YANGON UNIVERSITY OF ECONOMICS

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ESTIMATION OF RATE OF RETURNS ON INVESTMENT IN EDUCATION IN MYANMAR

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CERTIFICATION

I hereby certify that content of this dissertation is wholly my own work unless otherwise referenced or acknowledged. Information from sources is referenced with original comments and ideas from the writer herself/himself.

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ABSTRACT

Education is one of the main drivers of economic growth and development The success of education system of a country depends on the motivation of individuals within the system. A person's motivation to pursue education is largely determined by the monetary returns among other things such as career advancement, skill development, and employment opportunities. This study aims to analyse the returns on education in Myanmar by using data from Labour Force Survey (2015) of Myanmar. The Mincer's wage model and recursive (path) model were used to analyse the rate of returns on investment in education. The findings showed that education had positive and significant effect on earnings, and the rate of returns was about 2.9 per cent in 2015. Moreover, there was an inverted U-shaped relationship between working experience and earnings. The results also indicated that there was an income gap in gender, region and marital status in Myanmar. According to the results, working family members' education could contribute to improve the type of their occupation and higher wage. And then according to the estimated coefficients of the path model, father education and father occupation, father education and other working family members' education, father occupation and other working family members' occupation, other working family members' education and their occupation and their earnings are significantly linking. Based on the findings, it is recommended that the estimation of rate of returns on investment in education is important for the policymaker in order to create the society with people more pursuing education. In such a way, the society will tend to achieve economic stability, healthier environment, lower crime, and greater equality.

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LIST OF ABBREVIATIONS

ADB	Asian Development Bank
AIC	Akaike Information Criterion
ASEAN	Association of Southeast Asian Nations
CESD	Center for Economic and Social Development
CESR	Comprehensive Education Sector Review
CSO	Central Statistical Organization
EU	European Union
FDI	Foreign Direct Investments
GDP	Gross Domestic Product
GLS	Generalized Least Squares
GNP	Gross National Product
GoM	Government of Myanmar
HDI	Human Development Index
ICT	Information and Communication Technology
ISCO	International Standard Classification of Occupation
IV	Instrumental Variables
LFS	Labor Force Survey
MDGs	Millennium Development Goals
MMK	Myanmar Kyat
MLE	Maximum Likelihood Estimation
MoE	Ministry of Education
MNPED	Ministry of National Planning and Economic Development
MTRD	Myanmar Television and Radio Department
NEL	National Education Law
NIEs	Newly Industrialized Economies
NESP	National Education Strategic Plan
OECD	Organization for Economic Co-operation and Development
OLS	Ordinary Least Squares
RESET	Regression Specification Error Test
RMSEA	Root Mean Square Error of Approximation
SDG	Sustainable Development Goal

SEM	Structural Equation Modeling
TVET	Technical and Vocational Education and Training
UK	United Kingdom
US	United States
UNECE	United Nations Economic Commission for Europe
UNESCO	United Nations Educational, Scientific and Cultural Organization
UNU-WIDER	United Nations University-World Institute for Development Research
VET	Vocational Education and Training
2SLS	Two-Stage Least Squares

CHAPTER I
INTRODUCTION

Education is regarded as one of the driving forces to economic growth and poverty reduction at individual level as well as national level. At individual level, it gives personal growth and opportunities for socioeconomic improvement. At national level, it provides high quality workers and expands knowledge among citizens of the respective countries.

Impacts of education are mostly positive and have spill-over effects on the neighbourhood of an educated person. Education is not only regarded as a vital component of economic growth, but also a foundation of the development of other social conditions such as health, nutrition, gender equity, and poverty alleviation. Various types of education provide numerous skills and benefits for people.

According to the UNESCO (2021), education is the process, that enable learning gaining knowledge and skills, values, habits and so forth. Education also means helping people to learn how to do things and encouraging them to think about what they learn. Education plays as major role in nurturing qualified human resources and promoting skills. There are three types of educations, which play as major role in nurturing qualified human resources. These include formal education and informal education.

Formal education equips people with skills, knowledge, information and awareness (UNESCO, 2021). It also improves the abilities of citizens to adapt changing circumstances more quickly and guide them to develop responsible and capable personnel in the society. It also enables students to learn skills that help improve their productivity. In addition, it supplies different types of social and non-market benefits such as improvement in child well-being, health status, and social capital.

Non-formal education is an education, which is institutionalized and organized by specific providers, yet it is alternative and/or complement to formal education within realm of lifelong learning and have no specific continuous pathway (UNESCO,

2021). It is characterized by a deliberate choice of the person, which takes place outside of the systems mentioned above, in any organization pursuing educational and training purposes, even volunteering, national civil service, private social service and in private firms. People with diverse age and backgrounds can access non-formal education, which are suitable for them.

In contrast to other types of educations, informal education is the learning arising from daily tasks that linked with work, family, community, daily life or leisure with nonorganized and less structured nature. Informal education does not lead to certification yet may be validated and certified through recognition of prior learning schemes. Informal education is called experiential or incidental learning as well (European Centre for the Development of Vocational Training- CEDEFOP, 2008). Informal education may be teaching a child by his/her parents how to prepare a meal or ride a bicycle. Informal education can be access through self-study and reading. It takes place outside schools and colleges arises from the learner's involvement in activities that are not undertaken with a learning purpose in mind.

Among these three types of education, formal education provides people with skills and knowledge to improve human resources of a nation to adept the changing circumstances more quickly. Different levels of formal education: basic education (primary, middle or lower secondary and high school or upper secondary education) and higher education: provide people to develop responsible and capable personnel in the society. Schooling or formal education is also crucial for the nationals in socialization and acculturation (Saleemad, 2017).

Primary education provides basic literacy and numeracy, which are essential for manual jobs as well as for labour-intensive manufacturing sectors. Secondary education enhances communication and problem-solving skills of the learners. It is a foundation stage to step towards advanced education and training. It enables people to acquire working skills and knowledge. Tertiary education generally involves training and research guidance beyond the secondary school level. Specifically, it consists of universities, colleges, research centres and other institutions. Tertiary or higher education provides easier access to expertise, skills, knowledge and professionals for a nation.

Human resource development should focus on two strategies: maximization of skill and knowledge through education and training and utilization of human resources through job creation. If these goals were pursued, then others such as

economic growth, higher levels of living, and more equitable distribution of income were thought to be the likely consequences. Most of the education policies of East Asian economies were intended towards these goals (Harbison,1973). Contribution of schooling is often measured by labour market earnings. In developing countries, education and experience are the only human asset for getting earnings for a major part of the labour force (Montenegro & Patrinos, 2014).

Human development index (HDI) is utilized to access the levels of well-being of the people. The index is based on three basic social indicators: longevity, knowledge and a decent standard of living. Longevity is measured by life expectancy at birth, as an index of population health. Knowledge is measured by adult literacy rate and gross enrolment ratios of primary, secondary and tertiary levels of an economy. Standard of living is measured by the natural logarithm of gross domestic product per capita at purchasing power parity. By revising the level of the index, it is easy to access a development status of an economy (Human Development Report, 1990).

Primary goal of every country is to achieve and sustain economic and social development and it ultimately depends on the availability of a healthy, nourished, and well-educated population (ADB, 2012). In this rapidly changing competitive global economy, the need for nurturing and developing human resources is the most important factor for countries. Investing in physical capital alone is not adequate in order to achieve economic development. As stated in Agenda 21 of the United Nations, “the ability of a country to pursue sustainable development is determined by the capacity of its people.”

In order to end poverty, protect natural environment, reduce the negative impacts of changing climatic condition and ensure peace and prosperity for people around the world, 17 Sustainable Development Goals (SDGs) are set in 2015 with setting targets to achieve in 2030. Attaining inclusive and quality education confirms that education is amongst the most indispensable driving force for countries. Goal 4 of the SDGs aimed to guarantee all children (girls and boys) to complete free primary and secondary schooling, to provide affordable vocational training and access to quality higher education by 2030 (UNECE, 2017).

To achieve this goal, the Government of Myanmar (GoM) is determined to promote more equitable access and higher quality outcomes for students-commitments which are clearly set out in the National Education Strategic Plan (2016

- 2021). Extent to which (i) global citizenship education and (ii) education for sustainable development, including gender equality and human rights, are main streamed at all levels in: (a) national education policies, (b) curricula, (c) teacher education, and (d) student assessments (UNECE, 2017).

In terms of productivity, the education can be recognized by seeing the ability of workers to adapt new technology and instructions, which are determined by the level of education. According to Montanini (2013), it can also be seen that the level of higher education is related to the abilities required in the job market. Therefore, the productivity contributes to upsurge number of skilled workers, reflecting the higher salaries and vice versa.

1.1 Rationale of the Study

There is a strong consensus among economists that education is the vital determinants of people's earnings. According to the human capital theory, education is an investment that increase the skills and productivity of individuals involved in various industries (Low, 2000). Accordingly, these individuals earn higher income in job market due to their skills and efficiencies. Education can also increase earnings. According to this view, education mainly serves as a signal about the qualifications of the workers to potential employers.

As employers cannot easily observe the abilities of workers in most cases, they may rely on education as a signalling device in their hiring decisions. Above all, returns on investment in education are useful to examine effectiveness of education. Returns on education play an indispensable role in designing policies and crafting incentives that promote investment and ensure that even low-income families make an investment in education.

According to OECD (2009), education is part of the solution to current economic challenges, enhancement of innovative capacity, and fight against climate change. In developing countries, education gives people wider access to paid employment, success, proper health care and knowledge of legal rights. Although education plays an essential role in socioeconomic improvement at individual and national level, many developing countries are experiencing disparities in education sector and low returns from different levels of education.

Based on human capital theory, return on investment in education has been studied since the mid-twentieth century. Human capital can be invested in different

ways including formal schooling and trainings. Investment in education produces benefits at many levels from individual economic prosperity to achieving economic development at the national level. While developed countries have measured returns from various levels of education since the 1950s, developing countries have estimated them since the late twentieth century. As human capital is a factor that generate desirable impact on economy, it is essential to explore the return on education of the countries, especially for developing countries.

In Myanmar, education is regarded as an important element in the development of socio-economic sector. Educating children and young people may lead to better economic and social changes which is vital for economic development of Myanmar. Basic education structure of Myanmar is 5:4:2 with five years at primary school, four years at middle school and two years at high school. At higher education level, professional and non-professional universities are offering diploma and bachelor, master's and doctorate degrees. In addition to formal education, non-formal education also provides benefits to various stakeholders in Myanmar. Non-formal education which operates outside the formal education system encompasses all the organized education such as literacy programs, adult education, vocational and occupational education, on-the-job training, health education, and continuing education for unfortunate children.

While data on non-formal education are difficult to obtain properly at national level, its advantages are enormous. Educating children and young people as the agents of positive social change is of vital importance in Myanmar. The National Education Strategic Plan (NESP) of Myanmar for 2017-2021 is an ambitious road map for a first phase of reforms that aims to improve teaching, learning and inclusion on all education levels. According to the NESP, basic education school year is increased to thirteen years with new curricula and interactive classrooms.

In economics, wage level is determined by productivity of labour. Among all possible contributing factors to labour productivity, education is more indispensable comparing to other factors. Decision making on education investment is similar to that of other financial assets. It compares the cost incurred at the present period with the present value of the future flows of benefits, and investment is made only when the total benefits outweigh the total cost. It also needs to check out whether it is worth more investing in education in Myanmar. Therefore, it is essential to carry out this study to get to the estimates of return on education from the investment in education.

1.2 Objectives of the Study

The main objective of this study is to examine the expected rate of returns on investment in education in Myanmar. In particular, the specific objectives are:

(1) To identify the factors that influence the rate of returns on investment in education using Mincer wage model

(2) To estimate the rate of returns on investment in education using Mincer wage model

(3) To examine the direct and indirect effects of rate of returns on investment in education using recursive (path) model

1.3 Method of Study

In this study, the secondary data from Labour Force Survey in Myanmar (2015) were used to estimate the rate of returns on education by using the Mincer's wage models. In the basic form of Mincer's wage model, logarithm of wage was regressed on education level and experience while in the extended form other control variables such as squared-experience, gender, and location were included. Parameters in the model were estimated by Mincer wage model and recursive regression model. In the former approach, a single equation was estimated and causality was implicitly assumed. In the latter approach, a system of equations was estimated and causality was explicitly assumed. In Mincer wage model, model diagnostic tests such as heteroscedasticity, endogeneity, White's heteroscedasticity test, regression specification error test (RESET), and Hausman test for endogeneity were also performed. Mincer's wage model was first estimated by ordinary least squares (OLS). White's robust standard errors was used under heteroscedasticity problem. Instrumental variables (IV) method was used in the presence of endogeneity problem of education variable in the model. In recursive regression model, directions of causality among variables were presented in path diagrams and all the causal links in the model were estimated simultaneously. In this analysis, a proposed causal model was first estimated and then multigroup analysis was performed to test if the proposed model was significantly different in gender and location.

1.4 Scope and Limitations of the Study

The effect of education on an individual or a society or a country is enormous and multi-dimensional. In social dimension, the behaviour of more educated people is

socially accepted and a smaller number of crimes in the community could be expected. In health dimension, more educated people have higher level of health knowledge and longer life expectancy could be anticipated. Similarly, better educated people are regarded as potential to earn higher and have higher economic status. In particular, the scope of this study is confined to the estimation of the rate of returns on education in Myanmar and the source of data was from Labour Force survey 2015. Then, the rate of returns on investment in education is measured by monthly wages/salaries. The main limitation of this study was the unavailability of data for unobserved variable 'ability', which has effect on both earnings and level of education. Furthermore, the control important variables such as cost of living, cost of training, skills/qualification, and school quality which influence the rate of returns on education are not included in this study. Demographic variables such as household size, number of siblings, sibling's current job, sibling's earnings, ease of getting access to education and so on are associated with returns on education. However, these are not included in this study. As a consequence, proxy variables such as educational level of parents was used. While this strategy might reduce the assurance of the research findings.

1.5 Organization of the Study

This study consists of six chapters. Chapter I is the introduction. Chapter II presents the empirical literature on returns on education. Chapter III reviews contribution of education in Myanmar's human capital formation. Chapter IV provides research methodology, in which modelling issues, underlying assumptions, and estimation strategies are discussed. Chapter V is estimation of returns on education in Myanmar, where basic and extended Mincer wage equations are estimated with Ordinary Least Squares (OLS) and Instrumental Variables (IV) methods is used to analyse national level as well as states and regions. This chapter also performs recursive regression model. Chapter VI concludes the current study with findings, discussions, recommendations and needs for future study.

CHAPTER II
LITERATURE REVIEW

This chapter provides the related studies on education in achieving higher socio-economic status of an economy. In this chapter, fundamentals of education and human capital investment is also portrayed. Moreover, previous studies of Mincer wage model, path analysis and the related literature of returns on investment in education are discussed.

2.1 Education in Achieving Higher Socio-Economic Status

Education is regarded as an individual's learning process to gain knowledge and understand higher specific objects. It is one of the outputs of an investment in human resources and an input for developing qualified human resources and the economy in the future. It is also regarded as one of the key factors to achieve greater equity both economically and socially. Prior to the twentieth century, it was widely believed that accumulation of physical capital was the most important for a nation to achieve economic growth. Development of secondary education was interrelated with the situation of export-led growth. However, many economies strongly emphasized primary and higher education. Higher education, which is also known as tertiary education comprises education, training, and research guidance provided beyond the secondary school level. In particular, it consists of universities, junior colleges, technical training schools, and the like. It provides students with knowledge and skills needed to pursue specific occupations and develops human resources to be capable of playing a central role in national economic growth. In addition, it also leads to gain wider opportunities for people and to achieve social development.

Becker (1964) stated that when individuals invest in their further education, they make themselves subsequently more productive in the labour market, which leads in turn to receive higher earnings. Education has received wide recognition around the world as a key element of the development process since the re-comprehension of Shultz in the early 1961. In 1961, Theodore Schultz, American

economist, rediscovered the importance of human resources. He developed human capital theory after finding out the reason of long-term high growth rates of the United States economy, which was due mainly to the investment in education. This meant that rates of return on investment in education was higher than the rate of return on physical capital, suggesting that need for enhancing educational investment for even more economic growth.

Mincer (1974) stated that educated workers gain three advantages comparing to less-educated one. These advantages include higher wages, better stability in employment and greater potential to earn higher income. Increased earnings by workers with higher education levels are attained due to the result of two factors. First, increased human capital results in higher productivity that allows workers to extract higher hourly wages. Second, increased education increases labour force participation, decreases the likelihood of being unemployed and reducing job turnover. Therefore, the educated workers keep a greater number of hours with higher pays than those less educated workers annually.

Sianesi and Reenen (2002) supported the screening theory where schooling and skill formation provide the enhancement of many economies at macro level. According to neo-classical approach, one-year increase in average education is found to raise the level of output per capita by between 3 and 6 %, while it would lead to over 1 percentage point faster growth as stated by the endogenous growth theories. At micro level, education and skill training influence on aspiration and success of each individual. Moreover, competitiveness of a country in the global economy depends on quality of education and system of education of that country, which in turn depends on the economic structure of a country. However, social progress outstripped economic growth in some countries. For instance, Bangladesh achieved remarkable progress in educational development, especially in secondary enrolment between the period of the 1990s and 2000s, although its income level was low. Net enrolment ratio in Bangladesh's secondary education increased from 19 per cent in 1990-1991 to 45 % in 2002-2003.

Pereira and Martins (2004) showed why considering a number of education-dependent covariates in a wage equation decreases the coefficient of education in the equation. This result is illustrated empirically with a meta-analysis for Portugal. The education coefficient decreases when covariates are used, which can be considered post-education decisions. In contrast, it is independent of sample size, tenure and

nature of different wages used. The outcomes provide the use of a simple specification of the Mincer equation, which emphasizes on total returns on education. In addition, it reveals that the returns on education in Portugal is around 9.7% in 1995 and increases by about 1% over ten years. This is because there is a momentous increase in new work forces' average education in labour market resulting from a larger increase in demand for skills**.**

Okletey (2013) focused on the effect of education on an individual's earnings in Ghana. The Mincer (1974) earnings equation is used in examining the relationship between different educational levels and their effect on earnings in Ghana. Findings from this study reveals that positive returns on education exist in Ghana due to a rise in years of schooling. At the primary level, returns on education are the lowest while return is the highest at the post-basic education. There is an insignificant return to education in junior secondary school. Returns for females at the secondary level are as high as males. Finally, marginal returns of workers from non-agricultural sector are higher than those from agricultural sector.

Enu and Hagan (2014) found out the connection between education and wage differentials and other factors that determined wage variations among workers from different sectors as well as to determine factors that lead to investments in higher forms of education. Pie charts, bar graphs, scatter diagrams and tables were employed to explain the pattern of some variables. This finding showed that aside education, there were other factors that attributed to the existing wage differentials. Some of these factors include the sex of the worker, sector in which the worker works in, skills and working conditions. All these are significant causes of wage differentials.

Rani (2014) studied the impact of the educational status, religion, caste and location of workers on incomes in India. Furthermore, ability of English language is studied. This study uses cross-sectional data of India Human Development Survey to estimate and argue Mincer equations. Returns to lower levels of education are low across different groups. This shows the low quality of basic schooling in India. Returns to higher education differ largely between 4.9% among the rural workers and 38.2% among workers with good English skill. The result diverges to Duraisamy reporting, which shows that there is highest return to secondary education in India, between 1983 and 1993-1994. Throughout the period, English language ability and higher education contribute to higher earnings.

2.2 Fundamentals of Economics of Education

Education reveals human behavior relating to schooling. Moreover, it deals with how this behavior influences development of an economy. In general, economics of education study economic issues relating to education. It covers application of economic concepts and principles in producing, financing, distributing and consuming educational services. Early studies linked schooling and labour market outcomes. The economics of education has developed to explore almost all economic issues with connections to education such as education as investment, demand for education, provision and allocation of resources to education, financing of education and education production function (Babalola, 2015).

Apart from the human capital theory, there are few comprehensive theories of economics of education in use in educational debates. Instead, there have been some economic concepts that are useful in the analysis of economic issues concerning education. Such concepts include education as investment and its effect on costs of education, returns on investment in education and labour productivity; demand for education; financing or provision of education and education production function.

An important distinction in economics of education is between investment and consumption. This distinction is based on the nature of the benefits derivable from education. This can classify an expenditure on education as either investment or consumption depending on whether or not the benefits are immediate and short-lived. An expenditure on education is consumption when such an education brings immediate but short-lived benefits. For instance, when the knowledge concerning economics of education is for fulfilling a direct academic exercise, it is considered consumption. The monetary and the opportunity costs of such education along with the consumer price index determine the decision to consume education. One consumes education when the cost of education is lower than the consumer price index despite that there is no expectation of future benefits. On the other hand, an expenditure on education is viewed as a form of investment if it promises future benefits. In fact, people demand education as an asset that is 'capable of generating long-lived future benefits if the present value of the expected stream of benefits resulting from such education exceeds the present cost of the education. One invests in education when one sees education as an asset that promises a stream of economic benefits in the future. Three basic questions have prompted economic discussions and debates on education as an investment good or service. These are: (1) is human capital

especially education, an investment good or service? (2) If it is an investment good, is investment in human capital especially education, a worthwhile one? (3) if it is worthwhile, is it as worthwhile as the investment in a physical asset? In order to understand the argument properly it is essential to explain the concept of capital and those of human capital as different from physical capital (Babalola, 2015).

(i) Capital Formation - Physical and Human

Human capital is as critical as physical capital as a means of production. Physical capital refers to the acquisition of machines, money and materials for further productive activities. Human capital, on the other hand, refers to the acquisition of trained and skilled men for further productive activities. The four main characteristics of capital are as follows (Ca-Pa-Bu-De):

a) ***Ca****=Capacity increase is expected.* Capitals are capable of increasing the productive capacity of an organization. For example, a trained man with the ability to handle and manipulate machines will increase the output of an organization,

b) ***Pa****=Pay-off time is long.* Capitals require a long period of time before they can pay off (this is known as an investment). An educated man would have to work for some years before he or she can pay off the money spent on his or her education;

c) ***Bu****=Building-up period is long.* It requires a lengthy period of time to build up capital. For example, it takes 18 years for a person to become a Medical Doctor in Nigeria.

d) ***De****=Depreciation is a must:* Capital/depreciate over time. Depreciation manifests in human knowledge and skills. To this end, human capital requires some updating through in-service training, seminars, workshops, further education, etc.

In human capital, such as education, lead to three major economic implications; namely: (a) increased expenses (or costs) since the accumulation of additional years of schooling requires investments just as physical capital does, (b) increased productivity by means of people improvement attributes such as knowledge, skills and attitudes that allow them to produce greater output and (c) return on investment by means of the rise in incomes (Babalola, 2015).

(ii) Cost of Investments in Education

The cost of education refers to the total resources devoted to education. They include the direct money outlays and the indirect financial burdens (in form of

opportunity costs measured as the loss of income incurred either by the individual or by the society as a result of schooling). The loss of the opportunity to earn wages or salaries in the labour market is the real cost, to the individual student, of his or her decision to enroll in a full-time or part-time course of education. For the whole economy, the loss of the national output that the student could have produced, if in employment, is part of the resource costs of education. Generally, cost of education is anything that a person or a government gives up because of a schooling decision. Like any investment, investments in education entail a cost. Characteristically education is very expensive thus its expenditure takes in terms of government consumption, granting that some costs are also borne by individuals (Babalola, 2015).

(iii) Returns on Investment

Human capital in terms of education has same characteristics with physical capital as both need an investment and have economic value. Physical capital earns a return as people are willing to sacrifice to use a piece of physical capital in work to produce more output. When measuring productive value of physical capital, it is the amount of return it commands in the market. For human capital, calculation of returns is more complicated as it is impossible to separate education from the person **to** estimate its rental fee. To avoid this difficulty (equating returns to rents as done for physical capital), returns to human capital are inferred from differences in wages among people with different levels of education. In essence, the economic benefits of education are measured in terms of the extra lifetime incomes or earnings enjoyed by educated workers, compared with workers with lower education or illiterate workers (Babalola, 2015).

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(iv) Demand for Education

The demand for education is based on human capital theory. Education is investment in attainment of skills and knowledge which will increase earnings or provide long-term benefits such as an appreciation of literature (cultural capital). Growth of human capital can gain technological progress because skilled employees are in demand due to the need for their skills and knowledge in the production process. In 1958, studies analyzed returns from additional schooling. Afterward, results attempted to allow for differences in returns across persons (indices) or level

of education (signals). During the period, countries with high enrollment/graduation rates have grown faster than countries without educational progress.

The United States has played as leading role in educational advances with the high school movement between 1910 and 1950. There is a correlation between gender differences in education with the level of growth. Level of development is observed in countries that have an equal distribution of the boys and girls in high school. In general, education seems to generate economic growth, yet backward causality relationship. For instance, if education is seen as luxury good, richer households are pursuing educational for enhancing their status, rather than the generation of wealth. Between 1915 and 2005, education contributed 14 % of average annual labour productivity, although there are several factors that affect economic growth. In addition to the link between formal education and growth of productivity there are many skills and capabilities come by way of learning outside of schooling in 21st Century (Babalola, 2015).

(v) Contribution of Education to Economic Growth

Economic growth is a sustained increase over a significant period of time, in the quantity of material goods and services produced in an economy. One important measure of economic growth is change in the per capita income. First, education inculcates skills such as typing, accounting teaching, medicine, law, engineering and electronics, which are useful in the productive process (extractive, manufacturing and construction, commercial and service sectors). Second, education imparts knowledge of economics, politics, science, history, arts, geography, philosophy, mathematics and logical reasoning that can cause important aspects of economic growth such as innovation, adaptation and entrepreneurship. Third, education provides job ethics and attitude beneficial to production. Finally, education can assess to select talents in the most efficient manner (Babalola, 2015).

2.3 Investment in Human Capital

Human capital is the economic value of the abilities and qualities of labour that influence productivity such as education. Investing in these qualities produces greater economic output. Human capital recognizes the intangible assets and qualities that improve performance of individual worker and the economy. These qualities cannot be separated from the people who receive or possess them. Investment in

human capital benefits individual workers and economy. It creates greater capacity for earning and increases generation of wealth. This is particularly true education some activities primarily affect future well-being; the main impact of others is in the present. Some affect money income and others psychic income, that is, consumption. Saving mainly affects consumption, while on-the-job training mainly influences income. College education could affect both consumption and income. This study focuses on activities that determined future monetary and psychic income by enhancing people's resources, which is known as investments in human capital (Becker, 1964).

