank in each province per gross provincial product at 1988	Bank of Thailand
S_h	Gross Enrollment Rate	Gross Enrollment Rate at secondary level of each province	Thailand Human Development Report
λ		λ = n +g + d; g + d = 0.05	
N	Growth rate of population	Population growth rate in each province	The National Statistic Office

3.3 Entrepreneurship and Income Inequality: Model Specification

The second objective of this study is to evaluate the relationship between entrepreneurship and income distribution in Thailand. In this study, we follow closely an inequality regression model developed by Beck et al. (2005). In their work, they investigate the effect of SME on inequality, where inequality is measured by two proxies: the Gini-coefficient and the income level of the poor (as measured by the lowest income quintile). In this study, the SME variable is replaced by the entrepreneurship variable. Using the Gini coefficient as a measure of inequality, the model is specified as follows:

$$(G_{it} - G_{i,t-k}) / \mathrm{K} = \alpha \mathrm{G}_{ik} + \beta(y_{it} - y_{i,t-k}) / K + \gamma E_{it} + \varepsilon_{it}, \quad (2)$$

where,

G = log of Gini-coefficient

$y_{i,t}$ = the log of GDP per capita at time t

E = number of new firm establishment

K = number of years intervals

k = the initial year

Using the lowest income quintile as a measure of inequality, the model is specified as follows:

$$(q_{it} - q_{i,t-k}) / K = \alpha q_{ik} + \beta(y_{it} - y_{i,t-k}) / K + \gamma E_{it} + \varepsilon_{it} \quad (3)$$

where,

q = the log of the lowest income quintile

k = the lowest income quintile of the initial year

In equations (2) and (3), β indicates whether the growth of GPP per capita affects inequality, and the coefficient γ points out the relationship between entrepreneurship and inequality. Growth in Gini coefficient is the annual growth in the Gini coefficient over the period 1998 – 2007. Growth in income of the poor is the annual growth rate in income of the lowest income quintile over the period 1998-2007.

3.3.1 Data

In this study, the data used are about income distribution and poverty from the National Economic and Social Development Board database, which can be found on the website www.nesdb.go.th. They are used to test the relationship between entrepreneurship and income distribution and poverty. The data of entrepreneurship, new firm establishment from 76 provinces of Thailand, are collected from Office of Business Registration, Department of Business Development of Thailand, which are available from year 1995 to 2008. For measuring of dependent variables, we use the income of the poor, growth in Gini-coefficient and headcount growth of 76 provinces of Thailand to evaluate the impact of new firm establishment on income distribution and poverty. The gross provincial product (GPP) data collected from website of National Economic and Social Development Board.

To test the relationship between entrepreneurship and income distribution and poverty, this study uses the data about income distribution and poverty from the National Statistical Office database, which can be found on the website www.nso.go.th. The data of entrepreneurship, new firm establishment is used, which is calculated by using the average number of new firm establishment from 76 provinces of Thailand, which is available from year 1995 to 2008.

For measuring of dependent variables, growth of income of the poor, growth in Gini-coefficient and headcount growth of 76 provinces of Thailand have been used to evaluate the impact of new firm establishment on income distribution and poverty.

Income growth of the poor is calculated by using the average growth rate of the gross provincial product per capita of the lowest income quintile in order to assess whether there is any impact of new firm establishment on the lowest income quintile beyond its impact on the growth rate and level of overall gross provincial product per capita

Growth in Gini is calculated by taking the average from the growth rate of the annualized log difference of the Gini coefficient which is defined as the ratio of area between Lorenz curve and the diagonal to the area below the diagonal. If the values were high it indicates that the income inequality is also high. The negative sign of the growth rate of Gini coefficient means that the movement towards income inequality, so the greater the negative growth rate of Gini coefficient means a faster movement towards income inequality and vice versa.

To prevent from the effect of business cycle fluctuations and serial correlation of the yearly data, we opt for five-year time intervals as proposed by Islam (1995). Thus, we end up with two data points for each province, 2000 and 2005. The data will be described in the following table.

Table 3.2
Description of Data

Variable	Measure	Description	Data Source
$y_{i,l,t}$	Lowest income quintile at time t	Lowest income quintile at time t	The National Economic and Social Development Board
$y_{i,t}$	GDP per capita at time t	GDP per capita at time t	The National Statistic Office
E	Firm establishment	Number of firm Establishment	Department of Business Development
G	the log of Gini coefficient	the log of Gini coefficient	Bank of Thailand
P	the log of headcount ratio	the log of headcount ratio	Thailand Human Development Report
n	Growth rate of population	Population growth rate in each province	The National Statistic Office

3.4 Entrepreneurship and Poverty: Model Specification

The third objective is to evaluate the relationship between entrepreneurship and poverty in Thailand. In this study, we follow closely a poverty regression model developed by Beck et al. (2005). In their work, they investigate the effect of SME on poverty, where poverty is measured by the headcount ratio. As before, the SME

variable is replaced by the entrepreneurship variable. The model is specified as follows:

$$(P_{it} - P_{i,t-1}) / K = \alpha P_{ik} + \beta (y_{it} - y_{i,t-k}) / K + \gamma E_{it} + \varepsilon_{it}, \qquad (4)$$

where,

P = the log of headcount ratio

K = the Headcount ratio of the initial year

In equation (4), β indicates whether the growth of GPP per capita affects poverty, and the coefficient γ points out the relationship between entrepreneurship and poverty. Headcount growth is the annual growth rate of Headcount over the period 2000-2007. Headcount growth is calculated by taking the average of the growth rate of the log difference of the headcount ratio.

3.5 Estimation Method

Two types of information are represented in the panel data: first, the cross-sectional information that revealed the differences between variable, and the time-series information, revealed in the changes within variables over time. Researchers can take advantage of these different types of information from panel data regression techniques.

It is not sufficient to use ordinary multiple regression technique on panel data due to the bias from omitted variable that may have some effects on the dependent variable.

By using panel data, some omitted variables could be controlled without observing them but only observing changes in the dependent variable over time. The omitted

variables differ between cases but are constant over time and that vary over time but are constant between cases could be controlled by using panel data. A panel dataset should have data on N cases, over T time periods, for a total of N × T observations.

The panel data structure offers researchers the flexibility in modeling differences in behavior across individuals. The basic framework for panel data is as follows:

$$y_{it} = \alpha_i + \beta_1 x_{1it} + \beta_2 x_{2it} + ... + \beta_k x_{kit} + \varepsilon_{it} \qquad (5)$$

where,

y = dependent variable;

x's = independent or explanatory variables;

β's = coefficients of x's;

α_i = individual-specific effects (i = 1, 2, …, N);

ε_{it} = error term;

i = index of cross sectional units (i = 1, 2, …, N);

k = index of explanatory variables (k = 1, 2, …, K);

t = index of time periods (t = 1, 2, …, T).

It is assumed that the error terms (ε_{it}'s) satisfy the standard assumptions of the classical linear regression model (CLRM): a) zero mean (i.e. E (ε_{it} | x_{it}) = 0); b) constant variance (i.e. Var (ε_{it}) = σ^2 for all i's); and c) no autocorrelation (i.e. Cov (ε_{it}, ε_{is}) = 0 for t ≠ s).

The term α_i is called the individual-specific effects (also known as unobserved effects or individual heterogeneity) which vary across individuals or the cross-section

units but are constant over time. In the case of this study, individuals or cross-section units are essentially provinces. Thus, the term α_i can be called the province-specific effects which vary across provinces but are constant over time.

In panel data setting, attention is paid to α_i since its treatment has great implications on the empirical modeling. Basically, there are two ways to treat α_i: ignore its presence or acknowledge its presence. Ignoring the presence of α_i gives rise to a model called the Pooled OLS model while acknowledging the presence of α_i gives rise to two models: the Random Effects model and the Fixed Effects model.

The Pooled OLS Model

In panel data setting, ignoring the presence of individual-specific effects (α_i) is the simplest way to perform estimation. Doing so means that α_i is treated as a constant (i.e. $\alpha_1 = \alpha_2 = \ldots = \alpha_N = \alpha$) so that the model in equation (5) reduces to

$$y_{it} = \alpha + \beta_1 x_{1it} + \beta_2 x_{2it} + \ldots + \beta_K x_{Kit} + \varepsilon_{it} \qquad (6)$$

what is known as the Pooled OLS model. Given the standard CLRM assumptions concerning ε_{it}'s (i.e. zero mean, constant variance and no autocorrelation), the appropriateness of treating α_i as a constant term (i.e. individual-specific effects do *not* matter) means that the Pooled OLS model is the appropriate model to be used (i.e. its estimator has desirable properties).

If α_i cannot be appropriately treated as a constant term (i.e. individual-specific effects do matter), then the Pooled OLS model is not the appropriate model to be used even though ε_{it}'s satisfy the standard CLRM assumptions. In this case, the Random Effects model or the Fixed Effects model could be the suitable model. Between the two, a key

distinguishing feature is whether or not α_i is correlated with other regressors (x's) in the model.

The Random Effects Model

In both the Random Effects and Fixed Effects model, it is assumed that α_i is present. In the Random Effects model, however, it is assumed that α_i is not correlated with other regressors (x's) in the model; (i.e. Cov (x_{kit}, α_i) = 0 for k = 1, 2, …, K).

If this is indeed the case, then α_i can be incorporated into the original error term, ε_{it}, to produce a composite error term. This can be done by breaking α_i into two parts, $\alpha_i \equiv \alpha + u_i$, where α is a constant and u_i is the province-specific effect. Thus, the model in equation (5) can be rewritten as

$$y_{it} = \alpha + \beta_1 x_{1it} + \beta_2 x_{2it} + ... + \beta_K x_{Kit} + \underbrace{u_i + \varepsilon_{it}}_{v_{it}} \qquad (7)$$

which is known as the Random Effects model (note: v_{it} is the composite error term).

It turns out that even if α_i's satisfies the standard CLRM assumptions (the same assumptions have been made about ε_{it}'s), the composite error terms, v_{it}'s, would exhibit the autocorrelation problem. As such, equation (7) cannot be appropriately estimated by the standard OLS method. Instead, equation (7) can be appropriately estimated by the generalized least squares (GLS) method (its estimator has desirable properties) which amounts to estimating the transformed model of equation (7) by the OLS method.

The Fixed Effects Model

Unlike the Random Effects model, the Fixed Effects model assumes that α_i is correlated with other regressors (x's) in the model; (i.e. Cov (x_{kit}, α_i) ≠ 0 for k = 1, 2, …, K). If this is the case, then employing equation (7) is inappropriate because it suffers from the endogeneity problem which is due to the presence of correlation between v_{it} and x's (i.e. Cov (x_{kit}, α_i) ≠ 0 ⇒ Cov (x_{kit}, u_i) ≠ 0 ⇒ Cov (x_{kit}, v_{it}) ≠ 0). As such, the Random Effects model is not the appropriate model to be used in this case.

If incorporating α_i into ε_{it} is problematic (when the former is correlated with x's), then one way to deal with this problem is by keeping α_i outside the error term. Since α_i is a latent variable, however, a dummy variable for each cross-sectional unit needs to be introduced as a proxy. So the model in equation (5) becomes

$$y_{it} = \sum_{i=1}^{N} \alpha_i D_i + \beta_1 x_{1it} + \beta_2 x_{2it} + \ldots + \beta_K x_{Kit} + \varepsilon_{it} \qquad (8)$$

where D_i is a dummy variable for each province. Equation (8) is known as the least squares dummy variable (LSDV) model.

Another way to deal with this problem is by eliminating α_i altogether from the model. This can be done by taking the time average of each term in equation (5), which yields:

$$\bar{y}_i = \alpha_i + \beta_2 \bar{x}_{2i} + \beta_3 \bar{x}_{3i} + \ldots + \beta_k \bar{x}_{ki} + \bar{\varepsilon}_i \qquad (9)$$

Then, subtracting equation (8) from equation (5) yields

$$(y_{it} - \bar{y}_i) = \beta_2 (x_{2it} - \bar{x}_{2i}) + \beta_3 (x_{3it} - \bar{x}_{3i}) + \ldots + \beta_k (x_{kit} - \bar{x}_{ki}) + (\varepsilon_{it} - \bar{\varepsilon}_i) \qquad (10)$$

Equation (10) is known as the Within model. Collectively, both equations (8) and (10) are called the Fixed Effects model. Although the equations look different from one another, both of them actually yield numerically identical estimates.

If α_i is correlated with x's, the Fixed Effects model is the appropriate model to be used (the model has desirable estimator if it is estimated by the standard OLS method).

Choosing between OLS, Fixed Effects, and Random Effects Estimators (Specification Tests)

The pooled model must own few assumptions. First, there is no correlation between the regressors and the error terms (the regressors are exogenous). Second, the variance of the error term is constant (there is no heteroskadasticity). Third, there is no correlation between any two of the error terms (there is no autocorrelation). Fourth, there is no individual heterogeneity (also known in this paper as the individual effect or province specific effects) but in making these assumptions the panel structure of the data is being ignored.

As stated earlier, the data were from 76 different provinces, so it is unreasonable to believe that there is no unobservable heterogeneity in data due to the individual characteristics of each province. Therefore, the pooled OLS method is not suitable to estimate this model. According to the theories described above, it is known that the error term of a panel data model has two parts, one that is uncorrelated with the other independent variables, and one, which is mostly interested in, that is called the individual-specific effect. The individual-specific effect characterizes the cross-sectional properties of the panel-data as it captures the variations that exist in the data

that are related to the fact that it has information about seventy-six different provinces, and not only one, and that does not vary over time. The size of the provinces or cultural elements, for example, can be considered an individual-specific effect. There are two conventional methods researchers may use to estimate the model once the need to control for the province-specific effects is identified the random effects and the fixed effects models. The random effects estimator should be used if one assumes that there is no correlation between the province -specific effects and the independent variables, in other words, this method should be used only if it is assumed that entrepreneurship and economic growth are not influenced by any characteristics of the specific province that was not explicitly defined in the model. As this is a very strong assumption, most empirical researches prefer to use the fixed effects method.

In order to choose between the pooled OLS model which is assumed that the individual affect is absent with the Fixed effect model which assumed that the individual effect is present, the restricted F-test can be applied. In case of selecting between the pooled OLS model and the Random Effect model, a statistical test called the Breusch-Pagan Lagrange Multiplier test (BP LM test) can be applied.

The fixed effects method is always consistent, but might not be the most efficient method if the random effects method is suitable for the data. In order to help researchers choose between these two methods, a common test to run is the Hausman (1978) test. Given a model and data in which fixed effects estimation would be appropriate, the Hausman test tests whether random effects estimation would be almost as good. In a fixed-effects kind of case, the Hausman test is a test of H0: that random effects would be consistent and efficient (note that fixed effects would

certainly be consistent). The result of the test is a vector of dimension k (dim(b)) which will be distributed chi-square(k). Therefore, if the Hausman test statistic is large, the hypothesis that random-effects are consistent and efficient is rejected and therefore one must use fixed-effects. If the statistic is small, this hypothesis is not rejected and it is safe to use the more efficient random-effects estimator.

3.6 Causality between Entrepreneurship and Growth: Model Specification

The fourth objective is to evaluate the causal relationship between firm establishment and economic growth in Thailand. A standard growth accounting model proposed by Solow (1957) is employed and which is augmented to include a measure of entrepreneurship as follows:

$$\left(\frac{\dot{Y}}{Y}\right)_t = \alpha + \delta\left(E\right)_t + \alpha\left(\frac{\dot{K}}{K}\right)_t + \beta\left(\frac{\dot{H}}{H}\right)_t + \gamma\left(\frac{\dot{L}}{L}\right)_t + \varepsilon \qquad (11)$$

where,

$\left(\frac{\dot{Y}}{Y}\right)_t$ is growth rate of per capita GPP of a province from time 0 to time t.

E_t is the number of new firm establishment in a province at time 0 to time t.

$\left(\frac{\dot{K}}{K}\right)_t$ is the rate of change in physical capital of a province at time 0 to time t.

$\left(\frac{\dot{H}}{H}\right)_t$ is the rate of change in human capital of a province at time 0 to time t by using Average year of schooling of the working population in a province.

$\left(\frac{\dot{L}}{L}\right)_t$ is the rate of change in amount of labor of a province at time 0 to time t.

3.6.1 Data

This study uses secondary sources of information from databases that are derived from many sources of official report and database. The data are derived from four main sources: The National Statistical Office (NSO), Office of Small and Medium Enterprise Promotion (OSMEP), Department of Business Development (DBD), and Office of the National Economic and Social Development Board. Here the sources of data will be described through the empirical equation 11:

Table 3.3
Description of Data

Variable	Measure	Description	Data Source
$\left(\frac{\dot{Y}}{Y}\right)_t$	growth rate of GPP	Absolute change in Gross Provincial Product from 1999 to 2008 (in millions of Thai Baht	The National Statistic Office
E_t	New Venture Creation	Number of firm Establishment	Department of Business Development

$\left(\frac{\dot{K}}{K}\right)_t$	rate of change in physical capital	$\dot{K}_t = S - \delta K_{t-1}$	
S	Saving	Amount of saving in a province	The National Statistic Office
K_{t-1}	stock of physical capital at time t-1	stock of physical capital of Thailand at time t-1 and take this ratios to provincial level	The National Statistic Office
$\left(\frac{\dot{H}}{H}\right)_t$	rate of change in human capital	Average year of schooling of the working population in a province	The National Statistic Office
$\left(\frac{\dot{L}}{L}\right)_t$	rate of change in amount of labor	Change in the number of employees in each province from 1999 to 2008	The National Statistic Office
L_t	Skilled Labor	Proportion of population with college degree	The National Statistic Office

Granger Causality test

In order to study the relationship between two variables by considering how the current and previous observation of one variable effect the future observation of another variable, the causality test is employed. One of the prominent causality testing is called Granger causality test which could be applied in the following steps.

a) Stationary testing

b) Choosing of Lag length

c) Testing correlation of the error term and the influence of a third variable

Stationary testing

There are two steps in order to use the Granger Causality to test the relationship between two variables. First, testing for stationarity of both variables, economic growth and entrepreneurship, by using the Augmented Dicky Fuller test (ADF). If both of them are stationary, the Granger Causality could be directly tested but if one of them is stationary and the other is not the Granger Causality test should not be conducted.

But if both of them are non-stationary, co-integration between the two variables needed to be checked. The Granger causality test could be conducted if both variables are cointegrated and if both of them are not cointegrated then the Granger Causality test could not be conducted. However, if only one of them is stationary and other is not, the Granger causality test should not be conducted.

In this study, the data are in the form of panel structure as its disposal as the ADF panel unit root test is used instead of the normal ADF unit root test. Panel Unit Root test are similar but not identical to regular unit root test.

The lag length choosing

The lag length is a specific number of lagged difference terms to be added to test the regressions which have sensitive effect on the regression result. The specific lengths are based on the assumption of lag length structure between two variables by taking

consideration on the immediate effects of these variable on one another at the certain time t or the effect of the current variables on one another at time t+1, t+2, etc.

In order to remove the serial correlation in the residuals the number of lags is taken to include in the regression. The criteria to choose the optimum lag length is based on the Schwartz Information Criterion (SIC) that imposes a large penalty for additional coefficient and the Akaike information criterion (AIC) that impose fewer penalties on the additional coefficient. Therefore, the SIC will always choose a model with a smaller lag length than the one chosen by the AIC alternative.

Cointegration Tests

In order to conduct the Granger Causality test, after testing for stationarity, if the result is shown to be not stationary then the cointegration test is needed. These tests are developed to find a stable long-run relationship among a set of non-stationary data.

The cointegration test has an important advantage to figure out the relationship between variables thought the data are not in equilibrium that can interpret the long run relationship (Engle and Granger, 1987).

There are three different methods for testing the cointegration: the Engle – Granger two steps, Johansen's Maximum Likelihood (ML) and the Stock-Watson procedures.

Granger causality tests

To test the long run causal relationship, one of the simple and powerful tools is Granger Causality test. The following model is estimated:

$$Y_{it} = \sum_{j=1}^{J} \alpha_j X_{it-j} + \sum_{j=1}^{J} \beta_j Y_{it-j} + u_{it} \qquad (12)$$

$$X_{it} = \sum_{j=1}^{J} \lambda_j X_{it-j} + \sum_{j=1}^{J} \delta_j Y_{it-j} + v_{it} \qquad (13)$$

Where,

X is entrepreneurship, Y is economic growth, t is time period, j is a lag and J is the lag length. The hypothesis for testing the Granger Causality can be written as follows:

$$H_o : \{\delta_1, \delta_2\} = 0$$

$$H_1 : \{\delta_1, \delta_2\} \neq 0$$

The null hypothesis is rejected if Fc > critical value of F, which implies that E does Granger cause Y. and the null hypothesis is not rejected if Fc < critical value of F implies that E does not Granger cause Y.

In the opposite direction the hypotheses are:

$$H_o : \{\beta_1, \beta_2\} = 0$$

$$H_1 : \{\beta_1, \beta_2\} \neq 0$$

The null hypothesis is rejected if Fc > critical value of F which implies that Y does Granger cause E. And the null hypothesis is not rejected if Fc < critical value of F implies that Y does not Granger cause E.

Impulse Response Function and Variance Decomposition

Using VAR analysis, this paper examines the variance decomposition and impulse response function analysis. Variance decomposition and impulse response function

provide insights into the dynamics of variables of the system, which shows "how each endogenous variable responds over time to a shock in that variable and in every other endogenous variable" (Shan, 2002). By examining variance decomposition, it is possible to discover the proportion of variance in sequence of time which is caused by its own shocks versus by other variables. If variance of the forecast error of GDP is explained more by variance of firm establishment, it implies that firm establishment contributes to GDP growth. Similarly, if the variance of the forecast error of firm establishment is more explained by variance of GDP, it implies that GDP contributes to firm establishment inflow (Shan, 2002).

The Impulse response function shows how GDP responds to shocks by firm establishment and vice versa. "If the impulse response function shows a stronger and longer response of GDP to a shock in firm establishment, then one could establish firm establishment causes GDP" (Shan, 2002).

This analysis of variance decomposition and the impulse response function provides another insight into the relationship between firm establishment and GDP and can be compared with the results of the Granger Causality test.

CHAPTER FOUR
RESULTS AND DATA ANALYSIS

4.1 Introduction

This chapter presents the results of analyzing the effect of entrepreneurship on growth, income distribution and poverty, and the causal relationship between entrepreneurship and growth. To achieve the objectives of the study, the pooled OLS, fixed-effects, and random-effects are presented for the first three objectives. The regression tries to quantify whether entrepreneurship affects economic growth, income distribution and poverty. The result of Granger Causality test is presented for the last objective.

4.2 Preliminary Analysis

The summary statistics and correlation analysis are presented in table 4.1 and 4.2 below. Correlations between all variables considered in this study are shown in Table 4.2. As expected, the log of new firm establishment, log of school enrolment rate and log of population growth are significantly positively correlated with the log of gross provincial product of Thailand. However, the log of real investment is positively insignificant correlated with the log of gross provincial product. The log of new firm establishment is significantly positively correlated with the log of real investment, the log of school enrolment rate, and the log of population growth. While the log of real investment is negatively correlated with the log of gross enrollment rate but positively related with the log of population growth. Lastly, the log of gross enrollment rate is negatively correlated with the log of population growth. These correlations imply that provinces with an establishment tend to higher income.

Table 4.1:
Descriptive statistics

Variables	Max	Min	Mean	S.D.
lnY	-0.9415	-4.6619	-3.39291	0.82639
lnE	9.995155	3.178054	5.124793	1.274254
lnSk	-0.65273	-5.05518	-1.93566	0.581822
lnSh	4.695925	3.613617	4.442099	0.165927
lnλp	3.219474	-3.14682	1.792772	0.723908

Table 4.2
Correlations

	Variables	lnY	lnE	lnSK	lnSh	lnλp
lnY	Pearson Correlation	1	.638(**)	.141	.321(**)	.205(*)
	Sig. (2-tailed)		.000	.103	.000	.016
lnE	Pearson Correlation		1	.203(*)	.218(*)	.239(**)
	Sig. (2-tailed)			.018	.011	.005
lnSk	Pearson Correlation			1	-.069	.022
	Sig. (2-tailed)				.427	.798
lnSh	Pearson Correlation				1	-.157
	Sig. (2-tailed)					.067
lnλp	Pearson Correlation					1
	Sig. (2-tailed)					

** Correlation is significant at the 0.01 level (2-tailed).
* Correlation is significant at the 0.05 level (2-tailed).

Table 4.3

Variance Inflation Factors

Minimum possible value = 1.0, Values > 10.0 may indicate a colinearity problem

lnE	1.205
lnSk	1.061
lnSh	1.122
lnλp	1.118

VIF(j) = 1/(1 - R(j)^2), where R(j) is the multiple correlation coefficient between variable j and the other independent variables

Properties of matrix X'X:

1-norm = 10198.251

Determinant = 2.8858952e+008

Reciprocal condition number = 1.3663433e-005

4.3 Entrepreneurship and Growth

In this section, the relationship between entrepreneurship and economic growth is analyzed by using a standard growth regression model proposed by Mankiw et al. (1992). The data used in this study consists of data of the establishments of new firms for 76 provinces of Thailand as a proxy of entrepreneurship which are available annually from 1995 to 2008, the saving of commercial bank per GPP is used as a proxy of physical capital investment; the data are available annually from 1996 to 2008. The gross enrollment rate is used as a proxy of human capital; the data are available for only years (2000 and 2005), and the data for population growth are available annually from 1995 to 2008.

To estimate the model, beginning with the pooled OLS estimator, the regression tries to quantify how much the explanatory variables impact the gross provincial product of the 76 provinces of Thailand. This study investigates whether an increase in entrepreneurship in Thailand, which is measured by the number of new firm establishment, has a significant effect on the gross provincial product.

The regression results from the OLS method are presented in Table 4.4 by regressing the log of gross provincial product (GPP) on the log of saving per real GPP, the log of gross enrollment rate, the log of population growth and the log of number of new firms establishment. The variable physical capital as measured by log of saving per real GPP enters with the expected sign but is insignificant. The estimated coefficient of human capital enters with the expected sign and significant at the 1% level while the population growth enters with the unexpected sign but is not significant even at the 1% level. The estimated coefficient of entrepreneurship as measured by number of new firm establishment enters with the expected positive sign and significant at the 1% level; the result suggests that when the number of new firm establishment increase by 1%, the GPP of Thailand will increase by 0.35%.

Table 4.4
Regression results on entrepreneurship and growth with cross-sectional data

Variables	**OLS Methods**	
	Coefficient	t-ratio
Constant	-13.95***	-4.47
Physical Capital (Saving per real GPP)	0.058	0.33
Human Capital (Gross Enrollment Rate)	1.94***	2.74

Population Growth	0.12	0.79
Entrepreneurship (new firms establishment)	0.36***	5.17
Observations	76	
Adjusted R-squared	0.45	

Note: ***, ** and * denote the significance level at, respectively, 1%, 5% and 10%.

Since the OLS estimation of cross sectional data does not take the provincial heterogeneity into account, the estimated results might be unreliable. To account for the provincial heterogeneity, the data have been transformed to the panel structure and the panel estimation methods (namely, Pooled OLS, Random Effect (RE) and Fixed Effect (FE) are employed, the results of which are reported in Table 4.5.

Table 4.5 shows the results of regressing the log of GPP on the log of saving per real GPP, the log of gross enrolment rate, the log of population growth and the log of the number of new firm establishment. The focus variable here is the number of new firm establishment. The pooled OLS estimation result in Column 1 shows that the estimated coefficient of the log of physical capital enters with a positively expected sign but is insignificant, the estimated coefficient of the log of gross enrollment rate enters with a positively expected sign and is significant at the 1% level, the estimated coefficient of the log of growth in population enters with the unexpected sign but is insignificant, and the coefficient of the log of the number of new firm establishment enters with a positively expected sign and is significant at the 1% level. Although the results appear to suggest that entrepreneurship has a positive effect on the level of income per capita, they are plagued by the unfavorable results with respect to the coefficients of the log of saving per real GPP and the log of population growth.

Table 4.5

Regression results on entrepreneurship and growth with four-year interval panel data

Variable	**Methods**		
	(1)	(2)	(3)
	Pooled OLS	Random-Effect	Fixed-Effect
Constant	-10.20	-5.35***	-5.04***
	(-6.84)	(-12.67)	(-12.77)
Physical Capital	0.06	0.03	0.03
(Saving per real GPP)	(0.61)	(1.16)	(1.14)
Human Capital	1.09***	0.21**	0.23**
(Gross Enrollment Rate)	(3.20)	(2.12)	(2.45)
Population Growth	0.12	-0.08***	-0.11***
	(1.55)	(-3.46)	(-4.58)
Entrepreneurship	0.36***	0.25***	0.17***
(new firms establishment)	(7.86)	(6.98)	(4.33)
Observations	136	136	136
Adjusted R-squared	0.45	-	0.99
Specification test	χ^2=54.72***	χ^2= 24.45***	F= 73.85***

Note: Figures in the parentheses are t-values. ***, ** and * denote the significance level at, respectively, 1%, 5% and 10%.

It should be noted that, like the usual OLS estimation of the cross sectional data, the pooled OLS model does not take the provincial heterogeneity into account. If the province-specific effects turn out to be important, then the pooled OLS estimates are biased and inconsistent, and the unfavorable results might be attributed to the failure of the pooled OLS model to capture these province-specific effects. To accommodate this potential problem, Equation (1) has been re-estimated by using the RE model

which acknowledges the presence of province-specific effects, the results are documented in Column 2.

Compared to the pooled OLS results, the RE results are similar when it comes to the signs and significance levels of the estimated coefficients of the log of saving per real GPP, log of gross enrollment rate, and log of number of new firm establishment. However, the RE results are remarkably different when it comes to the log of population growth when its estimated coefficient enters with the expected sign and is significant at the 1% level. Moreover, the magnitude of the coefficient of the log of gross enrollment rate seems to be in line with that in the previous studies. If the RE model is appropriate, then these results can be taken as evidence that entrepreneurship has a positive effect on the level of per capita income.

In order to choose between the Pooled OLS model and the RE model, the Breusch-Pagan Lagrange Multiplier test (BP LM test) is applied. If there is provincial heterogeneity, the RE model is preferred and if there is no provincial heterogeneity, the Pooled OLS is preferred. The Breusch-Pagan Lagrange Multiplier test (BP LM test) statistic of 54.72 shows that the provincial heterogeneity is present so the RE model is preferred.

Although the RE model acknowledges the presence of province-specific effects, it assumes that these unobserved effects are uncorrelated with other explanatory variable in the model. Hence, the RE model treats them as a random variable and subsume it under the error term. If there is a correlation between the two, then the RE estimates are inconsistent. To overcome this problem, Equation 1 has been re-estimated using the FE model which incorporates the province-specific effects, and presents the results in Column 3. Compared to the RE results, the FE results are

similar when it comes to the signs and significance levels of the estimated coefficients of all variables. If the FE model is appropriate, then these results can show that entrepreneurship has a positive effect on the level of per capita income.

Although both RE and FE results appear to convey a similar message, one of them must be chosen depending on whether there is a correlation between the province-specific effects and the explanatory variables. If there is no such correlation, then both FE and RE estimates are similar to each other (this constitutes the null hypothesis). If there is such a correlation, then the magnitude of RE and FE estimate is different from each other (this constitutes the alternative hypothesis). In this case, only the FE estimators are consistent. Given the Hausman test statistic of 24.45, the null hypothesis of similarity in the magnitude of FE and RE estimates is rejected. Since this implies the presence of correlation between the province-specific effects and the explanatory variables, the FE model is preferred. Therefore, the results in column (3) of Table 4.5 will be used for discussion purposes as they represent the valid results.

To confirm the suitable model between the Pooled OLS and Fixed Effect model, the restricted F-test is used to identify the presence of provincial effects. If there is enough evidence that the provincial effects are present the Fixed Effect model is preferred. A given restricted F-test statistic of 73.85 shows that the null hypothesis of the absence of provincial effect is rejected, again the FE model is preferred. Therefore, once again the results in column (3) of Table 4.5 will be used for discussion purposes as they represent the valid results.

Given the results in column (3) of Table 4.5, it can be concluded that entrepreneurship has a positive and significant effect on economic growth. Specifically, an increase in the number of new firm establishments by 1% is expected to increase GPP by 0.17%.

In our data set, the number of new firm establishment grows at the average of 13% per year for all provinces in Thailand. This implies that entrepreneurship alone contributes about 2.2% to GPP growth on an annual basis.

Saving per real GPP The insignificant estimated coefficient of lnSk, 0.03 (t-value = 1.14), shows the insignificant effect of physical capital on growth of Thai economy as in the study of Chuenchoksan and Nakornthab (2008) mentioned that the sources of growth of Thai economy in the past mainly came from investment in physical capital and later the source of growth changed to reduced investment in physical capital.

Gross Enrollment Rate The significant estimated coefficient (0.23, t-value =2.45) means that an increase in gross enrollment rate causes an increase in the growth rate of the economy. This is supported by the literature (Mankiw et al., 1992) that found strong positive correlations between these two variables.

Population Growth The significant estimated coefficient (-0.11, t-value =-4.58) implies that an increase in a number of population decreases economic growth. This finding seems to be consistent with the result found in many economic growth literatures. The idea is that the greater the population, the more thinly physical capital is spread among the workers.

4.4 Entrepreneurship and Income Inequality

To evaluate how much entrepreneurship affects income distribution two different dimensions of income distribution will be examined. First, the impact of new firms establishment on index of Gini-coefficient, is examined and report the result in section 4.41. Second, the effect of new firm establishment on the index of income of the poor by using the lowest income quintile index of Thailand then report the results

in section 4.42. Each model is tested by using OLS, Pooled OLS, Random-Effect and Fixed-effect methods.

4.4.1 Entrepreneurship and Gini coefficient

This section investigates if an increase in entrepreneurship of the provinces in Thailand causes income distribution as index by Gini coefficient to increase, decrease, or even if entrepreneurship has no significant impact on income distribution at all. The Beck et al. model is proposed to quantify the relationship between entrepreneurship and income distribution and presents the results from the method of OLS, pooled OLS, Random-effects, and Fixed-effects

The analyses had been starting from running the regression on the cross sectional data of the new firm establishment in Thailand at provincial level on Gini-coefficient index which is available every other year from 1998 to 2007 from The National Economic and Social Development Board of Thailand. The variable Gini coefficient is measured using the annual growth of Gini coefficient by taking log of it over the period 1998 – 2006 then the data have been arranged to the form of cross-sectional data by taking the eight years average means for all variables, the results are shown in Table 4.6. To take advantage from the number of observations, the data have been transformed to a panel structure by dividing the data into two periods, each of which contains the average mean of four years interval of each variable, that are the period of 1998-2002 and 2002-2006 the results are shown in Table 4.7. Meanwhile, the average mean of two years interval are also taken which brought the data to be a block of four time period that are 1998-2000, 2000-2002, 2002-2004, and 2004-2006. The results are shown in Table 4.8.

The results from the OLS method are presented in Table 4.6 by regressing the Gini coefficient on its Initial value of Gini-coefficient, log of gross provincial product (GPP), and the number of new firm establishment. The estimated coefficient on Initial Gini which is defined as the log of the first available data of Gini-coefficient of each province, -0.696864, which shows the convergence. This means that the Gini-coefficient level of Thailand is approaching the steady-state. The variable GDP Growth is the log of average mean of GPP per capita for 8 years of each province. The estimated coefficient on GPP Growth, -0.42, shows that increase in income per capita of Thai people will significantly decrease the rate of Gini-coefficient of Thailand. However, increasing in rate of new firm establishment does not significantly affect the rate Gini-coefficient.

Table 4.6
Regression results on entrepreneurship and inequality with cross-sectional data

Variables	**OLS Methods**	
	Coefficient	t-ratio
Constant	-0.58***	-5.11
Initial Gini	-0.70***	-6.14
GPP Growth	-0.42***	-3.50
Entrepreneurship (New firms establishment)	2.46541e-06	0.28
Observations	76	
Adjusted R-squared	0.33	

Note: ***, ** and * denote the significance level at, respectively, 1%, 5% and 10%.

The panel structure has been used to test the relationship between new firms establishment and income distribution in order to account for provincial heterogeneity, each variable in the model has been transformed to panel structure with

two time period and each period contained four years interval. The results are shown in Table 4.7

Table 4.7
Regression results on entrepreneurship and inequality with four-year interval panel data

Variables	**Methods**		
	(1)	(2)	(3)
	Pooled OLS	Random-Effect	Fixed-Effect
Constant	-0.56***	-0.62***	-1.52***
	(-6.76)	(-7.32)	(-13.64)
Initial Gini	-0.57***	-0.63***	-1.42***
	(-7.23)	(-7.77)	(-13.95)
GPP Growth	-0.24*	-0.21*	0.22*
	(-1.98)	(-1.75)	(1.76)
Entrepreneurship	1.17032e-06	1.00719e-06	4.09956e-06
(New firms establishment)	(0.21)	(0.17)	(0.18)
Observations	152	152	152
Adjusted R-squared	0.25	-	0.60
Specification test	χ^2=1.26***	χ^2=110.77***	F-Test= 2.72***

Note: Figures in the parentheses are t-values. ***, ** and * denote the significance level at, respectively, 1%, 5% and 10%.

Starting from column 1, the Pooled OLS method was used to regress the growth of log Gini-coefficient on the log initial Gini-coefficient, the growth rate of log GPP per capita and the average mean of new firm establishment, respectively. The log of initial Gini coefficient enters with a negative significance at 1% level, the growth of log GPP per capita is also enters with expected negative sign and significant only at 10% level while the new firm establishment enters with an unexpected sign but it is not significant. Up to this point, the result could be implied that new firms establishment do not affect to the growth rate of log of Gini coefficient.

Equation 11 has been re-estimated by using the RE model in order to acknowledge the presence of province specific effect, and the results are documented in Column 2. The RE results in column 2 are similar to the Pooled OLS method when it comes to the signs and significance levels of the estimated coefficient of log Gini-coefficient on the log initial Gini-coefficient, the growth rate of log GPP per capita and the average mean of new firm establishment. The log of initial Gini coefficient enters with expected sign and significant at 1% level, the growth of log GPP per capita also enters as negatively significant but only at 10% level while the new firm establishments enter with unexpected sign but they are not significant. The result from the RE method could imply that new firms establishment does not affect the growth rate of log of Gini coefficient. Here, the Breusch-Pagan Lagrange Multipler test (BP LM test) is used to choose between the Pooled OLS and RE model, with statistic of 1.26 shows that the provincial heterogeneity is present which means it prefers the RE model.