Many forms of such investments include schooling, on-the-job training, medical care, migration, and searching for information about prices and incomes. They differ in their effects on incomes and consumption, in the amounts typically invested, in the size of returns, and in the extent to which the connection between investment and return is perceived. But all these investments improve skills, knowledge, or health, and thereby raise money or psychic incomes (Becker, 1962).

Recent years have witnessed intensive concern with and research on investment in human capital. The main motive is that the increase in physical capital, at least as conventionally measured, explains a relatively small part of the growth of income in most countries. The education and training are the most vital investments in human capital (Becker, 1964).

Human Capital can be defined as the ability of an individual to generate income by having certain set of skills or knowledge. It is an amalgamation of investments in education training and various experiences. Through education and training an individual comes to possess certain skills and knowledge which can enhance his work experience and can be referred to as a stock of productive human capital. This stock of skills and knowledge can be hired by various employers to achieve a goal. The market value of these skills can be calculated by observing the demand of such skills in the market. It is safe to conclude that levels of experience, skills and knowledge an individual possesses is what makes the hiring of that individual by potential employers (Becker, 1993).

Human resource investments significantly contribute to productivity growth and constitute the linkages of investments at economic levels. A study for the OECD (Organization for Economic Cooperation and Development) member countries shown that participation in an additional year of secondary education amplifies economic

growth by almost 5%, as a short term effect and by 2.5% as a long term effect. OECD also observed that as compared to the previous decade, some EU member countries experienced a growth of 50% or more due to the improvements that were made in the field of human resources (Com, 2002).

Human capital is indispensable in the growth of individual firms and economic performance of the countries, the transformation of the economy into production further increases this importance. Due to this aspect, numerous countries have expanded their educational budgets to produce highly skilled workers with high human capital and are planning how to efficiently spend educational resources in an effective way. If education is considered an investment and its rate of return is analyzed, it will become clear that when this investment is made in individuals and nations, it manifests itself as a wasteful spending (lost income or direct costs of tuition) in the shorter term but provides major gains in the long-term future higher income for individuals and economic growth for nations (Becker,1993).

Education and human capital share a lot of common features. Skills gained through education can enhance the value of human capital which in turn leads to an increase in productivity. A higher level of human capital at individual or nation level is related with a higher rate of economic growth, because it increases labour productivity. It is said that labour productivity which is an important engine in augmenting output growth should increase according to the level of human capital especially, through secondary and tertiary education which is very essential for technological innovation, absorption and diffusion (Engelbrecht, 2002).

Powdthavee and Vignoles (2006) studied of the human capital theory reveals that when an individual invests his/her time and money in education in the long run, they make themselves more valuable and productive in the labour market. This provides an indication that the labour market is based on competition and the wages of an individual are directly associated with his/her productivity; any achievement in productivity will lead to higher earnings for that individual.

Positive results are expected by investing in human capital. These positive changes can be noted by observing an increase in economic growth, higher earnings and reduced poverty. Education is, par excellence, both a field of investment and a development factor. The contribution of education and training in the development process was largely recognized and estimates show that investments in education and

training generate benefits for people (private benefits) and society (social benefits), comparable to physical capital investments (World Bank, 2016).

Various methods exist as far as investing in human capital is concerned. The activities engaged in daily routines also help in enhancing peoples' experience and human capital. These activities can include simple tasks like reading a book or a newspaper to more advanced activities like higher education or hands-on job training. Getting a formal education at an institution still remains the most valuable and important way of investing in human capital. There are numerous variables that can affect an individual's pursuit of education and what kind of effect that education will have on that individual and the demand of skills in the market which one gains by going to an institution (Becker,1962).

Education is an essential but not adequate for an individual to enjoy good labour market outcomes, whether in the formal or informal economic sectors. In addition to education, good labour market opportunities for the skilled require an economy as a whole to be operating well, with macroeconomics stability, an attractive investment climate, and efficient labour markets, among other factors. It is here emphasized that the importance of a holistic approach to analysing education-labour market issues, with particular stress on education market diagnosis. Different countries at different levels of economic development have diverse requirements for education. For example, whereas East Asian countries might benefit from more secondary school graduates to fill their skill needs gap, Latin American countries, because of their wealth of natural resources, would benefit from more experts in manufacturing processes and more tertiary education graduates. It is pointed out a strong message for education and its role in determining labour market outcomes. Literacy, numeracy, and basic cognitive skills improve individuals' economic outcomes, whether through the indirect effect of sorting in more lucrative occupations or the direct effect of these skills on earnings (Fasih,2008).

2.4 Returns on Investment in Education

According to human capital theory, the rate of return can be used to calculate the value of education and work practice. Return to education is the rate of return to income with each additional year of schooling. A rate of return is the net gain or loss on an investment over a specified time period, expressed as a percentage of the investment's initial cost.

The benefits of investments in education are broad and difficult to quantify. These benefits might involve not only the economic returns, also non-economic and social returns. Measuring returns on investments in education estimate the benefits of increased education at both individual and national levels. The benefits of increased education at the individual level are known as private rates of return on education, and the benefits of increased education at the national level are known as social rate of returns on education. More specifically, private returns on education refer to the individual's benefits from investing in education whereas social returns refer to the large-scale benefits of such investments. Social returns also take into consideration the direct costs of schooling incurred by institutions or governments. When calculating private and social rate of return on education based on educational level and income, attention is generally given to individual income tax payment.

Maluccio (1998) evaluated the effect of investment in education on wages in the rural Philippines, which is the study of private returns to education. This study considers respondents of 2175 for whom there are wage observations in 1994. Statistical endogeneity of education in the wage function may result from unobserved determinants of education that also influence wages. While assessing wage functions, panel data are used that provide relevant instruments, which include distance to schools and measures of household resources to endogenize investments in education. A linear specification for education indicates a return of 7.3% per year. The estimated return to education increases more than 6% when education is endogenized. The paper recommends in what way heterogenous returns to education might represent extent of the downward bias in returns to schooling.

Uusitalo (1999) presented estimates of the return on education in Finland by using micro data that includes ability measures and background of family. It is found that ability test scores have a strong effect on the choice of education and on subsequent earnings. Estimating the return to education with no information on ability leads to an upward bias in the estimates. However, this bias is more than offset by a downward bias caused by endogeneity or measurement error. Instrumental variable estimates that utilize family background variables as instruments produce estimates of the return to schooling that are approximately 60% higher than the least squares estimates.

Harmon et al. (2000) mentioned that social returns on education of the secondary education in OECD countries were the highest, that is 9.4% compared with

the returns to primary and higher level, which were both 8.5% respectively. In the early 1990s, the rapid development of advanced information and communication technology and service sectors created demand for skilled human resources. Therefore, nurturing creativity of students became crucial. In most Newly Industrialized Economies (NIEs), reforms have been taken place in secondary level, providing young people for entering into the labour market.

Siphambe (2000) presented up-to-date private rates of returns on education in Botswana, using Household Income and Expenditure Survey data. The empirical fitness of the Mincerian Earnings Function is also tested. The study found that rates of return rise with the level of education, while empirical fitness of the model is relatively robust and it is also found that education is not income equalizer; (4) women are paid less than men despite being on average more highly educated than men. The policy implications are: there is room for private financing at the upper secondary and tertiary levels of education; employment creation has to be pursued vigorously; there is a need to address the equity and gender issues.

Brandolini and Cipollone (2002) examined the returns on education using gross labour earning obtained from Social Security Files along with years of schooling from the Labour Force Survey in Italy. They adopted an Instrumental Variable approach that exploits as instrument for the exogenous variation in school achievement according to the 1962 Mandatory Middle school reform. The best estimates range from 7 to 10 % a year depending on the method used.

Psacharopoulos and Patrinos (2002) studied that both social and private rates of return on primary level education in developing countries in Asian were the highest that was 16.2 % and 20 % respectively. For instance, workers with primary education have propensity to work in the urban informal sector and improve their level of earnings in Thailand. Therefore, social and private rates of return to primary level are the most favourable among all levels of education in most of the developing world.

Psacharopoulos and Patrinos (2004) estimated the returns on investment in education based on human capital theory and found that investment in education acted as comparable manner as investment in physical capital. In the developed world, the returns on human and physical capital tend to be equated at the margin. For developing countries, there is a need for more evidence on the impact of education on earnings.

Aslam (2007) found that large gender gap in Pakistan generate different labour market returns to education of male and female. This empirically test is estimating private returns on education separately for male and female wage earners. This paper contributes to the literature by using a variety of methodologies (OLS, Heckman Correction, 2SLS and Household Fixed Effects) in order to consistently estimate economic returns on education. Earnings function reveals that there is a considerable gender gap in economic returns to education, with returns on women's education being substantially significantly higher than men's. However, a decomposition of the gender wage gap suggests that there is highly differentiated treatment by employers. This paper concluded that the total labour market returns are much higher for men, despite returns on education being higher for women. This suggests that parents may have an investment motive in allocating more resources to boys than to girls within households.

Ruiz, et al. (2010) provided empirical evidence on the returns on education for the Spanish labour market. The paper uses the instrumental variable approach proposed by Hausman and Taylor to assess the direction and size of the bias that affects standard OLS estimation, when some of the wage determinants are endogenous. This study found that the returns to schooling are considerably higher when endogeneity is taken into account. It increased from around 6 % for each additional year of schooling to about 12 % when the effect is estimated through instrumental variables. This is in line with research for other countries.

Lozano (2011) stated that estimating returns on investments in education could be seen as a measurement of the future net economic payoff increasing the level of education attained by individuals. It is suggested that these disagreements are the results of inconsistencies in the data and methodologies used in the estimation of returns on education. Among the most frequently used are OLS, Heckman's Two-stage Selection Model, Double-Hurdle Model, Instrumental Variables (IV), the elaborate method, and the earnings function and short-cut methods based on the Mincerian equation. Return to investments in education were estimated through improved methodology and data comparability. Therefore, the differences among these returns and their significance were observed. This study suggested that investment in education among countries was based on their specific level of economic development in order to obtain the highest returns to these investments.

Alqattan (2013) applied that an estimation model in private rate of return on education in high income petroleum based developing countries. This study tries to develop a framework based on the Rate of Returns on Education model and to verify it by estimating the rate of return in these countis, and data is acquired from Kuwait. The Civil Service Commission data has 146,499 observations. The results of the employed Mincerian wage model show positive and economically significant parameters for return on education and a negative return for extra years of experience. The estimated rate of return for females is relatively higher than males. The average estimated rate of return to education is 5.2%; with the estimated return for females being 6.7%; and for males 5.5%. By expanding the model to include the 'level of education' terms, the results show the highest return for primary education and lowest for intermediate and diploma education. Results indicate also that the highest rates of returns on education for females occur in high school, whereas for males in bachelor-level higher education.

Fiaschi and Gabbriellini (2013) studied the returns on education in Italy between 1995 and 2010 through survey data. OLS is used to estimate the return to schooling. When the endogeneity of schooling is considered, the return to an additional year in schooling increases. It is found that returns have not changed much over the period, varying between 5.9% and 7.9%. Looking to the different sectors of employment, a relative convenience to work in the public sector emerges, but not significant for all the analysed years. In addition, there is an evidence of a gender pay gap, in favour of men for all the period considered. When the type of school attended is taken into consideration, the returns to education increase with higher levels of educational attainment.

Malik and Awan (2016) estimated the returns on education while controlling endogeneity and sample selection biases in Pakistan over a time period using OLS, simultaneous approach using both Heckman Sample Selection and Instrumental Variable. Landholding and non-earned income have been used as exclusion restrictions to control for sample selection bias in the Heckman Sample Selection technique. The endogeneity bias has been controlled with the help of parental education as instrumental in Instrumental Variable technique. Both methods have also been used collectively or simultaneously to get more efficient estimate in simultaneous approach. The increase in the unbiased and real returns to educations shows that profitability still exists in investing in education.

2.5 Methods Commonly Used in Investigating Returns on Education

The relationship between earnings and number of years of schooling has been studied for many years in the past. Moreover, nowadays the linkage between wages of individuals and the accumulated human capital has become an important research topic as the investment in human capital is largely covered by education and training. The Mincer Wage Model and Recursive (Path) Model are widely used in such an investigation of returns on investment in human capital.

2.5.1 Previous Studies Related to Mincer Wage Model

Mincer (1974) used a linear education term, a linear experience term and a quadratic experience term as explanatory factors for the log earning function. Education and experience are integral parts of the Mincerian wage function but in addition to these human capital factors, it now is common practice to add several other control variables, such as social, demographic, regional, and economic measures, that affect wages in the labour market.

Gwartney and Long (1978) used the Mincerian model to investigate the differences in earnings due to racial differences in the US labour market. By comparing nine different regressions for different racial groups, they found substantial differences in returns to schooling in different racial groups for both males and females. They have found out that number of working hours have significant effects on earning in all regression equations. Marital status was found to be significant for males except for one minority group showing insignificant for females. Residence of individuals was significant with expected signs except two minority groups. Age is used as an indicator for the labour market experience. An interesting result supporting human capital theory was that high relative earnings for Japanese minority consistent with their higher investment in acquiring human capital via schooling and lower returns for Mexican Americans consistent with their lesser schooling.

Psacharopoulos and Layard (1979) estimated that Mincerian wage model for a sample of the Moroccan male workers, using potential experience. After entering schooling and experience in different forms, they confirmed the Mincerian specification by comparing the proportion of explained variation from different specifications they used. They reported that rate of return for each additional year of schooling was 15.8 per cent. A relatively small sample of 1600 was used in this study and also this study was restricted to males only.

Psacharopoulos and Layard (1979) found that estimated the Mincerian wage regression for British males and reported that marginal returns to schooling of about was 9 per cent. The explanatory power of the model remained near one-third for the different specifications. Although they had a sample of reasonable size, but it was limited to men and also, they did not include any other factors which might have worked as determinants of wages. Their results from weekly and annually earnings were not largely different.

Papanicolaou and Psacharopoulos (1979) compared educational effects on wages for different groups depending on father's occupation through estimation of the Mincerian function by using data from males in the UK. Estimates from wage regressions of nine different groups gave different rates of returns that varied from 7 per cent to 14 per cent depending on the occupational group of fathers.

Chiswick (1983a) used Mincer's framework to find the wage differentials between Whites and Asian Americans as well as the differentials among three major groups of Asian Americans. The sample covered only 25-64 years old men. They found no support for any discrimination against Asian Americans compared to Whites as they reported similar returns to schooling for Whites and Asian Americans except for Filipino group, but this group was also lower in schooling attainments and other factors affecting earnings. Their results showed significant effects of regional and urban-rural differences, but these effects were different for different racial groups. These findings supported for the inclusion of controls for rural-urban as well as for different regions.

Chiswick (1983b) compared the rates of returns to schooling for the American born Jews with those of White people from other belongings. Beyond the standard human capital variables of schooling and experience, they estimated the Mincerian wage regression including some other control variables for region and type of residential area. They reported higher returns for Jews as compared to other White ethnic groups. Their results provided support for the inclusion of hours worked and regional controls.

Lindauer and Sabot (1983) studied that another important factor that affects wages of individuals in labour market is the sector of work. That is, whether an individual is working in public sector or private sector of economy. There are a number of studies that focused on pay gaps between these two sectors of work and found such gaps significant. Many other studies have also controlled for these effects

in estimation of the Mincerian wage model and considered working in state organization, local authorities, public hospitals, public firms as the public sector workers and others as the private sectors workers.

Behrman et al. (1985) applied the Mincerian approach using a sample of pre-revolutionary Nicaragua in order to estimate the rate of return to schooling. The Mincerian model was separately estimated for men and women and also for three categories of urban, rural or metropolitan areas. In addition to the standard human capital variables, they have used region, migration, health and nutrition as controls. They reported higher schooling returns for females (12-13 per cent in urban and 5 per cent in rural areas) as compared to those for men (7-10 per cent in urban and 3.7 per cent in rural areas).

Johnson and Chow (1997) estimated the Mincerian model to see the urban-rural differences between wages and returns to human capital measures by using the 1988 Chinese household income project data. They concluded that being a resident of rural area made no significant differences in wages. But separate urban-rural estimations uncovered that returns to schooling were higher for rural areas (about 4.02 per cent) than those in urban areas (about 3.29 per cent). However, they found higher returns to experience in urban China as compared to rural areas. Being a female had a negative effect on wages for both urban as well as in rural labour markets.

Kimmel (1997) compared the structure of wages and the source of racial wage differentials between Whites and Blacks in rural US workers. They found that in rural areas, males belonging to American Indians community and females from Black ethnicity are economically less rewarded in comparison to males and females from other groups of males and females of White ethnicity. The results show that 14% of the 24% total wage difference between Whites and American Indians males are unexplained however 66% of the 11% wage difference remains unexplained for females. Comparing to Whites and Blacks, 44% of the 31 % wage difference is unexplained for males, while 97% of the 15% wage difference is unexplained for females. By focusing on rural area, Whites are more similar to American Indians in facing relatively low wage returns to education. Though, Blacks suffer excessively severe penalties for low educational attainment. For all three races, females enjoy much higher returns to education than males.

Lemieux (2003) evaluated the empirical performance of the standard Mincer earnings equation thirty years after publishing *Schooling, Experience and Earnings*.

This paper found that the Mincer equation remains an accurate benchmark for estimating wage determination equations. It is adjusted by (1) including a quadratic function in potential experience rather than just a quadratic, (2) allowing for a quadratic term in years of schooling to capture the growing convexity in the relationship between schooling and wages, and (3) allowing for cohort effects to capture the dramatic growth in returns to schooling among cohorts born after 1950.

Bagheri and Kara (2005) used Household Expenditure Income Survey of Turkey to assess sample selection bias in the estimates of investment return on education. They compare two sets of estimated return to education in Turkey based on Mincerian augmented earnings function for gender, one with sample selection correction' using Heckman's two-step method and one 'without correction.' The coefficient of the inverse Mills ratio in the models is statistically significant at 1 percent, lending support for the sample selection bias.

Bhatti (2012) stated that estimated Mincer semi logarithmic wage function for the French and Pakistani labour force data. This model is considered as a standard tool in order to estimate the relationship between earnings/wages and different contributory factors. Despite of its widespread use, simple estimation of the Mincerian model is biased due to various econometric problems. The main sources of bias are endogeneity of schooling, measurement error, and sample selectivity. The endogeneity and measurement error biases are tackled the instrumental variables two stage least squares approach. This paper applied the Heckman (1979) two-step procedure to eliminate possible sample selection bias which found to be significant positive for the both countries. For both French and Pakistani, it would be the first study that corrected both sample selectivity and endogeneity in single specification in quantile regression framework.

Hamlen et al. (2012) proved that the well-known quadratic Mincer (1974) equation, where in the log of wage or salary is a quadratic function of the years of experience, is varying with the usual assumptions of utility maximization. The proof requires the use of the dynamic version of the Mincer equation and assumption of an isoelastic marginal utility function. The result is that a polynomial of degree three or greater is required to relate the log of wage or salary to the number of years of experience.

Patrinos (2016) examined whether the Mincer equation can be used to explain a host of economic, and even non-economic phenomena. One approach is explaining

(and estimating) employment earnings as a function of schooling and experience of labour market. The Mincer equation provides estimates of the average monetary returns of one additional year of education. This information is important for policymakers who much decide on education spending, prioritization of schooling levels, and education financing programs such as student loans.

Shi (2016) used the Mincer earnings function (Mincer, 1974) as a basic model to evaluate the relationship between school and earnings. This paper utilized data from the Panel Study of Income Dynamics in 2012 to examine return to education in the United States. This study uses control variables including gender, region, family economic background, and job industry to decrease the influence from other factors on the connection between income and schooling. To remove ability bias in the model, method of instrumental variable (IV) is used with education of parents as instruments for schooling, to re-examine return to education. The results from using the augmented wage function indicate that the OLS estimate 5.87% is downward-biased compared to the IV estimate 10.2%. Findings are associated with previous research. This study contributes to the field by updating the rate of return to education for year 2012 and showing that parental education is closely related with children's rate of return to education, which provide possible future policy directions on how to get better results from spending on education.

The Mincer wage model is empirically specified by the following factors:

(i) Functional Form

Dougherty and Jimenez (1991) used data from a random sample of adult male workers of the 1980 Brazilian census, to test the empirical validity of assumptions, the evidence that supports the appropriate regress, the logarithm of earnings and that the error term is then normally distributed, but it does not support the implicit assumptions that there is no interaction between the effects of education and work experience.

Borland and Suen (1994) concluded that it is difficult to differentiate between specifications of the earnings function which include a cubic experience term, cubic plus quartic experience terms, or a linear spline function in experience. A modified Gompertz function is found to perform poorly.

Lemieux (2003) concluded that the Mincer equation is still an accurate standard to estimate wage determination equations provided that it is adjusted by (1)

including a quartic function in potential experience and, (2) allowing for a quadratic term in years of schooling to take the growing convexity in the relationship between schooling and wages.

Trostel (2004) studied the significant systematic nonlinearity in the marginal rate of return. Especially, the marginal rate of return is increasing considerably at low levels of education and decreasing at high levels of education.

Malik and Awan (2016) found that the negative implications for income inequality, convexity in education-earning relationship in Pakistan has been confirmed by Indicator Function technique. Low education leads to low-earning workers who would be unable to bear the schooling cost of their children. This truly prevents earning potential making income inequality worse.

(ii) Education Level

Chase (1998) investigated that there had been changes in the economic benefits of education for individuals due to changes in the political and economic systems from communist to non-communist systems in Czech Republic and Slovakia. They used Mincer's earning function and found that returns to schooling increased in both countries for both genders after ending of communist era. However, the rewards for experience dropped for both economies.

Aromolaran (2006) estimated the private returns to schooling associated with levels of educational attainment for wage and self-employed workers using data from the General Household Survey. The estimates for both men and women are small at primary and secondary levels, 2–3 percent and 4 percent, respectively, but are substantial at post-secondary education level, 10–15 percent. Inter-generational returns to schooling decline for primary education but rise for post-secondary education.

Siphambe (2000) presented current rates of return to education for Botswana. The results show that the rates of return have in general declined by one percentage point on average between the two periods. Looking at the averages for the different school cycles, the fall in the average rates is quite significant at about six percentage points between the periods. The biggest fall is for secondary education, especially upper secondary education, which fell by 28 percentage points between the periods. The rates of return to tertiary education, however, rose by more than 50 percentage

points. Rates are higher for tertiary education and lower for secondary than for primary education.

Arshad and Ghani (2015) estimated the effects of education on earnings of Malaysians. The results show that the rates of return in Malaysia are high and positive, especially at the upper secondary and university education levels.

(iii) Location Effect

Guisinger, et al. (1984) reported that the rate of return to schooling in one of Pakistan's major urban areas is low, both in relation to the rate of return on physical capital and in relation to the rates of return to schooling in other developing countries.

Shabbir and Khan (1991) have attempted to study the unexplored question of possible inter-provincial differences in the set of parameters of the Mincerian earnings function by using a nationally representative data for 1568 male earners. The major finding is that across-province-differences in the parameters are pervasive. In particular, while the marginal rate of return for schooling from the regression estimates for overall Pakistan (i.e., pooled data) is 9.1 percent, this estimate hides significant inter-provincial variation. In fact, estimated marginal rate of return to schooling for each of the four provinces ranges from 9.9 percent for Punjab to 4.4 percent for Baluchistan.

Snipp and Sandefur (1988) studied the human capital earnings function to see the effect of metropolitan or non-metropolitan location of households on returns to education using a sample of Indian households in Alaska. They found that wages in metropolitan areas were higher while returns to schooling were also higher in metropolitan areas but not statistically different from non-metropolitan areas.

Arshad and Ghani (2015) found an important indication of wage differences attributable to regional/ urban-rural differences in Malaysia. Akay et al. (2016) studied the spatial effect on wages. The wage equations were estimated separately based on gender and sector by utilizing Household Labour Force Survey micro data set of 2013 in Turkey in order to analyse the empirical performance of Mincerian wage equation. The coordinate variables measuring the spatial effect on wages show that wages are maximum for public sector in Ankara and nearby cities.

(iv) Gender

Gwartney and Long (1978) stated that the difference in monetary gains for individuals due to gender in labour market is evident in many studies. The main reasons are preferences in favour of a particular gender and lesser availability of educated and highly skilled women due to their household responsibilities. Almost every study includes gender in the Mincerian wage model. This study also controls for gender wage differences by including a dummy variable in the set of explanatory variables.

Bastos, et al. (2003) found that the rates of return on schooling do not vary with gender. Bagheri and Kara (2005) found that the females' rates of returns are consistently higher than those of men. Aslam (2009) applied that an empirically test that differential labour market returns to education of male and female are one possible explanation for large gender gaps in education in Pakistan through estimating private returns to education for male and female wage earners and conclude that the total labour market returns are much higher for men, despite returns to education being higher for women.

Aslam (2009) stated to answer whether the labour market explain lower education of girls than of boys in Pakistan and find that females have significantly higher economic incentives to invest in education than males. The estimated return to additional completed years of schooling attainment ranges between 7 percent and 11 percent for men and between 13 percent and 18 percent for women.

Guriş and Caglayan (2012) studied the human capital theory for wage determination and analyse the differentials in returns to education and gender wage gap using usual Mincerian wage equation by using OLS, robust and resistant regressions. The results clearly show males definitely have a higher return than females in the years 2003 and 2006.

Tansel and Daoud (2011) found that Returns to education are higher for women than men in Palestine and Turkey over the period 2004-2008. Arshad and Ghani (2015) estimated the effects of education on earnings of Malaysians and find that male workers, on average, received 40.3 percent higher than their female counterparts, holding other factors constant. Productivity and skills between gender also may contribute differently on wages.

Barnardt et al. (2017) investigated a possible gender gap in returns on education using data from the World Bank' Skills Towards Employability and

Productivity program for seven developing and emerging countries. This study control for cognitive skills, non-cognitive skills and parental education- previously unobserved due to unavailability of data to investigate how this heterogeneity is playing a role in estimating the gender differential in educational returns. This model selection using the Heckman two-step estimation procedure to examine whether selection may be driving this phenomenon. These findings suggest that gender gaps in returns to education are not as prominent in the countries. These papers find that controlling for unobserved heterogeneity on the one hand, and selection on the other, has different effects in different countries, highlighting the importance of understanding individual countries' labour markets in detail before drawing conclusions regarding the existence of a gender gap in returns to education.