To incorporate the province-specific effects, the FE model is used to re-estimate Equation 11 and presents the results in column 3. Compared to the RE results, it shows that the FE results are similar when it comes to the signs and significance levels of the estimated coefficients of variables except the growth of GPP per capita which enters with unexpected positive sign and significant at 10% level . Although both RE and FE results appear to convey a similar message, one of them must be chosen. Given the Hausman test statistic of 110.769 in Column 2, the null hypothesis of similarity in the magnitude of FE and RE estimates is rejected. Since this implies the presence of correlation between the province-specific effects and the explanatory variables, the FE model is preferred. To confirm the suitable model between the Pooled OLS and Fixed Effect model, a given restricted F-test statistic of 2.71766

shows that the null hypothesis that the absence of provincial specific effect is rejected, and the FE model is preferred.

The regression results from Table 4.7 could be concluded by using the results from FE model that the four years average of number of new firm establishment does not have any significant impact on Growth in Gini-coefficient.

To take advantage of the number of the observations, the data have been transformed to increase the number of observations by reducing the number of intervals for each period to 2 years intervals and again the regression is run to get the results as shown in Table 4.8

Table 4.8

Regression results on entrepreneurship and inequality with two-year interval panel data

	Methods		
Variables	(1)	(2)	(3)
	Pooled OLS	Random-Effect	Fixed-Effect
Constant	-0.52***	-0.52***	-1.27***
	(-9.52)	(-9.52)	(-17.15)
Initial Gini	-0.52***	-0.52***	-1.20***
	(-10.03)	(-10.03)	(-17.70)
GPP per capita	-0.33***	-0.33***	-0.15
	(-2.89)	(-2.89)	(-1.40)
Entrepreneurship	2.09519e-07	2.09519e-07	1.04889e-05
(New firms establishment)	(0.07)	(0.07)	(0.78)
Observations	304	304	304

Adjusted R-squared	0.24	-	0.48
Specification test	$\chi^2 = 0.11$	$\chi^2 = 195.85$***	F-Test= 2.79***

Note: Figures in the parentheses are t-values. ***, ** and * denote the significance level at, respectively, 1%, 5% and 10%.

Note: Entrepreneurship is two years average of number of new firm establishment

Table 4.8 shows the regression results of Growth of log Gini-coefficient as dependent variable on log initial Gini-coefficient, the growth rate of log GPP per capita and the average mean of new firm establishment respectively, with the three different methods: Pooled OLS, Fixed-Effect and Random-Effect. Starting from column 1, the Pooled OLS method was used to regress the growth of log Gini-coefficient on the log initial Gini-coefficient, the growth rate of log GPP per capita and the average mean of new firm establishment, respectively. The log of initial Gini coefficient enters with a negative significant at 1% level, the growth of log GPP per capita also enters with an expected sign and is significant at 1% level while the new firm establishment enters with an unexpected sign but it is not significant.

In Column 2, the RE has been used to re-estimate equation 11 but the results are still similar to the Pooled OLS method when it comes to the signs and significance levels of the estimated coefficient of the growth of log Gini-coefficient on the log initial Gini-coefficient, the growth rate of log GPP per capita and the average mean of new firm establishment. The log of initial Gini coefficient enters with a negative significance at 1% level, the growth of log GPP per capita also enters with a negative significant at 1% level while the new firm establishment enters with an unexpected sign but it is not significant. The Breusch-Pagan Lagrange Multiplier test (BP LM

test) statistic of 0.11 shows that the provincial heterogeneity is not present so here the Pooled OLS is preferred.

Re-estimated Equation 11 using the FE model to acknowledge the presence of province-specific effects instead of the pooled OLS model and document the results in Column 3. The FE results are similar to the Pooled OLS method when it comes to the signs and significance levels of the estimated coefficient of log Gini-coefficient on the log initial Gini-coefficient and the average mean of new firm establishment. The log of initial Gini coefficient enters with a negative significance at 1% level, the growth of log GPP per capita enters with a negative sign but not significant while the new firm establishment enters with an unexpected sign and is not significant. A given restricted F-test statistic of 2.79097 from table 4.8 shows that the null hypothesis shows that the absence of provincial effect is rejected, again the FE model is preferred.

Given the Hausman test statistic of 195.86, the null hypothesis of similarity in the magnitude of FE and RE estimates is rejected. Since this implies the presence of correlation between the province-specific effects and the explanatory variables, the FE model is preferred.

Conclusion of the results from Table 4.8 from the preferred FE model, by using the two years average of new firm establishments as the proxy of entrepreneurship, shows that entrepreneurship does not have a significant impact on Gini-coefficient.

To increase the size of parameter of variable new firm establishment, the number of new firm establishment per hundred thousand population have been used instead of raw numbers of the new firm establishment. Beginning with the OLS method, in

Table 4.9, eight years average of new firm establishments per hundred thousand populations will be used as independent variable to run regression on log of eight years growth rate of Gini-coefficient.

Table 4.9
Regression results on entrepreneurship and inequality with cross-sectional data (entrepreneurship per 100,000 populations)

Variables	**OLS Methods**	
	Coefficient	t-ratio
Constant	-0.60***	-5.41
Initial Gini	-0.72***	-6.53
GPP per capita	-0.34***	-2.86
Entrepreneurship (New firms establishment)	-0.0006**	-2.30
Observations	76	
Adjusted R-squared	0.37	

Note: ***, ** and * denote the significance level at, respectively, 1%, 5% and 10%.

Table 4.9 shows the results from the OLS regression method. The results show that all variables enter with negatively significant which included the variable of new firm establishment. The estimated coefficient on initial Gini, -0.718838, shows the convergence. That means that the Gini-coefficient level of Thailand is approaching the steady-state. The variable GDP per capita is the log of average mean of GDP per capita for 8 years of each province. The estimated coefficient on GDP per capita, -0.34, shows that increase in income per capita of Thai people will significantly decrease the rate of Gini-coefficient of Thailand. An increase in the rate of new firm establishment has a significant effect on the rate of Gini-coefficient. This means that when income per capita and/or new firm establishment increase, the rate of Gini -coefficient will be decrease.

After using of new firm establishment per one hundred thousand populations as an independent variable instead of raw number of new firm establishment, the result from Table 4.9 shows significant impact of new firm establishment per hundred thousand population on the rate of growth in Gini-coefficient while in Table 4.6 raw number of new firm establishment does not have a significant impact on growth rate of Gini-coefficient.

To account for the provincial heterogeneity, the panel structure has been used to test the relationship between new firm establishment per hundred thousand population and growth rate of Gini-coefficient. Each variable in the model has been transformed to panel structure with two time period and each period contained four years interval. Result showed in Table 4.10.

Table 4.10
Regression results on entrepreneurship and inequality with four-year interval panel data (entrepreneurship per 100,000 populations)

	Methods		
Variables	(1)	(2)	(3)
	Pooled OLS	Random-Effect	Fixed-Effect
Constant	-0.57***	-0.62***	-1.51***
	(-7.02)	(-7.52)	(-13.65)
Initial Gini-Coefficient	-0.59***	-0.64***	-1.42***
	(-7.59)	(-8.08)	(-14.09)
GPP Growth	-0.17	-0.15	0.25**
	(-1.40)	(-1.20)	(2.01)
Entrepreneurship	-0.0004**	-0.0005**	-0.0005
(New firms establishment)	(-2.38)	(-2.39)	(-1.04)
Observations	152	152	152

Adjusted R-squared	0.27	-	0.60
Specification test	χ^2=1.18	χ^2 = 107.35***	F-Test=2.63***

Note: Figures in the parentheses are t-values. ***, ** and * denote the significance level at, respectively, 1%, 5% and 10%.

Regression results from Table 4.10 show the impact of entrepreneurship and other variable on income distribution by starting from Column 1, the Pooled OLS method was used to regress the growth of log Gini-coefficient on the log initial Gini-coefficient, the growth rate of log GPP per capita and the average mean of new firm establishment per hundred thousand populations, respectively. The log of initial Gini coefficient enters with a negative significance at 1% level, the growth of log GPP per capita is enter with expected negative sign but is not significant while the new firm establishment enters with expected sign and it is significant at 5% level. The result from table 4.10 indicates that the number of new firm establishment have a significant effect on growth of log Gini-coefficient in negative way.

The unfavorable results might be attributed to the failure of the pooled OLS model to capture these province-specific effects if the province-specific effects were found to be important due to the pooled OLS model ignoring the possible provincial heterogeneity. To accommodate this potential problem, Equation 11 has been re-estimated by using the FE model which acknowledge the presence of province-specific effects, and the results are documented in Column 2.

In Column 2, the RE results are similar to the Pooled OLS method when it comes to the signs and significance levels of the estimated coefficient of Growth in Gini-coefficient on the log initial Gini-coefficient, the growth rate of log GPP per capita and the average mean of new firm establishment. The log of initial Gini coefficient enters with a negative significance at 1% level, the growth of log GPP per capita also

enters with a negative sign but is not significant while the new firm establishment enters with an expected sign and is significant even at 5% level. Given the Breusch-Pagan Lagrange Multiplier test (BP LM test) statistic of 1.18 shows that the provincial heterogeneity is not present which means the Pooled OLS is preferred. In Column 3, results of FE method are quite different with the Pooled OLS method and RE method when it comes to the signs and significance levels of the estimated coefficient of Growth in Gini-coefficient on the log initial Gini-coefficient, the growth rate of log GPP per capita and the average mean of new firm establishment per hundred thousand populations. The log of initial Gini coefficient enters with a negative significance at 1% level, the growth of log GPP per capita also enters with negative significance but only at 5% level while the new firm establishment enters with expected sign but it is not significant. A given restricted F-test statistic of 2.63 shows that the null hypothesis that absent of provincial effect is rejected, this shows that the FE model is preferred.

Although the specification test of restriction F-test shows the FE model is preferred compared to the Pooled OLS, the Pooled OLS is preferred compared to the RE model. To confirm the most preferred model between the FE and RE model, the Hausman is applied. Given the Hausman test statistic of 107.35, the null hypothesis of similarity in the magnitude of FE and RE estimates is rejected. Since this implies the presence of correlation between the province-specific effects and the explanatory variables, the FE model is preferred. Conclusion can be made based on the preferred FE model that entrepreneurship does not have significant impact on income inequality.

To take advantage from the number of the observations, the data have been transformed to increase the number of observations by reducing the number of

intervals for each period to 2 years intervals and again run regression to get the results as shown in Table 4.11.

Table 4.11
Regression results on entrepreneurship and inequality with two-year interval panel data (entrepreneurship per 100,000 populations)

	Methods		
Variables	(1)	(2)	(3)
	Pooled OLS	Random-Effect	Fixed-Effect
Constant	-0.54***	-0.54***	-1.25***
	(-9.97)	(-9.97)	(-16.82)
Initial Gini-Coefficient	-0.55***	-0.55***	-1.19***
	(-10.61)	(-10.61)	(-17.67)
GPP Growth	-0.28**	-0.28**	-0.14
	(-2.49)	(-2.49)	(-1.30)
Entrepreneurship	-0.0004***	-0.0004***	-0.0002
(New firms establishment)	(-3.15)	(-3.15)	(-0.49)
Observations	304	304	304
Adjusted R-squared	0.27	-	0.48
Specification test	$\chi^2 = 0.10$	$\chi^2 = 182.15$***	F-Test=2.60***

Note: Figures in the parentheses are t-values. ***, ** and * denote the significance level at, respectively, 1%, 5% and 10%.

Table 4.11 shows the regression result of growth of log Gini-coefficient on log initial Gini-coefficient, the growth rate of log GPP per capita and the average mean of new firm establishment per hundred thousand populations. Starting from column 1, the log of initial Gini-coefficient enters with a negative significance at 1% level, the growth of log GPP per capita also enters with a negative sign but is significant at 5% level

while the new firm establishment enters with an expected sign and is significant at 1% level.

Re-estimation the equation 11 is needed to prevent the problem of the possibility of province specific effects which are disregarded in the pooled OLS model by using the RE model which acknowledges the presence of province-specific effects. The results are shown in Column 2. The RE results are similar to the Pooled OLS method when it comes to the signs and significance levels of the estimated coefficient of Growth in Gini-coefficient on the log initial Gini-coefficient, the growth rate of log GPP per capita and the average mean of new firm establishment. The log of initial Gini coefficient enters with a negative significance at 1% level, the growth of log GPP per capita also enters with a negative sign and is significant even at 1% level while the new firm establishment enters with an expected sign and is significant at 1% level. The Breusch-Pagan Lagrange Multiplier test (BP LM test) statistic of 0.101092 shows that the provincial heterogeneity is not present so here the Pooled OLS is preferred.

The re-estimation of the Equation 11 is conducted by using the FE model which incorporates the province-specific effects, and the results are presented in Column 3. The FE results are different from the Pooled OLS method and RE method when it comes to the signs and significance levels of the estimated coefficient of Growth in Gini-coefficient on the log initial Gini-coefficient, the growth rate of log GPP per capita and the average mean of new firm establishment per hundred thousand populations. The log of initial Gini coefficient enters with a negative significance at 1% level, the growth of log GPP per capita also enters with a negative sign but is not significant while the new firm establishment enters with an expected sign but it is not significant. In column 3, the value of restricted F-test is 2.60 which shows that the

provincial effect is present and the null hypothesis is rejected. This shows that the FE model is preferred.

Although the specification test of restriction F-test shows the FE model is preferred compared to the Pooled OLS, the Pooled OLS is also more preferred than the RE model. To confirm the most preferred model between the FE and RE model, the Hausman is applied. Given the Hausman test statistic of 182.15, the null hypothesis of similarity in the magnitude of FE and RE estimates is rejected. Since this implies the presence of correlation between the province-specific effects and the explanatory variables, therefore the FE model is preferred.

Table 4.11 of preferred FE model that Entrepreneurship does not have significant impact on Gini-coefficient. This implies that although Thailand records a remarkably high entrepreneurship establishment, it appears that it does not contribute to narrowing income inequality.

4.4.2 Entrepreneurship and Income of the poor

This section investigates if an increase in entrepreneurship of the provinces in Thailand has any impact on the income of the poor. Again, the Beck et al. model is proposed to quantify the relationship between entrepreneurship and income inequality and the result will be presented using the method of OLS, pooled OLS, Random-effects, and Fixed-effects

To assess the relationship between entrepreneurship and the income of the poor people of Thailand, the lowest income quintile is used as the proxy to regress equation 12. The variable lowest income quintile is defined as the annual growth rate in income of the lowest income quintile over the period 1998-2007 which is available for every

two years by obtaining from The National Economic and Social Development Board. The data have been arranged into three forms, cross sectional with eight years average means, panel data with four years and two years intervals. The four years interval divided the data into two time periods, 1998-2002, 2002-2004, and four time periods for the two years intervals starting from 1998-2000, 2000-2002, 2002-2004 and 2004-2006. The result is shown in Table 4.12 – 4.17

Table 4.12
Regression results on entrepreneurship and lowest income quintile with cross-sectional data.

Variables	**OLS Methods**	
	Coefficient	t-ratio
Constant	1.21***	4.19
Initial Income of the poor	-0.66***	-4.55
GPP Growth	0.24	1.45
Entrepreneurship (New firms establishment)	3.89862e-06	0.31
Observations	76	
Adjusted R-squared	0.19	

Note: ***, ** and * denote the significance level at, respectively, 1%, 5% and 10%.

Table 4.12 shows the results from the OLS method. The variable Initial Income of the poor is the log of the first available data of lowest income quintile of each province. The results shows that the estimated coefficient on Initial Income of the poor, -0.66, shows the convergence which means that the lowest income quintile level of Thailand is approaching the steady-state. The variable GPP Growth is the log of average mean of GDP per capita for 8 years of each province. The estimated coefficient on GDP Growth, 0.24, shows that increase in income per capita of Thai people will

significantly increase the rate of income quintile of the poor people of Thailand. Increasing in rate of new firm establishment has no significant effects on the rate of the lowest income quintile.

The panel structure has been used to test the relationship between new firm establishment and income of the poor people in order to account for provincial heterogeneity, each variable in the model has been transformed to panel structures with two time periods and each period contained four years intervals The results are shown in Table 4.13.

Table 4.13
Regression results on entrepreneurship and lowest income quintile with four-year panel data

	Methods		
Variables	(1)	(2)	(3)
	Pooled OLS	Random-Effect	Fixed-Effect
Constant	1.41***	1.41***	3.13***
	(7.13)	(7.13)	(10.65)
Initial Income of the poor	-0.71***	-0.71***	-1.52***
	(-7.25)	(-7.25)	(-10.70)
GPP Growth	0.07	0.07	-0.27
	(0.45)	(0.45)	(-1.44)
Entrepreneurship	2.13911e-06	2.13911e-06	-8.4993e-06
(New firms establishment)	(0.31)	(0.31)	(-0.24)
Observations	152	152	152
Adjusted R-squared	0.26	-	0.45
Specification test	χ^2=0.98	χ^2= 60.09***	F-Test=1.70***

Note: Figures in the parentheses are t-values. ***, ** and * denote the significance level at, respectively, 1%, 5% and 10%.

Regression results from Table 4.13 shows the impact of entrepreneurship and other variables on growth in the lowest income quintile starting from column 1, the Pooled OLS method was used to regress the growth of lowest income quintile on the log initial of lowest income quintile, the growth rate of log GPP per capita and the average mean of new firm establishment, respectively. The log of initial in lowest income quintile enters with a negative significance at 1% level, the growth of log GPP per capita enters with a positive sign but is not significant while the new firm establishment enters with expected sign but is not significant.

Equation 12 has been re-estimated by using the RE model and document the results in Column 2. The RE results are similar to the Pooled OLS method when it comes to the signs and significance levels of the estimated coefficient of Growth in lowest income quintile on the log initial lowest income quintile, the growth rate of log GPP per capita and the average mean of new firm establishment. The log of initial lowest income quintile enters with a negative significance at 1% level, the growth of log GPP per capita also enters with positive sign and is not significant while the new firm establishment enters with expected sign and is not significant. The Breusch-Pagan Lagrange Multiplier test (BP LM test) statistic of 0.98 shows that the provincial heterogeneity is not present so here the Pooled OLS is preferred.

Re-estimated Equation 12 by using FE model which incorporates the province-specific effects, and present the results in Column 3. The FE results shows that the log of initial lowest income quintile enters with a negative significance at 1% level, the growth of log GPP per capita also enters with a negative sign but is not significant while the new firm establishment enters with an unexpected sign but it is not

significant. A given restricted F-test statistic of 1.6976 shows that the null hypothesis that absent of provincial effect is rejected, this is shows that the FE model is preferred.

Although the specification test of restriction F-test shows the FE model is preferred compared to Pooled OLS, meanwhile the Pooled OLS is also more preferred than the RE model. To confirm the most preferred model between the FE and RE model the Hausman test is applied given the statistic of 60.09, the null hypothesis of similarity in the magnitude of FE and RE estimates is rejected. Since this implies the presence of correlation between the province-specific effects and the explanatory variables, therefore the FE model is preferred.

Conclusion from Table 4.13 is based on the preferred FE model that Entrepreneurship does not have any significant impact on income of the poor.

Table 4.14
Regression results on entrepreneurship and lowest income quintile with two-year interval panel data.