(v) Age

Bhalotra and Sanhueza (2004) studied that age is considered as an important factor that affects the decision of individuals to participate or not as the wage workers in labour market. Inclusion of age in the set of explanatory variables in the selection equation is reasonable because people's responsibilities grow with their age which leads them to work in labour market. Moreover, age is also related to some other factors, such as marriage or availability or non-availability of income from family, that affect participation decision. This variable is included in almost every study.

2.5.2 Related Studies Based on Recursive (Path) Model

Psacharopoulos and Tinbergen (1978) examined some alternative path analyses on the explanation of schooling, occupation and earnings. This study estimated the path coefficients of the traditional path analysis linking family background, ability, schooling, occupation and earnings with the aid of the very large sample of the British General Household Survey of 1972. First, the level of educational attainment is better explained by family background and ability than occupation or earnings are. Second, the direct effect of family background on earnings is very small. On the other hand, family background is much more import in determining the respondent's occupation, the latter in turn strongly determining earnings. Thus, family background operates on earnings mainly in an indirect way. The same result holds for schooling, although here both the direct and indirect effects are substantial.

Sewell et al (1986) stated the family effects in simple models of education, occupational status, and earnings by using path analyses**.** Amongst fraternal pairs from the Wisconsin longitudinal study, the model generates measured and unmeasured family backgrounds, mental ability, and effects of schooling on status of occupation and earnings. The models are estimated from incomplete data with corrections for measurement error, and they permit direct comparisons of within-family and between-family regressions. There is no evidence that the effects of family background bring about a bias in mental ability on schooling or in the effects of schooling on status of occupational or earnings. Family background has no large independent effects on ability, schooling, and to a lesser degree, socioeconomic condition.

Ansong (2013) assessed the association between household economic resources and academic performance of youth in Ghana through multilevel structural equation modelling. Empirical evidence from around the world suggests potential connections, but there are significant research gaps on how specific types of economic resources affect educational outcomes. By linking income and educational outcomes, this study finds strong relationship between income and children's academic performance, other find mixed or contradictory results. The mixed results suggest the need for further conceptualization and empirical research to clarify the nature of the relationships between different types of economic resources and academic performance.

Mendolia et al (2017) quantify education's role as a means through which family background influences economic outcomes in Australia. Mediation analysis is used to allow for multidimensional treatments. This enhances validity of mediation analysis, in which family background is exogenous and multidimensional. This approach lets the mediating role of education to vary across background characteristics, whereas it estimates overall mediating effect. The attainment of education account for 21%-37% of the family background effect on hourly earnings, and affect 13%-19% on wealth. These estimates are likely upward-biased. Therefore, the link between family background and economic outcomes operates mostly through other mechanisms.

Li and Qiu (2018) examined in what way family background affects academic achievement of children at an early stage. By using data from the Chinese Family Panel Study in 2010, this paper suggests two pathways through which family effects

academic performance of the children. First, parents compete to access opportunities of high-quality education for their children. Better educational opportunities lead to better academic performance. Secondly, children's learning habits is determined by parenting behaviour and educational support for their children could nurture academic performance. Moreover, this study fund that academic performances of urban students are largely affected by socioeconomic status of families comparing to rural counterparts. These findings allow important implications for reducing class difference in students' academic performance and improve educational equity in contemporary China.

CHAPTER III
ROLE OF EDUCATION IN HUMAN CAPITAL OF MYANMAR

This chapter describes overview of education and education system in Myanmar. It also discusses current status of human capital in Myanmar.

3.1 Overview of Education in Myanmar

Education in Myanmar has long been regarded as important and significant since ancient time. Nonformal education (monastic education, adult basic education, adult literacy education, school equivalency preparation, etc.) and informal education (self-studying learning from parents, surrounding environment and observations in work place, etc.) play as major role in developing human resources in early period.

In the past centuries, boys were taught at monastery schools in Myanmar, where they would learn basic 3 Rs (reading, writing and rithmetic/ arithmetic). All boys eight to ten years of age would begin attending school in a nearby Buddhist monastery. In ancient Myanmar, very few women could access to education mainly at home as women needed to learn more one how to carry out household chores. During colonial period, especially in early 20th century, there was a gradual increase in participation of women in diverse education stages (Ministry of Education, 2000).

Achieving economic development in a country mainly depends on improvement in education sector of that country. Education helps improving skill and knowledge of citizens from diverse groups within society to fulfill the expanding labor market. In 2011, the civilian government made social and economic reforms including education sector for upgrading human resources. With the open-door policy and economic reforms in Myanmar, labor market of the country needs qualified human resources in different economic sectors (CESR, 2018).

The CESR aimed to set up a plan to understand what the current situation is and a strategy for education sector to achieve quality improvement and

development. CESR focuses on policy, legislation, management and finance, basic education, teacher education, non-formal education, technical vocational education and training (TVET), tertiary education and information and communication technology (ICT). The process of CESR is an in-depth analysis of education to develop a strategy to improve access to and quality of education all over the country with three phases: Rapid Assessment (Phase 1), In Depth Analysis (Phase 2) and Development of one overall National Education Sector Plan (Phase 3) with cost analyses for the government (CESR, 2018).

In 2014, National Education Law (NEL) approval by Parliament in September to strengthen quality, effectiveness and efficiency of the national education system. The NEL was reinforced by passing of the NEL Amendment in 2015. The NEL and NEL Amendment offer a comprehensive framework for the operation of major reforms in Myanmar education system (UNESCO, 2016). These reforms consist of recognition of the right of all citizens to free, compulsory education at the primary level, establishment of education quality assurance system, expansion of the basic education system to 13 years, support for the learning of ethnic languages and culture; and enhancing decentralization.

The NESP arranges for the government, different stakeholders in education and citizens with a *Roadmap* for reforms in education for next five years that will largely improve access to quality education for students from different levels of national education system. According to the NESP (2016), priorities are set in education reform of Myanmar after 2011. These priorities are

1. Establishing early childhood care programmes
2. Improving primary education completion,
3. Supporting and promoting ethnic languages and cultures
4. Achieving an appropriate teacher student ratio,
5. Improving abilities and subject matter expertise of teachers in all schools,
6. Prioritizing the needs of schools in less developed areas to make education accessible mainly in secondary levels
7. Improving the quality of life of people with limited educational qualifications, through middle and high school equivalency programmes and vocational training,

8. Developing a world-class higher education system, where universities have autonomy over their own curriculum and governance and the ability to conduct independent research,
9. Emerging vocational education and training system that is equal in status with academic learning at universities,
10. Establishing effective education services that do not place a burden on parents and communities,
11. Ensuring effective, efficient and transparent allocation and use of government, private sector, other domestic and international funding and
12. Realizing effective reforms in education sector and management and monitoring programs through the use of accurate information and data.

In addition to setting national education plan and policies, Myanmar is collaborating with International Organizations to improve education sector. There are several bilateral and multilateral collaborations with the Ministry of Education and other related Ministries in basic and higher education sector after 2011. According to UNECE (2017), improvement and challenges in achieving Sustainable Development Goal 4, *ensuring inclusive and equitable quality education and the promotion of lifelong learning opportunities for all* are examined based on Census in 2014.

In Myanmar, around 16 percent of the population aged 25 years and above have no schooling, which include 19 percent of females and 13 percent of males. The Census data found that educational performance of women is higher than male counterparts at higher educational levels. Out of almost 1.9 million people aged 25 and over who had graduated from university, 1.1 million were women. Moreover, of the 116,000 persons completing postgraduate, around two thirds were women. Hence, it can be said that women's participation in higher education is high.

3.2 Education System in Myanmar

The education system in Myanmar has developed after its independence from the British on January 4, 1948. This development was realized through the network of missionary schools with expatriate teachers. During the period, English was set as medium of instruction. Yet, Myanmar's education changed after declaring English was banned to taught in schools. The country's education system has been underdeveloped and left out of technological advances due to political instabilities.

Secular schooling is widely offered by monasteries in Myanmar while basic education (primary, secondary) and higher education programs were offered by the government schools and higher education institutions (Department of Higher Education, 2012).

Traditionally, boys in Myanmar were taught Burmese and basic arithmetic skills in monastery schools. Young men still continued receiving their education in monasteries even after introducing public schooling. During the British colonial era, Myanmar's education system was transformed towards more Westernized. Christian missionary schools were established in major cities for providing education for children from high-income families. During the period, universities in Myanmar renowned as the best in Southeast Asia. However, the nationalization of schools after 1962 generated diminishing the quality of education in Myanmar.

According to Myanmar's Ministry of Education (2000): "Every school-age child in school" and "education for all" are the mottoes which guide Myanmar's educational efforts. To catch up with the information age, almost all schools from basic education sector are being equipped with computers to help students become familiar with electronic media. A complementary approach in education is to develop a healthy moral mind in a healthy active body. Schools train pupils in moral and social behavior. As a further support toward this goal monastic schools have been revised.

The Ministry of Education plays as major role in education system of Myanmar. Primary, lower secondary and upper secondary schools are administered by the Department of Basic Education while universities, colleges and professional institutes were administered by the Departments of Higher Education 1 and 2, based in Yangon (for lower Myanmar) and Mandalay (for upper Myanmar) respectively. Almost all schools are operated by the government. After 2010, there was an increase in private schools with different forms. Schooling is compulsory until the end of elementary school (Department of Higher Education, 2012).

There are still many challenges in Myanmar to have a better educational environment. When United Nations Millennium Declaration set eight Millennium Development Goals (MDGs) in 2000, every country has to ensure that children everywhere will be able to complete a full course of primary education by 2015. As Myanmar is a member of the international community, it is obliged to fulfill this MDG goal. Meanwhile, the Myanmar population is growing gradually each year and as a consequence it is expected that there would be more children in primary schools.

In order to meet the MDG goal, which targeted towards full access to and the quality of primary education in Myanmar, there was an increased in the education expenditure from the government, provision of training and recruitment of teachers, a better education standard, the number of schools and its facilities (MNPED, 2010). After 2015, SDGs were initiated to reach universal free, equitable and quality basic education for all school aged children are aimed to achieve by 2030 with eliminating gender differences in education with equal access (UNDP, 2015).

SDG target 4.6 seeks to ensure that "by 2030 "all youth and a substantial proportion of adults, both men and women, achieve literacy and numeracy". According to the 2014 Census, number of illiterate people in Myanmar had decreased from 4.5 million in 1983 to 3.6 million in 2014 and that the adult literacy rate (for those aged 15 and above) was almost 90 percent. This is the average for Southeast Asian countries. Male adult literacy rate is 93 percent while female adult literacy rate is 87 per cent.

SDG Target 4.1 intends to *complete free, equitable and quality primary and secondary education for all girls and boys by 2030* while Target 4.5 set to *eliminate gender disparities in education and ensure equal access to all levels of education*. According to the 2014 Census, school attendance rates differed by age that peak at age 9 years at 85 percent attending. Yet, the gender differences in school attendance rates were small. Males school attendance rates was slightly higher at secondary school age, while females have higher attendance rates at primary school and above university. In Myanmar, under half a million children aged 7 to 15 years had never attended school, especially in rural areas. The proportion of non-attenders in urban areas was just 2 percent, while it was 6 percent in rural areas (UNECE, 2017).

Education levels in Myanmar consists of primary, middle and secondary school levels before moving on to tertiary education. Primary school is made up of Grades 1 to 5 and lasts five years. Primary school education is compulsory for all children in Myanmar grades 6 to 9 fall under middle school and last four years. Secondary school is made up Grades 10 and 11 and lasts two years (Department of Higher Education, 2013).

The education system in Myanmar is presented in Table (3.1).

Table (3.1) Education System in Myanmar

Education	School/ level	Years
Primary	Elementary	5
Middle	Intermediate School	4
Secondary	Secondary	2
Tertiary	Bachelor	4-5
Tertiary	Master	2
Tertiary	Ph.D	5

Source**:** Ministry of Education (2000)

3.2.1 Preschools and Primary Education

Primary education is officially compulsory. It lasts five years, and to continue onto secondary school, students must pass a comprehensive examination of basic subjects. Preschools are opened for children over 2 years of age and they are in extensive care or public systems. Kindergarten starts from the age of 5 (not younger than 4 years and 8 months at the time of school's commencement date.

Myanmar's population is about 60 million and the number of primary school students in 2011 was around 5.2 million, approximately 8 percent of total population. In Myanmar, the government compulsory primary education policy consists of Grade One to Five. Grade One to Three is the lower primary level, in which children learn Myanmar and English languages, Mathematics and Science. Upper primary is the Grade Four to Five, in which children learn Geography and history in addition to those subjects of lower level. Along with the revised curriculum started from 2001, natural science, moral and civics, painting and music, physical education and school activities are added in primary education (Department of Higher Education, 2013).

The Myanmar government aims to enable every individual to acquire basic education. Every child from the age of five attends a primary school. Every child who is eligible is being encouraged to attend. However, school enrolment rate has not reached 100 percent yet. According to 2011 statistic, the enrolment rate was 85 percent but the completion rate was just over 81 percent. Furthermore, to promote greater access to and the quality of Basic Education, the Thirty-year Long-Term

Basic Education Development Plan (2001-02 FY to 2030-31 FY) is being implemented in Myanmar

In order to have a better education environment, not only public schools but also private and religious-run schools are needed to transform actively in line with the SDGs. The literacy rate in Myanmar has 92 %, which is higher than some South East Asian countries in 2010. However, there are still some challenges in different levels of education (Ministry of Education, 2013).

3.2.2 High schools and Secondary Education

Secondary education is divided into middle schools (standards 6-8), and upon passing the basic Education Standard VIII Examination, students continue onto high schools, which cover standards 9-10. At the end of standard 10, students must pass the Basic Education Standard 10 Examination (matriculation exam) in order to receive their diplomas. Students who do pass the matriculation examination receive either Diploma A or Diploma B. Those with Diploma A are allowed to continue their educations at university.

Secondary schools are usually combined, containing both middle and high schools. There is much corruption in educational equality. However, in primary and secondary schools, the system is “no-failure education system”. Exam system exists in high schools and matriculation. Students, who passed the middle school have choices, which include 2 tracks to enter high school (science or arts specialization). All high school students take Myanmar, English, and Mathematics. However, Science-specialized students also take 3 additional subjects: Chemistry, Physics and Biology as part of their coursework, while arts-specialized students take Geography, History and economics (Department of Higher Education, 2013).

At the end of Grade 10, students take the University Entrance Examination, commonly referred to as the matriculation exam in English, administered by the Myanmar Board of Examinations annually in mid-March. High scores in a subject are set as distinction for that subject. Students who achieve distinctions in many subjects with total marks of around 500 are generally guaranteed to enter medical universities. Test scores are released at testing sites all over the country in June**.**

Students who attend international English-language schools or other private schools are not eligible to sit for the matriculation exam, nor are they allowed to enroll in Burmese universities. Instead, they typically study overseas, at destinations

such as Singapore, Malaysia, Australia, United Kingdom and the United States. (Ministry of Education, 2013).

3.2.3 Universities and Higher Education

Modernization of an economy required development of high and middle level human resources such as doctors, engineers, academics, technicians, etc. trained from higher education. Higher education in Myanmar is important for nurturing skilled and qualified work force with traditional and social values and for producing qualified academics and technologists necessary for the development of the nation.

After independence, the University Education Law was promulgated in 1964 and repealed in 1973 and amended in 1983, 1989 and 1998. Universities (Arts and Science Universities and Professional Institutions) are established in accordance with this existing law. The establishment of Colleges and Academies affiliated to universities requires the consents of the law. Only the universities founded in compliance with this University Education Law can confer degrees, diplomas, certificates and other honorary degrees. Since 2010, reforms are being made to enhance the quality of higher education in Myanmar (Department of Higher Education, 2012).

In order to respond technical advances, efforts have been made to enhance learning opportunities that overcome the limitations of place and time higher education institutions in Myanmar launched electronic learning in the year 2000. With the establishment of e-learning centers, e-resources and computer training centers in higher education, computer literate graduates are prepared for the labor market. In addition, VSAT system was launched to facilitate to utilize visual information especially for the students from the University of Distance Education. The University was established on July, 1992, with 23 departments throughout the country. Lectures were broadcasted by the Myanmar Television and Radio Department (MTRD) since the academic year 1991-92. Later, e-learning centers serve as one-stop facilities for students from distance education. Until 2010, both basic and higher education in Myanmar followed the above pace (Department of Higher Education, 2012).

The Ministry of Education formulated the Special Four-Year Education Development Plan from 2000-01 to 2003-04 to develop the education sector and to development of highly qualified human resources. Also in 2001, a long-term plan of

the 30-Year Long-Term Basic Education Plan (2001-02 to 2030-31) was set with six phases. In each phase, there are five- years duration. The 30-Year Long-Term Education Development Plan contains 10 programs for basic education with the purpose of promoting greater access to, and quality of, basic education, and 36 programs for the higher education sector which focus on six areas that will generate qualitative development of higher education and contribute to national development endeavors and the preservation of national identity and culture (Ministry of Education, 2013).

There are forty-five universities and colleges and 154 technical and vocational schools. In 2004, the Myanmar government said that between 1989 and 2004 the number of colleges and universities increased from 32 to 154 with student enrolment rising from 120,000 to 890,000.

Most of Myanmar's universities and colleges are under the control of the Ministry of Education. A university semester in an academic year is less than six months. The new university semester begins in mid-June. The university year ends in October. (Department of Higher Education, 2012).

Major universities include the Universities of Yangon, Yangon Technical University, University of Yangon and University of Mandalay. Military academies, engineering schools and medical schools in many cases remained open even while the other universities were. They offer the most modern and up-to-date facilities.

Department of Higher Education in Myanmar has two branches: Lower Myanmar and Upper Myanmar, under the Ministry of Education. These branches are responsible for the administration and coordination. Higher education administrative policy falls under two councils. The universities' Central Council holds responsibility to set higher education policies while the Council of University Academic Bodies is responsible for setting academic regulations and tasks. The Myanmar education Committee was established in 1991 and renamed **as** the National Education Committee in 2011. The committee remains responsible for up-keeping cultural, social, and traditional values within the education system, while respecting the economic and political visions of the country. The committee is chaired by the Union Minister of Education. (Department of Higher Education, 2013).

In Myanmar, there are 163 universities, with all of them are state funded. The higher education funding increased by 107 % between fiscal year 2012 and

2013. Among these Universities, the Ministry of Education is responsible for 66 universities. Rest of universities are under 12 other ministries. The Ministry of Education establishes at least one liberal arts and science university, one technical university, and one computer science university in 24 development zones of the country. (Department of Higher Education, 2013).

The Ministry of Education established the National Center for Human Resource Development to provide students with more flexible options for higher education. The Center creates vocational, technological, and professional courses to meet students' demands. Human resource centers adapt to the needs of local communities such as foreign languages for the tourist industry. Human resource centers offer certificates, degrees, undergraduate diplomas, postgraduate diplomas, and postgraduate degree courses. The human resource centers intend to provide a parallel education system for individuals to broaden knowledge and work related skills. Students have the flexibility to complete degrees in at their own pace and in their own free time (Department of Higher Education, 2013).

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Universities in Myanmar remain highly centralized and state run. Student enrollment in universities in 2014 was 550,000. Reaching revolves around textbook instruction with little to no research focus. Universities offer bachelor's degree programs, master's degree programs, and doctorate degree programs. The higher education system follows a 4-1-2-year program with 4 years for a bachelor's degree, one year of qualifying classes, and 2 years for a master's degree.

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3.2.4 Vocational and Tertiary Education

Vocational training is mainly provided by private sector in Myanmar and become popular among young people to enter hospitality, tourism, beauty, fashion, nursing or engineering fields. These trainings link students with better jobs.

The oldest tertiary institution is Yangon (Rangoon) University founded in 1878. It has been at the center of civil discontent throughout its history. Notwithstanding this, women's halls of residence are strictly limited which filters out many promising female students from the countryside.

For young people in Myanmar, they study their bachelor degree program after completing matriculation and enter the job market, both public and private sectors as well as nongovernmental sector. It may look like simple steps but it takes at least thirteen years to go through this route, ten for matriculation and at least three for a degree. (Department of Higher Education, 2013).

As the country is rapidly developing some sectors like agriculture, energy and mining, tourism, financial sector, infrastructure, manufacturing, and telecommunications, need a large number of workforce. These sectors are creating new jobs in the country's labor market. The insurance industry has been liberalized, and foreign firms are coming into the country and some have already started their operations. And yet, there is not enough skilled labor force.

Also, the government is trying to attract more Foreign Direct Investments (FDI) into the country by deregulating, and by creating more industrial zones. There may be tens of thousands of jobs which need to be filled within a few years. Vocational education has become a way to create skilled workforce to meet the needs of different industries (Department of Higher Education, 2013).

However, there are several challenges. In 2018, according to a report by Labour Department of the Ministry of Labour, Immigration and Population, more than 200,000 people left Myanmar to work in other countries and many of them had vocational training courses. Therefore, it is also a challenge to keep skilled labour from leaving the country in search for better opportunities.

Vocational education and training (VET) has a lot of benefits for employees. They can have better chances of employment, higher earnings levels, increased job satisfaction, improved flexibility and mobility and lifelong learning. It is clear that Vocational Education and Training is good for employees.

VET differs from traditional education. VET mainly focuses on nurturing and training specific skills for specific jobs, to train practical skills rather than theoretical backgrounds. It may not be a perfect solution but it helps with making education more relevant to manpower development.

Graduates are having a hard time in finding work. Countries that value vocational education achieve rapid economic development. However, Asian countries, including Myanmar, value less on vocational education and emphasize on university or college education. Some of Asian Countries like Japan, Korea, Singapore, Indonesia, Philippines, and Thailand have fairly developed their vocational education system (Department of Higher Education, 2013).

3.3 Current Status of Human Capital in Myanmar

The progress of any country is heavily depend on its education system. Education systems must be in line with the demands of a changing labour market to create the human capital needed for economic development. Education has to reach all groups within society and has to be of a high quality to cater for a demanding labour market.

In Myanmar, low quality of labour force is indicated by a small number of workers in the formal sectors and a large share of labour force is with education below senior high school. Regarding the education in Myanmar, there raises a question related to the rate of returns on education. Basically, an individual with higher level of educational achievement wants to get higher return (Department of Population, 2014).

According to the ADB,2012, large youth population is frequently cited as one of Myanmar's major strengths. The country may benefit from a "demographic dividend" with a large share of the population engaged in productive work and supporting a smaller share of older and non-working people. While its demographic profile is favourable, the country suffers from a number of key deficits in its labour market structure. A large share of workers is underemployed and thus are not able to contribute their full energy to economic output. Moreover, the workforce is relatively under-educated and low-skilled. And finally, the creation of an organized workforce is still in its infancy, with most workers engaged in various types of informal work that is only recently reviving after years of the suppression. Labour disruptions due to

strikes may pose a concern for foreigners seeking to invest and take advantage of low wages.

A key labour market problem is that much of the workforce is unskilled, with low educational attainment. There are multiple weaknesses in the educational system. Myanmar is expected to experience structural change in which industry will play an increase role in driving economic growth and job creation. This has implications for skill development and labour force needs. A systematic breakdown of potential changes in employment patterns linked to an economic transformation would be a useful exercise to guide investment in education to better prepare the labour and talent pool for future opportunities. Wages are low but productivity is critical to competitiveness (Tanaka, et al., 2015).

The 2014 Myanmar Population and Housing Census shows that Myanmar has a pattern of literacy similar to most less developed countries: younger generations are more literate than older generations; urban men have the highest literacy rates and rural women the lowest. The adult literacy rate (for those aged 15 and over) in 2014 was 89.5 percent. Although males' literacy rates (92.6 percent) are higher than females' (86.9 percent), there has been greater improvement among females since the 1983 census. Gender differences in literacy are relatively small up to around 50 years of age. Thereafter, males are more literate than females and the differences increase with age. This reflects the gender differences in school attendance in earlier years. Urban residents are more literate (95.2 percent) than rural residents (87.0 percent). Adult literacy rates among the States/Regions range from 96.6 percent in Yangon to 64.6 percent in Shan (Department of Population, 2014).

The number of illiterate persons has decreased from 4.5 million in 1983 to 3.6 million in 2014. The total number of illiterate households (households with no literate persons aged 15 and over) in Myanmar was about half a million (4.6 percent of all conventional households). Illiterate households are mainly a rural phenomenon, especially in Chin (10.7 percent), Kayin (17.1 percent) and Shan (24.9 percent). Illiterate households are proportionately fewer in urban areas in almost all States/Regions (Department of Population, 2014).

The educational attainment, as measured by the highest grade/level completed at the most advanced level in the education system, is still quite low in Myanmar. About 16 percent of the population aged 25 years of age and over reported having no schooling. The proportion was higher for females 18.8 percent than for males 13.3

percent and this was the case generally in all age groups, with the proportion increasing with age such that more than half of women aged 80 and over had received no schooling. The proportion with no schooling was higher in conventional households 16.6 percent than in institutions 9.1 percent; higher in rural areas 20.2 percent than in urban areas 7.3 percent; and highest in Shan State 44.9 percent and lowest in Yangon Region 5.9 percent (Department of Population, 2014).

The labour force is about 31 million people in 2014, according to the latest World Development Indicators data, although different sources cite numbers up to 32.5 million. The share of the working age population (15–64) is about 70 of the total. Furthermore, about 40 of the working-age population is between 15 and 29, and women account for almost half of the labour force. Myanmar has an almost 80 labour force participation rate (Tanaka, et al., 2015).

The government of Myanmar is implementing twelve priorities of education policy to improve different levels of education. The pace of sustainable and inclusive economic growth in Myanmar is partly determined by the quality of labour force. Investment in health and education including technical and vocational education and training (TVET) also plays an essential part in raising labour productivity, that can take advantage of growth opportunities and help country's young population benefit from dramatic socio economic transformation in Myanmar (Tanaka, et al., 2015).