	Methods		
Variables	(1)	(2)	(3)
	Pooled OLS	Random-Effect	Fixed-Effect
Constant	1.10***	1.10***	2.19***
	(9.32)	(9.32)	(13.56)
Initial Income of the poor	-0.55***	-0.55***	-1.07***
	(-9.53)	(-9.53)	(-13.78)
GPP Growth	0.19	0.19	0.086
	(1.39)	(1.39)	(0.60)
Entrepreneurship	1.13493e-06	1.13493e-06	-4.59899e-06

(New firms establishment)	(0.30)	(0.30)	(-0.25)
Observations	304	304	304
Adjusted R-squared	0.23	-	0.33
Specification test	χ^2=0.75	χ^2= 99.84***	F-Test=1.64***

Note: Figures in the parentheses are t-values. ***, ** and * denote the significance level at, respectively, 1%, 5% and 10%.

Regression results from Table 4.14 show the impact of entrepreneurship and other variables on growth in the lowest income quintile. Column 1, the Pooled OLS method was used to regress the growth of in lowest income quintile on the log initial of lowest income quintile, the growth rate of log GPP per capita and the average mean of new firm establishment, respectively. The log of initial in the lowest income quintile enters with a negative significance at 1% level, the growth of log GPP per capita enters with a positive sign but is not significant while the new firm establishment enters with an expected sign but is not significant.

In Column 2, the RE results are similar to the Pooled OLS method when it comes to the signs and significance levels of the estimated coefficient of Growth in lowest income quintile on the log initial lowest income quintile, the growth rate of log GPP per capita and the average mean of new firm establishment. The log of initial lowest income quintile enters with a negative significance at 1% level, the growth of log GPP per capita also enters with a positive sign and is not significant while the new firm establishment enters with an expected sign and is not significant.

The Breusch-Pagan Lagrange Multiplier test (BP LM test) statistic of 0.75 shows that the provincial heterogeneity is not present so here so the Pooled OLS is preferred. In Column 3, the FE results shows that the log of initial lowest income quintile enters

with a negative significance at 1% level, the growth of log GPP per capita also enters with a negative sign but is not significant while the new firm establishment enters with an unexpected sign but it is not significant. A given restricted F-test statistic of 1.64 shows that the null hypothesis is absent so the provincial effect is rejected. This shows that the FE model is preferred.

Given the Hausman test statistic of 99.84, the null hypothesis of similarity in the magnitude of FE and RE estimates is rejected. Since this implies the presence of correlation between the province-specific effects and the explanatory variables therefore the FE model is preferred.

Relationship between two years average of Entrepreneurship and Growth in lowest income quintile can be concluded by using the preferred FE model that two years average of Entrepreneurship does not have significant impact on Growth in lowest income quintile.

Table 4.15 shows the results from the OLS method. The variable Initial Income of the poor is the log of the first available data of lowest income quintile of each province. The results shows that the estimated coefficient on Initial Income of the poor, -0.70, shows the convergence which means that the lowest income quintile level of Thailand is approaching the steady-state. The variable GDP Growth is the log of average mean of GDP per capita for 8 years of each province. The estimated coefficient on GDP Growth, 0.16, shows that increase in income per capita of Thai people will increase the rate of income quintile of the poor people of Thailand but is not significant. And increasing in rate of new firm establishment has no significant effect on the rate of the lowest income quintile.

Table 4.15
Regression results on entrepreneurship and lowest income quintile with cross-sectional data (entrepreneurship per 100,000 populations).

Variables	**OLS Methods**	
	Coefficient	t-ratio
Constant	1.26	4.47
Initial Income of the poor	-0.70	-4.85
GPP Growth	0.16	0.93
Entrepreneurship (New firms establishment)	0.0007	1.92
Observations	76	
Adjusted R-squared	0.23	

Note: ***, ** and * denote the significance level at, respectively, 1%, 5% and 10%.

The panel structure has been used to test the relationship between new firm establishment and income distribution. To account for provincial heterogeneity, each variable in the model has been transformed to a panel structure with two time periods and each period contained four years intervals. The results are shown in Table 4.16.

Regression results from Table 4.16 show the impact of entrepreneurship and other variables on growth in lowest income quintile. The Pooled OLS method was used to regress the growth of the lowest income quintile on the log initial of lowest income quintile, the growth rate of log GPP per capita and the average mean of new firm establishment, respectively. The results are presented in Column 1. The log of the initial in the lowest income quintile enters with a negative significance at 1% level, the growth of log GPP per capita enters with a negative sign and is not significant while the new firm establishment enters with an expected sign and significant at 5% level.

Table 4.16

Regression results on entrepreneurship and lowest income quintile with four-year panel data (entrepreneurship per 100,000 populations)

	Methods		
Variables	(1)	(2)	(3)
	Pooled OLS	Random-Effect	Fixed-Effect
Constant	1.43***	1.43***	3.10***
	(7.32)	(7.32)	(10.60)
Initial Income of the poor	-0.72***	-0.72***	-1.52***
	(-7.49)	(-7.49)	(-10.70)
GPP Growth	-0.007	-0.007	-0.29
	(-0.04)	(-0.04)	(-1.51)
Entrepreneurship	0.0004**	0.0004**	0.0002
(New firms establishment)	(2.04)	(2.04)	(0.29)
Observations	152	152	152
Adjusted R-squared	0.27	-	0.45
Specification test	χ^2= 1.04	χ^2= 57.44***	F-Test=1.63**

Note: Figures in the parentheses are t-values. ***, ** and * denote the significance level at, respectively, 1%, 5% and 10%.

Column 2, the RE results are similar to the Pooled OLS method when it comes to the signs and significance levels of the estimated coefficient of Growth in the lowest income quintile on the log initial lowest income quintile, the growth rate of log GPP per capita and the average mean of new firm establishment. The log of the initial lowest income quintile enters with a negative significance at 1% level, the growth of log GPP per capita enters with a negative sign and is not significant while the new firm establishment enters with an expected sign and is significant at 5% level. The Breusch-Pagan Lagrange Multiplier test (BP LM test) statistic of 1.04 shows that the

provincial heterogeneity is not present so here the Pooled OLS is preferred. In Column 3, the FE results shows that the log of initial lowest income quintile enters with a negative significance at 1% level, the growth of log GPP per capita enters with a negative sign but is not significant while the new firm establishment enters with expected sign but it is not significant. A given restricted F-test statistic of 1.63 significant at 5% level shows that the null hypothesis is absent and the provincial effect is rejected, this shows that the FE model is preferred. Given the Hausman test statistic of 57.44, the null hypothesis of similarity in the magnitude of FE and RE estimates is rejected. Since this implies the presence of correlation between the province-specific effects and the explanatory variables therefore the FE model is preferred.

Conclusion can be made by using the preferred FE model that four years average Entrepreneurship per one hundred thousand populations does not have significant impact on Growth in the lowest income quintile.

Table 4.17
Regression results on entrepreneurship and lowest income quintile with two-year panel data (entrepreneurship per 100,000 populations)

	Methods		
Variables	(1) Pooled OLS	(2) Random-Effect	(3) Fixed-Effect
Constant	1.13***	1.13***	2.19***
	(9.54)	(9.54)	(13.53)
Initial Income of the poor	-0.57***	-0.57***	-1.07***
	(-9.80)	(-9.80)	(-13.77)

GPP Growth	0.15	0.15	0.083
	(1.07)	(1.07)	(0.58)
Entrepreneurship (New firms establishment)	0.0002**	0.0002**	2.43759e-05
	(2.12)	(2.12)	(0.08)
Observations	304	304	304
Adjusted R-squared	0.24	-	0.33
Specification test	χ^2=0.91	χ^2= 95.41***	F-Test=1.57***

Note: Figures in the parentheses are t-values. ***, ** and * denote the significance level at, respectively, 1%, 5% and 10%.

Regression results from Table 4.17 show the impact of entrepreneurship and other variables on growth in lowest income quintile. Column 1, the Pooled OLS method was used to regress the growth of lowest income quintile on the log initial of lowest income quintile, the growth rate of log GPP per capita and the average mean of new firm establishment, respectively. The log of initial in lowest income quintile enters with a negative significance at 1% level, the growth of log GPP per capita enters with a positive sign but is not significant while the new firm establishment enters with an expected sign and significant at 5% level.

In Column 2, the RE results are similar to the Pooled OLS method when it comes to the signs and significance levels of the estimated coefficient of Growth in lowest income quintile on the log initial lowest income quintile, the growth rate of log GPP per capita and the average mean of new firm establishment. The log of initial lowest income quintile enters with a negative significance at 1% level, the growth of log GPP per capita enters with a positive sign and is not significant while the new firm establishment enters with expected sign and is significant at 5% level. The Breusch-

Pagan Lagrange Multiplier test (BP LM test) statistic of 0.91 shows that the provincial heterogeneity is not present so here the Pooled OLS is preferred. In Column 3, the FE results shows that the log of initial lowest income quintile enters with a negative significance at 1% level, the growth of log GPP per capita enters with a positive sign but is not significant while the new firm establishment enters with an expected sign but it is not significant. A given restricted F-test statistic of 1.57 shows that the null hypothesis that absent of provincial effect is rejected, this is shows that the FE model is preferred.

Although the specification test of restriction F-test shows the FE model is preferred compared to Pooled OLS, the Pooled OLS is also preferred compared to the RE model. To confirm the most preferred model between the FE and RE model the Hausman is applied. Given the Hausman test statistic of 95.41, the null hypothesis of similarity in the magnitude of FE and RE estimates is rejected. Since this implies the presence of correlation between the province-specific effects and the explanatory variables therefore the FE model is preferred.

The preferred FE model also conclude, that the two years average Entrepreneurship per one hundred thousand does not have significant impact on the growth in lowest income quintile (refer Table 4.17). As was the case with the Gini coefficient, it appears that entrepreneurship establishment in Thailand does not contribute to narrowing income inequality among its population.

4.5 Entrepreneurship and Number of poor people

The results from the method of OLS, pooled OLS, Random-effects, and Fixed-effects from the proposed Beck et al model are presented again in this section to investigate the relationship between entrepreneurship and poverty. The Head Count Index is used

as the proxy for poverty to find relationship with entrepreneurship by regressing equation 13.

The variable Head Count Index is defined as the annual growth rate in the Head Count Index over the period 2000-2006 which is available for every two years by obtaining from The National Economic and Social Development Board. The data have been arranged into cross sectional with seven years average means and panel data with two years intervals with three time period starting from 2000-2002, 2002-2004 and 2004-2006. The result is shown in Table 4.18 – 4.21

Table 4.18
Regression results on entrepreneurship and poverty head count with Cross-sectional data

Variables	**OLS Methods**	
	Coefficient	t-ratio
Constant	-0.30	-0.55
Initial Head Count Index	-0.23*	-1.71
GPP Growth	-0.19	-0.21
Entrepreneurship (New firms establishment)	-5.58991e-05	-1.21
Observations	76	
Adjusted R-squared	0.01	

Note: ***, ** and * denote the significance level at, respectively, 1%, 5% and 10%.

Table 4.18 shows the results from the OLS method. The variable Initial Head Count Index is the log of the first available data of poverty headcount of each province. Results shows that the estimated coefficient on Initial Head Count Index, -0.228815, shows the convergence which means that the poverty headcount level of Thailand is

approaching the steady-state. The variable GDP Growth is the log of average mean of GDP per capita for 6 years of each province. The estimated coefficient on GDP Growth, -0.19, shows that an increase in income per capita of Thai people will decrease the rate of poverty headcount of Thailand but is not significant. An increase in the rate of new firm establishment has no significant effects on the rate of poverty headcount.

The panel structure has been used to test the relationship between the new firm establishment and income distribution. For provincial heterogeneity, each variable in the model has been transformed to panel structure with two time period and each period contained four years intervals. The results are shown in Table 4.19.

Table 4.19
Regression results on entrepreneurship and poverty head count with two-year interval panel data

	Methods		
Variables	(1)	(2)	(3)
	Pooled OLS	Random-Effect	Fixed-Effect
Constant	1.88*	1.88*	12.05***
	(1.65)	(1.65)	(5.84)
Initial Head Count Index	-1.71***	-1.71***	-5.98***
	(-4.79)	(-4.79)	(-8.07)
GPP Growth	2.81	2.81	8.79
	(0.57)	(0.57)	(1.51)
Entrepreneurship	-9.61016e-05	-9.61016e-05	-0.001
(New firms establishment)	(-0.85)	(-0.85)	(-1.15)
Observations	220	220	220
Adjusted R-squared	0.10	-	0.24

Specification test	χ^2 =0.41	χ^2 = 42.96***	F-Test=1.52**

Note: Figures in the parentheses are t-values. ***, ** and * denote the significance level at, respectively, 1%, 5% and 10%.

Regression results from Table 4.19 show the impact of entrepreneurship and other variables on growth in Head Count growth. The Pooled OLS method was used to regress the growth of Head Count growth index, the growth rate of log GPP per capita and the average mean of new firm establishment, respectively. The log of initial in Head Count Growth enters with a negative significance at 1% level, the growth of log GPP per capita enters with a positive sign but is not significant while the new firm establishment enters with an expected sign but is not significant.

In Column 2, the RE results are similar to the Pooled OLS method when it comes to the signs and significance levels of the estimated coefficient of Head Count growth on the log initial Head Count, the growth rate of log GPP per capita and the average mean of new firm establishment. The log of initial Head Count Growth enters with a negative significance at 1% level, the growth of log GPP per capita enters with a positive sign and is not significant while the new firm establishment enters with expected sign but is not significant. The Breusch-Pagan Lagrange Multiplier test (BP LM test) statistic of 0.41 shows that the provincial heterogeneity is not present so here the Pooled OLS is preferred.

In Column 3, the FE results shows that the log of initial Head Count growth enters with a negative significance at 1% level, the growth of log GPP per capita enters with a positive sign but is not significant while the new firm establishment enters with an expected sign but it is not significant. A given restricted F-test statistic of 1.52 shows

that the null hypothesis that absent of provincial effect is rejected, this is shows that the FE model is preferred.

Although the specification test of restriction F-test shows the FE model is preferred compared to Pooled OLS, meanwhile the Pooled OLS is also more preferred than the RE model. To confirm the most preferred model between the FE and RE model the Hausman is applied. Given the Hausman test statistic of 42.96, the null hypothesis of similarity in the magnitude of FE and RE estimates is rejected. Since this implies the presence of correlation between the province-specific effects and the explanatory variables therefore the FE model is preferred.

Results of two years average Entrepreneurship and Head Count Growth can be concluded using the results of preferred FE model that the two years average Entrepreneurship does not have significant impact on Head Count Growth.

Table 4.20
Regression results on entrepreneurship and poverty headcount with cross-sectional data (entrepreneurship per 100,000 populations)

Variables	**OLS Methods**	
	Coefficient	t-ratio
Constant	0.55	1.05
Initial Head Count Index	-0.44	-3.32***
GPP Growth	-0.16	-0.20
Entrepreneurship (New firms establishment)	-0.007	-4.00***
Observations	76	
Adjusted R-squared	0.19	

Note: ***, ** and * denote the significance level at, respectively, 1%, 5% and 10%.

Table 4.20 shows the results from the OLS method. The variable Initial Head Count Index is the log of the first available data of poverty headcount of each province. Results shows that the estimated coefficient on Initial Head Count Index, -0.44, shows the convergence which means that the poverty headcount level of Thailand is approaching the steady-state. The variable GDP Growth is the log of average mean of GDP per capita for 6 years of each province. The estimated coefficient on GDP Growth, -0.16, shows that increase in income per capita of Thai people will decrease the rate of poverty headcount of Thailand but is not significant. And increasing in rate of new firm establishment can decrease the poverty headcount and has significant effects on the rate of poverty headcount at 1% level.

The panel structure has been used to test the relationship between new firm establishment and income distribution, each variable in the model has been transformed to panel structure with two time periods and each periods contained four years intervals. The results are shown in Table 4.21.

Table 4.21

Regression results on entrepreneurship and poverty headcount with two-year interval panel data (entrepreneurship per 100,000 populations)

Variables	**Methods**		
	(1)	(2)	(3)
	Pooled OLS	Random-Effect	Fixed-Effect
Constant	3.50**	3.50**	13.59***
	(2.43)	(2.43)	(5.70)
Initial Head Count Index	-2.16***	-2.16***	-6.26***
	(-4.99)	(-4.99)	(-8.16)
GPP Growth	2.59	2.59	9.44
	(0.53)	(0.53)	(1.62)

Entrepreneurship	-0.01**	-0.01**	-0.03*
(new firms establishment)	(-2.01)	(-2.01)	(-1.71)
Observations	220	220	220
Adjusted R-squared	0.12	-	0.25
Specification test	$\chi^2 = 0.12$	$\chi^2 = 40.96$***	F-Test=1.50**

Note: Figures in the parentheses are t-values. ***, ** and * denote the significance level at, respectively, 1%, 5% and 10%.

Regression results from Table 4.21 show the impact of entrepreneurship and other variables on growth in Head Count growth. Column 1, the Pooled OLS method was used to regress the growth of Head Count on log of Initial Head Count, the growth rate of log GPP per capita and the average mean of new firm establishment, respectively. The log of initial Head Count Growth enters with a negative significance at 1% level; the growth of log GPP per capita enters with a positive sign but is not significant while the new firm establishment enters with expected sign and is significant at 5% level.

In Column 2, the RE results are similar to the Pooled OLS method when it comes to the signs and significance levels of the estimated coefficient of Head Count growth on the log initial Head Count, the growth rate of log GPP per capita and the average mean of new firm establishment. The log of initial Head Count growth enters with a negative significance at 1% level, the growth of log GPP per capita enters with a positive sign and is not significant while the new firm establishment enters with an expected sign and is significant at 5% level. The Breusch-Pagan Lagrange Multiplier test (BP LM test) statistic of 0.11 shows that the provincial heterogeneity is not present so here the Pooled OLS is preferred. In Column 3, the FE results shows that the log of initial Head Count enters with a negative significance at 1% level, the

growth of log GPP per capita enters with a positive sign but is not significant while the new firm establishment enters with expected sign and is significant at 10% level.

To specify the suitable model between the Pooled OLS and Fixed Effect model the restricted F-test is used to identify the present of provincial specific effect. If there is enough evidence that the provincial effects are present the Fixed Effect model is preferred. A given restricted F-test statistic of 1.50 shows that the null hypothesis that the absence of the provincial effect is rejected, this is shows that the Fixed Effect model is preferred. Although the specification test of restriction F-test shows the FE model is preferred compared to Pooled OLS, meanwhile the Pooled OLS is also preferred compared to the RE model. To confirm the most preferred model between the FE and RE model the Hausman is applied. Given the Hausman test statistic of 40.96, the null hypothesis of similarity in the magnitude of FE and RE estimates is rejected. Since this implies the presence of correlation between the province-specific effects and the explanatory variables therefore the FE model is preferred.

In conclusion, the preferred FE model justified that Entrepreneurship has a significant and negative impact on poverty. Specifically, an increase in entrepreneurship by 1% is expected to decrease poverty by 0.03%. As mentioned before, the number of new firm establishment grows at the average of 13% per year for all provinces in Thailand. This implies that entrepreneurship alone contributes about 0.4% to poverty reduction on an annual basis.

4.6 Causality between Entrepreneurship and Growth

The causal analysis starting by testing for stationarity by applying the ADF Panel Unit Root test as discussed in the previous section. The summarized ADF panel unit root test results are present in Table 4.22. Which is found that all variables included in this

study are all integrated at order zero I (0). Therefore, the tests suggest that all of the variables in the equation are stationary at level. Thus the VAR Granger Causality Test is directly estimated.