According to a survey by the Japanese External Trade Organization, wages in Myanmar are the lowest in the ASEAN region. However, employers often say that finding skilled and talented workers is challenging. Official data on unemployment are lacking, although there are numerous other data sources. The World Bank's World Development Indicators suggest that unemployment in Myanmar ranks in the middle of ASEAN. The World Bank data also indicate that women have slightly higher unemployment rates (at 5) than men (4); in youth unemployment, however, the differences are more pronounced, with women at 13 and men 10 (Tanaka, et al., 2015).

Improvement in access and quality of education can raise the welfare of society through significant increase in income or salary. In Myanmar, investment in human capital is lower than required. The overall educational attainment of workers has improved remarkably in recent years. However, Myanmar still faces a challenge to increase workers' skill through higher level of educational attainment (World Bank,

2016). Therefore, it is important to analyse the returns on education in Myanmar in order for policy makers to make improvement in the current education system.

Only a relatively small proportion (7.3 percent, about 2 million) of the population aged 25 and over had graduated from university or a higher level of education. Based on the Myanmar's educational attainment profile it was found that the performance of women is higher than men at higher educational levels. Out of almost 1.9 million people aged 25 and over who graduated from university, 1.1 million – more than half - were women, and of the 116,000 persons with a postgraduate qualification, almost two thirds were women. Women comprised a higher proportion of the highly educated in all States/Regions except Chin. The difference in the proportion of highly educated was large between urban and rural areas: 16.8 percent in urban areas compared to just 3.1 percent in rural areas. Large differences were also reported between States/Regions; the highest proportion of highly educated was recorded in Yangon (15.9 percent) and the lowest in Kayin (3.6 percent) (Department of Population, 2014).

At present, skill and knowledge of work force in labour market low comparing to neighbouring countries. Hence, Centre for Economic and Social Development (CESD) conducted a survey on private enterprises in the food processing and garment manufacturing sectors of Myanmar to collect quantitative and qualitative information on key labour issues (Bernhardt, et al., 2016).

According to the survey conducted by CESD for the food processing and garment manufacturing sectors, labour turnover rates in Myanmar are very high. The average labour turnover rate is 57 percent for garment producers and 39 percent for food processors. This means that an average factory saw around half of its workforce leave in 2014. This analysis suggests that labour turnover is often worker-initiated. Looking at the gender composition shows that the large majority of workers in garment factories are female, reflecting the importance of the clothing sector in providing formal employment opportunities to Myanmar women. By contrast, most workers in the food processing industry are male. (Bernhardt, et al., 2016).

Looking at the educational achievements of companies' workforces, the findings indicate that around 60 percent of employees in both industries have completed secondary or high school. Overall, compared to Myanmar's population as a whole, the workforces of the enterprises that participated in the enterprise survey appear to be quite well educated. (Bernhardt, et al., 2016).

However, when asked to assess the composition of their workforces in terms of skilled versus low skilled production workers, survey participants reported around 60 percent of their production workers are low skilled. Offering training and skill development programs is an important means for companies to enhance skill levels, productivity and professionalism of staff. The enterprise survey results indicate that a minority of enterprises reported spending money on employee training (22 percent of garment producers and 14 percent of food manufacturers). These percentages appear to be lower than for other countries in the region, such as the Lao People's Democratic Republic, Viet Nam or China (Bernhardt, et al., 2016).

Recently, wage levels have been an important issue in labour market of Myanmar that generate strikes and demanded by union workers. To resolve these disputes, the GoM promulgated the Minimum Wages Act in 2013**.** A minimum wage rate of 3,600 kyats (MMK) per day came into force on 1 September 2015 (corresponding to a monthly minimum wage of approximately US$91). Many companies, especially in the garment sector which is both labour-intensive and particularly exposed to international competition, protested against this minimum wage rate, claiming it was too high and would harm their competitiveness. Myanmar's minimum wage rate ranks among the lowest in Asia, as does the country's GDP per capita (Bernhardt, et al., 2017).

In terms of the composition of wages, some companies in the sample do not pay a basic wage; in fact, 16 percent of them do not (all of them are micro or small food processing enterprises). Apart from that, the majority of enterprises set wages to reflect overtime pay; attendance, skills, seniority and production bonuses; and housing and transportation allowances. On average, the basic wage rate makes up only 52 percent of a worker's wage, with the remainder being derived from additional payment items. This structure could imply a certain degree of income insecurity for workers. Overtime payments account for 16 percent of an average worker's total wage while attendance bonuses and productivity bonuses account for around 10 percent and 8 percent, respectively. Wage structures with non-wage payment are much more dominant in the apparel sector than in the food processing sector. (Bernhardt, et al., 2017).

Labour productivity is a major factor in determining whether an enterprise is competitive and profitable, and in setting workers' wages. Calculating labour productivity by dividing a company's sales value by its number of workers yields an

average monthly productivity per employee of MMK 547,000 in the food processing industry and MMK 155,000 in garment factories. It is interesting to compare these figures with workers' remuneration. On average, the garment enterprises in the sample pay monthly wages of MMK 127,720 to their workers while food processors pay MMK 103,926. This means that in the garment sector there is only a narrow gap between the measure for monthly labour productivity and monthly average wages (Bernhardt, et al., 2017).

With the financial support of Denmark government, the Central Statistical Organization (CSO) of Myanmar, the UNU-WIDER and the University of Copenhagen have initiated the project 'Towards Inclusive Development in Myanmar'. The project is mainly intended to reinforce evidence-based policymaking and analysis through a rigorous 'Myanmar Micro, Small, and Medium Enterprise Survey' of private manufacturing enterprises (Bonn, 2015).

The survey focuses on manufacturing firms and their employees from 35 townships from all regions and states in 2017. The data were collected in 35 townships in all regions and states of the country in 2017. The sample sizes were 2,496 enterprises and 6,722 employees, which is statistically representative in Myanmar, in which there are 71,000 manufacturing businesses (Berkel et al., 2018).

CHAPTER IV
RESEARCH METHODOLOGY

This chapter discusses the specification of basic Mincer wage model, extended Mincer wage model and the modelling issues. It also presents specification of path analysis, model estimation and model testing.

4.1 Basic Mincer Wage Model

Following the specification of Mincer (1974), the returns on education is estimated from the following basic Mincerian wage model, which is a function of education and working experience.

$$lnwage = \beta_0 + \beta_1 educ + \beta_2 exp + \beta_3 exp^2 + \varepsilon \quad (4.1)$$

where ln wage = Natural Logarithm of Wage in Months ('000 kyats)

educ = Years of Schooling

exp = Working Experience in Years

exp^2 = Square of Working Experience in Years

$\beta's$ the population regression coefficients and ε the error term.

The relationship between natural log of wage, which is the dependent variable, and independent variables, education, experience, squared experience is linear in parameters. Linearity in the parameters is one of the requirements in least squares estimation. Since more educated people are more likely to earn higher wage, the parameter β_1 is expected to be positive. Again, more working experience would increase their wage, the parameter β_2 is expected to be positive. However, after a certain level of working experience, the size of wage increment would decline. Is thus, the parameter β_3 is expected to be negative. Therefore, the expected sign of the parameters would be $\beta_1, \beta_2 > 0$ and $\beta_3 < 0$.

Being a log-linear model, the coefficient, β_1, indicates an approximate percentage change in wage. That is, if one year of schooling increases, wage would approximately increase by $\beta_1 \times 100$ percent. An exact percentage change can be found

by $\left(e^{\beta_1}-1\right)100$, which is the return to education. The interpretation of the effect of working experience is not straightforward since the slope of the wage function varies with experience. For a given level of education, the slope of the Mincer wage model with respects to the working experience is

$$\frac{\partial lnwage}{\partial exp} = \beta_2 + 2\beta_3 exp$$

Since $\beta_2 > 0$ and $\beta_3 < 0$, the quadratic *lnwage-exp* relation is concave and the slope at some point will become negative after a level of working experience equals of $exp^* = -\frac{\beta_2}{2\beta_3}$.

4.2 Extended Mincer Wage Model

The basic Mincer wage model just includes two independent variables, education and working experience. Moreover, it also assumes that the impact of the main variable on wage is identical regardless of the social and demographic characteristics of the workers. This assumption is strong and in fact many empirical studies show that the impact of the variable, such as the returns on education, is varied with social, demographic, and spatial characteristics of the workers. The basic Mincer wage model is, therefore, extended by incorporating gender, marital status, and location variables. From the extended Mincer wage model:

$$lnwage = \beta_0 + \beta_1 educ + \beta_2 (educ \times male) + \beta_3 exp + \beta_4 exp^2 + \beta_5 male + \varepsilon \quad (4.2)$$

Compared to the basic Mincer wage equation, the above equation incorporates a gender variable, *male*, and an interaction term between education and male, $(educ * male)$ The above equation has in fact combined the two regression lines of Mincer wage equation for male and female, where both the intercept and slope with respects to gender are different. That is, β_2 indicates the differences in the returns on education by gender while β_5 represents the differences in the average wage between male and female.

$$lnwage = \beta_0 + \beta_1 educ + \beta_2 (educ \times single) + \beta_3 exp + \beta_4 exp^2 + \beta_5 single + \varepsilon \quad (4.3)$$

Compared to the basic Mincer wage equation, the above equation incorporates a marital variable, *single*, and an interaction term between education and single,

$(educ * single)$. The above equation has in fact combined the two regression lines of Mincer wage equation for single and other marital status, where both the intercept and slope with respects to marital status are different. That is, β_2 indicates the differences in the returns on education by marital status while β_5 represents the differences in the average wage between single and other marital status.

$$lnwage = \beta_0 + \beta_1 educ + \beta_2 (educ \times urban) + \beta_3 exp + \beta_4 exp^2 + \beta_5 urban + \varepsilon \quad (4.4)$$

Compared to the basic Mincer wage equation, the above equation incorporates a location variable, *urban*, and an interaction term between education and urban, $(educ * urban)$. The above equation has in fact combined the two regression lines of Mincer wage equation for urban and rural areas, where both the intercept and slope with respects to urban and rural areas are different. That is, β_2 indicates the differences in the returns on education by urban and rural areas while β_5 represents the differences in the average wage between urban and rural areas.

Moreover, any regression models apply to the ordinary least squares technique (OLS) that is derived from the relevant data and maximum likelihood technique (MLE) which is an alternative to OLS for the intention of estimation. In Mincer Wage Model, it can only be used to the (OLS) for parameter estimation.

4.3 Diagnostic Checking for Model's Assumptions

The estimated results of the Mincer wage models are valid only if the model is not misspecified and the conditions under which the OLS provides reliable results are met. Moreover, given that the properties of the OLS estimator as well as the different tests are derived from the way the model is constructed, including the stochastic specification of the model, it is important to undertake diagnostic checks.

4.3.1 Regression Specification Error Test (RESET)

A specification issue arises if the relation between the dependent variable and the explanatory variables is not linear. Least squares estimation requires linearity in the parameters, so nonlinear relations, such as standard polynomial functions or where some or all of the variables are expressed in logarithms, can still be treated as linear models. The regression specification error test (RESET) proposed by Ramsey (1969)

can be used to diagnose the presence of nonlinearities. The implementation of RESET involves two steps.

First step: Obtain the OLS fitted values, $\widehat{lnwage}$, from the Mincer wage model

$$\widehat{lnwage} = \beta_0 + \beta_1 educ + \beta_2 exp + \beta_3 exp^2 + \varepsilon$$

Second step: Run the following model

$$lnwage = \beta_0 + \beta_1 educ + \beta_2 exp + \beta_3 exp^2 + \Psi \widehat{lnwage} + v$$

The RESET is of the null hypothesis $H_0 : \psi = 0$, and is a simple *t* test. If the null hypothesis is not rejected, then the linear specification is admissible. On the other hand, rejection can be the result of nonlinearities in the relationship between the dependent variable and the explanatory variables or the misspecification of functional form.

4.3.2 Heteroscedasticity

Heteroscedasticity entails the failure of the identical part of the independent and identically distributed (iid) specification of the error term. It means that the variance of the error term changes from one observation to another, often in relation to a variable. If it is the solve problem with the model, it has no consequences for the unbiasedness property of the OLS estimator. It does affect the way in which the variance of the estimator is calculated and thus will cause bias in the test statistics. White test can be used to detect heteroskedasticity. The advantage of this test is that the precise knowledge of what variables will appear in the variance function. The null hypothesis is homoskedasticity and the test statistic has Chi-square distribution.

4.3.3 Endogeneity

A more serious problem occurs if there is correlation between the error term and any of the explanatory variables. This may happen if one or more of the latter are subject to measurement error. More commonly the correlation is due to the endogeneity of the explanatory variables. If this is the case, the OLS estimator will be both biased and inconsistent. A test that examines whether OLS estimators are biased because of correlation between regressor and error term has been proposed by Hausman (1978). The idea behind the test is that if there is no correlation between regressor and error term, the OLS and IV estimators are both consistent. If there is a correlation, then the IV estimator is still consistent whereas the OLS is not. Any

significant divergence between the two therefore indicates the presence of a correlation between regressor and error term. A straightforward version of Hausman test is in two steps. Here, *educ* is suspected to be correlated with error and *fathereduc* is instrument.

First step: Obtain the OLS residuals, $\hat{v}$, from the following model

$$\widehat{educ} = \alpha_1 + \alpha_2 exp + \alpha_3 exp^2 + \alpha_4 fathereduc + v$$

Second step: Run the following regression model

$$lnwage = \beta_0 + \beta_1 educ + \beta_2 exp + \beta_3 exp^2 + \emptyset\hat{v} + \varepsilon$$

The above two models are estimated with the OLS. The Hausman test is of the null hypothesis: $H_0 : \phi = 0,$ which is simply a *t* test.

4.4 Instrumental Variables (IV) Estimation

If there are unobserved factor such as 'father education' that affects both education and wage, then the estimated rate of returns on education will be biased upwards due to the correlation between the explanatory variable and the error term. An asymptotic approach to reducing bias in the estimation of returns to education due to 'father education' is to use the method of instrumental variables (IV), with father education as instruments. Given that there are several variables in the equation, the two stage least squares (2SLS) version of instrumental variables (IV/2SLS) estimation is easier to implement and comprehend. The OLS estimates are thought to be biased and inconsistent while the IV/2SLS are, though still biased, consistent. In order to obtain the consistent estimate of the return to education in the Mincer wage model, the IV/2SLS estimation can be implemented in two steps.

First step: Obtain the fitted value of education, $\widehat{educ}$, from the following model

$$\widehat{educ} = \alpha_1 + \alpha_2 exp + \alpha_3 exp^2 + \alpha_4 fathereduc + v$$

Second step: Run the following model

$$lnwage = \beta_0 + \beta_1 educ + \beta_2 exp + \beta_3 exp^2 + \varepsilon$$

Applying the OLS to this equation provides the IV estimates of the parameters, and if the instruments have the required properties (correlated with *educ*, but not with the original error term), the OLS estimator in the second stage (being the IV estimator) is consistent.

Weak Instruments

IV method requires instrumental variables for the endogenous regressor. The two criteria for a variable to be an instrumental variable are (1) it must be strongly correlated with the endogenous regressor, and (2) it must not be correlated with the error term. There is a growing literature on the problems of 'weak' instruments, in which the chosen instrument is weakly correlated with the endogenous regressor. This concerns the first requirement of an instrumental variable and, if the correlation is low, the IV estimator can be very biased. In this analysis, education is believed to be the endogenous variable while father's is used as the instruments. In order for the IV method to provide reliable estimates, the instruments must be correlated with the endogenous regressor, education. One simple test that can be undertaken is whether the coefficients on the instrument α_4 is zero in the first stage regression of 2SLS as follows.

$$\widehat{educ} = \alpha_1 + \alpha_2 exp + \alpha_3 exp^2 + \alpha_4 fathereduc + v$$

This involves calculating the standard *t* test statistic for the hypothesis $H_0 : \alpha_4 = 0$. It is suggested that this statistic should be greater than 3 for the instruments to be valid. If it is less than 3, the weakness of the instruments could cause substantial bias.

4.5 Background of Recursive (Path) Model

The previous sections employed standard multiple regression approach to estimate the returns on education in Myanmar. One of the disadvantages of standard multiple regression approach is that it cannot explicitly specify the causal links among variables. In addition, it can handle only one dependent variable at a time.

Path analysis is a statistical technique to examine the comparative strength of direct and indirect relationships among variables. A series of parameters are estimated by solving one or more structural equations in order to test the fit of the correlation matrix between two or more causal models, which are hypothesized by the researcher to fit the data.

Path analysis assesses the comparative strength of different effects on an outcome, the relationships between variables in the path model are expressed in terms of correlations and represent hypotheses proposed by the study. Therefore, the relationships or pathways cannot be statistically tested for directionality and the

models themselves cannot prove causation. However, path models do reflect theories about causation and can inform the researcher as to which hypothesized causal model best fits the pattern of correlations found within the data set. One of the advantages of using path analysis is that it forces researchers to explicitly specify how the variables related to one another and thus encourages the development of clear and logical theories about the process influencing a particular outcome. Path analysis is also advantageous in that it allows researchers to break apart or decompose the various factors affecting an outcome into direct effects and indirect components.

However, there are many theories and concepts which highlight the specific causal links among the variables of family background, intellectual ability, educational attainment, occupational status, and labour earnings. For instance, Psacharopoulos and Tinbergen (1978) use the following model of causal link flowing from family background to labour earnings.

$$\begin{pmatrix} Family \\ background \end{pmatrix} \rightarrow \begin{pmatrix} Intellectual \\ ability \end{pmatrix} \rightarrow \begin{pmatrix} Educational \\ attainment \end{pmatrix} \rightarrow \begin{pmatrix} Occupational \\ status \end{pmatrix} \rightarrow \begin{pmatrix} Labour \\ earnings \end{pmatrix}$$

In the above model, family background is the exogenous to the model. It affects respondent's ability, which in turn affects respondent's educational attainment, occupational status, and labour earnings, recursively. The advantages of path model are to be able to specify the causal links among variables explicitly. Moreover, it can estimate multiple equations system simultaneously and provide the overall fit of the model. The causal relationships can be observed from the path diagram.

4.6 Elements of Recursive (Path) Model

(1) The Path Diagram: Social scientific theories of causal relationships often specify a system of relationships in which some variables affect other variables and these in turn influence still other variables in the model. A single multiple regression model can only specify one response variable at a time. However, path analysis estimates as many regression equations as are needed to relate all the proposed theoretical relationship among the variables in the explanation at the same time. A path diagram represents the hypothesized causal model in path analysis. The single straight arrows indicate a causal relationship, leading from the explanatory (causal) variable to the outcome variable (effect).

(2) Exogenous and Endogenous Variables: Variables often play more than one role in path models and this reflected in the analytic language used in path analysis. Exogenous variables are variables whose cause is external to the model and whose role is to explain other variables or outcomes in the model. Endogenous variables are variables whose values are solved by within the system and estimated by the model. Endogenous variables have incoming arrows and can include outcome variables (only income arrows) and intervening causal variables.

(3) Residual Error: Residuals or error terms (represented by *e*) are exogenous independent variables that are not directly measured and reflect unspecified causes of variability in the outcome or unexplained variance plus any error due to measurement. They are depicted in the diagram by arrows connecting the errors terms with their respective outcome or endogenous variables. Residual errors are assumed to have a normal distribution with a mean of zero and to be uncorrelated with other variables in the model. Not error terms are not always uncorrelated.

(4) Path Coefficients: Although not required, path models often report the standardized regression coefficients (beta) or estimated path coefficients that have been converted into standardized z-scores, for each causal path depicted in the model**.** Standardized coefficients allow researchers to compare the relative magnitude of the effects of different explanatory variables in the path model by adjusting the standard deviations such that all the variables, despite different units of measurement, have equal standard deviations. These standardized path coefficients measure the relative strength and sign of the effect from a causal variable to an endogenous or outcome variable in the model. When more than one causal variable is present in the model, the standardized path coefficients represent partial regression coefficients that measure the effect of one variable on another, controlling for prior variables.

(5) Structural Equations: Since the path analytic method follows the usual assumptions of ordinary least squares regression, all the relationships are assumed to be specified by a series of path or structural equations that describe causal relationships between the variables. In path models, to solve for the direct effects, each endogenous variable is regressed on all the variables with direct paths leading to it. Each outcome or endogenous variable also has a residual path or error term ε associated with it representing the variation left unexplained by the explanatory variables in the path model.

(6) Direct and Indirect Causal Relationships: Causal relationships between variables may consist of direct and indirect effects. Direct causal effects are effects that go directly from one variable to another. Indirect effects occur when the relationship between two variables is mediated by one or more variables. The magnitude of the indirect effects is determined by taking the product of the path coefficients along the pathway between the two causally related variables. Thus, the total indirect effect between two variables in a path model equals the sum of the products of each indirect effect (Lleras, 2005).

(7) Mediation: Mediation can take numerous forms in a model. Full mediation (also called indirect only mediation) is the direct effect between two constructs is non-significant, but an indirect effect through a mediator does have a significant relationship. Partial mediation is another form that mediation can take. This is where the direct effect between two constructs is significant, and so is the indirect effect through a mediator. Complementary mediation is where the direct effect and the indirect effect have a similar influence in regard to directionality. For instance, the direct effect may a have positive influence, and the indirect effect has a positive influence as well. A competitive mediation has different directionality between the direct effect and indirect effect. The direct effect might have a negative influence, but the indirect effect might have a positive influence. With this type of mediation, the presence of the mediator can change the directionality of the influence (Collier, 2020).

4.7 Estimation and Testing

The model is recursive since all the causal linkages flow in one direction and none of the variables represent both cause and effect at the same time. This causal model is the only kind of model which can properly be called path analysis. In models where the hypothesized causality flows in a single direction, the estimation can be done relatively simply by using OLS regression or maximum likelihood estimation (MLE) to solve the equations for each endogenous or outcome variable in the model.

Recursive (path) regression model is particularly sensitive to model specification. The inclusion of irrelevant variables or the exclusion of important causal variables changes the value of path coefficients. In addition to recursively, it is also assumed that all causally relevant variables have been included in the model. Specification error occurs when significant causal variables are excluded from the model. When this type of error occurs the value of the path coefficients reflect the

common variance shared with these omitted variables. Since the strength of direct and indirect effects on the outcome variables in the model are evaluated using the path coefficients, the decision of whether or not to include different variables in the path model is critical to the interpretation of the underlying (causal) processes (Lleras, 2005).

4.8 Goodness-of-Fit Criteria

A number of goodness-of-fit measures are available to assess the overall fit of the hypothesized model. Goodness-of-fit measures the extent to which the actual or observed covariance input matrix corresponds to (or departs from) that predicted from the proposed model. Goodness-of-fit measures can be classified into three types: (1) absolute fit measures, (2) incremental fit measures, and (3) parsimonious fit measures (Ho, 2013).

4.8.1 Absolute Fit Measures

These measures determine the degree to which the proposed model predicts (fits) the observed covariance matrix. Some commonly used measures of absolute fit include the Chi-square statistic, the goodness-of-fit statistic, and the root mean square error of approximation.

Chi-Square Statistic

The most fundamental measure of overall fit is the likelihood-ratio Chi-square (χ^2) statistic, the only statistically based measure of goodness-of-fit available in SEM. In applying the χ^2 test, wishes to reject the null hypothesis so as to claim support for its alternative, that is, there is a significant difference between the "observed" and the "expected." When used in this way, the larger the Chi-square (χ^2) value the "better." However, when used in SEM, this study is looking for *no significant differences* between the actual and predicted matrices. As such, this study does not wish to reject the null hypothesis and, consequently, the smaller the χ^2value, the better fit of the model. However, the Chi-square (χ^2)statistic is very sensitive to departures from multivariate normality of the observed variables and increases as a direct function of sample size. In the case of large samples, the power of the statistical test underlying the SEM approach is very high. With a great deal of statistical power, almost every reasonable model will be rejected if only the Chi-square (χ^2)value and

the associated probability are considered. Thus, given departures from multivariate normality or larger samples, a proposed model can easily fail to fit the data statistically, even though the discrepancy between the sample covariance matrix and that reproduced by the parameter estimates of the proposed model may be insignificant from a practical standpoint. Given these limitations, this study should complement the Chi-square (χ^2) measure with other goodness-of-fit measures.

Goodness-of-Fit Index

The goodness-of-fit index measures how much *better* the model fits compared with no model at all. It is a non-statistical measure ranging from 0 (poor fit) to 1 (perfect fit). While higher values indicate better fit, no threshold levels of acceptability have been established.

Root Mean Square Error of Approximation (RMSEA)

The RMSEA takes into account the error of approximation in the population, it is a measure of *discrepancy per degree of freedom*, and asks the question. The value is representative of the *badness-of-fit* when the proposed model is estimated in the population, in that a value of "0" indicates the best fit and higher values indicate worse fit. Values ranging from 0.05 to 0.08 are deemed acceptable; values ranging from 0.08 to 0.10 indicate mediocre fit, and those greater than 0.10 indicates a poor fit. In reporting the RMSEA, it is also important to report its 90% confidence interval for the population parameter estimated by RMSEA. This interval reflects the degree of uncertainty associated with RMSEA as a point estimate at the 90% level of statistical confidence.

4.8.2 Incremental Fit Measures

These measures compare the proposed model to some baseline model, most often referred to as the null or independence model. In the independence model, the observed variables are assumed to be uncorrelated with each other. The independence model is so severely and implausibly constrained that it would provide a poor fit to any interesting set of data. A number of incremental fit measures have been proposed: Tucker-Lewis Index; Normed Fit Index; Relative Fit Index; Incremental Fit Index; and Comparative Fit Index. While the calculations of these fit indices and their underlying assumptions may be somewhat different, they all represent comparisons between the proposed model and a null or independence model. Specifically, they show the improvement achieved by a proposed model over the null model (i.e., a

model assuming independence among the variables); they range from 0 (a fit that is no better than the null model) to 1 (a perfect fit).

4.8.3 Parsimonious Fit Measures

In scientific research, theories should be as simple, or parsimonious, as possible. Pursuing this line of thought, parsimonious fit measures relate the goodness-of-fit of the proposed model to the number of estimated coefficients required to achieve this level of fit. Their basic aim is to diagnose whether model fit has been achieved by "overfitting" the data with too many coefficients. Their role is mainly to compare models on the basis of some criteria that take parsimony (in the sense of number of parameters to be estimated) as well as fit into account.