Table 4.22
Panel Unit Root Test Result

	Level /(I(0))			
Variable	Levin, Lin & Chut	Im, Pesaran and Shin W-stat	ADF - Fisher Chi-square	PP - Fisher Chi-square
YG	-18.8278	-11.9053	395.706	387.494
	(0.0000)	(0.0000)	(0.0000)	(0.0000)
EG	-28.2639	-21.5027	655.451	669.376
	(0.0000)	(0.0000)	(0.0000)	(0.0000)
EDUG	-130.304	-47.6985	735.196	667.282
	(0.0000)	(0.0000)	(0.0000)	(0.0000)
KG	-203.055	-55.9512	462.113	462.808
	(0.0000)	(0.0000)	(0.0000)	(0.0000)
LG	-222.788	-40.2306	578.200	707.038
	(0.0000)	(0.0000)	(0.0000)	(0.0000)

Table 4.23
Granger causality test results (VAR Granger Causality/Block Exogeneity Wald Tests)

Independent	**YG**		**EG**		**KG**	
Dependent	Chi-sq	Prob.	Chi-sq	Prob.	Chi-sq	Prob.
YG	-	-	9.493855	0.0087	9.346335	0.0093
EG	2.975057	0.2259	-	-	42.13711	0.0000
KG	33.91236	0.0000	95.09451	0.0000	-	-
EDUG	13.08256	0.0014	11.12072	0.0038	2.927213	0.2314
LG	0.949976	0.6219	1.467603	0.4801	0.977151	0.6135

Table 4.23 *(Continue)*

Independent	**EDUG**		**LG**	
Dependent	Chi-sq	Prob.	Chi-sq	Prob.
YG	6.725311	0.0346	0.534422	0.7655
EG	0.586756	0.7457	0.863835	0.6493
KG	14.88311	0.0006	1.045264	0.5930
EDUG	-	-	0.069445	0.9659
LG	0.446766	0.7998	-	-

In order to investigate the direction of causal relationship between Gross provincial products and firm establishment whether the gross provincial product granger cause firm establishment and vice versa. Panel granger causality is tested by VAR method in order to check these relationships. Table 4.23: presents the results for the Granger causality test. Based on the VAR Granger causality test, it is found that there are significant relationships between YG and EG, KG and EDUG, which means that firm establishment, growth in physical capital and growth in human capital are granger cause growth in gross provincial product. In contrary, growth of gross provincial product does not granger cause firm establishment and growth of labor but granger cause growth in physical capital and growth in human capital.

In summary, there is only one way relationship between growth of output (gross provincial product) and entrepreneurship (firm establishment), that there is an increase in firm establishment that could cause the granger cause gross provincial products to significantly change. This means that firm establishment plays a key role in increasing of Gross provincial products. For other variables, 1) There are two ways granger causal relationship that runs from the physical capital to GPP and vice versa, 2) there are two ways granger causal relationship that runs from human capital to GPP and vice versa, 3) there are two ways granger causal relationship that runs from physical capital to firm establishment and vice versa, 4) there is only one way granger causal relationship that run from firm establishment to human capital, 5) there is only one way granger causal relationship that run from human capita to physical capital. Finally, there are no evidence to show any granger causal relationship between growth in labor and growth in gross provincial product.

The variance Decomposition

The variance decomposition of growth of gross provincial product (YG) clearly indicates that most (95.7%) of the variation of YG is explained by its own innovations even after 10^{th} periods, while 1.26% of variation of YG is explained by disturbance of growth of firm establishment (EG). Meanwhile the variance decomposition of growth of firm establishment (EG) indicates that most (94.6%) of the variation of EG is explained by its own innovations and only 0.28% of variation of EG is explained by disturbance of growth of gross provincial product (YG). These imply that even firm establishment (EG) does not have a great influence on growth of gross provincial product (YG) but the variance decomposition of growth of gross provincial product (YG) has been explained by growth of firm establishment (EG) that have a greater value than the variation of growth of firm establishment (EG). This explain the growth of gross provincial product (YG). This is consistent with the result of Granger Causality Test that the growth of firm establishment granger which causes growth of gross provincial product but not vice versa.

The dynamic relationship between gross provincial product and Firm establishment were evaluated by using the Impulse Response Function. The results confirm that there are causal relationship between growth in firm establishment (EG) and growth in gross provincial product (YG). However, the growth in firm establishment (EG) has greater effects on the growth in gross provincial product and vice versa.

Table 4.24
The variance Decomposition results of education growth

Variance Decomposition of EDUG:

Period	S.E.	EDUG	EG	KG	LG	YG
1	50.59163	100.0000	0.000000	0.000000	0.000000	0.000000
2	52.98882	98.05047	0.599935	0.364219	0.002143	0.983236
3	53.07393	97.80013	0.757911	0.386584	0.006539	1.048838
4	53.14330	97.58023	0.962852	0.403528	0.007283	1.046111
5	53.15914	97.53601	1.005575	0.405557	0.007303	1.045553
6	53.15949	97.53478	1.005961	0.406391	0.007314	1.045558
7	53.16010	97.53263	1.007846	0.406593	0.007338	1.045588
8	53.16027	97.53212	1.008328	0.406604	0.007342	1.045608
9	53.16027	97.53211	1.008328	0.406615	0.007342	1.045609
10	53.16028	97.53209	1.008343	0.406616	0.007342	1.045610

Table 4.25
The variance Decomposition results of entrepreneurship growth

Variance Decomposition of EG:						
Period	S.E.	EDUG	EG	KG	LG	YG
1	29.55398	1.334181	98.66582	0.000000	0.000000	0.000000
2	31.28622	1.320638	95.10063	3.481570	0.082086	0.015075
3	31.34479	1.415071	94.77220	3.506198	0.085949	0.220584
4	31.45256	1.488775	94.65492	3.492803	0.092037	0.271466
5	31.46949	1.489790	94.61127	3.524123	0.092401	0.282419
6	31.47078	1.491682	94.60415	3.524162	0.092395	0.287614
7	31.47163	1.492326	94.60274	3.524087	0.092454	0.288391
8	31.47180	1.492339	94.60236	3.524313	0.092455	0.288535
9	31.47181	1.492358	94.60229	3.524310	0.092456	0.288581
10	31.47181	1.492362	94.60229	3.524310	0.092456	0.288587

Table 4.26

The variance Decomposition results of physical capital growth

Variance Decomposition of KG:						
Period	S.E.	EDUG	EG	KG	LG	YG
1	11.03461	0.654595	1.313935	98.03147	0.000000	0.000000
2	12.05636	0.954722	1.896872	97.01757	0.060537	0.070302
3	13.11339	3.425160	9.138647	84.95349	0.060942	2.421764
4	13.28235	3.497991	8.935621	84.25450	0.062702	3.249185
5	13.32842	3.547029	8.882862	83.90332	0.062290	3.604501
6	13.34326	3.574575	8.917202	83.75298	0.062908	3.692335
7	13.34573	3.575351	8.913907	83.73521	0.062923	3.712612
8	13.34623	3.575867	8.913261	83.73050	0.062928	3.717446
9	13.34635	3.576072	8.913445	83.72917	0.062940	3.718369
10	13.34637	3.576073	8.913425	83.72903	0.062941	3.718535

Table 4.27

The variance Decomposition results of labour growth

Period	S.E.	EDUG	EG	KG	LG	YG
1	49.21588	0.007757	0.800219	0.223819	98.96820	0.000000
2	49.55950	0.047304	0.815365	0.312378	98.81466	0.010292
3	49.60643	0.070843	0.921771	0.312984	98.62788	0.066523
4	49.60808	0.071527	0.923028	0.316704	98.62140	0.067339
5	49.60867	0.071543	0.923752	0.317097	98.61905	0.068558
6	49.60893	0.071748	0.924395	0.317094	98.61804	0.068722
7	49.60894	0.071748	0.924401	0.317121	98.61799	0.068744
8	49.60895	0.071748	0.924409	0.317123	98.61797	0.068750
9	49.60895	0.071750	0.924415	0.317123	98.61796	0.068751
10	49.60895	0.071750	0.924415	0.317123	98.61796	0.068751

Table 4.28

The variance Decomposition results of economic growth

Variance Decomposition of YG:						
Period	S.E.	EDUG	EG	KG	LG	YG
1	6.624495	0.583240	0.048138	1.333447	0.022789	98.01239
2	6.720796	1.021837	1.182853	1.631203	0.029967	96.13414
3	6.735607	1.047323	1.193514	1.783542	0.092954	95.88267
4	6.740679	1.063137	1.266377	1.831155	0.092861	95.74647
5	6.741837	1.065730	1.268721	1.850944	0.092896	95.72171
6	6.742212	1.066985	1.269185	1.855033	0.092886	95.71591
7	6.742325	1.067422	1.269679	1.855813	0.092887	95.71420
8	6.742349	1.067475	1.269683	1.856030	0.092887	95.71392
9	6.742354	1.067490	1.269684	1.856064	0.092888	95.71387
10	6.742355	1.067494	1.269687	1.856070	0.092888	95.71386

Cholesky Ordering: EDUG EG KG LG YG

The Impulse Response Function

The impulse response functions in figure 4.1 to 4.5 illustrate the dynamic relationship between GPP and Firm establishment. These figures confirm the causal relationship between growth of new firm establishment (EG) and growth of gross provincial product (YG) that the growth of new firm establishment (EG) has greater effect on growth in gross provincial product than vice versa.

While Figure 4.1 – 4.5, confirmed the two ways causal relationship between growth of new firm establishment and growth of gross provincial product, only Figure 4.1 and 4.2 will be taken into consideration. Figure 4.1 show the causal relationship of growth of gross provincial product on growth of new firm establishment and Figure 4.2 shows the causal relationship of growth of new firm establishment on growth of gross provincial product.

The result from Figure 4.1 shows the response of growth in gross provincial product (YG) and growth in firm establishment (EG) to one standard deviation shock. Positive growth in firm establishment shock has an immediate positive effect on YG. It increases GPP growth which last approximately for 5 periods.

The response of growth in gross provincial product (YG) to other variables shows that the response of growth in gross provincial product (YG) mainly on its own shock. There is a negative response of growth in gross provincial product (YG) at the early stage and have positive at after stage on shock of growth in human capital (EDUG) and physical capital (KG). And there is only small positive response of growth in gross provincial product (YG) on shock of growth in labor (LG).

On the other hand, Figure 4.2 shows the response of growth in new firm establishment (EG) and growth in gross provincial product (YG) to one standard deviation shock. There is only a small negative response of growth in new firm establishment (EG) on shock of growth in gross provincial product (YG).

The response of growth in new firm establishment (EG) to other variables shows that the response of growth in new firm establishment (EG) mainly on its own shock. There is a positive response of growth in new firm establishment (EG) on shock of growth in human capital (EDUG) and physical capital (KG). While there is positive response of growth in new firm establishment (EG) on shock of growth in labor (LG).

Overall, results from the impulse response function from figure 4.1 and 4.2 concluded that the growth of the new firm establishment has greater impact on growth of gross provincial product, compared to the growth of provincial products on the growth of new firm establishment. This eventually confirmed the granger causality test of only one way relationship of entrepreneurship on growth but not vice versa.

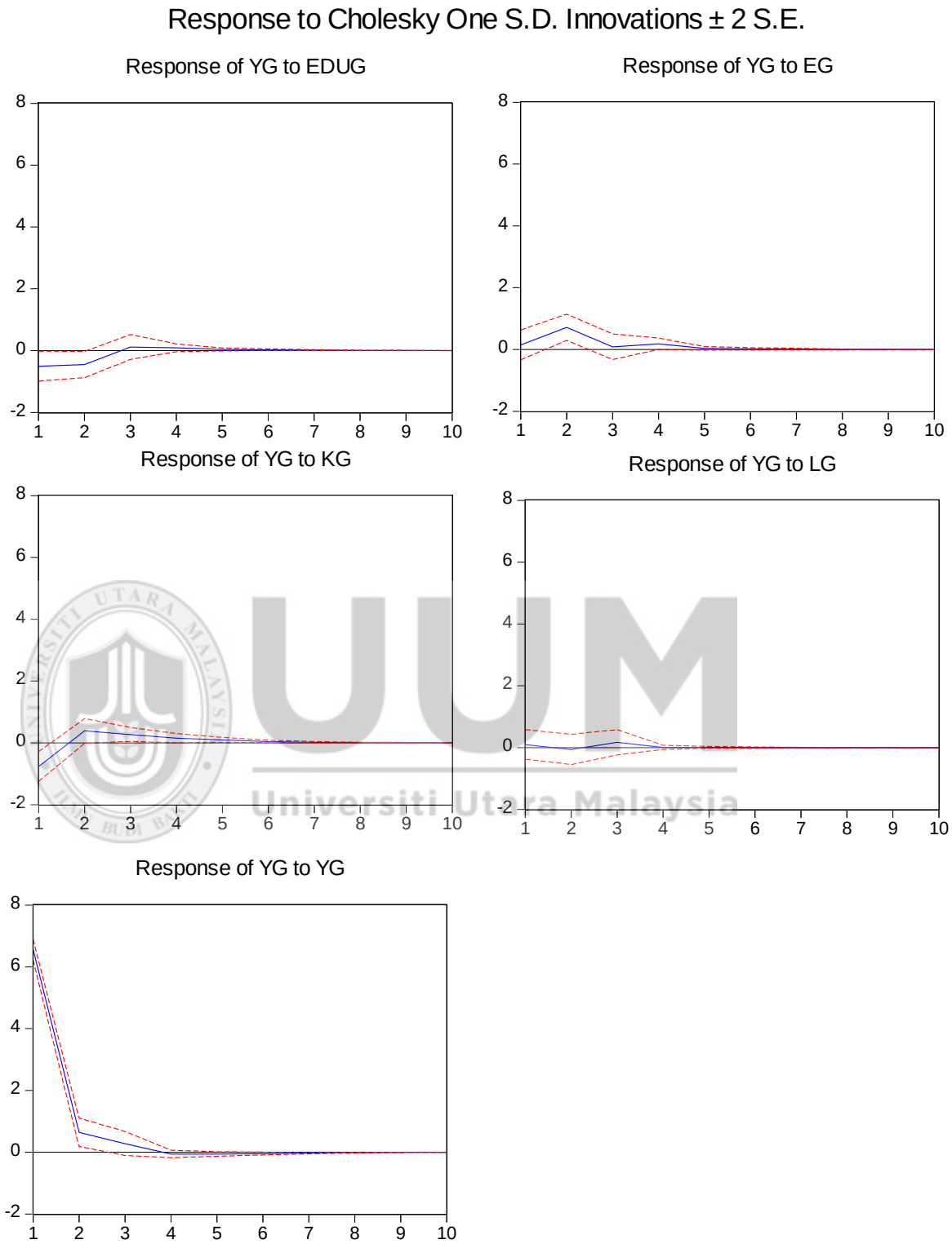

Figure 4.1
The response of growth in gross provincial product (YG) and growth of new firm establishment (EG)

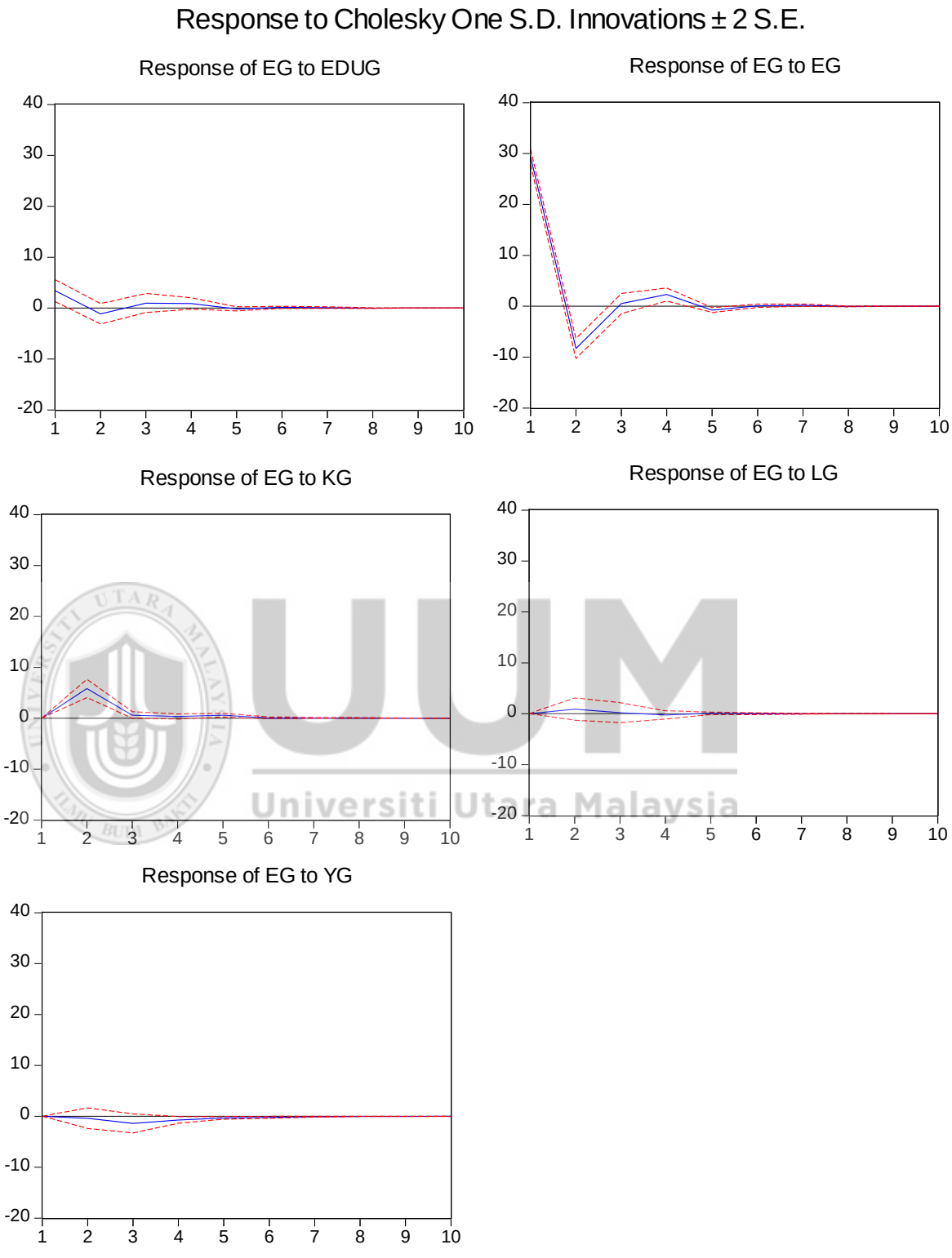

Figure 4.2
The response of growth of new firm establishment (EG) and growth in gross provincial product (YG)

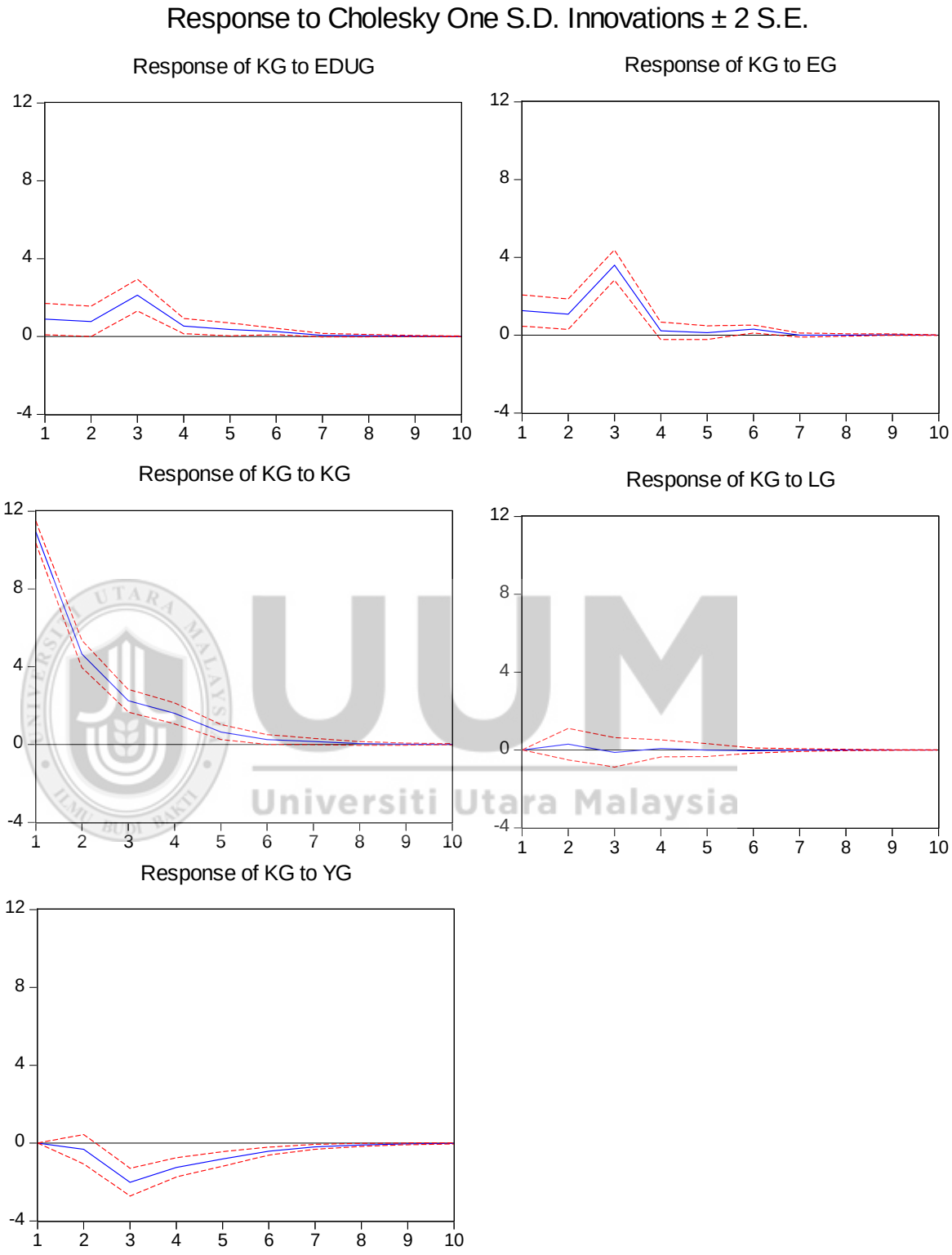

Figure 4.3
The response of growth in Physical capital (KG) and growth in gross provincial product (YG)

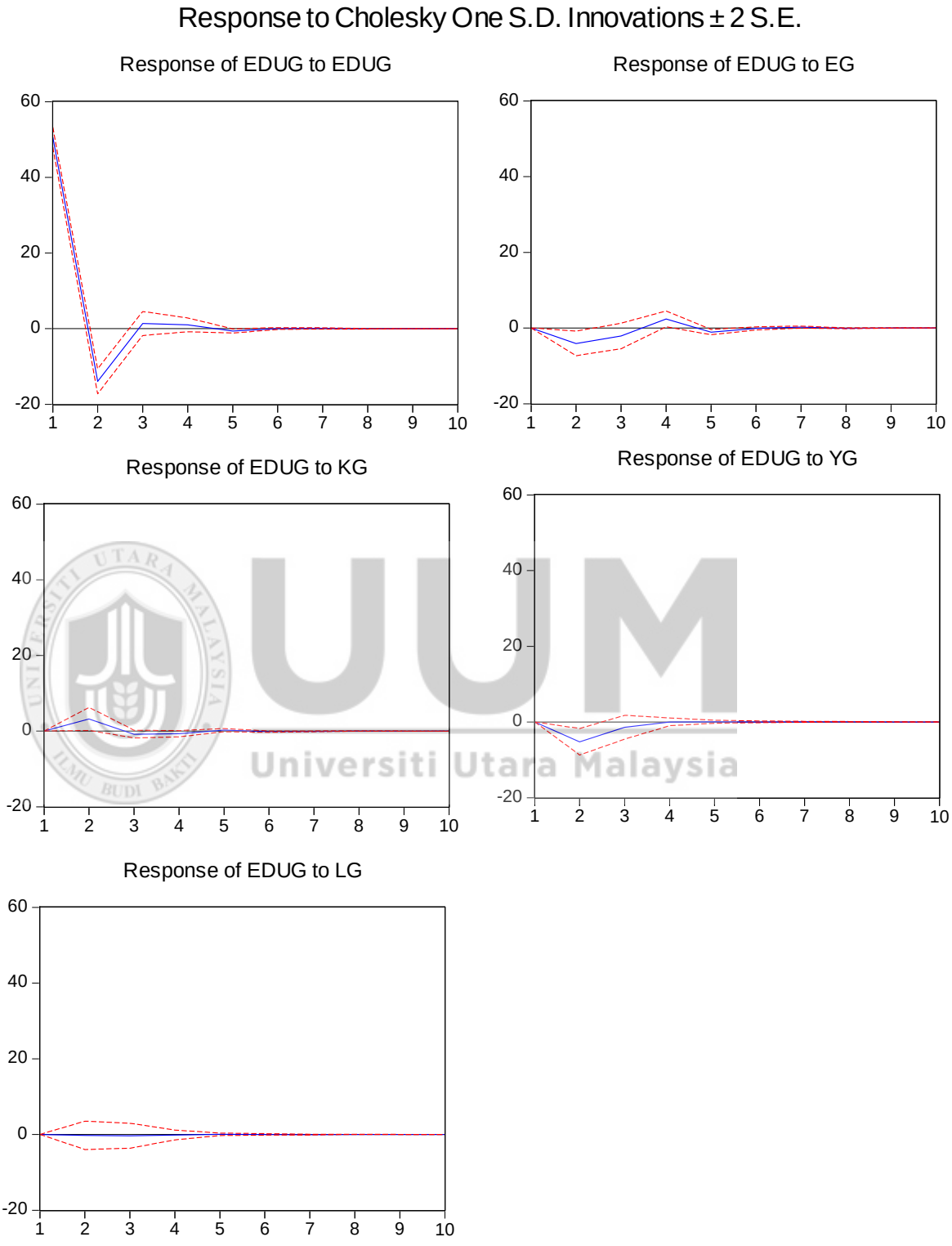

Figure 4.4
The response of growth of Education (EDUG) to other variables

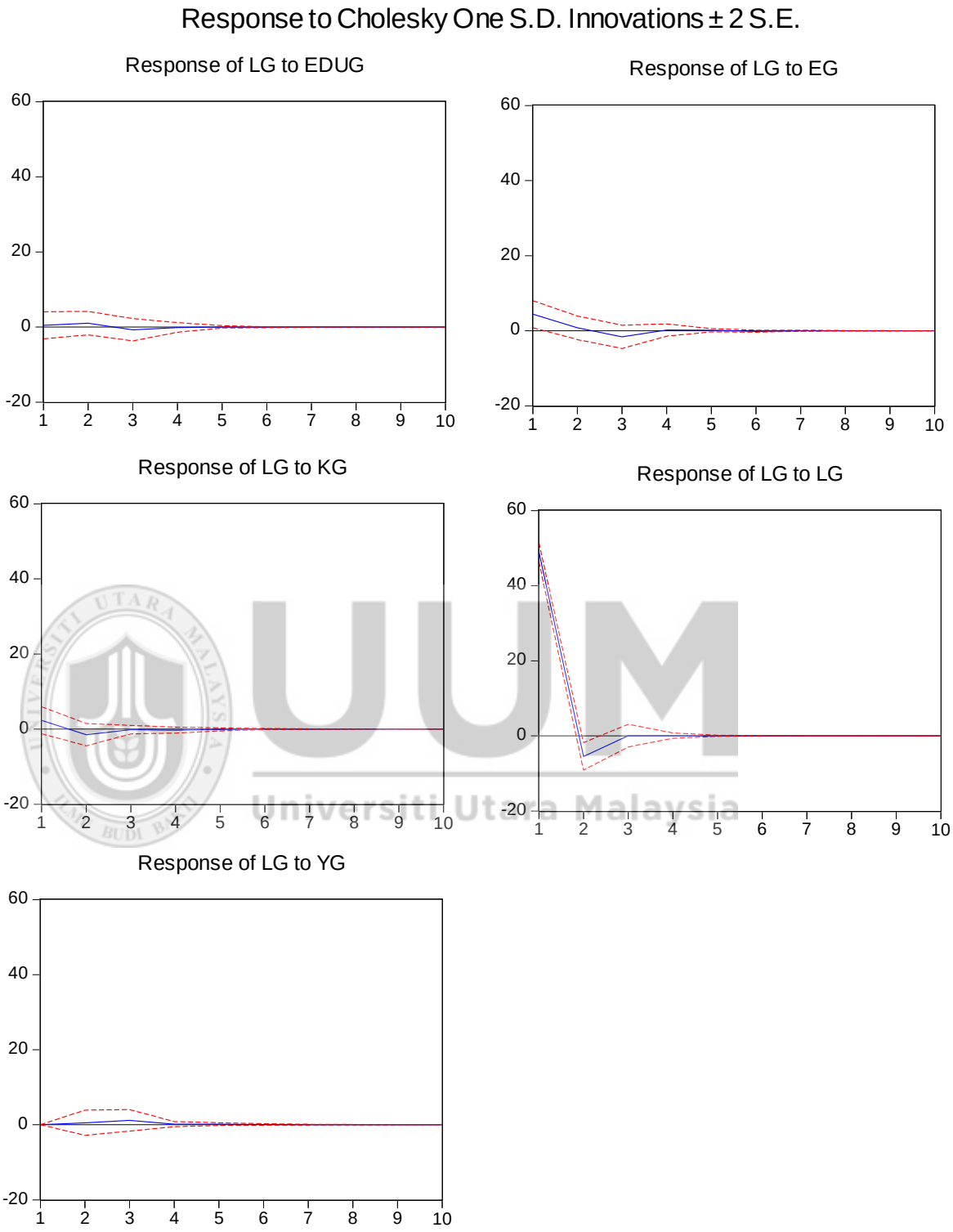

Figure 4.5
The response of growth of labor (LG) to other variables

CHAPTER FIVE
CONCLUSION

5.1 Introduction

The remarkable performance of Thailand in terms of new entrepreneurship establishment raises the need to investigate its impact on economic development. Schumpeter (1934) suggests that one of the major drivers of economic development is entrepreneurship. Thus, the important role of entrepreneurship on economic development could have never been over emphasized. While many studies have been done to investigate the effects of entrepreneurship on growth, employment, productivity and so on, it seems that studies to investigate its effects on poverty and inequality are still lacking. Thus, this study aimed at analyzing the effects of entrepreneurship on poverty and inequality seems very much desirable, which an attempt to fill such gaps.

The argument advanced in this study is that, if entrepreneurship is to play a significant role in economic development of Thailand, the remarkable performance of Thailand in terms of new entrepreneurship establishment should not only have a positive effect on economic growth of Thailand, but also it should have a positive effect on poverty and income inequality as well. Only then, entrepreneurship will be meaningful to the overall economic development of Thailand.

Thus, in this study four research questions are asked. First, does entrepreneurship contribute to economic growth? Second, does entrepreneurship contribute to reduction in income inequality? Third, does entrepreneurship contribute toward poverty alleviation? And fourth, is there any causal relationship between entrepreneurship and

growth? This latter question is also investigated to ascertain the relationship between growth and entrepreneurship, since there is also a possibility of reverse relationship, i.e. growth effecting entrepreneurship. In investigating these questions, a growth regression model by Mankiw et al. (1992) and also Beck et al. (2005) are employed. The data used in this study are collected from secondary sources produced by the Thailand authorities. Basically, the aim of the study is to investigate the role of entrepreneurship on growth, inequality and poverty. Here the results of this study are summarized and finally concluded.

5.2 Summary of the Findings

With regard to the effect of entrepreneurship on growth, the study discovered that there is evidence that entrepreneurship contributes to economic growth. An increase in the number of new firm establishments by 1% is expected to increase GPP by 0.17%. In the data set, the number of new firm establishment grows at the average of 13% per year for all provinces in Thailand. This implies that entrepreneurship alone contributes about 2.2% to GPP growth on an annual basis. This is consistent with the finding of Ace et al. (2005) who found that countries with higher degrees of entrepreneurial activity have higher rate of economic growth. Thus, this study implies that entrepreneurship development could be a vital strategy for promoting and sustaining economic growth in Thailand. The speedy economic recovery observed following the Thailand economic crisis in 1997-1999 could perhaps be explained by the finding of this study. It is also interesting to note that, upon investigating the causality test between entrepreneurship and growth, the finding of this study reveals that the causality is only one way. It is found that entrepreneurship Granger causes growth, but not the other way round. Other tests such as variance decomposition and impulse response function also disclose the same results.

With regard to the effect of entrepreneurship on income inequality, the study shows that entrepreneurship has no impact on the Gini coefficient, which is the first measure of income inequality employed in this study. To ascertain this result, an alternative measure of inequality is also employed, which is the percentage of income quintile of the poorest in the population. Interestingly, using this alternative measure of inequality, the result remains the same. Thus, the findings of this study revealed that both measures of income inequality – the Gini coefficient and income of the poor – did not provide evidence on the positive effect of entrepreneurship on income distribution. This implies, although Thailand recorded a remarkably high entrepreneurship establishment, yet it appears that does not contributed to narrowing income inequality. Similarly, the Gini coefficient for entrepreneurship establishment in Thailand does not contributed toward narrowing income inequality among its population.

Based on the effect of entrepreneurship on poverty, there is evidence of negative relationship between entrepreneurship and growth in the headcount ratio, which is a common measure of poverty. This indicates that entrepreneurship plays a significant role in alleviating poverty in Thailand and seems to be consistent with Sandy (2004) who found entrepreneurship has a significant effect on reducing poverty. Again, the positive effect of entrepreneurship on poverty could help to enlighten the observed speedy recovery of Thailand after the economic crisis in 1997-1999. An increase in entrepreneurship by 1% is expected to decrease poverty by 0.03%. As mentioned before, the number of new firm establishment grows at the average of 13% per year for all provinces in Thailand. This implies that entrepreneurship alone contributes about 0.4% to poverty reduction on an annual basis. Therefore, the results of present

study, contributed evidence to the important role of entrepreneurship on economic growth, poverty and income inequality in Thailand.

5.3 Policy Implications

As mentioned earlier, the argument advanced in this study is that, if entrepreneurship is to be meaningful to the overall economic development of Thailand, the remarkable performance of Thailand in terms of new entrepreneurship establishment must contribute significantly not only to economic growth of Thailand, but it must also contribute positively to reduce income inequality and also poverty. Based on evidences of this study, it can be concluded that entrepreneurship does have a positive effect on economic growth and reducing poverty, but it fails to improve income distribution in Thailand. These results imply that, while entrepreneurship could be proven as a viable strategy to promote growth and reduce poverty in Thailand, it fails to be an effective strategy to improve income distribution. Thus, in term of income distribution, the entrepreneurship may have insufficient effect on the overall economic development of Thailand. Unless and until entrepreneurship could bring a positive effect on income distribution, the role of entrepreneurship on economic development of Thailand is still limited.

Thus, the findings of this study appeal for the entrepreneurship policies in Thailand to be revisited. Entrepreneurship policies and strategies in Thailand need to be re-examined and re-formulated to make it as an effective tool and play a significant role in economic development of Thailand, especially with regard to improving income distribution. Perhaps, one of the explanations on why entrepreneurship in Thailand has no significant effects on improving income distribution is due to the fact that the distribution of entrepreneurship activities and establishment and poverty is skewed.

Entrepreneurship activities are found to be more intense in the urban areas rather than in the rural areas. On the other hand, the reverse is observed with regard to poverty where it is found to be more intense in the rural areas rather than in the urban areas. This might explain why income is relatively higher and poverty is lower in the urban areas. In the rural areas, however, since entrepreneurship activities and establishment is relatively low while the number of poor are relatively large, the impact of entrepreneurship activities and establishment on income and poverty in the rural areas, even though positive, it is quite limited. Hence, while entrepreneurship might improve income and reduce poverty in both areas, income in the urban areas might have increased relatively higher in the urban areas. As a result, it might widen income inequality in Thailand. Another possible explanation could be on the profile of the entrepreneurs. Perhaps a majority of those who are involved in entrepreneurship activities are those in the middle or upper income bracket. If this is the case, then obviously entrepreneurship activities might have improved significantly the income of these groups compared to those in the lower income bracket. As a result, entrepreneurship might worsen income inequality in Thailand. For both of these possibilities and scenarios, perhaps entrepreneurship policies and strategies in Thailand need to be reexamined. To have a significant effect on the overall economic development in Thailand, one of the areas of interventions could be providing appropriate incentives and infrastructure as well as other support, to intensify entrepreneurship activities and establishments in the rural areas.

5.4 Recommendations for Future Studies

In this study, entrepreneurship is measured by the number of new firm establishments regardless of their capital size. Since different sizes might have different impacts on growth, inequality, and poverty, our estimation results might be driven by the

heterogeneity of these firms. Therefore, it is imperative that future studies take the heterogeneity of firm size into consideration.

Due to the unavailability of the data, the sample period is severely limited in this study. For the growth regression, the sample period is 1996-2008; for inequality regression, the sample period is 1998-2007; and for poverty regression, the sample period is 2000-2007. As a result, the sample size is quite limited, and this might affect the estimation results. Therefore, it is recommended that future studies consider extending the sample size.

It has been argued earlier that the failure of entrepreneurship to improve income distribution can be attributed to the possibility that entrepreneurship activities are concentrated among the richer segment of the society. Therefore, future studies should be conducted to verify whether this is indeed the case. If so, then studies on the possibility of using the microcredit scheme and or the syariah complying scheme, especially through funds from zakat and baitul-mal as mechanism to foster entrepreneurs among the poorer segment of the society might be justified.