Parsimonious Normed Fit Index

The parsimonious normed fit index takes into account the number of degrees of freedom used to achieve a level of fit. Parsimony is defined as attaining higher degrees of fit per degree of freedom used (one degree of freedom per estimated coefficient). Higher values of parsimonious normed fit index are better, and its primary use is in the comparison of models with differing levels of freedom. When comparing between models, differences of 0.06 to 0.09 are proposed to be indicative of substantial model differences.

Akaike Information Criterion (AIC)

The AIC is a comparative measure between models with differing numbers of constructs. AIC values closer to zero indicate better fit and greater parsimony. A small AIC generally occurs when small chi-square values are achieved with less estimated coefficients. This indicates not only a good fit of observed versus predicted covariance, but also a model not prone to "overfitting." In applying this measure to the comparison decision problem, one estimates all models, ranks them according to the AIC criterion, and chooses the model with the smallest value.

CHAPTER V
ESITMATION OF RATE OF RETURNS ON INVESTMENT IN EDUCATION

This chapter provides the main data source and definitions of variables used in estimating the Mincer's wage model. It provides the estimates of the rate of returns on education for the nation, states and regions by the least squares and instrumental variables methods. First, a series of model diagnoses are also performed. It extends the standard multiple regression approach to wage model, estimates the recursive (path) model. In addition, this chapter performs multigroup analysis for the recursive (path) model by gender and region. The main concern of this chapter is to test the causal recursive (path) model and to test whether these recursive (path) causal links are the same for males and females, and also for urban and rural areas.

5.1 Sources of Data

The main source of data for the study was obtained from the "Myanmar Labour Force, Child Labour and School-to-Work Transition Survey" which was carried out from 1st January to 31st March, 2015 by the Department of Labour under the Ministry of Labour, Immigration and Population. As it was a sample survey, the sampling frame was based upon the Population and Housing Census conducted in 2014. The census included 80,557 enumeration areas, of which a sample of 1,500 enumeration areas was selected and within these areas 24,000 households where chosen for this labour force survey. The first collected sample size is 13,173 respondent participant, which includes both people in the labour force and not in the labour force. However, due to the constraints such as respondent must be at the working age of between 15 and 65 years, respondent must earn regular wages, and respondent must be combined with parents, the sample size was reduced to 2,134 respondents in estimating the Mincer wage model.

5.2 Description of Variables Included in the Study

This section describes the fourteen variables and definitions which are mainly used in estimation of returns on education in Myanmar. Out of the fourteen variables, gender, marital status, location, and states and regions variables are binary dummy variables. The other variables are continuous variables. Wage, age, education, working experience, and occupation data are collected from respondents while father education and father occupation data are collected through their parents. In this chapter, the rates of returns on education are estimated by the following basic Mincer's wage model.

$$lnwage = \beta_0 + \beta_1 educ + \beta_2 exp + \beta_3 exp^2 + \varepsilon$$

In this study, lnwage is the dependent variable. Explanatory variables are education, father education, occupation, father occupation, age, experience, gender, marital status, location and states and regions. Dependent variable and explanatory variables included for the study are;

1. wage: Variable for earnings, this measures the salary or wage of respondent per month in thousand kyats.
2. lnwage: This measures the natural logarithm of monthly wage of respondent from job.
3. educ: Variable for respondent's education, this measures the years of schooling of the respondent. Table (3.1) Education System in Myanmar provided the information on the highest level of education compatible with the levels; zero for those who have no schooling, four years for those who have below primary level, five years for those who have primary level, nine years for those have middle and vocational certificate level, eleven years for those have high school and under graduate diploma level, fifteen years for those have bachelor degree and post graduate diploma level, seventeen years for those have master level, and twenty one years for those have PhD level.
4. fathereduc: Variable for father education, this is defined in the same way as variable for respondent's education.
5. occupation: This measures the types of occupation of the respondent. Occupation is measured by the scale of International Standard Classification of Occupation (ISCO-08) groups similar kind of occupations. In those case where occupations are used as part of the measurement of the skill level of an

occupation. In this study, skill level is assumed to be interval scales. The mapping of ISCO-08 major groups to skill levels are provide in Appendix Table (B-1).

6. father occupation: This measures the types of occupation of the respondent's father. This is defined in the same way as variable for occupation.
7. age: Age in years.
8. age^2: This is defined the square of age in years.
9. exp: Variable for experience, this measures the working experience in months.
10. exp^2: This is defined the square of working experience in months.
11. male: This is defined gender of the respondent (1 if male and 0 female).
12. single: This is defined marital status of the respondent (1 if single and 0 otherwise).
13. urban: This is defined location of the respondent (1 if urban and 0 rural).
14. sr: This is defined states and regions of the respondent. This is classified into fifteen states and regions which are (1 = Kachin, 2 = Kayah, 3 = Kayin, 4 = Chin, 5 = Sagaing, 6 = Tanintharyi, 7 = Bago, 8. = Magway, 9 = Mandalay, 10 = Mon, 11 = Rakhine, 12 = Yangon, 13 = Shan, 14 = Ayeyawady, 15 = Nay Pyi Taw).

5.3 Characteristics of Variables in Mincer's Wage Model

Appendix Table (B-2) presents the summary of general characteristics of variables included in the study. According to this Table (B-2), wage distribution shows that the majority earn less than 100,000 kyats while only few respondents earn above 400,000 kyats.

In the result of respondent's education, there are a respondent who has no education, 243 respondents who have below primary level, 670 respondents who have primary level, 566 respondents who have middle and vocational certificate level, 238 respondents who have high school and under graduate diploma level, 413 respondents who have bachelor degree and post graduate diploma, and 3 respondents have master level respectively. The distribution of the years of schooling seems to be fairly symmetric. More than half of the respondents have education with no more than middle school whereas a small portion of respondents are graduates.

Concerning the father's education, there are 25 respondent's father who has no education, 495 respondent's father who have below primary level, 972 respondent's father who have primary level, 412 respondent's father who have middle and vocational certificate level, 150 respondent's father who have high school and under graduate diploma level, 78 respondent's father who have bachelor degree and post graduate diploma, a father of respondent has master level, and a father of respondent has PhD level respectively. The majority of fathers have education level up to middle school.

In the result of respondent's occupation, most of the respondents are skill level two which means that they do their clerical support workers, service and sales workers, skilled agricultural, forestry and fishery workers, craft and related trades workers, plant and machine operators, and assemblers, and elementary occupations workers.

The result also shows that most of the father's occupation are skill level two which means that they do their clerical support workers, service and sales workers, skilled agricultural, forestry and fishery workers, craft and related trades workers, plant and machine operators, and assemblers, and elementary occupations workers.

According to the age distribution, there are 2019 respondents between 15 to 34 age group, and 115 respondents between 35 to 65 age group. Therefore, the majority of respondents are under 35 years.

Concerning the respondents working experience, there are 1599 respondents who have 2 years of experience, 332 respondents who have 5 years of experience, and 203 respondents who have 10 years of experience respectively. About one third of respondents have working experience of 2 years.

The results also indicate that 54 percent of respondents are males and 46 percent of respondents are females. About 86 percent of respondents are single while 14 percent of respondents possess other marital status. The 58 percent of respondents are from rural areas while 42 percent from urban areas.

By regions of Myanmar, the majority of respondents 13.45 percent, 11.95 percent lived in Yangon and Bago respectively. Followed by 2.86 percent lived in Kachin, 1.92 percent lived in Kayah, 2.20 percent lived in kayin, 1.08 percent lived in Chin, 9.47 percent lived in Sagaing, 6.66 percent lived in Tanintharyi, 8.01 percent lived in Magway, 10.45 percent lived in Mandalay, 4.21 percent lived in Mon, 5.34

percent lived in Rakhine, 6.19 percent lived in Shan, 10.78 percent lived in Ayeyawady, and 5.43 percent lived in Nay Pyi Taw respectively.

5.4 Preliminary Analysis for Estimation of Returns on Education in Myanmar

Appendix Table (B-3) presents the summary statistics for the variables used to estimate the returns on investment in education in Myanmar. As shown in this Table (B-3), the statistics describe that the number of respondents of wage earner is 2134. The average monthly wage is 123.86 (000) kyats, with a standard deviation of 420.80 (000) kyats. As regards to education, the mean years of schooling for the respondents is about 9 years, ranging from a minimum of no education to a maximum of 17 years. An average of respondent's working experience has around three years, ranging from a minimum of two months to a maximum of 10 years. An average of respondent's age has 23 years, ranging from a minimum of 15 years to a maximum of 50 years. The average of respondent's father education has 6 years in education, ranging from a minimum of no education to a maximum of 21 years.

5.5 Correlation Analysis among Wage, Education, and Working Experience

Appendix Figure (B-1) (a**)** shows the histograms of the monthly wages as a dependent variable, the distribution of monthly wage is highly skewed to the right. That is, the majority earn a low level of wage while a few people earn a high level of wage.

In order to have a symmetric distribution, the level of monthly wage is transformed into the log of monthly wage. Appendix Figure (B-1) (b**)** shows the histograms of the dependent variable, log monthly wage. As expected, the histogram of log monthly wage becomes symmetric. The log monthly wage will, therefore, be used in the later analyses in order to have a relatively normal distribution.

Appendix Figure (B-2) (a) shows the scatter diagrams of the dependent variable, log monthly wage, and the independent variable, education. It shows that the log monthly wage and education are linearly and positively associated.

Appendix Figure (B-2) (b) shows the scatter diagrams of the dependent variable, log monthly wage, and the independent variable, experience. It shows that the log monthly wage and experience seems to indicate a non-linear relationship.

Both graphs cannot show a clear pattern of relationship between the variables, thus need to check the strength of the relationship. As shown in Appendix Table (B-4), it was shown that the correlation coefficients between the dependent variable, log monthly wage, and the two independent variables, education and working experience. In these results, the correlation between education and log monthly wage is about 0.18, which indicates that there is a weakly positive relationship between the variables. The correlation between working experience and log monthly wage is about 0.05, which indicates that there is a weakly positive relationship between the variables. These two correlation coefficients are very small, however, there are statistically significant as indicated by their corresponding p-values. It is common that the size of correlation coefficient is small in empirical research using cross section data, compared to those using time series data. The main reasons are that in cross section studies it is very difficult to capture the variation among individuals while in the time series studies a common trend make variable highly correlated.

5.6 Analysis of Returns on Education in Myanmar

This section provides the analysis of rate of returns on investment in education by using Mincer wage model and recursive regression model.

5.6.1 Parameters Estimation for Basic Mincer Wage Model

This section estimates the following Mincer's wage model, where log-wage is regressed on education, experience, and squared-experience. The constant (linear) effect of experience on wage is very restricted. In reality, wage can increase until a certain level of experience, beyond which wage can decrease as experience increases. In order to capture this quadratic effect (inverted U-shape) of experience on wage, the squared experience term is introduced in the model.

$$lnwage = \beta_0 + \beta_1 educ + \beta_2 exp + \beta_3 exp^2 + \varepsilon$$

Table (5.1) reports the estimated OLS results of the basic Mincerian wage model. The estimated equation yields the following information. All the coefficients are highly and significantly different from zero since the absolute *t* statistics (8.34) are much larger than the 5 percent critical value of 1.96. R^2 is particularly low, suggesting that is explained by human capital only 4 percent of the variation of the log-wage of respondents. The return of an additional year of education is estimated to be approximately 2.9 percent. In the first month in the labour force, other things being

equal, the relationship between experience and wage shows that respondent get 0.5 percent on average, but it will decline after a certain level of experience. The negative coefficient related to quadratic term for experience reveals the concavity of the experience-wage relationship which is in confirmatory in almost all Mincer based studies. Therefore, the return on education or wage is decreasing with extra working experience since the function is resulted as an inverted U- shape. The estimated constant coefficient suggests that someone entering the labour market for the first time with no educational investment will on average have monthly wage of 63.50 thousand kyats $\left(=e^{4.151}\right)$.

Table (5.1) Estimated Basic Mincer Wage Model with OLS

Variables	OLS
educ	0.02939***
	(0.00352)
exp	0.00523***
	(0.00149)
exp2	-0.00003***
	(0.00001)
Constant	4.15084***
	(0.04015)
N	2,134
R-squared	0.0393

Standard errors in parentheses

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

5.6.2 Diagnostic Checking for Mincer Wage Model

After estimation the parameters of the regression model, the assumptions have to check to get the validity results.

Regression Specification Error Test (RESET)

The regression specification error test (RESET) proposed by Ramsey (1969) can be used to check if there is any misspecification of the model. The implementation of RESET involves two steps.

First step: Obtain the OLS fitted values, $\widehat{lnwage}$, from the Mincer wage model

$$\widehat{lnwage} = \beta_0 + \beta_1 educ + \beta_2 exp + \beta_3 exp^2 + \varepsilon$$

Second step: Run the following model

$$lnwage = \beta_0 + \beta_1 educ + \beta_2 exp + \beta_3 exp^2 + \Psi \widehat{lnwage} + v$$

The RESET is of the null hypothesis $H_0 : \psi = 0$, and is a simple *t* test. If the null hypothesis is not rejected, then the current model specification is sufficient. On the other hand, rejection of the null hypothesis indicates that the model need further improvement.

Table (5.2) reports the results of RESET. Since ψ is not statistically significant, the null hypothesis of correct functional form cannot be rejected. It is, thus, concluded that the current functional form of the Mincer wage model is adequate.

Table (5.2) Regression Specification Error Test (RESET)

Variables	RESET
educ	-0.02625
	(0.20912)
Exp	-0.00463
	(0.03708)
exp2	0.00003
	(0.00024)
$\widehat{lnwage}$	0.20920
	(0.78603)
Constant	0.57136
	(13.4492)
n	2134
R-squared	0.0393
F-test [$H_0 : \psi = 0$]	0.070
Prob > F	0.790

Standard errors in parentheses
Note: *, **, *** Significant at the 10%, 5%, and 1% level respectively.

Testing for Heteroskedasticity

In cross-section analysis there has traditionally been relative interest in the issue of error autocorrelation, since it should not be present in samples that are supposed to be drawn randomly from a population at a given moment in time. More

prevalent in cross-section analysis is the presence of unobserved heterogeneity which can give rise to two econometric problems — heteroscedasticity and correlation between the error term and the explanatory variables. The presence of heteroscedasticity can be detected by a scatter diagram.

Appendix Figure (B-3) shows the scatter diagram of residuals from the basic Mincerian wage model against the fitted value of the dependent variable. The graph clearly shows that the variance of residuals is changing with the fitted values, indicating the potential heteroskedasticity problem in the estimated Mincerian wage model.

According to the scatter diagram of Appendix Figure (B-3), it seems that the estimated Mincer wage model suffers from heteroskedasticity problem. Therefore, test for heteroskedasticity is performed. According to the results of White's heteroskedasticity test, where the null hypothesis is there is no heteroskedasticity, the value of test static, which follows the Chi-square distribution with degree of freedom eight, is 16.34 and the corresponding p-value is 0.0377. The null hypothesis is, thus, rejected and the presence of heteroskedasticity problem is confirmed.

If the source of heteroscedasticity is known the linear relation can be transformed and the generalized least squares (GLS) estimates can be obtained. However, in practice it is rare to have information on the specific form of heteroscedasticity, and an alternative strategy is to estimate the variance of the OLS estimator using a more appropriate formula. In this case, White's (1980) consistent estimate of the variance covariance matrix of the OLS estimator can be used.

Table (5.3) makes a comparison between the results of basic Mincer wage model with and without White's standard error. As expected, the coefficients remain unchanged, but the estimated standard errors are a slightly lower in White's robust standard error than in without robust standard error.

Table (5.3) OLS Results of Mincer Model with and without White's Standard Error

	OLS	
Variables	**Without robust standard error**	**With White's robust standard error**
educ	0.02939***	0.02939***
	(0.00352)	(0.00208)
exp	0.00523***	0.00523***
	(0.00149)	(0.00099)
exp2	-0.00003***	-0.00003**
	(0.00001)	(0.00001)
Constant	4.15084***	4.15084***
	(0.04015)	(0.02694)
n	2134	2134
R-squared	0.0393	0.0393

Standard errors in parentheses

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

Test for Endogeneity

Endogeneity problem occurs if there is correlation between the error term and any of the explanatory variables. Endogeneity problem can be tested by Hausman's two-steps procedure. In this analysis, *educ* is suspected to be correlated with error and *fathereduc* is instrument.

First step: Obtain the OLS residuals, $\hat{v}$, from the following model

$$\widehat{educ} = \alpha_1 + \alpha_2 exp + \alpha_3 exp^2 + \alpha_4 fathereduc + v$$

Second step: Run the following regression model

$$lnwage = \beta_0 + \beta_1 educ + \beta_2 exp + \beta_3 exp^2 + \emptyset\hat{v} + \varepsilon$$

The above two models are estimated with the OLS. The null hypothesis of the Hausman test is: $H_0 : \phi = 0$, there is no correlation between the error term and any of the explanatory variables, which is simply a *t* test.

Table (5.4) presents the results of the two-step procedure of Hausman test for the endogeneity of education. As indicated in the second step, the coefficient of $\hat{v}$ is significant at 1%. The null hypothesis is rejected and it is concluded that there is correlation between education and the error term.

Table (5.4) Two-step Procedure of Hausman Test for Endogeneity

Variables	First step	Second step
Exp	0.01966**	0.00465***
	(0.00808)	(0.00168)
exp2	-0.00017***	-0.00003**
	(0.00006)	(0.00001)
fathereduc	0.66783***	
	(0.02445)	
educ		0.05271***
		(0.00709)
$\hat{v}$		-0.03088***
		(0.00755)
Constant	4.11408***	3.95742***
	(0.20889)	(0.06234)
n	2134	2134
R-squared	0.2496	0.0457

Robust standard errors in parentheses

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

5.6.3 Comparison of the *OLS and IV/2SLS* Results for Mincer Wage Model

If there is endogeneity problem, the OLS is both biased and inconsistent while the Instrumental Variable (IV) estimator is consistent but less efficient. The previous section indicates that there is endogeneity problem in Mincer wage model.

In order to make a comparison between the two methods, Table (5.5) reports the OLS and IV/2SLS results of basic Mincer wage model. As expected, the standard errors of the IV/2SLS estimates are slightly larger than those of the OLS estimates. Even though IV/2SLS estimators are less efficient than OLS estimators, IV/2SLS estimators are consistent results. The returns on education estimates of the OLS is less than IV/2SLS. The OLS estimate indicates that the return on education is 2.9% while IV estimate shows that it is 5.3%.

Table (5.5) The OLS and IV/2SLS Results of Basic Mincer Wage Model

Variables	OLS	IV/2SLS
Educ	0.02939***	0.05271***
	(0.00352)	(0.00619)
Exp	0.00523***	0.00465***
	(0.00149)	(0.00151)
exp2	-0.00003***	-0.00003**
	(0.00001)	(0.00002)
Constant	4.15084***	3.95742***
	(0.04015)	(0.05136)
N	2134	2134
R-squared	0.0393	0.0201

Robust standard errors in parentheses

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

5.6.4 Testing for Validity of Instruments

The second column of Table (5.6) reports the results for testing the weak instruments. The education variable is strongly correlated with the instrument — the *t* statistics (27.32) are much larger than critical value of 1.96 (the rule of thumb proposed was t-statistic greater than 3). This indicates that the instrumental variable used in the IV method meets the first criterion of a valid instrument.

In sum, on the basis of the two tests (Hausman test, and weak instrument test), the instrumental variable approach can be deemed as appropriate in this study and more confidence can be expressed in the IV estimates than the OLS estimates.

Table (5.6) Test for the Validity of Instrumental Variables

Variables	Weak instrument test
Exp	0.01966**
	(0.00808)
exp2	-0.00017***
	(0.00006)
Fathereduc	0.66783***
	(0.02444)
Constant	4.11408***
	(0.20889)
N	2134
R^2	0.2496

Robust standard errors in parentheses

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

5.6.5 Parameters Estimation for Extended Mincer Wage Models

This section presents the two extended Mincer wage models are estimating returns on education by control variables and estimating returns on education by states and regions with control variables.

5.6.5.1 Estimating Returns on Education by Control Variables

In this section, the basic Mincer wage model is extended by incorporating gender, marital status, and location variables.

Extended Model (1)

The following Model (1) extended the Mincer wage model to include the interaction between education and male.

$$lnwage = \beta_0 + \beta_1 educ + \beta_2 (educ \times male) + \beta_3 exp + \beta_4 exp^2 + \beta_5 male + \varepsilon$$

where the dependent variable is lnwage while the independent variables are education, interaction of education and male, experience, squared experience, and male.

Extended Model (2)

The following Model (2) extended the Mincer wage model to include the interaction between education and single.

$$lnwage = \beta_0 + \beta_1 educ + \beta_2 (educ \times single) + \beta_3 exp + \beta_4 exp^2 + \beta_5 single + \varepsilon$$

where the dependent variable is lnwage while the independent variables are education, interaction of education and single, experience, squared experience, and single.

Extended Model (3)

The following Model (3) extended the Mincer wage model to include the interaction between education and urban.

$$lnwage = \beta_0 + \beta_1 educ + \beta_2 (educ \times urban) + \beta_3 exp + \beta_4 exp^2 + \beta_5 urban + \varepsilon$$

where the dependent variable is lnwage while the independent variables are education, interaction of education and urban, experience, squared experience, and urban.

Table (5.7) Extended Mincer Wage Models with IV Method

Variables	Model 1	Model 2	Model 3
Educ	0.08420***	0.17213***	0.07312***
	(0.01176)	(0.04261)	(0.01901)
educ*male	-0.06148***		
	(0.12731)		
Exp	0.00493***	0.00342**	0.00459***
	(0.00166)	(0.00186)	(0.00173)
exp^2	-0.00003**	-0.00002	-0.00003**
	(0.00001)	(0.00001)	(0.00001)
Male	0.81976***		
	(0.12219)		
educ*single		-0.14203***	
		(0.04205)	
Single		1.12819***	
		(0.36619)	
educ*urban			-0.03839**
			(0.01906)
Urban			0.36618**
			(0.15547)
Constants	3.50634***	3.02708***	3.78744***
	(0.10845)	(0.36073)	(0.14466)
N	2134	2134	2134

Robust standard errors in parentheses

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

Table (5.7) presents the estimated results of extended Miner wage models. The second column of Table (5.7) shows that all variables in the basic Mincer wage equation are still significant. The coefficient of the binary gender variable, *male*, is positive and significant, suggesting that the average wage of male is higher than female.

The coefficient of the interaction term, *educ*male*, for a respondent with additional one year of education, suggesting that male respondent leads to an increase in wages of approximately [0.81975-0.06148 (1) = 0.75827]. It also would indicate that the slope of gender-earnings profile depends on the level of education (especially on male). Because human capital theory (Becker,1962) implies that males with the higher level of education are likely to be getting the better job opportunities with highly salaries. Those males who have the higher levels of education are still learning the education or training in order to improve their skill or knowledge.

The third column of Table (5.7) shows that all variables in the basic Mincer wage equation are still significant. The coefficient of the binary marital variable, *single*, is positive and significant, indicating that the average wage of single is higher than other marital status.

The coefficient of the interaction term, *educ*single*, for a respondent with additional one year of education, suggesting that single respondent leads to an increase in wages of approximately [1.12819-0.14203 (1) = 0.98616]. It also would indicate that the slope of marital status-earnings profile depends on the level of education (especially on single). Because human capital theory implies that singles with the higher level of education are likely to be getting the better job opportunities with highly salaries. Those singles who have the higher levels of education are having the space in their life to spend quality time for themselves. Therefore, the interaction term is expected to take a negative sign.

The fourth column of Table (5.7) shows that all variables in the basic Mincer wage equation are still significant. The coefficient of the binary urban variable, *urban*, is positive and significant, indicating that the average wage of urban area is higher than rural area.

The coefficient of the interaction term, *educ*urban*, for a respondent with additional one year of education, suggesting that who lives in urban respondent leads to an increase in wages of approximately [0.36618-0.03839 (1) = 0.32779]. This result also would indicate that the slope of location-earnings profile depends on the level of

education (especially on urban). Because human capital theory implies that the people who have the higher level of education in urban areas are likely to be getting the better job opportunities with highly salaries. Those people who have the higher levels of education are getting the better access to medical facilities and better job opportunities with higher salaries, having more convenient in all aspects for life in cities and getting the well transportation system.

5.6.5.2 Estimating Returns on Education by States and Regions with Control Variables

Although all the variables in the extended Mincer wage model are significant, it is important to test whether these variables are still significant at the state and region level. In order to test this, the extended Mincer wage model is estimated for each state and region and the results are compared.

Table (5.8) reports the estimated results of extended Mincer wage model for each state and region. Among all states and regions, education has significant and positive impact only for Sagaing, Bago, Mon, Yangon, Shan, and Nay Pyi Taw. In 15 states and regions, the rate of returns on investment in education are different. In Yangon and Nay Pyi Taw, it was found that the service/tertiary sector-concerned with offering intangible goods and services to consumers and quaternary sector (knowledge, economy, education, research and development) which are the main sectors of the economy. As mentioned by the results, it was also found that the primary sector (the agriculture, mining, fishing and so on), secondary/manufacturing sector-concerned with producing finished goods, which are the main sectors of the economy were all in the development condition (especially in Sagaing, Bago, Mon, and Shan). So, it looked good for the labour productivity because of being the development condition in the economy of these states and regions. Briefly, it was generally affected on the estimating returns on education in Sagaing, Bago, Mon, Yangon, Shan, and Nay Pyi Taw since the conditions of the socio-economic background by those states and regions have been developing. The inverted U-shape relationship (that is, the positive coefficient of experience while the negative coefficient of squared experience) of working experience is maintained only in Bago, Mandalay, Yangon, and Shan. Male earns higher wage than female in Sagaing, Tanitharyi, Bago, Mandalay, Mon, Yangon, Shan, Ayeyawaddy, and Nay Pyi Taw. Marital status does not have significant impact, except for Ayeyawaddy. Urban-rural

location does not have significant effect, except in Kayin, in the other states and regions.

Table (5.8) Extended Mincer Wage Model with IV Method for the States and Regions with Control Variables

Variables	Kachin	Kayah	Kayin	Chin	Sagaing
educ	0.06684	-0.15885	-0.05081	0.02404	0.06651*
	(0.05595)	(0.31905)	(0.06007)	(0.09577)	(0.03739)
exp	-0.00415	-0.00964	0.01329	-0.01539	0.00296
	(0.00850)	(0.02472)	(0.01362)	(0.01077)	(0.00509)
exp2	0.00003	-0.00002	-0.00011	0.00014*	-0.00002
	(0.00006)	(0.00001)	(0.00009)	(0.00008)	(0.00003)
male	0.23464	0.23323	0.27597	0.17581	0.24762**
	(0.15460)	(0.93141)	(0.22271)	(0.14923)	(0.09457)
single	0.09656	-0.29858	-0.17947	-0.47474	-0.20624*
	(0.20778)	(0.40314)	(0.22247)	(0.28293)	(0.11749)
urban	0.20184	0.65302	0.67041***	0.08573	-0.02714
	(0.23271)	(0.99929)	(0.23169)	(0.38669)	(0.09094)
Constant	3.89543***	5.97996**	4.41244***	4.84553***	3.77619***
	(0.44087)	(2.65625)	(0.79776)	(1.23523)	(0.27649)
n	61	41	47	23	202
R-squared	0.0155	0.0011	0.2400	0.5264	0.0622

Robust standard errors in parentheses

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

Table (5.8) Extended Mincer Wage Model with IV Method for States and Regions with Control Variables (Cond.)

Variables	Tanintharyi	Bago	Magway	Mandalay	Mon
educ	0.09795	0.11078*	-0.04079	0.04623	0.06934***
	(0.06226)	(0.05432)	(0.05233)	(0.02985)	(0.02338)
exp	-0.00483	0.01059*	-0.00059	0.01129**	0.00239
	(0.09801)	(0.00606)	(0.00554)	(0.00552)	(0.00468)
exp2	0.00006	-0.00008*	-0.00006	-0.00006	0.00001
	(0.00006)	(0.00004)	(0.00004)	(0.00004)	(0.00004)
male	0.42488**	0.40262**	-0.04099	0.33418***	0.31826***
	(0.19247)	(0.12741)	(0.08925)	(0.08361)	(0.10744)
single	0.16552	0.16872	0.14574	0.16802	-0.15418
	(0.26964)	(0.14573)	(0.13937)	(0.14901)	(0.13583)
urban	-0.17536	-0.27754	0.25779	0.02022	-0.09386
	(0.11767)	(0.20021)	(0.18594)	(0.08773)	(0.14539)
Constant	3.47994***	3.07185***	4.73556***	3.50945***	3.70022***
	(0.560115)	(0.49438)	(0.36611)	(0.34699)	(0.22272)
n	142	255	171	223	90
R-squared	0.0011	0.0011	0.0011	0.1064	0.1502

Robust standard errors in parentheses

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

Table (5.8) Extended Mincer Wage Model with IV Method for States and Regions with Control Variables (Cond.)

Variables	Rakhine	Yangon	Shan	Ayeyawady	Nay Pyi Taw
educ	0.03928	0.06740***	0.07230*	0.02645	0.07733***
	(0.03162)	(0.01424)	(0.03673)	(0.01651)	(0.02871)
exp	0.02027	0.00698**	0.01292*	0.00169	0.006 05
	(0.01509)	(0.00375)	(0.00719)	(0.00294)	(0.00421)
exp2	-0.00013	-0.00005	-0.000 07	-0.00002	-0.00004
	(0.00011)	(0.00004)	(0.00005)	(0.00002)	(0.00003)
male	0.21464	0.22724***	0.44820***	0.33120***	0.17697*
	(0.15372)	(0.07053)	(0.10775)	(0.05735)	(0.08709)
single	-0.45579	0.03328	-0.23441	-0.20114**	-0.09739
	(0.31865)	(0.10048)	(0.14425)	(0.09765)	(0.10571)
urban	-0.09425	0.10532	-0.14298	0.01009	-0.01590
	(0.14869)	(0.08224)	(0.19571)	(0.08823)	(0.08327)
Constant	4.16789***	3.65604***	3.65329***	4.12835***	3.60516***
	(0.45538)	(0.20041)	(0.36588)	(0.15982)	(0.21535)
n	114	287	132	230	116
R-squared	0.0989	0.1201	0.1801	0.2038	0.0065

Robust standard errors in parentheses

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

5.6.6 Model Specification of Recursive (path) Model

This section extends the standard multiple regression approach to earning model. Empirical analyses in this study use recursive (path) models where the sequence of causation follows.

$$\begin{pmatrix} Father \\ education \end{pmatrix} \rightarrow \begin{pmatrix} Father \\ occupation \end{pmatrix} \rightarrow \begin{pmatrix} Respondent \\ education \end{pmatrix} \rightarrow \begin{pmatrix} Respondent \\ occupation \end{pmatrix} \rightarrow \begin{pmatrix} Labour \\ earnings \end{pmatrix}$$

In the above model, following the theoretical causal structure among social and economic variables, four-equation recursive models are fitted that they are:

(1) Father occupation = f (Father education)

(2) Respondent education = g (Father education, Father occupation)

(3) Respondent occupation = h (Father education, Father occupation, Respondent education)

(4) Respondent earning = i (Father education, Father occupation, Respondent education, Respondent occupation)

The above model consists of a set of four equations and five observed variables, of which four variables are endogenous and one is exogenous. In the first equation, father occupation is a function of father education. In the second equation, respondent education is a function of father occupation and father education. In the third equation, respondent occupation is a function of father occupation and father education, and respondent education. In the last equation, respondent earning is a function of father occupation and father education, respondent education, and their occupation.

Education is measured by the respondent's number of years of schooling completed. Occupation is measured by the scale of International Standard Classification of Occupations, where higher number indicates the higher labour-intensive occupation. Earnings are measured by the respondent's monthly wage in thousand kyats from employment.

Figure (5.1) shows the recursive (path) model of earnings, where father's education by the education level of respondent father; father's occupation by the occupation of respondent father, *education* is respondent's number of years of schooling completed; *occupation* is respondent's occupation; *earnings* are respondent's monthly wage in thousand kyats; and e1~e4 are random error terms. The model is recursive. Observed endogenous variables are *father's occupation*, respondent's *education*, their *occupation* and their *earnings* while observed,

exogenous variable is *father's education*. Unobserved exogenous variables are four error terms.

The head of arrows shows the direction of causal link among the variables. In the model, father's education has effect on other four variables. Father's occupation has effect on other three variables. respondent's education has effect on other two variables. respondent's occupation has effect on their earnings. In addition to the direct effect, the recursive (path) model also includes indirect effect through mediation variable. The mediation variables are father's occupation, respondent's education and their occupation. For instance, father's occupation has direct effect on respondent's earnings as well as indirect effect through their occupation. respondent's education has direct effect on their earnings as well as indirect effect through their occupation. Father's education has direct effect on respondent's earnings as well as indirect effect through father's occupation, respondent's education, and their occupation.

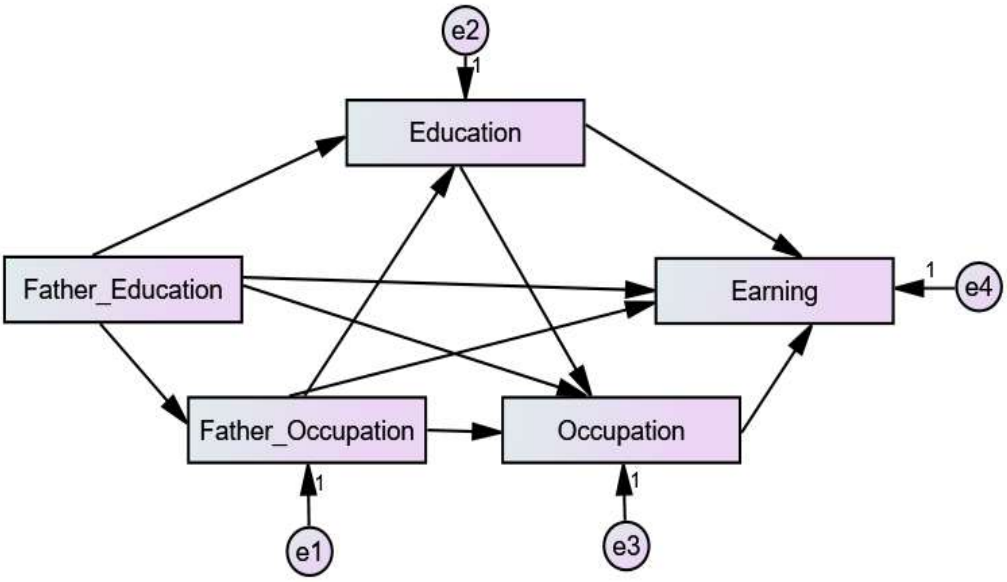

Figure 5.1: Recursive (path) Model of Earnings

Source: Own Calculations

5.6.6.1 Estimating the Recursive (path) Model

Figure (5.2) shows the estimated recursive (path) model of earnings. The figures on the arrows are standardized regression weights. The advantages of using standardized coefficients are to be able to compare the contribution of competing variables. The figures on each endogenous variable are the multiple correlation

coefficients, which indicate the proportion of the variance of the dependent variable explained by the model.

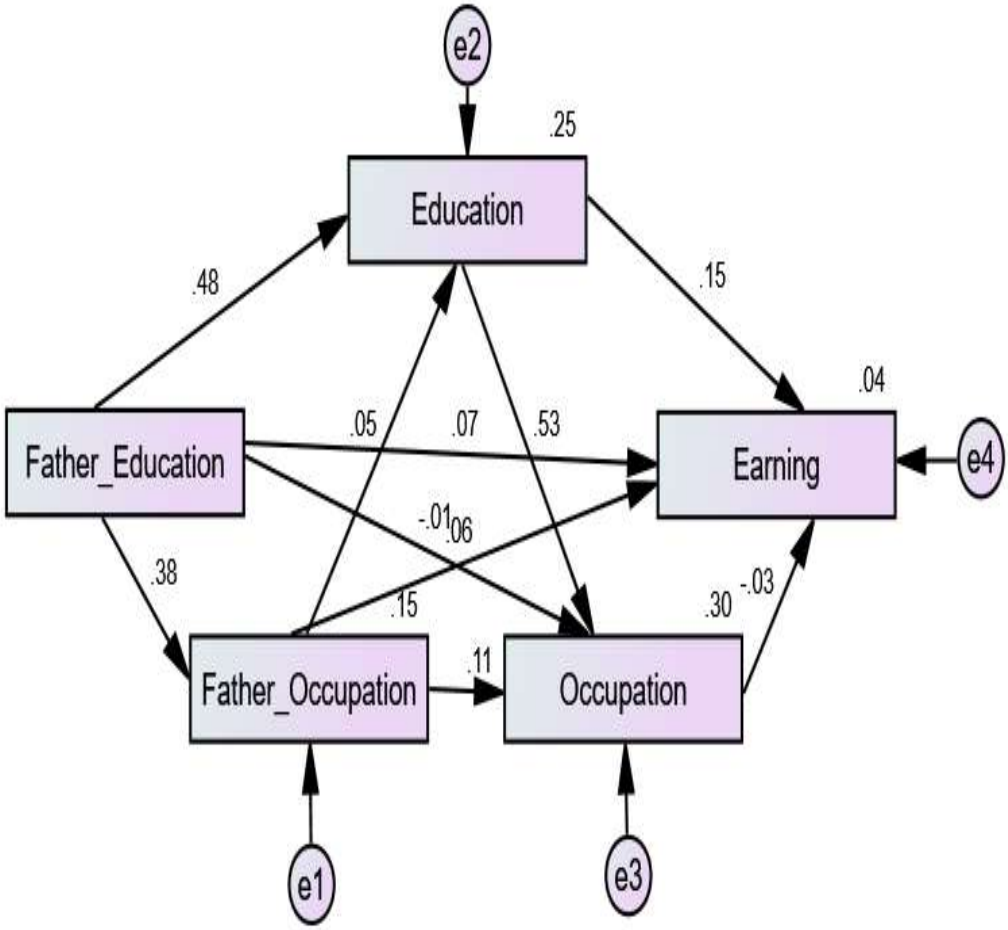

Figure 5.2: Estimated Recursive (path) Model of Earnings

Source: Own Calculations

The sample includes 2,134 father and other respondents. The model is exactly identified because the degree of freedom is zero (the number distinct sample moments is exactly equal to the number of distinct parameters to be estimated), and thus the goodness-of-fit measures cannot be calculated (Ho, 2013).

In Table (5.9), the results indicate that the father's education is significantly and positively related to be father's occupation, it also significantly and positively correlated with respondent's education. Father's occupation is significantly and positively associated with respondent's occupation. Respondent's education is significantly and positively effect on their occupation, it also significantly and positively associated with their earnings.

Furthermore, it appears respondent's' education not only strong effect (0.526) on their occupation but also moderate effect (0.146) on their earnings, suggesting that respondent's earnings is largely dependent on their occupation and their education. Father's occupation had a moderate effect (0.105) of respondent's occupation, but their father's occupation had no substantive effect on other respondent's education. Moreover, Father's education had a strong effect (0.479) on other respondent's education. If father's education is high, respondent who achieve at a high level of education because of father's educational guidance, in turn, improves their subsequent respondent's earnings. It was also found that father's education had a strong effect (0.384) on their occupation.

Table (5.9) Maximum Likelihood Estimates of Standardized Regression Weights

	Estimate
Father_ Occupation <---- Father_ Education	0.384***
Education <---- Father_ Education	0.479***
Education <---- Father_ Occupation	0.046
Occupation <---- Father_ Education	-0.015
Occupation <---- Father_ Occupation	0.105***
Occupation <---- Education	0.526***
Earning <---- Father_ Education	0.068
Earning <---- Father_ Occupation	0.062
Earning <---- Occupation	-0.027
Earning <---- Education	0.146***

Source: Own calculations.

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

In Table (5.10), results show that father's education explains about 0.147 or 14.7% of the variance of father's occupation. Father's education and their occupation account for about 0.249 or 24.9% of the variance of respondent's education. Father's education, father's occupation, and respondent's education explain about 0.304 or 30.4% of the variance of respondent's occupation. Father's education, father's occupation, respondent's education, and their occupation account for about 0.042 or 4.2% of the variance of their earning.

Table (5.10) Squared Multiple Correlation

Endogenous	Estimate
Father Occupation	0.147
Education	0.249
Occupation	0.304
Earning	0.042

Source: Own calculations.

Table (5.11) presents the total effect of the exogenous variable on each endogenous. Total effect is the sum of direct and indirect effects. Exogenous variable father's education has total effect of 0.384, 0.497, 0.287, and 0.157on each endogenous variable father occupation, respondent's education, their occupation, and their earnings, respectively. Exogenous variable father occupation has total effect of 0.046, 0.129, and 0.066 on each endogenous variable respondent's education, their occupation, and their earnings, respectively. Exogenous variable education has total effect of 0.526 and 0.132 on each endogenous variable respondent's occupation and their earnings, respectively. Exogenous variable respondent's occupation has total effect of -0.027 on the endogenous variable respondent's earnings.

Thus, in terms of standardized units, the total effect of father education on respondent's education (0.497) is higher than (sign ignored) the effect of father occupation. Furthermore, the total effect of respondent education (0.526) on their occupation is higher than (sign ignored) the effect of father education and father occupation. Moreover, the total effect of father education (0.157) on respondent's earnings is higher than (sign ignored) the effect of father occupation, respondent education and their occupation.

Table (5.11) Standardized Total Effects

Exogenous / **Endogenous**	Father Education	Father Occupation	Education	Occupation
Father Occupation	0.384	0.000	0.000	0.000
Education	0.497	0.046	0.000	0.000
Occupation	0.287	0.129	0.526	0.000
Earning	0.157	0.066	0.132	-0.027

Source: Own calculations.

Table (5.12) presents the direct effect of exogenous variable on each endogenous variables. Exogenous variable father's education has direct effect of 0.384, 0.479, -0.015 and 0.068 on each endogenous variable father's occupation, respondent's education, their occupation, and their earnings, respectively. Exogenous variable father's occupation has direct effect of 0.046, 0.105, and 0.062 on each endogenous variable respondent's education, their occupation, and their earnings, respectively. Exogenous variable respondent's education has direct effect of 0.526 and 0.146 on each endogenous variable their occupation and their earnings, respectively. Exogenous variable respondent's occupation has direct effect of -0.027 on the endogenous variable their earnings.

Father education had a strong effect on their occupation (0.384), suggesting that types of occupation of fathers depend on their education. Furthermore, Father's education had a strong effect on respondent's education (0.479), meaning that respondent's education is largely dependent on father's education. Whereas, father's education had a weak effect on respondent's earnings (0.068). Father's occupation also had a moderate effect on respondent's occupation (0.105), meaning that father's occupation is highly supportive for respondent's occupation. Whereas, father's occupation had a weak effect on respondent's education and their earnings (0.046 and 0.062, respectively). Moreover, education of respondent had strong effect on their occupation (0.526), indicating that types of occupation of respondent depend on their education. The moderate effect on respondent's earning was from their education (0.146); more able respondents also take more earning in high level of education.

Table (5.12) Standardized Direct Effects

Exogenous / Endogenous	**Father Education**	**Father Occupation**	**Education**	**Occupation**
Father Occupation	0.384	0.000	0.000	0.000
Education	0.479	0.046	0.000	0.000
Occupation	-0.015	0.105	0.526	0.000
Earning	0.068	0.062	0.146	-0.027

Source: Own calculations.

Table (5.13) presents the indirect effect of exogenous variable on each endogenous. Indirect effect can be obtained by subtracting the direct effect from the

total effect. Exogenous variable father's education has indirect effect of 0.018, 0.301 and 0.089 on each endogenous variable respondent's education, their occupation, and their earnings, respectively. Exogenous variable father's occupation has indirect effect of 0.024 and 0.003 on each endogenous variable respondent's occupation, and their earnings, respectively. Exogenous variable respondent's education has indirect effect of -0.014 endogenous variable their earnings.

The results of this analysis suggest that father's education has direct effect on respondent's education, it does have an indirect effect, through father's occupation. Father's education affects respondent's earning. Furthermore, the highly educated father takes more respondent in high level of education, and these education, in turn, improve their earnings. Moreover, father's occupation affects respondent's occupation, which in turn affects their earning. This makes sense: more father's occupation takes more respondent's occupation in job, and their occupation, in turn, improves their earning.

Table (5.13) Standardized Indirect Effects

Exogenous / **Endogenous**	Father Education	Father Occupation	Education	Occupation
Father Occupation	0.000	0.000	0.000	0.000
Education	0.018	0.000	0.000	0.000
Occupation	0.301	0.024	0.000	0.000
Earning	0.089	0.003	-0.014	0.000

Source: Own calculations.

5.6.6.2 Estimating the Recursive (path) Models for Male and Female

In addition to testing the above proposed recursive (path) model, multi group analysis is conducted for the same path model for male and female groups. Figure (5.3) shows the estimated path model for males.

For this multigroup analysis by gender, there are two data set (for males and females), each containing 5 observed variables. The two covariance matrices were generated from the two data sets contain 30 sample moments. For the group-invariant model, there are 20 parameters to be estimated. This model therefore has 10 (30-20) degrees of freedom, and yield a significant Chi-square value, χ^2 (n=1161, df=10) = 117.682, p<0.01. For the group-variant model, there are 30 parameters to be

estimated. This model, therefore, has zero degree of freedom and cannot calculate Chi-square statistics. However, for both invariant model and variant model, the baseline comparisons fit indices of normed fit index, incremental fit index, and comparative fit index are all above 0.9.

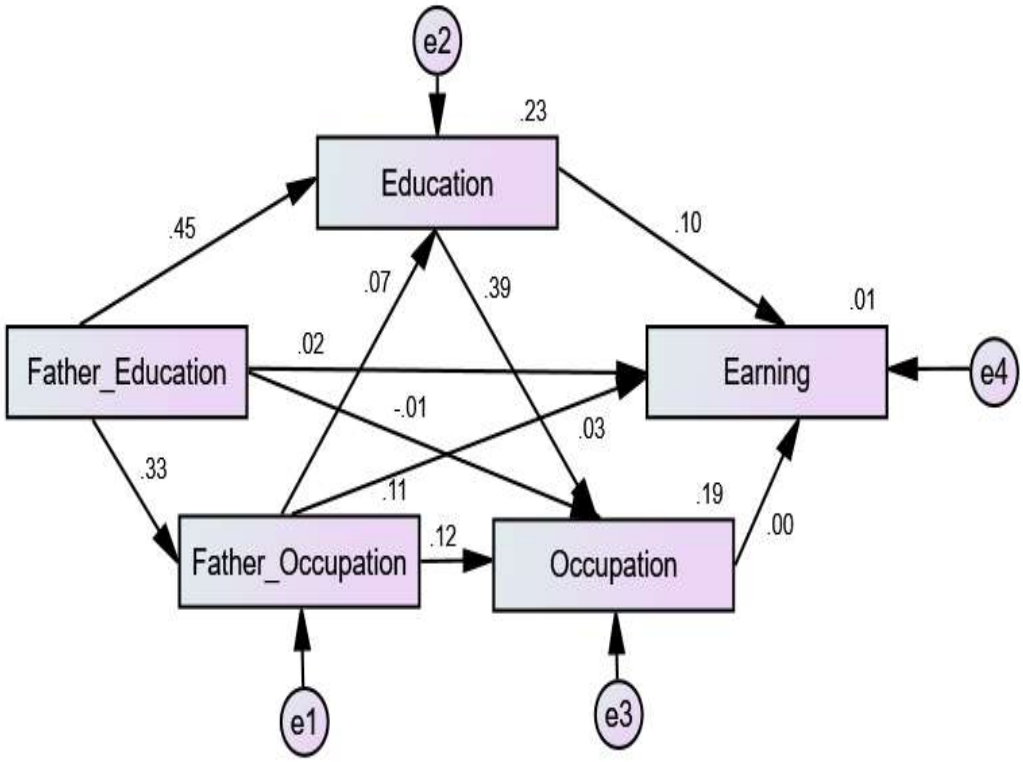

Figure 5.3: Multigroup Analysis by Gender (Male)

Source: Own Calculations

In Table (5.14), the results indicate that the father's education is significantly and positively related to be father's occupation, it also significantly and positively correlated with respondent's education. Father's occupation is significantly and positively associated with respondent's occupation. Respondent's education is significantly and positively effect on their occupation, it also significantly and positively associated with their earnings.

Furthermore, it appears respondent's education not only strong effect (0.505) on their occupation but also moderate effect (0.136) on their earnings, suggesting that respondent's earnings is largely dependent on their occupation and education. Father's occupation had a moderate effect (0.122) of respondent's occupation, but their father's occupation had no substantive effect on respondent's education. Moreover, Father's education had a strong effect (0.484) on respondent's education. If

father's education is high, respondents who achieve at a high level of education because of father's educational guidance, in turn, improves their subsequent respondent's earnings. It was also found that father education had a strong effect (0.377) on their occupation.

Table (5.14) Maximum Likelihood Estimates of Standardized Regression Weights (Male-Group Invariant)

	Estimate
Father_ Occupation <---- Father_ Education	0.377***
Education <---- Father_ Education	0.484***
Education <---- Father_ Occupation	0.049
Occupation <---- Father_ Education	-0.014
Occupation <---- Father_ Occupation	0.122***
Occupation <---- Education	0.505***
Earning <---- Father_ Education	0.063
Earning <---- Father_ Occupation	0.057
Earning <---- Occupation	0.014
Earning <---- Education	0.136***

Source: Own calculations.

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

In Table (5.15), results show that father's education explains about 0.142 or 14.2 % of the variance of father occupation. Father's education and their occupation account for about 0.254 or 25.4% of the variance of respondent education. Father's education, father 'soccupation, and respondent's education explain about 0.290 or 29% of the variance of respondent occupation. Father's education, father's occupation, respondent's education, and respondent's occupation account for about 0.044 or 4.4% of the variance of respondent earnings.

Table (5.15) Squared Multiple Correlation (Male-Group Invariant)

Endogenous	Estimate
Father Occupation	0.142
Education	0.254
Occupation	0.290
Earning	0.044

Source: Own calculations.

Table (5.16) presents the total effect of the exogenous variable on each endogenous. Total effect is the sum of direct and indirect effects. Exogenous variable father's education has total effect of 0.377, 0.502, 0.285, and 0.157 on each endogenous variable father's occupation, respondent's education, their occupation, and their earnings, respectively. Exogenous variable father's occupation has total effect of 0.049, 0.147, and 0.066 on each endogenous variable respondent's education, their occupation, and their earnings, respectively. Exogenous variable education has total effect of 0.505 and 0.143 on each endogenous variable respondent's occupation and their earnings, respectively. Exogenous variable respondent's occupation has total effect of 0.014 on the endogenous variable respondent's earnings.

Thus, in terms of standardized units, the total effect of father education on respondent's education (0.502) is higher than (sign ignored) the effect of father occupation. Furthermore, the total effect of respondent education (0.505) on their occupation is higher than (sign ignored) the effect of father education and father occupation. Moreover, the total effect of father education (0.157) on respondent's earnings is higher than (sign ignored) the effect of father occupation, respondent education and their occupation.

Table (5.16) Standardized Total Effects (Male-Group Invariant)

Exogenous / Endogenous	Father Education	Father Occupation	Education	Occupation
Father Occupation	0.377	0.000	0.000	0.000
Education	0.502	0.049	0.000	0.000
Occupation	0.285	0.147	0.505	0.000
Earning	0.157	0.066	0.143	0.014

Source: Own calculations.

Table (5.17) presents the direct effect of exogenous variable on each endogenous variables. Exogenous variable father's education has direct effect of 0.377, 0.484, -0.014 and 0.063 on each endogenous variable father's occupation, respondent's education, their occupation, and their earnings, respectively. Exogenous variable father's occupation has direct effect of 0.049, 0.122, and 0.057 on each endogenous variable respondent's education, their occupation, and their earnings, respectively. Exogenous variable respondent's education has direct effect of 0.505 and 0.136 on each endogenous variable respondent's occupation and their earnings, respectively. Exogenous variable respondent's occupation has direct effect of 0.014 on the endogenous variable their earnings.