APPENDIX

Appendix A: Economic growth rate of Thailand and Southeast Asia Countries

Country	1994	1995	1996	1997	1998	1999	2000	2001
Southeast Asia	7.8	8.2	7.4	3.7	-7.5	3.2	6.0	2.0
Cambodia	3.9	6.7	5.5	2.6	1.3	5.0	7.7	6.3
Indonesia	7.5	8.2	7.8	4.7	-13.2	0.2	4.8	3.5
Lao	8.1	7.0	6.9	6.9	4.0	4.0	5.8	5.7
Malaysia	9.2	9.8	10.0	7.5	-7.5	5.4	8.3	0.4
Myanmar	7.5	6.9	6.4	5.7	5.0	4.5	6.2	-
Philippines	4.4	4.7	5.8	5.2	-0.5	3.2	4.4	3.2
Thailand	9.0	8.9	5.9	-1.8	-10.4	4.1	4.6	1.8
Viet Nam	8.8	9.5	9.3	8.2	4.4	4.4	6.1	5.8

Continued:

Country	2002	2003	2004	2005	2006	2007	2008
Southeast Asia	4.5	5.0	6.3	5.7	6.0	6.5	4.3
Cambodia	5.5	7.0	7.7	13.3	10.8	10.2	6.7
Indonesia	4.4	4.9	5.1	5.7	5.5	6.3	6.0
Lao	5.9	5.9	6.9	7.3	8.3	7.9	7.2
Malaysia	4.1	5.6	7.1	5.3	5.8	6.3	4.6
Myanmar	12.0	13.8	12.6	13.6	12.7	-	3.6
Philippines	4.4	4.5	6.0	5.0	5.4	7.2	3.8
Thailand	5.3	6.9	6.1	4.5	5.1	4.8	2.5
Viet Nam	6.4	7.1	7.5	8.4	8.2	8.5	6.2

Source: World Development Report 2012

Appendix B: Thailand growth rate

Year	Growth Rate
1988	13.3
1990	11.2
1992	8.1
1994	9.0
1996	5.9
1998	-10.5
2000	4.8
2002	5.3
2004	6.3
2006	5.1
2009	-2.3

Source: World Development Report 2012

Appendix C: Thailand poverty incident year 1988-1996

poverty incident				
Year	Poverty percentage	Poverty Gap	Severity of Poverty	Number of Poverty(million)
1988	32.6	10.4	4.6	17.9
1990	27.2	8	3.3	15.3
1992	23.2	6.8	2.8	13.5
1994	16.3	4.3	1.7	9.7
1996	11.4	2.8	1.1	6.8
		Percentage Change		
1988-1990	-16.6	-23.1	-28.3	-14.5
1990-1992	-14.7	-15.0	-15.2	-11.8
1992-1994	-29.6	-37.0	-39.9	-28.5
1994-1996	-30.2	-34.7	-34.6	-29.6

Source: Household Social and Economic Survey, Statistic Office Thailand

Appendix D: Percentage of Poverty severity to population

Year	Ultra Poor	Marginal Poor	Near Poor
1988	21.8	10.8	9.1
1990	17.0	10.2	8.6
1992	14.2	9.0	8.3
1994	9.3	7.0	6.6
1996	6.1	5.3	6.1
	Percentage Change		
1988-1990	-22.1	-5.2	-6.1
1990-1992	-16.7	-11.9	-2.5
1992-1994	-34.2	-22.2	-21.1
1994-1996	-34.3	-24.7	-7.2

Source: Household Social and Economic Survey, Statistic Office Thailand

Appendix E: Number of the Poor (Million)

Year	Ultra Poor	Marginal Poor	Near Poor
1988	12.0	5.9	5.0
1990	9.5	5.7	4.8
1992	8.2	5.2	4.9
1994	5.5	4.1	3.9
1996	3.7	3.2	3.7
	Percentage Change		
1988-1990	-20.2	-2.8	-3.7
1990-1992	-13.8	-8.9	0.9
1992-1994	-33.1	-20.9	-19.7
1994-1996	-33.4	-23.6	-5.9

Source: Household Social and Economic Survey, Statistic Office Thailand

Appendix F: Percentage of Poverty at regional level

Year	Central	Northern	North-Eastern	Southern	Bangkok and Vicinity
1988	26.6	32.0	48.4	32.5	6.1
1990	22.3	23.2	43.1	27.6	3.5
1992	13.3	22.6	39.9	19.7	1.9
1994	9.2	13.2	28.6	17.3	0.9
1996	6.3	11.2	19.4	11.5	0.6
	Percentage Change				
1988-1990	-16.2	-27.4	-10.9	-15.2	-42.8
1990-1992	-40.4	-2.6	-7.5	-28.6	-44.4
1992-1994	-30.4	-41.4	-28.3	-12.3	-54.7
1994-1996	-31.7	-14.8	-32.0	-33.4	-27.3

Source: Household Social and Economic Survey, Statistic Office Thailand

Appendix G: Percentage of Poverty at area level

Year	Municipality	Sanitation District	Rural
1988	8.0	21.8	40.3
1990	6.9	18.2	33.8
1992	3.6	12.7	29.7
1994	2.4	9.6	21.2
1996	1.6	5.8	14.9
Percentage Change			
1988-1990	-13.8	-16.5	-16.1
1990-1992	-47.8	-30.2	-12.1
1992-1994	-33.3	-24.4	-28.6
1994-1996	-33.3	-39.6	-29.7

Source: Household Social and Economic Survey, Statistic Office Thailand

Appendix H: Poverty at the time of crisis

poverty incident				
Year	Poverty percentage	Poverty Gap	Severity of Poverty	Number of Poverty(million)
1996	11.4	2.8	1.1	6.8
1998	13.0	3.3	1.3	7.9
		Percentage Change		
1996-1998	14.0	17.9	18.2	15.8
Crisis Index	20.9	26.5	27.6	22.3
Expected Value	10.8	2.6	1.0	6.4

Source: Household Social and Economic Survey, Statistic Office Thailand

Appendix I: Percentage of Poverty severity to population after crisis

Year	Ultra Poor	Marginal Poor	Near Poor
1996	6.1	5.3	6.1
1998	7.1	5.9	6.0
	Percentage Change		
1996-1998	16.0	11.3	-1.8
Crisis Index	24.3	15.9	0.5
Expected Value	5.7	5.1	6.0

Source: Household Social and Economic Survey, Statistic Office Thailand

Appendix J: Number of poor people between the crises (million)

Year	Ultra Poor	Marginal Poor	Near Poor
1996	3.7	3.2	3.7
1998	4.4	3.6	3.7
	Percentage Change		
1996-1998	18.6	13.5	0.4
Crisis Index	26.6	17.7	2.2
Expected Value	3.4	3.1	3.6

Source: Household Social and Economic Survey, Statistic Office Thailand

Appendix K: Percentage of Poverty by region between the crises

Year	Central	Northern	North-Eastern	Southern	Bangkok and Vicinity
1996	6.3	11.2	19.4	11.5	0.6
1998	7.6	9.1	24.0	14.6	0.6
			Percentage Change		
1996-1998	20.3	-18.9	23.5	26.8	-12.7
Crisis Index	30.0	-14.3	29.9	34.4	-2.4
Expected Value	5.8	10.6	18.5	10.9	0.6

Source: Household Social and Economic Survey, Statistic Office Thailand

Appendix L: Percentage of Poverty at area level

Year	Municipality	Sanitation District	Rural
1996	1.6	5.8	14.9
1998	1.4	7.5	17.3
	Percentage Change		
1996-1998	-12.5	29.3	16.1
Crisis Index	-4.9	38.9	22.8
Expected Value	1.5	5.4	14.1

Source: Household Social and Economic Survey, Statistic Office Thailand

Appendix M: Poverty Gap Ratio, Severity of Poverty, Poverty line, Percentage of Poverty and number of poverty year 1988-2010

Year	1988	1990	1992	1994	1996	1998
Poverty Gap Ratio	1.40	8.05	6.62	3.92	2.85	3.35
Severity of Poverty	4.30	2.82	2.23	1.22	0.85	0.99
Poverty line (Baht/person/Month)	633	692	790	838	953	1,130
Percentage of Poverty	42.21	33.69	28.43	18.98	14.75	17.46
number of poverty (Million)	22.1	18.4	15.8	10.7	8.5	10.2
Total Population (Million)	52.4	54.5	55.6	56.6	57.6	58.7

Continue:

Year	2000	2002	2004	2006	2008	2010
Poverty Gap Ratio	4.24	2.75	2.01	1.81	1.49	1.33
Severity of Poverty	1.30	0.81	0.56	0.53	0.40	0.37
Poverty line (Baht/person/Month)	1,135	1,190	1,242	1,386	1,579	1,678
Percentage of Poverty	20.98	14.93	11.16	9.55	8.95	7.75
number of poverty (Million)	12.6	9.1	7.0	6.1	5.8	5.1
Total Population (Million)	59.9	61.2	62.9	63.4	64.5	65.5

Sources: Office of the National Economic and Social Development Board of Thailand

Appendix N: Gini coefficient of Thailand

Year	Gini coefficient
1988	0.487
1990	0.515
1992	0.536
1994	0.520
1996	0.513
1998	0.507
2000	0.522
2002	0.507
2004	0.493
2006	0.511
2009	0.485
2011	0.484

Sources: Office of the National Economic and Social Development Board of Thailand

Appendix O: Percentage of income of Thai population

Income Quintile	Percentage of population					
	1988	1990	1992	1994	1996	1998
Quintile 1(20%)	4.58	4.29	3.96	4.07	4.18	4.30
Quintile 2(20%)	8.05	7.54	7.06	7.35	7.55	7.75
Quintile 3(20%)	12.38	11.70	11.11	11.67	11.83	12.00
Quintile 4(20%)	20.62	19.50	18.90	19.68	19.91	19.82
Quintile 5(20%)	54.37	56.97	58.98	57.23	56.53	56.13
Quintile 5/Quintile 1	11.88	13.28	14.90	14.07	13.52	13.06

Continue:

Income Quintile	Percentage of population					
	2000	2002	2004	2006	2007	2009
Quintile 1(20%)	3.95	4.23	4.54	4.03	4.41	4.79
Quintile 2(20%)	7.27	7.72	8.04	7.69	8.04	8.36
Quintile 3(20%)	11.50	12.07	12.41	12.13	12.42	12.57
Quintile 4(20%)	19.83	20.07	20.16	20.04	20.20	20.08
Quintile 5(20%)	57.45	55.91	54.86	56.11	54.93	54.19
Quintile 5/Quintile 1	14.55	13.23	12.10	13.92	12.47	11.31

Sources: Office of the National Economic and Social Development Board of Thailand

Appendix P: Average income of Thai population **(**Baht/person/month**)**

Population Group	**1988**	**1990**	**1992**	**1994**	**1996**	**1998**
Quintile 1(20%)	244	296	371	451	623	722
Quintile 2(20%)	429	519	661	815	1,125	1,300
Quintile 3(20%)	660	807	1,041	1,294	1,762	2,013
Quintile 4(20%)	1,098	1,344	1,770	2,181	2,965	3,325
Quintile 5(20%)	2,897	3,927	5,525	6,342	8,412	9,417
Total	1,066	1,379	1,874	2,217	2,978	3,356

Continue:

Population Group	**2000**	**2002**	**2004**	**2006**	**2009**
Quintile 1(20%)	666	817	982	1,057	1,503
Quintile 2(20%)	1,226	1,494	1,741	2,016	2,622
Quintile 3(20%)	1,938	2,334	2,686	3,179	3,941
Quintile 4(20%)	3,343	3,882	4,367	5,254	6,299
Quintile 5(20%)	9,687	10,808	11,874	14,707	16,993
Total	3,372	3,867	4,331	5,243	6,272

Sources: Office of the National Economic and Social Development Board of Thailand

Appendix Q: Data for testing the relationship between entrepreneurship and economic growth

Provinces	Year	lnYp	lnE	lnSk	lnSh	lnlp
1	2000	-3.77775	4.330733	-1.82685	4.128746	2.038949
1	2005	-3.1234	4.369448	-2.34708	4.436752	-3.14682
2	2000	-4.21756	5.484797	-1.70393	4.366913	1.712264
2	2005	-4.03075	6.061457	-2.89757	4.615121	0.684563
3	2000	-3.6633	6.881411	-1.65515	4.483003	1.895345
3	2005	-3.53194	7.34601	-2.15073	4.638605	2.088253
4	2000	-3.87602	4.65396	-1.64404	4.395683	2.414626
4	2005	-3.73076	5.036953	-2.54412	4.363099	2.269211
6	2000	-4.22297	3.555348	-2.44665	4.570579	1.809431
6	2005	-4.09769	4.110874	-3.67695	4.5486	1.140033
8	2000	-3.71648	5.09375	-1.63887	4.268298	1.859049
8	2005	-3.66212	5.583496	-2.11188	4.564348	0.537349
9	2000	-4.20422	4.248495	-1.23426	4.175925	1.681606
9	2005	-3.88941	4.990433	-1.70323	3.815512	0.548745
10	2000	-4.08517	4.189655	-1.89634	4.400603	1.403344
10	2005	-3.93684	4.143135	-1.81091	4.492001	0.644723
11	2000	-4.23723	3.178054	-1.75523	4.380776	2.106415
11	2005	-4.19743	3.828641	-2.16859	4.391977	2.485838
12	2000	-3.60779	5.123964	-1.57115	4.511958	1.5778
12	2005	-3.42472	5.501258	-1.70835	4.60517	0.661694
13	2000	-2.52787	4.574711	-1.76524	4.578826	1.612536
13	2005	-2.56118	5.337538	-2.00424	4.611152	1.543103
14	2000	-4.06454	3.850148	-1.73367	4.178992	1.867959
14	2005	-3.94513	3.931826	-1.31105	4.582925	1.03113
15	2000	-3.96476	4.143135	-2.59809	4.283587	1.772944
15	2005	-3.8142	4.394449	-1.61035	4.554929	0.677406
16	2000	-3.87302	3.637586	-1.40671	4.297285	1.927794
16	2005	-3.82145	3.951244	-1.7582	4.55598	1.047429
18	2000	-1.84205	9.64355	-1.42668	4.149464	1.90337
18	2005	-1.65967	9.995155	-1.4701	4.585987	1.341709
19	2000	-3.40935	5.01728	-1.36027	4.300003	2.185582
19	2005	-3.41211	5.332719	-2.14366	4.543295	2.227383
20	2000	-3.65436	4.70953	-1.9415	4.515245	2.078316
20	2005	-3.49837	5.056246	-2.03665	4.588024	1.539423
21	2000	-2.59911	5.370638	-2.57832	4.478473	2.063634
21	2005	-1.93106	5.913503	-2.39778	4.635699	1.715811
22	2000	-1.94341	7.246368	-2.25086	4.62791	2.475315
22	2005	-1.63416	8.438583	-1.20604	4.695925	2.413799
23	2000	-3.53749	3.78419	-1.18033	4.174387	1.577828

23	2005	-3.38435	4.174387	-2.43784	4.51086	0.653172
24	2000	-3.4591	3.73767	-1.50179	4.356709	2.451269
24	2005	-3.24523	4.820282	-1.91528	4.565389	0.985602
25	2000	-3.65564	3.401197	-1.86855	4.403054	2.06899
25	2005	-3.4951	4.369448	-2.61835	4.647271	1.669364
26	2000	-2.82427	5.968708	-1.82527	4.427239	2.326473
26	2005	-2.53651	6.52503	-2.32363	4.670021	1.967481
27	2000	-3.12166	7.419381	-1.50062	4.369448	2.687981
27	2005	-2.91556	7.909489	-1.44238	4.433195	2.706505
28	2000	-2.02929	6.985642	-2.24475	4.611152	3.171271
28	2005	-2.14245	7.754053	-1.58376	4.532599	3.219474
29	2000	-3.22972	5.043425	-1.5799	4.368181	2.129914
29	2005	-3.04157	6.674561	-1.80181	4.55598	1.765552
30	2000	-3.26164	4.488636	-2.59636	4.273884	2.049247
30	2005	-2.48456	5.062595	-2.06099	4.641502	1.659239
31	2000	-1.6467	5.749393	-1.60971	4.429626	2.042297
31	2005	-1.33862	6.575076	-1.34343	4.649187	1.739344
32	2000	-3.13253	4.65396	-1.45356	4.453184	1.875297
32	2005	-2.98724	5.455321	-1.73337	4.65396	1.360388
33	2000	-1.25765	6.013715	-1.26691	4.440296	2.468993
33	2005	-0.9415	6.64379	-1.4808	4.672829	2.22474
34	2000	-3.19268	5.123964	-1.46911	4.346399	1.915282
34	2005	-2.8714	5.583496	-1.63245	4.547541	1.565393
35	2000	-3.06249	4.919981	-1.87934	4.421247	1.886831
35	2005	-2.93636	5.31812	-2.16825	4.629863	1.186978
36	2000	-1.5436	7.275172	-2.38634	4.50535	2.304622
36	2005	-1.3211	7.860185	-1.53978	4.531524	2.442957
37	2000	-3.60106	3.367296	-2.2114	4.26268	1.328694
37	2005	-3.37748	3.713572	-1.79704	4.578826	-0.84016
38	2000	-1.54797	6.253829	-1.81727	4.350278	2.521945
38	2005	-1.1761	6.630683	-1.78003	4.352855	2.171529
39	2000	-2.66722	5.438079	-1.66442	4.449685	2.318785
39	2005	-2.159	6.113682	-1.27254	4.534748	1.09624
40	2000	-3.34784	3.496508	-2.20983	4.48526	1.484028
40	2005	-3.04907	4.007333	-2.05777	4.67935	0.944579
41	2000	-3.66189	4.844187	-0.65273	4.329417	1.827581
41	2005	-3.55267	5.252273	-1.70102	4.490881	1.094966
42	2000	-3.5309	3.850148	-1.51946	4.458988	1.700054
42	2005	-3.31803	4.234107	-1.59592	4.613138	1.112887
43	2000	-3.96617	4.094345	-1.99183	4.514151	2.072248
43	2005	-3.82732	4.290459	-1.18713	4.504244	1.689823
45	2000	-3.71736	5.786897	-1.38804	4.404277	2.254817
45	2005	-3.4402	6.230481	-1.67724	4.592085	1.495592

46	2000	-4.25071	4.356709	-1.4834	4.283587	1.993114
46	2005	-4.19259	4.644391	-1.75627	4.498698	1.325461
49	2000	-3.88812	6.238325	-1.49291	4.237001	1.956759
49	2005	-3.71622	6.660575	-1.6194	4.553877	1.449855
50	2000	-4.4216	4.836282	-1.7941	4.219508	2.136304
50	2005	-4.26255	4.983607	-2.10955	4.528289	1.577052
51	2000	-4.34534	4.532599	-2.22729	4.309456	1.943619
51	2005	-4.19282	4.60517	-1.57023	4.561218	1.542633
52	2000	-4.3941	4.521789	-2.26942	3.613617	1.821274
52	2005	-4.19082	4.934474	-2.9096	4.504244	1.464241
53	2000	-4.19092	4.454347	-2.18967	4.37827	1.753154
53	2005	-4.05027	4.418841	-1.88979	4.609162	0.616901
54	2000	-4.55383	4.488636	-1.67727	4.264087	2.000751
54	2005	-4.32138	4.718499	-1.66166	4.549657	1.500967
55	2000	-4.44667	4.369448	-1.49855	4.225373	2.052402
55	2005	-4.25719	4.812184	-2.22755	4.54542	1.653791
56	2000	-4.44907	4.70953	-2.91344	4.335983	1.907523
56	2005	-4.29745	4.94876	-2.01893	4.546481	1.319337
58	2000	-4.17775	5.342334	-1.40891	4.348987	2.119769
58	2005	-4.06253	5.971262	-1.49311	4.507557	1.572093
59	2000	-4.28446	5.181784	-1.53519	4.222445	2.069631
59	2005	-4.10769	5.609472	-1.33505	4.53582	1.552277
60	2000	-4.25899	4.025352	-2.08759	4.453184	2.156104
60	2005	-4.18267	4.532599	-2.93757	4.57368	1.495149
61	2000	-4.473	3.637586	-1.74403	4.265493	2.038053
61	2005	-4.32236	3.688879	-1.99223	4.598146	1.639453
62	2000	-4.6619	3.951244	-3.05762	4.204693	2.029244
62	2005	-4.3848	3.988984	-2.44139	4.45783	1.614981
64	2000	-3.41178	4.49981	-1.70355	4.291828	2.333868
64	2005	-3.17525	4.867534	-2.64535	4.602166	1.871336
65	2000	-3.45134	4.51086	-1.4854	4.237001	2.265752
65	2005	-3.21965	4.85203	-1.65066	4.543295	1.775008
66	2000	-3.56346	5.46806	-1.66411	4.251348	1.860011
66	2005	-3.40788	5.765191	-2.4104	4.551769	1.253812
67	2000	-3.9233	4.174387	-1.66437	4.198705	2.522942
67	2005	-3.71563	4.234107	-3.83298	4.308111	1.875674
68	2000	-3.67201	4.060443	-3.3453	4.377014	2.317944
68	2005	-3.65876	4.158883	-2.77234	4.503137	2.028851
69	2000	-3.2144	4.189655	-1.82692	4.245634	2.104656
69	2005	-3.02915	4.762174	-1.09332	4.516339	1.895188
70	2000	-3.93914	4.26268	-1.66599	4.200205	1.917921
70	2005	-3.67198	4.477337	-1.75385	4.514151	1.510524
71	2000	-2.4281	6.821107	-2.05643	4.432007	3.07987