Father's education had a strong effect on their occupation (0.377), suggesting that types of occupation of fathers depend on their education. Furthermore, Father's education had a strong effect on respondent's education (0.484), meaning that respondent's education is largely dependent on father's education. Whereas, father's education had a weak effect on respondent's earnings (0.063). Father's occupation also had a moderate effect on respondent's occupation (0.122), meaning that father's occupation is highly supportive for respondent's occupation. Whereas, father's occupation had a weak effect on respondent's education and their earnings (0.049 and 0.057, respectively). Moreover, education of respondents had strong effect on their occupation (0.505), indicating that types of occupation of respondents depend on their education. The moderate effect on respondent's earnings was from their education (0.136); more able respondents also take more earning in high level of education.

Table (5.17) Standardized Direct Effects (Male-Group Invariant)

Exogenous / Endogenous	Father Education	Father Occupation	Education	Occupation
Father Occupation	0.377	0.000	0.000	0.000
Education	0.484	0.049	0.000	0.000
Occupation	-0.014	0.122	0.505	0.000
Earning	0.063	0.057	0.136	0.014

Source: Own calculations.

Table (5.18) presents the indirect effect of exogenous variable on each endogenous. Indirect effect can be obtained by subtracting the direct effect from the total effect. Exogenous variable father's education has indirect effect of 0.019, 0.300 and 0.094 on each endogenous variable respondent's education, their occupation, and their earnings, respectively. Exogenous variable father's occupation has indirect effect of 0.025 and 0.009 on each endogenous variable respondent's occupation, and their earnings, respectively. Exogenous variable respondent's education has indirect effect of 0.007 endogenous variable respondent's earnings.

The results of this analysis suggest that father's education has direct effect on respondent's education, it does have an indirect effect, through father's occupation. Father's education affects respondent's earning. Furthermore, the highly educated father takes more respondents in high level of education, and these education, in turn, improve their respondent's earnings. Moreover, father's occupation affects respondent's occupation, which in turn affects respondent's earning. This makes sense: more father's occupation takes more respondent's occupation in job, and their occupation, in turn, improves their respondent's earning.

Table (5.18) Standardized Indirect Effects (Male-Group Invariant)

Exogenous / **Endogenous**	**Father Education**	**Father Occupation**	**Education**	**Occupation**
Father Occupation	0.000	0.000	0.000	0.000
Education	0.019	0.000	0.000	0.000
Occupation	0.300	0.025	0.000	0.000
Earning	0.094	0.009	0.007	0.000

Source: Own calculations.

Figure (5.4) shows the estimated path model for females. The model specification is exactly the same as the males. However, the coefficients are different.

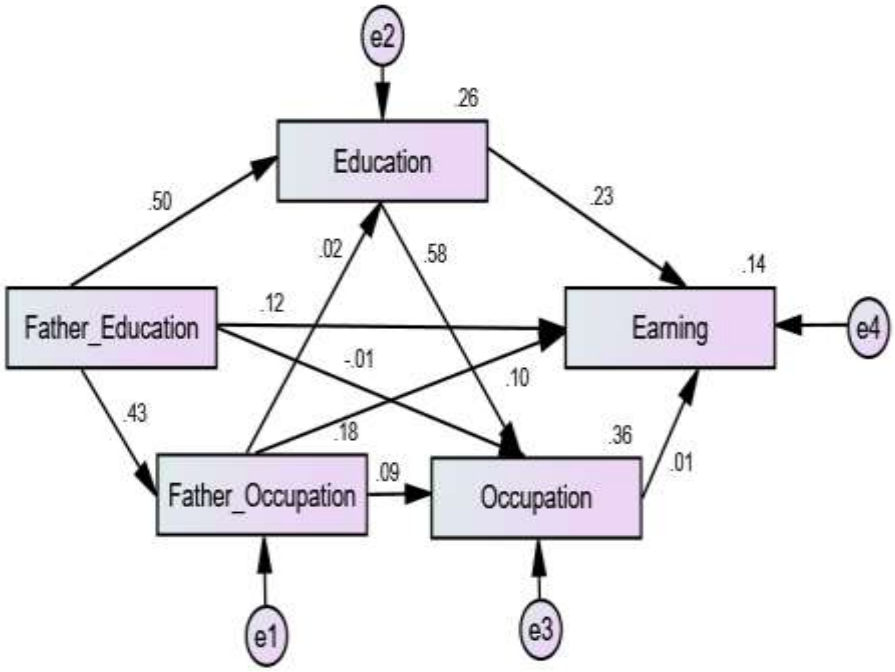

Figure 5.4: Multigroup Analysis by Gender (Female)

Source: Own Calculations

In Table (5.19), the results indicate that the father's education is significantly and positively related to be father's occupation, it also significantly and positively correlated with respondent's education. Father's occupation is significantly and positively associated with respondent's occupation. Respondent's education is significantly and positively effect on their occupation, it also significantly and positively associated with their earnings.

Furthermore, it appears respondent's education not only strong effect (0.412) on their occupation but also moderate effect (0.197) on their earnings, suggesting that respondent's earnings is largely dependent on their occupation and their education. Father's occupation had a moderate effect (0.097) of respondent's occupation, but their father's occupation had no substantive effect on respondent's education. Moreover, Father's education had a strong effect (0.457) on respondent's education. If father's education is high, respondents who achieve at a high level of education because of father's educational guidance, in turn, improves their subsequent respondent's earnings. It was also found that father's education had a strong effect (0.367) on their occupation.

Table (5.19) Maximum Likelihood Estimates of Standardized Regression Weights: (Female-Group Invariant)

	Estimate
Father_ Occupation <---- Father_ Education	0.367***
Education <---- Father_ Education	0.457***
Education <---- Father_ Occupation	0.048
Occupation <---- Father_ Education	-0.011
Occupation <---- Father_ Occupation	0.097***
Occupation <---- Education	0.412***
Earning <---- Father_ Education	0.087
Earning <---- Father_ Occupation	0.080
Earning <---- Occupation	0.025
Earning <---- Education	0.197***

Source: Own calculations.

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

In Table (5.20), results show that father's education explains about 0.135 or 13.5% of the variance of father occupation. Father's education and their occupation account for about 0.227 or 22.7% of the variance of respondent education. Father's education, father's occupation, and respondent's education explain about 0.191 or 19.1% of the variance of respondent occupation. Father's education, father's occupation, respondent's education, and their occupation account for about 0.087 or 8.7% of the variance of respondent earnings.

Table (5.20) Squared Multiple Correlation (Female-Group Invariant)

Endogenous	Estimate
Father Occupation	0.135
Education	0.227
Occupation	0.191
Earning	0.087

Source: Own calculations.

Table (5.21) presents the total effect of the exogenous variable on each endogenous. Total effect is the sum of direct and indirect effects. Exogenous variable father's education has total effect of 0.367, 0.474, 0.220, and 0.215 on each

endogenous variable father's occupation, respondent's education, their occupation, and their earnings, respectively. Exogenous variable father's occupation has total effect of 0.048, 0.117, and 0.092 on each endogenous variable respondent's education, their occupation, and their earnings, respectively. Exogenous variable education has total effect of 0.412 and 0.207 on each endogenous variable respondent's occupation and their earnings, respectively. Exogenous variable respondent's occupation has total effect of 0.025 on the endogenous variable their earnings.

Thus, in terms of standardized units, the total effect of father education on respondent's education (0.474) is higher than (sign ignored) the effect of father occupation. Furthermore, the total effect of respondent education (0.412) on their occupation is higher than (sign ignored) the effect of father education and father occupation. Moreover, the total effect of father education (0.215) on respondent's earnings is higher than (sign ignored) the effect of father occupation, respondent education and their occupation.

Table (5.21) Standardized Total Effects (Female-Group Invariant)

Exogenous / Endogenous	Father Education	Father Occupation	Education	Occupation
Father Occupation	0.367	0.000	0.000	0.000
Education	0.474	0.048	0.000	0.000
Occupation	0.220	0.117	0.412	0.000
Earning	0.215	0.092	0.207	0.025

Source: Own calculations.

Table (5.22) presents the direct effect of exogenous variable on each endogenous variables. Exogenous variable father's education has direct effect of 0.367, 0.457, -0.011 and 0.087 on each endogenous variable father's occupation, respondent's education, their occupation, and their earnings, respectively. Exogenous variable father's occupation has direct effect of 0.048, 0.097, and 0.080 on each endogenous variable respondent's education, their occupation, and their earnings, respectively. Exogenous variable respondent's education has direct effect of 0.412 and 0.197 on each endogenous variable respondent's occupation and their earnings,

respectively. Exogenous variable respondent's occupation has direct effect of 0.025 on the endogenous variable respondent's earnings.

Father's education had a strong effect on their occupation (0.367), suggesting that types of occupation of fathers depend on their education. Furthermore, Father's education had a strong effect on respondent's education (0.457), meaning that respondent's education is largely dependent on father's education. Whereas, father's education had a weak effect on respondent's earnings (0.087). Father's occupation also had weak effect on respondent's education, their occupation, and their earnings (0.048, 0.097 and 0.080, respectively). Moreover, education of respondents had strong effect on their occupation (0.412), indicating that types of occupation of respondents depend on their education. The moderate effect on respondent's earnings was from their education (0.197); more able respondents also take more earning in high level of education. Respondent's occupation had a weak effect on their earnings (0.025), meaning that respondent's occupation had no substantive effect on respondent's earnings.

Table (5.22) Standardized Direct Effects (Female-Group Invariant)

Exogenous / Endogenous	Father Education	Father Occupation	Education	Occupation
Father Occupation	0.367	0.000	0.000	0.000
Education	0.457	0.048	0.000	0.000
Occupation	-0.011	0.097	0.412	0.000
Earning	0.087	0.080	0.197	0.025

Source: Own calculations.

Table (5.23) presents the indirect effect of exogenous variable on each endogenous. Indirect effect can be obtained by subtracting the direct effect from the total effect. Exogenous variable father's education has indirect effect of 0.017, 0.231 and 0.128 on each endogenous variable respondent's education, their occupation, and their earnings, respectively. Exogenous variable father's occupation has indirect effect of 0.020 and 0.012 on each endogenous variable respondent's occupation, and their earnings, respectively. Exogenous variable respondent's education has indirect effect of 0.010 endogenous variable respondent's earnings.

The results of this analysis suggest that father's education has direct effect on respondent's education, it does have an indirect effect, through father's occupation. Father's education affects respondent's earning. Furthermore, the highly educated father takes more respondents in high level of education, and these education, in turn, improve their respondent's earnings. Moreover, father's occupation affects respondent's occupation, which in turn affects respondent's earning. This makes sense: more father's occupation takes more respondent's occupation in job, and their occupation, in turn, improves their respondent's earning.

Table (5.23) Standardized Indirect Effects (Female-Group Invariant)

Exogenous / Endogenous	Father Education	Father Occupation	Education	Occupation
Father Occupation	0.000	0.000	0.000	0.000
Education	0.017	0.000	0.000	0.000
Occupation	0.231	0.020	0.000	0.000
Earning	0.128	0.012	0.010	0.000

Source: Own calculations.

Table (5.24) shows the differences of the regression coefficients for male group and female group. The bold critical ratios indicate that the differences of regression coefficients between male and female are statistically significant. This implies that earnings are different between male and female. It can be seen that the causal links between father education and father occupation, between father education and respondent education, between respondent education and their occupation are significantly different between males and females.

Table (5.24) Critical Ratios for Difference between Male and Female (Group Variant)

	M1	M2	M3	M4	M5	M6	M7	M8	M9	M10
F1	**3.219**									
F2		0.050								
F3			1.713							
F4				**2.274**						
F5					0.213					
F6						1.134				
F7							-1.195			
F8								**8.083**		
F9									0.276	
F10										1.326

Source: Own calculations.

5.6.6.3 Estimating the Recursive (path) Models for Urban and Rural

In addition to multigroup analysis by gender, regional differences between urban and rural areas are also tested. Figure (5.5) shows the estimated recursive regression model for urban.

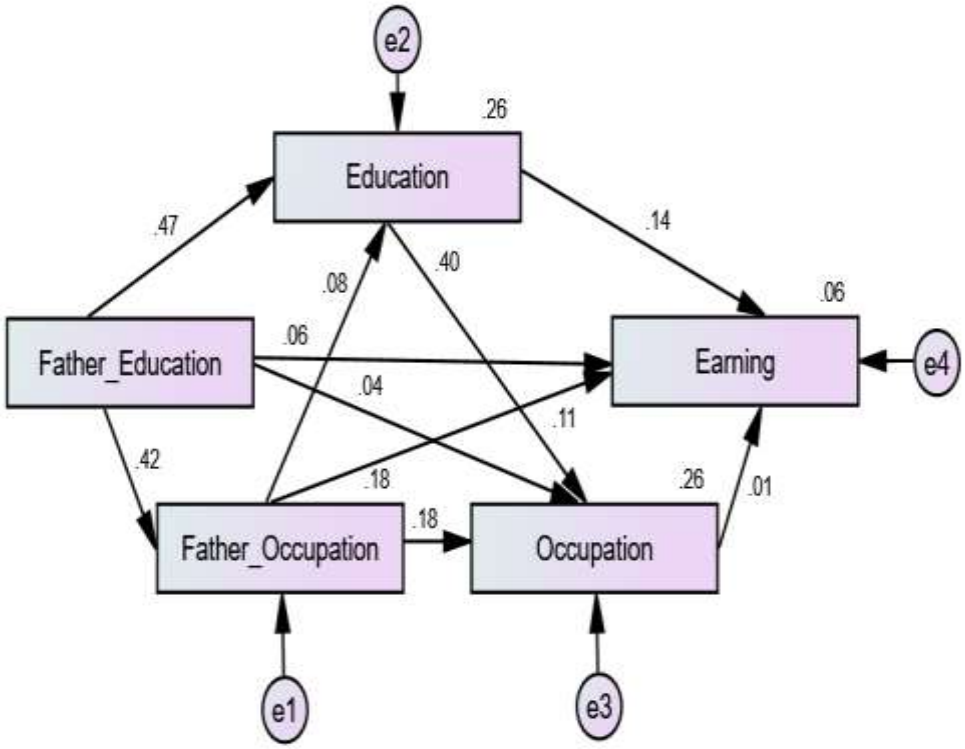

Figure 5.5: Multigroup Analysis by Region (Urban)

Source: Own Calculations

For this multigroup analysis by region, there are two data set (for urban and rural), each containing 5 observed variables. The two covariance matrices were generated from the two data sets contain 30 sample moments. For the group-invariant model, there are 20 parameters to be estimated. This model therefore has 10 (30-20) degrees of freedom, and yield a significant Chi-square value, χ^2 (n=889, df=10) = 91.991, p<0.01. For the group-variant model, there are 30 parameters to be estimated. This model, therefore, has zero degree of freedom and cannot calculate Chi-square statistics. However, for both invariant model and variant model, the baseline comparisons fit indices of normed fit index, incremental fit index, and comparative fit index are all above 0.9.

In Table (5.25), the results indicate that the father's education is significantly and positively related to be father's occupation, it also significantly and positively correlated with respondent's education. Father's occupation is significantly and positively associated with respondent's occupation. Respondent's education is significantly and positively effect on their occupation, it also significantly and positively associated with their earnings.

Furthermore, it appears respondent's education not only strong effect (0.511) on their occupation but also moderate effect (0.132) on their earnings, suggesting that respondent's earnings is largely dependent on their occupation and their education. Father's occupation had a moderate effect (0.112) of respondent's occupation, but their father's occupation had no substantive effect on respondent's education. Moreover, Father's education had a strong effect (0.504) on respondent's education. If father's education is high, respondents who achieve at a high level of education because of father's educational guidance, in turn, improves their subsequent respondent's earnings. It was also found that father's education had a strong effect (0.252) on their occupation.

Table (5.25) Maximum Likelihood Estimates of Standardized Regression Weights (Urban-Group Invariant)

	Estimate
Father_ Occupation <---- Father_ Education	0.252***
Education <---- Father_ Education	0.504***
Education <---- Father_ Occupation	0.044
Occupation <---- Father_ Education	0.001
Occupation <---- Father_ Occupation	0.112***
Occupation <---- Education	0.511***
Earning <---- Father_ Education	0.065
Earning <---- Father_ Occupation	0.069
Earning <---- Occupation	-0.024
Earning <---- Education	0.132***

Source: Own calculations.

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

In Table (5.26), results show that father's education explains about 0.063 or 6.3% of the variance of father occupation. Father's education and their occupation account for about 0.267 or 26.7% of the variance of respondent education. Father's education, father's occupation, and respondent's education explain about 0.294 or 29.4% of the variance of respondent occupation. Father's education, father's occupation, respondent's education, and their occupation account for about 0.036 or 3.6% of the variance of respondent earnings

Table (5.26) Squared Multiple Correlation (Urban-Group Invariant)

Endogenous	Estimate
Father Occupation	0.063
Education	0.267
Occupation	0.294
Earnings	0.036

Source: Own calculations.

Table (5.27) presents the total effect of the exogenous variable on each endogenous. Total effect is the sum of direct and indirect effects. Exogenous variable father's education has total effect of 0.252, 0.515, 0.293, and 0.143 on each

endogenous variable father's occupation, respondent's education, their occupation, and their earnings, respectively. Exogenous variable father's occupation has total effect of 0.044, 0.134, and 0.071 on each endogenous variable respondent's education, their occupation, and their earnings, respectively. Exogenous variable education has total effect of 0.511 and 0.119 on each endogenous variable respondent's occupation and their earnings, respectively. Exogenous variable respondent's occupation has total effect of -0.024 on the endogenous variable respondent's earnings.

Thus, in terms of standardized units, the total effect of father education on respondent's education (0.515) is higher than (sign ignored) the effect of father occupation. Furthermore, the total effect of respondent education (0.511) on their occupation is higher than (sign ignored) the effect of father education and father occupation. Moreover, the total effect of father education (0.143) on respondent's earnings is higher than (sign ignored) the effect of father occupation, respondent education and their occupation.

Table (5.27) Standardized Total Effects (Urban-Group Invariant)

Exogenous / Endogenous	Father Education	Father Occupation	Education	Occupation
Father Occupation	0.252	0.000	0.000	0.000
Education	0.515	0.044	0.000	0.000
Occupation	0.293	0.134	0.511	0.000
Earning	0.143	0.071	0.119	-0.024

Source: Own calculations.

Table (5.28) presents the direct effect of exogenous variable on each endogenous variables. Exogenous variable father's education has direct effect of 0.252, 0.504, 0.001 and 0.065 on each endogenous variable father's occupation, respondent's education, their occupation, and their earnings, respectively. Exogenous variable father's occupation has direct effect of 0.044, 0.112, and 0.069 on each endogenous variable respondent's education, their occupation, and their earnings, respectively. Exogenous variable respondent's education has direct effect of 0.511 and 0.132 on each endogenous variable respondent's occupation and their earnings, respectively. Exogenous variable respondent's occupation has direct effect of -0.024 on the endogenous variable respondent's earnings.

Father education had a strong effect on their occupation (0.252), suggesting that types of occupation of fathers depend on their education. Furthermore, Father's education had a strong effect on respondent's education (0.504), meaning that respondent's education is largely dependent on father's education. Whereas, father's education had a weak effect on respondent's occupation and their earnings (0.001 and 0.065, respectively). Father's occupation also had a moderate effect on respondent's occupation (0.112), meaning that father's occupation is highly supportive for respondent's occupation. Whereas, father's occupation had a weak effect on respondent's education and their earnings (0.044 and 0.069, respectively). Moreover, education of respondents had strong effect on their occupation (0.511), indicating that types of occupation of respondents depend on their education. The moderate effect on respondent's earnings was from their education (0.132); more able respondents also take more earning in high level of education.

Table (5.28) Standardized Direct Effects (Urban-Group Invariant)

Exogenous / Endogenous	Father Education	Father Occupation	Education	Occupation
Father Occupation	0.252	0.000	0.000	0.000
Education	0.504	0.044	0.000	0.000
Occupation	0.001	0.112	0.511	0.000
Earning	0.065	0.069	0.132	-0.024

Source: Own calculations.

Table (5.29) presents the indirect effect of exogenous variable on each endogenous. Indirect effect can be obtained by subtracting the direct effect from the total effect. Exogenous variable father's education has indirect effect of 0.011, 0.291 and 0.078 on each endogenous variable respondent's education, their occupation, and their earnings, respectively. Exogenous variable father's occupation has indirect effect of 0.023 and 0.003 on each endogenous variable respondent's occupation, and their earnings, respectively. Exogenous variable respondent's education has indirect effect of -0.012 endogenous variable respondent's earnings.

The results of this analysis suggest that father's education has direct effect on respondent's education, it does have an indirect effect, through father's occupation. Father's education affects respondent's earning. Furthermore, the highly educated father takes more respondents in high level of education, and these education, in turn,

improve their respondent's earnings. Moreover, father's occupation affects respondent's occupation, which in turn affects respondent's earning. This makes sense: more father's occupation takes more respondent's occupation in job, and their occupation, in turn, improves their respondent's earning.

Table (5.29) Standardized Indirect Effects (Urban-Group Invariant)

Exogenous / Endogenous	Father Education	Father Occupation	Education	Occupation
Father Occupation	0.000	0.000	0.000	0.000
Education	0.011	0.000	0.000	0.000
Occupation	0.291	0.023	0.000	0.000
Earning	0.078	0.003	-0.012	0.000

Source: Own calculations.

Figure (5.6) shows the estimated path model for rural area, which is the same as the urban.

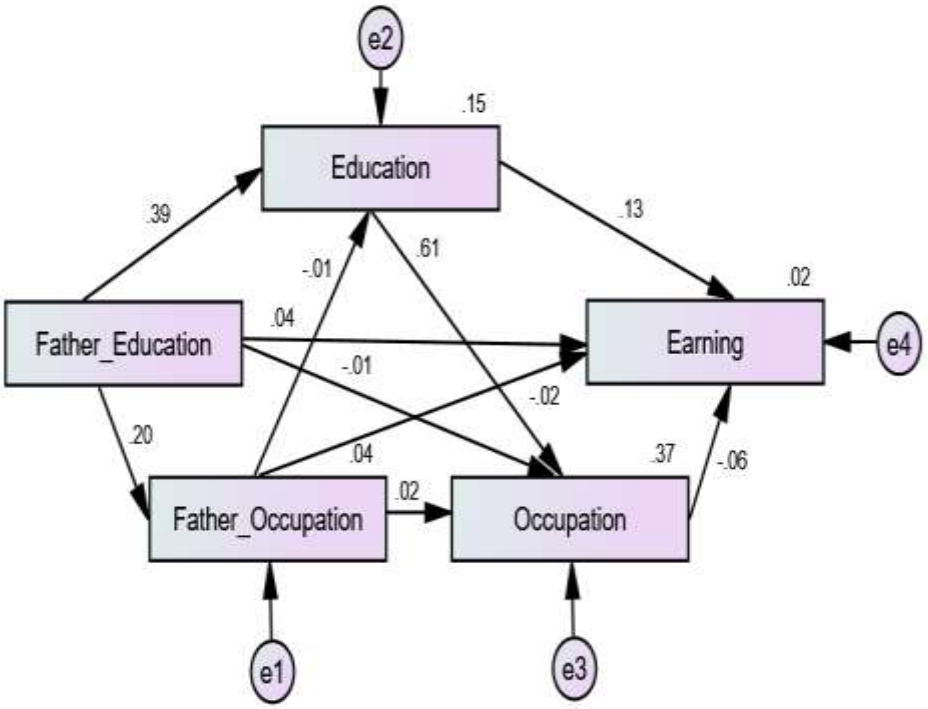

Figure 5.6: Multigroup Analysis by Region (Rural)

Source: Own Calculations

In Table (5.30), the results indicate that the father's education is significantly and positively related to be father's occupation, it also significantly and positively

correlated with respondent's education. Father's occupation is significantly and positively associated with respondent's occupation. Respondent's education is significantly and positively effect on their occupation, it also significantly and positively associated with their earnings.

Furthermore, it appears respondent's education not only strong effect (0.563) on their occupation but also moderate effect (0.127) on their earnings, suggesting that respondent's earnings is largely dependent on their occupation and their education. Father's occupation had a weak effect (0.073) of respondent's occupation, but their father's occupation had no substantive effect on respondent's education. Moreover, Father's education had a strong effect (0.362) on respondent's education. If father's education is high, respondents who achieve at a high level of education because of father's educational guidance, in turn, improves their subsequent respondent's earnings. It was also found that father's education had a strong effect (0.304) on their occupation.

Table (5.30) Maximum Likelihood Estimates of Standardized Regression Weights (Rural-Group Invariant)

	Estimate
Father_ Occupation <---- Father_ Education	0.304***
Education <---- Father_ Education	0.362***
Education <---- Father_ Occupation	0.026
Occupation <---- Father_ Education	0.001
Occupation <---- Father_ Occupation	0.073***
Occupation <---- Education	0.563***
Earning <---- Father_ Education	0.045
Earning <---- Father_ Occupation	0.039
Earning <---- Occupation	-0.021
Earning <---- Education	0.127***

Source: Own calculations.

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

In Table (5.31), results show that father's education explains about 0.092 or 9.2% of the variance of father occupation. Father's education and their occupation account for about 0.137 or 13.7% of the variance of respondent education. Father's education, father's occupation, and respondent's education explain about 0.335 or

33.5% of the variance of respondent occupation. Father's education, father's occupation, respondent's education, and their occupation account for about 0.023 or 2.3% of the variance of respondent earnings.

Table (5.31) Squared Multiple Correlation (Rural-Group Invariant)

Endogenous	Estimate
Father_ Occupation	0.092
Education	0.137
Occupation	0.335
Earnings	0.023

Source: Own calculations.

Table (5.32) presents the total effect of the exogenous variable on each endogenous. Total effect is the sum of direct and indirect effects. Exogenous variable father's education has total effect of 0.304, 0.370, 0.232, and 0.099 on each endogenous variable father's occupation, respondent's education, their occupation, and their earnings, respectively. Exogenous variable father's occupation has total effect of 0.026, 0.088, and 0.041 on each endogenous variable respondent's education, their occupation, and their earnings, respectively. Exogenous variable respondent's education has total effect of 0.563 and 0.115 on each endogenous variable their occupation and their earnings, respectively. Exogenous variable respondent's occupation has total effect of -0.021 on the endogenous variable their earnings.

Thus, in terms of standardized units, the total effect of father education on respondent's education (0.370) is higher than (sign ignored) the effect of father occupation. Furthermore, the total effect of respondent education (0.563) on their occupation is higher than (sign ignored) the effect of father education and father occupation. Moreover, the total effect of respondent education (0.115) on respondent's earnings is higher than (sign ignored) the effect of father occupation, respondent education and their occupation.