71	2005	-2.45361	7.520235	-1.53261	4.563306	2.821731
72	2000	-3.59493	4.382027	-2.0265	4.609162	2.699505
72	2005	-3.53314	4.276666	-1.80804	4.50535	2.062547
73	2000	-3.21107	3.555348	-5.05518	4.347694	2.638365
73	2005	-3.12211	3.931826	-2.31297	4.465908	2.717307
74	2000	-3.07851	6.274762	-1.28291	4.247066	2.366949
74	2005	-2.96173	6.54535	-3.03667	4.498698	2.223926
75	2000	-3.28871	3.610918	-1.76946	4.420045	2.322904
75	2005	-3.21417	3.7612	-2.04503	4.540098	2.200804
76	2000	-3.23994	6.216606	-2.49496	4.306764	2.396129
76	2005	-2.99295	7.47817	-2.51266	4.576771	2.238387

Appendix R: Data for testing the relationship between entrepreneurship and Gini coefficient

Provinces	Year	lnGini06-lnGini98(8year)	lnGi8(initial)	lnyi06-lnYi98	E/8	Eper100t/8
1	2006	-0.077063348	-0.939047719	0.78	103.125	13.65006547
2	2006	0.325931955	-1.117795108	0.15	389.125	31.46727274
3	2006	0.140106038	-0.970219074	0.10	1375.75	85.14096366
4	2006	-0.216296013	-0.74865989	0.31	139	27.51217436
5	2006	0.243009632	-1.174414002	0.23	225.375	20.39250136
6	2006	0.203885735	-1.002393431	0.10	64.5	13.35799454
7	2006	-0.14831976	-0.918793862	0.21	81.125	13.92408406
8	2006	0.065554265	-0.996958635	0.07	261.875	30.52757598
9	2006	0.18610228	-1.177655496	0.34	122.375	11.91161971
10	2006	0.140905453	-1.190727578	0.14	103.375	21.44254967
11	2006	-0.142139767	-0.916290732	0.14	44.25	18.28567332
12	2006	0.052965536	-0.738144546	0.07	299.625	37.78669796
13	2006	0.106843096	-1.087672349	0.11	178.375	43.88285749
14	2006	-0.025919378	-0.757152511	0.11	78.75	12.70098853
15	2006	0.189426382	-0.983499482	0.10	76.5	16.0054776
16	2006	-0.019608471	-0.88673193	0.16	42.25	12.74069455
17	2006	0.128309449	-1.090644119	0.19	99.625	19.97099404
18	2006	0.111225635	-1.030019497	0.34	19611.13	343.7209283
19	2006	-0.07084769	-0.858021824	0.05	204.625	25.50707961
20	2006	-0.276076526	-0.665532014	0.15	158.625	31.73727641
21	2006	0.027587957	-1.251763468	0.88	287.625	44.51219195
22	2006	-0.141830195	-1.418817553	0.51	2836.625	247.895839
23	2006	-0.075304383	-0.95191791	0.11	53.125	15.31688467
24	2006	0.196353979	-0.913793852	0.19	94.375	42.53677807
25	2006	-0.126959627	-1.347073648	0.25	62.625	25.15108562
26	2006	0.428010346	-1.180907531	0.46	572	71.59912108
27	2006	0.290551515	-1.343234872	0.31	2276	248.3441155
28	2006	-0.202469257	-0.991553216	0.50	1731.875	233.7880783
29	2006	-0.119583216	-0.874669057	0.50	410.75	84.39942461
30	2006	-0.080042708	-1.207311706	0.54	141.875	31.6164372
31	2006	-0.099090903	-1.328025453	0.72	516.875	69.44722674
32	2006	-0.279960026	-1.067113622	0.42	169.75	37.19145543
33	2006	0.254675776	-1.465337568	0.52	640.25	117.2354195
34	2006	0.502091944	-1.287354413	0.44	239.625	29.07034716
35	2006	-0.020672571	-0.939047719	0.47	166	21.86844994
36	2006	-0.012739026	-1.439695138	0.61	2148.375	206.83528
37	2006	0.383180063	-1.418817553	0.20	47.375	23.50370483
38	2006	-0.30736163	-1.123930097	0.58	644.375	145.806849

39	2006	-0.016863806	-1.207311706	0.57	344.625	56.5738728
40	2006	-0.030844675	-0.848632083	0.34	53.375	24.07825338
41	2006	-0.53038615	-0.884307686	0.14	167.875	19.6674671
42	2006	-0.236862824	-0.862749965	0.17	60.125	20.9191704
43	2006	0.150880031	-1.049822124	0.16	79	14.74501614
44	2006	0.221915804	-1.120857898	0.24	104.5	10.63973385
45	2006	-0.087011377	-0.957112726	0.47	443.625	25.30834516
46	2006	0.228700836	-1.130102956	0.18	92.125	8.183344991
47	2006	0.031840606	-1.078809661	0.20	69.75	12.71819744
48	2006	0.128254336	-0.967584026	0.09	78.75	11.15461744
49	2006	0.112374694	-0.88673193	0.27	674.75	26.38807274
50	2006	0.248849096	-1.018877321	0.13	157.375	10.25974017
51	2006	0.323614082	-1.402423743	0.17	105.5	11.23343261
52	2006	0.232691916	-1.305636458	0.21	123.75	9.401725145
53	2006	0.066862945	-0.978166136	0.17	101.5	16.27938082
54	2006	0.159541528	-0.994252273	0.19	117.625	8.114692999
55	2006	0.142174489	-1.021651248	0.22	111.625	10.11522488
56	2006	0.247214123	-1.041287222	0.17	127.5	9.210525033
57	2006	-0.199566821	-0.687165109	0.16	156.875	17.37849107
58	2006	0.403225466	-1.210661792	0.15	334.375	21.91103847
59	2006	0.339801873	-1.358679194	0.18	259	14.56835175
60	2006	0.106733199	-1.010601411	0.18	69.25	20.66637711
61	2006	0.296687455	-1.190727578	0.24	42.25	11.47191743
62	2006	0.046776065	-1.03563749	0.30	56	11.28241839
63	2006	0.217850978	-1.075872802	0.53	198.625	51.93979286
64	2006	-0.134956233	-1.200645014	0.38	126.75	26.9175721
65	2006	-0.08944506	-0.983499482	0.24	131.375	21.935921
66	2006	0.021252276	-0.869884359	0.17	299.25	19.69697587
67	2006	-0.138836445	-0.972861083	0.25	79.875	11.56426527
68	2006	-0.150039293	-0.809680997	-0.00	68.375	10.9643092
69	2006	0.245570587	-1.234432012	0.18	117.375	49.06372588
70	2006	0.002460026	-0.901402119	0.26	82	16.31458973
71	2006	-0.402857545	-0.95972029	0.31	1398	508.5399372
72	2006	-0.327212911	-0.949330586	0.11	78	17.22199942
73	2006	0.092551557	-1.108662625	0.09	54.75	32.86400324
74	2006	-0.002894358	-1.061316504	0.18	694.875	54.67736349
75	2006	-0.106059572	-1.145703896	0.24	45.375	16.75689489
76	2006	0.332938664	-1.414693836	0.41	1057.375	113.5438616

Appendix S: Data for testing the relationship between entrepreneurship and Income of the poor

Provinces	Year	lnYq06-lnYq98(8year)	lnYq8(initial)	lnyi06-lnYi98	E100/8
1	2006	-0.055569851	2.00148	0.78	13.65007
2	2006	-0.112477983	2.240709689	0.15	31.46727
3	2006	-0.197359434	1.902107526	0.10	85.14096
4	2006	0.327687407	1.589235205	0.31	27.51217
5	2006	-0.131769278	2.091864062	0.23	20.3925
6	2006	-0.514898949	2.104134154	0.10	13.35799
7	2006	-0.077558234	1.902107526	0.21	13.92408
8	2006	0.030771659	1.85629799	0.07	30.52758
9	2006	-0.075985907	2.104134154	0.34	11.91162
10	2006	-0.290923566	2.332143895	0.14	21.44255
11	2006	0.171850257	2.079441542	0.14	18.28567
12	2006	-0.125163143	1.62924054	0.07	37.7867
13	2006	0.085766822	1.902107526	0.11	43.88286
14	2006	0.117783036	1.722766598	0.11	12.70099
15	2006	-0.457424847	2.066862759	0.10	16.00548
16	2006	0.139761942	1.791759469	0.16	12.74069
17	2006	-0.22054277	2.261763098	0.19	19.97099
18	2006	-0.098845835	2.140066163	0.34	343.7209
19	2006	0	1.871802177	0.05	25.50708
20	2006	0.397301797	1.410986974	0.15	31.73728
21	2006	-0.023256862	2.163323026	0.88	44.51219
22	2006	0.124562723	2.282382386	0.51	247.8958
23	2006	0.168335315	1.791759469	0.11	15.31688
24	2006	-0.333491608	1.902107526	0.19	42.53678
25	2006	0.107420249	2.272125886	0.25	25.15109
26	2006	-1.136352617	2.091864062	0.46	71.59912
27	2006	-0.152340725	2.219203484	0.31	248.3441
28	2006	0.037271395	2.066862759	0.50	233.7881
29	2006	0.14518201	1.85629799	0.50	84.39942
30	2006	-0.225956493	2.186051277	0.54	31.61644
31	2006	0.125880246	2.104134154	0.72	69.44723
32	2006	0.164303051	2.128231706	0.42	37.19146
33	2006	-0.340082349	2.406945108	0.52	117.2354
34	2006	-0.428193359	2.186051277	0.44	29.07035
35	2006	0.147324715	1.840549633	0.47	21.86845
36	2006	-0.09265883	2.424802726	0.61	206.8353
37	2006	-0.069795762	2.186051277	0.20	23.5037
38	2006	0.371176035	2.186051277	0.58	145.8068
39	2006	-0.01242252	2.091864062	0.57	56.57387

40	2006	0.148420005	1.609437912	0.34	24.07825
41	2006	0.543086486	1.808288771	0.14	19.66747
42	2006	0	1.987874348	0.17	20.91917
43	2006	-0.141078598	2.028148247	0.16	14.74502
44	2006	-0.394654192	2.219203484	0.24	10.63973
45	2006	0.056352937	1.931521412	0.47	25.30835
46	2006	-0.182321557	2.128231706	0.18	8.183345
47	2006	0.035932009	2.104134154	0.20	12.7182
48	2006	-0.257045103	2.014903021	0.09	11.15462
49	2006	-0.330241687	1.85629799	0.27	26.38807
50	2006	-0.538996501	1.974081026	0.13	10.25974
51	2006	-0.428668005	2.388762789	0.17	11.23343
52	2006	-0.120363682	2.272125886	0.21	9.401725
53	2006	0	1.85629799	0.17	16.27938
54	2006	-0.27029033	2.028148247	0.19	8.114693
55	2006	-0.249654677	2.151762203	0.22	10.11522
56	2006	-0.462623522	2.091864062	0.17	9.210525
57	2006	0.249215792	1.667706821	0.16	17.37849
58	2006	-0.713766468	2.282382386	0.15	21.91104
59	2006	-0.146603474	2.397895273	0.18	14.56835
60	2006	-0.262364264	2.054123734	0.18	20.66638
61	2006	-0.114775515	2.116255515	0.24	11.47192
62	2006	-0.186877373	2.174751721	0.30	11.28242
63	2006	-0.443205436	2.091864062	0.53	51.93979
64	2006	0.021739987	2.208274414	0.38	26.91757
65	2006	0.097980408	1.916922612	0.24	21.93592
66	2006	-0.188052232	1.945910149	0.17	19.69698
67	2006	0.169418152	1.871802177	0.25	11.56427
68	2006	0.229574442	1.824549292	-0.00	10.96431
69	2006	0.098845835	2.041220329	0.18	49.06373
70	2006	0.159427737	2.091864062	0.26	16.31459
71	2006	0.312683375	2.066862759	0.31	508.5399
72	2006	0.304660409	1.987874348	0.11	17.222
73	2006	0.112795494	1.902107526	0.09	32.864
74	2006	0.013245227	2.014903021	0.18	54.67736
75	2006	-0.055262679	2.2300144	0.24	16.75689
76	2006	-0.372979653	2.360854001	0.41	113.5439

Appendix T: Data for testing the relationship between entrepreneurship and Poverty

Provinces	Year	lnHC06-lnHC00(6year)	lnHC6(initial)	lnyi06-lnYi00	E6
1	2006	-0.562660731	1.762896591	0.708508805134247	15.3
2	2006	-0.790777724	3.539779184	0.178297037267605	36.8
3	2006	-0.707475511	2.882316011	0.214042264526853	97.8
4	2006	-0.504825372	3.54665317	0.267467614764538	31.8
5	2006	-0.537540563	2.749470849	0.271017228795618	23.4
6	2006	-0.126289309	3.085928243	0.140121363655853	15.6
7	2006	-1.216250398	2.770095032	0.205964797367988	15.5
8	2006	-1.340770556	3.491244185	0.065631800898565	35.6
9	2006	-0.817250141	3.6351437	0.359459573252234	13.5
10	2006	-0.82711098	3.257851705	0.152390088480677	24.8
11	2006	0.118828595	3.842555127	0.145552524544755	21.8
12	2006	-0.919813754	3.165245548	0.150553557191428	44.6
13	2006	-0.764450836	2.304443311	0.083546428317249	52.5
14	2006	-0.423658826	2.91714221	0.117701283511249	14.8
15	2006	-0.920668576	2.579072022	0.171013502304149	17.5
16	2006	-0.921157174	3.05814943	0.100865404308630	14.2
17	2006	-0.895639495	2.974131812	0.217756111475458	23.5
18	2006	-1.206168659	0.538728314	0.187340987557796	387
19	2006	-1.183347289	3.356576971	0.095260503765552	28
20	2006	-2.156484113	2.543493828	0.206868163499832	36.1
21	2006	2.031279485	-0.439623538	0.809702685384734	51.5
22	2006	-2.274237437	0.541584906	0.412821108422422	295
23	2006	0.10895016	1.730823502	0.155186890660909	17.4
24	2006	-0.937289891	2.94863172	0.269669245363461	48.9
25	2006	-2.958882558	2.906075411	0.231999932672771	28.1
26	2006	-0.615267205	-0.194410664	0.369761339603460	81.4
27	2006	#NUM!	#NUM!	0.384232238662936	280
28	2006	-1.763222872	1.18749579	0.354894211283534	271
29	2006	-2.139026548	2.593907214	0.328309865161971	102
30	2006	-1.588055744	2.368493607	0.807209548115845	35.7
31	2006	-1.273914906	0.585730323	0.410849370277168	81.1
32	2006	-1.638814185	2.408310029	0.194251668442792	42.6
33	2006	-2.238528517	1.436964475	0.426597034290667	135
34	2006	0.535853686	1.456217292	0.319959202164066	32.2
35	2006	-0.937405144	2.378087547	0.115432937591093	25.3
36	2006	#NUM!	-0.361936278	0.371821429400114	236
37	2006	1.82845994	-0.272774158	0.264123809005861	25.4
38	2006	-2.125357128	1.85618213	0.517231610728883	166
39	2006	-0.874343672	2.038965855	0.562681859565641	65.3
40	2006	-0.346204392	1.910103363	0.305807858104755	27.4

41	2006	-2.543668966	3.338662436	0.134921520223836	22.4
42	2006	-0.775195525	2.438701977	0.224603545040139	22.5
43	2006	-0.53522855	3.610564415	0.201661305536570	16.1
44	2006	-0.235767245	3.157457487	0.271168306893774	11.7
45	2006	-0.749623446	3.457160687	0.453108066629907	28.5
46	2006	-0.746700965	3.587266448	0.131876292748318	9.28
47	2006	-1.81029899	3.827539869	0.198897837021025	14.7
48	2006	-0.590758095	3.848425454	0.055686526428213	12
49	2006	-0.374108979	3.110062217	0.259055390967850	30.3
50	2006	-0.114127453	3.538244853	0.202455457985778	11.5
51	2006	-0.88671441	3.015490735	0.209804755628138	12.6
52	2006	-0.780996837	3.463251714	0.255007299601541	10.8
53	2006	-0.657582773	3.16909051	0.147639077052313	19.2
54	2006	-0.655097755	3.706867786	0.258878025381415	9.11
55	2006	-1.24199597	3.94351755	0.233813099213766	11.5
56	2006	-1.405676824	4.057759287	0.192992204534432	10.4
57	2006	-0.824925518	2.761655266	0.275851941419599	20.5
58	2006	-1.530338344	4.104936938	0.178352263936720	24.8
59	2006	-0.029715892	3.253557483	0.225857072481263	16.4
60	2006	-0.497354032	3.305339109	0.123301940259527	23.5
61	2006	-1.271587512	3.704354959	0.205362092574674	12.9
62	2006	-1.174383029	3.792561629	0.336866749532865	12.9
63	2006	-0.194475999	1.931800665	0.512161147624340	59.5
64	2006	-1.001567938	1.967194238	0.316893536066411	30.3
65	2006	-2.313275384	1.969345158	0.271258801138318	25
66	2006	-1.99552784	3.01313911	0.168540985429170	22.2
67	2006	-0.458659134	3.756453959	0.259615856606510	12.1
68	2006	-0.876084582	3.667576073	0.102356038860645	12.1
69	2006	#NUM!	1.487516792	0.250725245587244	57.3
70	2006	-0.83082457	2.030217765	0.312995928040507	18.7
71	2006	#NUM!	#NUM!	0.213597416798853	583
72	2006	-1.043057951	2.946598554	0.103867638676361	18.2
73	2006	-4.385948407	3.220289592	0.213847277937674	34.2
74	2006	-2.882389428	2.666822058	0.179413114707293	61.5
75	2006	-0.263163196	2.135501556	0.181302006274789	19
76	2006	-1.936136951	1.735714707	0.402148798495524	135

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