Table (5.32) Standardized Total Effects (Rural-Group Invariant)

Exogenous / Endogenous	Father Education	Father Occupation	Education	Occupation
Father Occupation	0.304	0.000	0.000	0.000
Education	0.370	0.026	0.000	0.000
Occupation	0.232	0.088	0.563	0.000
Earning	0.099	0.041	0.115	-0.021

Source: Own calculations.

Table (5.33) presents the direct effect of exogenous variable on each endogenous variables. Exogenous variable father's education has direct effect of 0.304, 0.362, 0.001 and 0.045 on each endogenous variable father's occupation, respondent's education, their occupation, and their earnings, respectively. Exogenous variable father's occupation has direct effect of 0.026, 0.073, and 0.039 on each endogenous variable respondent's education, their occupation, and their earnings, respectively. Exogenous variable respondent's education has direct effect of 0.563 and 0.127 on each endogenous variable respondent's occupation and their earnings, respectively. Exogenous variable respondent's occupation has direct effect of -0.021 on the endogenous variable respondent's earnings.

Father's education had a strong effect on their occupation (0.304), suggesting that types of occupation of fathers depend on their education. Furthermore, Father's education had a strong effect on respondent's education (0.362), meaning that respondent's education is largely dependent on father's education. Whereas, father's education had a weak effect on respondent's occupation and their earnings (0.001 and 0.045, respectively). Father's occupation also had a weak effect on respondent's education, their occupation and their earnings (0.026, 0.073 and 0.039, respectively). Moreover, education of respondents had strong effect on their occupation (0.563), indicating that types of occupation of respondents depend on their education. The moderate effect on respondent's earnings was from their education (0.127); more able respondents also take more earning in high level of education.

Table (5.33) Standardized Direct Effects (Rural-Group Invariant)

Exogenous / Endogenous	Father Education	Father Occupation	Education	Occupation
Father Occupation	0.304	0.000	0.000	0.000
Education	0.362	0.026	0.000	0.000
Occupation	0.001	0.073	0.563	0.000
Earning	0.045	0.039	0.127	-0.021

Source: Own calculations.

Table (5.34) presents the indirect effect of exogenous variable on each endogenous. Indirect effect can be obtained by subtracting the direct effect from the total effect. Exogenous variable father's education has indirect effect of 0.008, 0.231 and 0.054 on each endogenous variable respondent's education, their occupation, and their earnings, respectively. Exogenous variable father's occupation has indirect effect of 0.015 and 0.001 on each endogenous variable respondent's occupation, and their earnings, respectively. Exogenous variable respondent's education has indirect effect of -0.012 endogenous variable respondent's earnings.

The results of this analysis suggest that father's education has direct effect on respondent's education, it does have an indirect effect, through father's occupation. Father's education affects respondent's earning. Furthermore, the highly educated father takes more respondents in high level of education, and these education, in turn, improve their respondent's earnings. Moreover, father's occupation affects respondent's occupation, which in turn affects respondent's earning. This makes sense: more father's occupation takes more respondent's occupation in job, and their occupation, in turn, improves their respondent's earning.

Table (5.34) Standardized Indirect Effects (Rural-Group Invariant)

Exogenous / Endogenous	Father Education	Father Occupation	Education	Occupation
Father Occupation	0.000	0.000	0.000	0.000
Education	0.008	0.000	0.000	0.000
Occupation	0.231	0.051	0.000	0.000
Earning	0.054	0001	-0.012	0.000

Source: Own calculations.

Table (5.35) shows the differences of the path coefficients for urban and rural. The bold critical ratios indicate that the differences of regression coefficients between urban and rural are statistically significant. This implies that earnings are different between urban and rural. The causal links between father education and father occupation, between father occupation and respondent occupation, between father occupation and respondent education, and between respondent education and their occupation are significantly different between urban and rural.

Table (5.35) Critical Ratios for Difference between Urban and Rural (Group Variant)

	U1	**U2**	**U3**	**U4**	**U5**	**U6**	**U7**	**U8**	**U9**	**U10**
R1	**-7.169**									
R2		-1.022								
R3			0.028							
R4				1.495						
R5					**-2.815**					
R6						-1.707				
R7							**4.465**			
R8								**-2.295**		
R9									-0.871	
R10										-0.203

Source: Own calculations.

This study shows that father occupation, father education, respondent education, their occupation, and their earnings have a specific order of linkages. It is found that respondent's education has positive and significant effect on their earnings in all cases. The path model was also used to test for multi groups such as between males and females and between urban and rural areas. These multi group analyses showed that some of the regression coefficients are not equal between the two genders and between the two regions. In terms of the model fit, the goodness-of-fit measures indicated that the recursive regression model fit the observed data very well.

CHAPTER VI
CONCLUSION

This chapter emphasized the most significant findings and discussion in regard to returns on education in Myanmar. The study intended to investigate the expected rate of returns on education in Myanmar by using the two approaches such as Mincer's wage model and recursive regression model. Based on findings and discussion, a number of recommendations as well as a need for further research are also presented in this chapter.

6.1 Findings and Discussions

This study estimated the rate of returns on education in Myanmar. Mincer's wage model, which was driven from human capital theory, was used. This model particularly explores the relationship between earnings and the number of years of schooling. Using the data from the 2015 Labour Force Survey, Mincer's wage model and path analysis or recursive regression model were used to estimate the rate of returns on investment in education in Myanmar.

Mincer's wage model was estimated in basic form and extended form. In the basic form, the logarithm of wage was regressed on the number of years of schoolings, experience, and squared experience. The main reason for including the squared experience is to capture the non-linear relationship between wage and working experience. In the extended form, in addition to the variable in the basic form other control variables of gender, marital status and location were included. The main reason for including these control variables is to test whether rate of returns on investment in education are different between male and female, and between urban and rural area.

Furthermore, three econometric issues were considered in getting the model's validity. Firstly, the assumption of constant variance of error term was tested by White test. The result from White test confirmed the presence of heteroscedasticity. In the presence of heteroscedasticity, the standard errors of the ordinary least squares

(OLS) estimators are incorrect. This problem was overcome by using the White's heteroscedasticity consistent estimator. Secondly, the assumption of correct model specification was tested by Regression Specification Error Test (RESET). The results from the RESET indicated that there was no serious misspecification in the model. Finally, the assumption of the zero covariance between the independent variables in the model and the error term was tested by Hausman test. The test confirmed that independent variable of the number of years of schooling is correlated with the ability in the error term. The consequence of the violation of this assumption is that the OLS estimators are both biased and inconsistent. This problem was overcome by using the instrumental variable (IV) method. While IV estimators are consistent, they are less efficient compared to OLS estimators. Overall, the estimation results of the basic form of Mincer's wage model were in line with the theory proposed.

The findings of this study show that the rate of returns on education are estimated to be about 2.9% and the coefficient of the number of years of schooling is positive and significant. This result indicates that the rate of returns on education in Myanmar is low. The low returns on education are highly reflected by the low education level of the participants. The similar findings were found in the previous studies: Shabbir and Khan (1991) claimed that the returns on education were 9.1% in Pakistan with the basic Mincer's wage function; Maluccio (1998) also claimed that returns on education were 7.3% in Philippines and Alqattan (2013) showed that the returns on education were 5.2% in Kuwait. In compared to the returns on education of these above mentioned researchers, it can be found that the results obtained in this study present a slight difference due to using the different data sets and identified in different education systems.

Moreover, the findings of positive coefficient of the linear term of working experience and the negative coefficient of the quadratic term of working experience of this study indicate that it is an inverted U-shape relationship between working experience and earnings. The implication is that earnings will not always increase at a constant rate as working experience increases. Instead, the rate of increase in earnings will decline beyond the certain level of working experience. The similar findings were found in a previous study Alqattan (2013) which showed that the employed Mincerian earnings model was estimated by positive and significant coefficient of returns on education and a negative coefficient of quadratic year of experience in Kuwait. And, it was also found that the returns on education in Kuwait were low.

In particular, it can be explained that the salaries of government employees are increased by their positions, and the rate of return is also increased regularly before their retirement. However, once these government employees retire from their jobs, their salaries or, their rate of returns on education decline. Therefore, the relationship between earnings and experience is represented by the inverted U-shape curve.

The estimation results of the extend form of Mincer's wage model indicates that in addition to the coefficient of male dummy variable is positive and significant, earnings of male are, on average, higher than female, while other things are constant. The similar findings were found in a study of Aslam (2009) in which the differential returns on education of male and female are well explained on the gender gap in education in Pakistan, and consequently, the returns in the labour market were much higher for men. Another similar finding, from Guris and Caglayan (2012) clearly showed that the returns on education for males were higher than that for females.

The estimation results of the extend form of Mincer's wage model indicates that the coefficient of marital status of single dummy variable is positive and significant in this study. Moreover, earnings of single are, on average, higher than other marital status, while other things are constant. Furthermore, the coefficient of urban dummy variable is also positive and significant. The findings also highlighted those earnings in urban areas are, on average, higher than rural areas, while other things constant. The similar findings were found in a study from Arshad and Ghani (2015) in which an evidence of wage differentials attributable to regional/urban-rural locations in Malaysia was significant. According to another similar finding of Magdalyn (2013) showed the rate of returns on education in Indonesia described the statistical relationship with earnings, education, experience and quadratic experience. The analysis was conducted by seeing the effect of different sex, regions, and marital status. Accordingly, the results indicated that the rate of returns on education of urban areas is higher than rural areas. Another similar finding was also found in a study of Wannakrairoj (2013). The researcher confirmed the effect of education and experience on wages of workers in Thailand, focusing on urban and rural labour markets.

Moreover, the coefficient of the interaction term, *educ*male*, for a respondent with additional one year of education, suggesting that male respondent leads to an increase in wages of approximately 0.75827. The coefficient of the interaction term, *educ*single*, for a respondent with additional one year of education, suggesting that

single respondent leads to an increase in wages of approximately 0.98616. The coefficient of the interaction term, *educ*urban*, for a respondent with additional one year of education, suggesting that who lives in urban respondent leads to an increase in wages of approximately 0.32779.

And then, the slope of the male-earning, single-earning, and urban-earning profiles depend on the level of education. Human capital theory implies that educated males with the higher level of education are likely to be getting the better job opportunities with highly salaries. It means that those educated employees who have the higher levels of education are still learning the education or training related to their fields to be improved the skill or knowledge. The similar findings were found in a previous study Alqattan (2013) which showed that the employed Mincerian earnings model was estimated by negative and significant coefficient of returns on education include the terms of the interaction in Kuwait.

By the studying in 15 states and regions, the coefficient of education is positive and significant in Sagaing, Bago, Mon, Yangon, Shan, and Nay Pyi Taw. The implication of this result is that economically more developed regions need more education and could pay higher level of wage, compared to those states and regions which are less prosperity. Moreover, the value of coefficient in education is non-significant in the states and districts being the needs to develop.

In the recursive (path) model, a proposed model with explicit directions of causality was estimated. The path model included only observed variables and consisted of four simple and multiple regression models. The multi groups analysis was also performed for the same path model. The estimation results from the recursive (path) model were also in line with those from Mincer's wage model. That is, the number of years of schooling had positive and significant effect on earnings in all cases. Moreover, the results from multi group analyses showed that path coefficients were significantly different between male and female, and between urban and rural.

Furthermore, this study found that father occupation is significantly and positively associated with respondent's occupation. Father education is significant and positive correlated with their occupation and respondent's education. Father education is one of the main factors of respondent's education while high level of respondent's education could attract a better type of their occupation. Moreover, respondent education is significantly and positively associated with respondent occupation and

their earnings. In addition to the respondent education could provide a better type of respondent's occupation and a higher wage for respondents.

In conclusion, there have the causal links between father occupation and respondent occupation, father education and respondent education, and respondent education and their occupation, and their earnings. The similar findings were found in a study of Timbergen and Psacharopoulos (1978) that showed to some alternative path analyses on the explanation of schooling, occupation and earnings. That study estimated the path coefficients of the traditional path analysis linking family background, ability, schooling, occupation and earnings. Therefore, the results of that study are in line with the results of Myanmar.

6.2 Recommendations

Based on the findings and discussion, the recommendations are presented. The level of rate of return to investment on education in Myanmar is low with 2.9%. So, the parents should be aware of the benefits of higher education and interested in encouraging their children to pursue this level of education. As the government, it should assist with doing the top management in the field of human capital investment on education, focus on getting the chance of high income based economy and monitor the education system in Myanmar. The government should promote the role of educated workers through raising their salaries and wages so that the investment in education might be improved.

Furthermore, this study found that the returns on education for males were higher than that for females. Therefore, the government should seek wages to empower female economically by producing income generating schemes and increasing employment opportunities. The government also should promote equal access to opportunities such as education, jobs and decision making for the female.

Moreover, this finding shows that respondents who live in urban areas have greater earnings than respondents who live in rural areas. It has also found that the rate of returns on investment in education in 15 states and regions are different. Therefore, the government should create job opportunities in rural area so that the return on human capital would be increased over the whole country. Besides, the government needs to provide good quality of roads for transportation, much more educational budget and support for rural development, particularly to rural in the poorest areas in states and regions.

6.3 Needs for Future Research

In this study, educational level, working experience, age, gender, marital status, residential area, and father's education, father's occupation was considered as the determinants for measuring returns on investment in education. In fact, there are some other factors that may have influence on determining the returns on education. These include cost of living, cost of training, skills/qualification, and demographic factors such as household size, number of siblings, sibling's current job, sibling's earnings, ease of getting access to education and so on. Therefore, it would be found out the more precise findings on returns on investment in education if someone could carry out the future research taking into account all those related factors. Moreover, the return on education should be measures in terms of social and health status in addition to monetary term. In addition, future research on returns on education should be conducted through simulation analysis

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APPENDICES

APPENDIX A

Derivation of Individual Acquisition of Earning

Investment in people is time consuming. The present value of real earnings streams with and without investment is equal only at a positive discount rate. This rate is the internal rate of return on the investment. The rate of return is a parameter for the individual and is derived by assuming that (1) a change in investment does not change marginal rate of return and (2) all investment costs are time cost. To analyze the effects of investments in schooling is done by assuming that

(1) No further human capital investment is made after completion of schooling.

(2) The flow of individual earnings is constant throughout the working life.

(3) Excluded are economy wide changes affecting individual productivity and earnings during the life cycle.

(4) Since changes in earnings are produced by net investment in human capital stock, the net concept is used in most of the analysis. Zero depreciation is assumed during the school years and zero net investment during the working life.

In calculating the effects of schooling on earnings, it is first assumed that postponement of earnings due to lengthier schooling is tantamount to a reduction of the earnings span.

Let

n: length of working life plus length of schooling

: length of working life for persons without schooling

Y_s : present value of an individual's lifetime earnings at the start of schooling

r: discount rate

t: time in years

d: difference in the amount of schooling in years

e: base of natural logarithms

When the discounting process is discrete

$$V_s = Y_s \sum_{t=s+1}^{n} \left(\frac{1}{1+r} \right)^t$$

and more conveniently when the process is continuous

$$V_s = Y_s \int_s^n e^{-rt} dt$$

$$= Y_s \left(\frac{e^{-rt}}{-r} \Big|_s^n \right)$$

$$= -\frac{Y_s}{r} \left(e^{-rn} - e^{-rs} \right)$$

$$= \frac{Y_s}{r} \left(e^{-rs} - e^{-rn} \right)$$

Similarly, the present value of lifetime earnings of an individual who engages in *s-d* years of schooling is

$$V_{s-d} = \frac{Y_{s-d}}{r} \left(e^{-r(s-d)} - e^{-rn} \right)$$

The ratio, $K_{s,s-d}$,of annual earnings after *s* years to earning after *s-d* years of schooling is found by letting

$$K_{s,s-d} = \frac{V_s}{V_{s-d}}$$

$$= \frac{\frac{Y_s}{r} \left(e^{-rs} - e^{-rn} \right)}{\frac{Y_{s-d}}{r} \left(e^{-r(s-d)} - e^{-rn} \right)}$$

$$= \frac{Y_s}{Y_{s-d}} \cdot \frac{(e^{-rs} - e^{-rs})}{(e^{-r(s-d)} - e^{-rn})}$$

$$\frac{Y_s}{Y_{s-d}} = \frac{e^{-r(s-d)} - e^{-rn}}{e^{-rs} - e^{-rn}}$$

$$\frac{Y_s}{Y_{s-d}} = \frac{e^{rn} \left(e^{-r(s-d)} - e^{-rn} \right)}{e^{rn} \left(e^{-rs} - e^{-rn} \right)}$$

$$\frac{Y_s}{Y_{s-d}} = \frac{e^{rn} \left(e^{-rs+rd} - e^{-rn} \right)}{e^{rn} \left(e^{-rs} - e^{-rn} \right)}$$

$$= \frac{e^{r(n+d-s)} - e^{0}}{e^{r(n-s)} - e^{0}}$$

$$= \frac{e^{r(n+d-s)} - 1}{e^{r(n-s)} - 1} \qquad \text{(A 3.1)}$$

It can be seen that *c* is

(1) Larger than unity,

(2) A positive function of *r*,

(3) A negative function of *n*,

In other words,

(1) People with more schooling command higher annual pay;

(2) The difference between earnings of individuals due to the difference in investment of *d* years of schooling is larger for the higher the rate of return on schooling;

(3) The difference is larger, the shorter the general span at working life, since the costs of schooling must be recouped over a relatively shorter period.

Since the change in $K_{s,s-d}$ with a change in *s* and *n* is negligible when *n* is large, it can be, for all practical purposes, treated as a constant, *k*.

The conclusion that *k* is constant holds exactly when spans of earning life are assumed fixed, regardless of schooling. Redefine *n* as the fixed span of earning life.

Then

$$V_s = Y_s \int_s^n e^{-rt} dt$$

$$= Y_s \left(\frac{e^{-rt}}{-r} \Big|_s^{n+s} \right)$$

$$= -\frac{Y_s}{r} \left(e^{-r(n+s)} - e^{-rs} \right)$$

$$= -\frac{Y_s}{r} . e^{-rs} \left(e^{-rn} - 1 \right)$$

$$= \frac{Y_s}{r} . e^{-rs} \left(1 - e^{-rn} \right)$$

$$V_{s-d} = Y_{s-d} \int_{s-d}^{n+s-d} e^{-rt} dt$$

$$= Y_{s-d} \left(\frac{e^{-rt}}{-r} \Big|_{s-d}^{n+s-d} \right)$$

$$= -\frac{Y_{s-d}}{r} \left(e^{-r(n+s-d)} - e^{-r(s-d)} \right)$$

$$= -\frac{Y_{s-d}}{r} . e^{-r(s-d)} \left(e^{-rn} - 1 \right)$$

$$= \frac{Y_{s-d}}{r} . e^{-r(s-d)} \left(1 - e^{-rn} \right)$$

And solving for $K_{s,s-d}$ from the equalization of present values, we get

$$K_{s,s-d} = \frac{V_s}{V_{s-d}}$$

$$= \frac{\frac{Y_s}{r} . e^{-rs} \left(1 - e^{-rn} \right)}{\frac{Y_{s-d}}{r} . e^{-r(s-d)} \left(1 - e^{-rn} \right)}$$

$$= \frac{Y_s}{Y_{s-d}} \cdot \frac{e^{-rs}}{e^{-r(s-d)}}$$

Let $V_s = V_{s-d}$:

$$Y \frac{Y_s}{Y_{s-d}} = \frac{e^{-r(s-d)}}{e^{-rs}} = e^{rd} \qquad \text{(A 3.2)}$$

Here, in contrast to (A 3.1) the earnings ratio, *k*, of incomes differing by *d* years of schooling does not at all depend on the level of schooling (*s*) nor, more interestingly, on the length of earning life (*n*), when that is finite, even if short. Now, define

$$K_{s,0} = \frac{Y_s}{Y_0} = K_s$$

By equation (A 3.2), $K_s = e^{rs}$, $\frac{Y_s}{Y_0} = e^{rs}$. In logarithms the formula becomes:

$$\ln \frac{Y_s}{Y_0} = \ln e^{rs}$$

$$\ln Y_s = \ln Y_0 + rs \qquad \text{(A 3.3)}$$

Equation (A 3.3) shows the logarithm of earnings to be a strict linear function of time spent at school.

When the coefficient on schooling is the marginal rate of return, equation (A 3.3) is an arbitrage condition. The first order conditions do not determine a unique schooling level under the assumptions of Mincer (1958). Because individuals are assumed to be identical and indifferent across schooling levels, schooling is indeterminate at the individual level.

In later work, Mincer (1974) draws on the analysis of Becker and Chiswich (1966) to incorporate post-school work-experience as a determinant of earnings and to approximate an optimizing model of schooling choice and work experience assuming that the proportion of earrings foregone in investment declines linearly with experience. This framework allows for heterogeneity among agents. Assuming that the proportion of income foregone in post-school investments is the same at all schooling levels, the Mincer (1974) earnings function is

$$\ln Y = \alpha_0 + \rho s + \beta_0 x + \beta_1 x^2 + \varepsilon_i \qquad \text{(A 3.4)}$$

Where ρ may vary among people, it is assumed to be uncorrelated with *s*.

APPENDIX B

Sample Design for the Myanmar Labour Force Survey, 2015

The Ministry of Labour, Immigration and Population conducted the Household Labour Force Sample Survey in 1990 with the collaboration and cooperation of the International Labour Organization (ILO), the United Nations Development Programme (UNDP) and United Nations Population Fund (UNFPA) and after that no survey of this kind had ever been carried out for more than two and a half decades. As a matter of fact, the nation's labour force data had been available only the estimates based on the 1990 Labour Force Sample Survey for this years. However, these estimated data could no longer meet the needs of the present day situations of the country and shortage of reliable Labour Force data had prevailed for years. The dearth of such kind of reliable statistical information had been the weakness for the adoption of labour market policies and programmes in Myanmar. In view of this, the Department of Labour under the Ministry of Labour, Immigration and Population had made consultations with the ILO in 2014 for conducting a new Labour Force survey.

The recent survey was conducted from 1 January to 31 March 2015. In this survey, the Ministry of Labour, Employment and social Security jointly with the Central Statistical Organization conducted a national Labour force, Child Labour and School-to-Work Transition Survey in 2015 (LF-CL-SWTS) with the financial and technical support of the ILO. The sample size in this survey was 24,000 households covering over 1,500 enumeration areas (EAs) of the population and housing census, 2014.

The main objectives of the LF-CL-SWTS was to collect detailed information on the population aged 5 years and above disaggregated by age, sex, state/region, sector and social category. The survey provided information on the national labour market that can be used to develop, manage and evaluate labour market policies and programmes. Also, the survey provided detailed information on child workers, subsistence workers, occupational injuries and hazards at work and the nature and ways of transition from school to work for youth.

In the survey, a stratified two-stage sampling design was adopted for the selection of the sampling units for urban as well as rural areas. The first stage units (FSUs) were enumeration area (EAs) blocks. The second stage units (SSUs) were the

households. The sample design had two stages. Each type of residency-rural or urban-in a State/Region/Union Territory was treated as a basic stratum. As there seven States, seven Regions and one Union Territory in the country, there will be (7+7+1)× 2 = 30 basic strata in total. Considering, time and manpower resources the targeted sample size in terms of FSUs were determined as 1,500 EAs. In the country, altogether 1500 EAs were selected for the survey from the EA blocks of the population and housing census of Myanmar 2014, covering 522 urban EAs and 978 rural EAs. Out of which 1,468 EAs comprising 519 EAs in urban and 949 EAs in rural areas were surveyed.

In this study, the actual sample size is 13,173 individuals, which includes both people in the labour force and not in the labour force. However, due to the constraints such as respondent must be at the working age of between 15 and 65 years, respondent must earn regular wages, and respondent must be combined with parents, the sample size was reduced to 2,134 respondents in estimating the Mincer wage model.

Table (B-1) The Mapping of ISCO-08 Major Groups to Skill Levels

ISCO-08 Major Group	Skill level
1 Managers	3 and 4
2 Professionals	4
3 Technicians and Associate Professionals	3
4 Clerical Support Workers	2
5 Services and Sales Workers	2
6 Skilled Agricultural, Forestry and Fishery Workers	2
7 Craft and Related Trades Workers	2
8 Plant and Machine Operators, and Assemblers	2
9 Elementary Occupations	1,2 and 4
0 Armed Forces Occupations	

Table (B-2) Characteristics of Variables

No.	Wage Group ('000 kyats per month)	Number of Respondents	Percent
1	<100	1348	63.17
	100-200	647	30.32
	200-300	79	3.70
	300-400	26	1.22
	>400	34	1.59
	Total	2134	100.00
2	**Respondent's Education (in years)**	**Number of Respondents**	**Percent**
	0	1	0.05
	4	243	11.39
	5	670	31.40
	9	566	26.52
	11	238	11.15
	15	413	19.35
	17	3	0.14
	Total	2134	100.00

3	**Father's Education (in years)**	**Number of Respondents**	**Percent**
	0	25	1.17
	4	495	12.20
	5	972	45.55
	9	412	19.31
	11	150	7.03
	15	78	3.66
	17	1	0.05
	21	1	0.05
	Total	2134	100.00
4	**Respondent's Occupation**	**Number of Respondents**	**Percent**
	1	2	0.10
	2	1796	84.20
	3	67	3.10
	4	269	12.60
	Total	2134	100.00
5	**Father's Occupation**	**Number of Respondents**	**Percent**
	1	1	0.05
	2	1992	93.34
	3	80	3.75
	4	61	2.86
	Total	2134	100.00
6	**Age (in years)**	**Number of Respondents**	**Percent**
	15-19	625	29.29
	20-25	744	34.86
	25-29	416	19.49
	30-34	234	10.97
	35-39	80	3.75
	40-44	27	1.27
	45 and over	8	0.37
	Total	2134	100.00

7	**Working experience (in months)**	**Number of Respondents**	**Percent**
	2	109	5.11
	3	112	5.25
	6	228	10.68
	12	445	20.85
	24	705	33.04
	60	332	15.56
	120	203	9.51
	Total	2134	100.00
8	**Gender**	**Number of Respondents**	**Percent**
	Female	973	45.60
	Male	1161	54.40
	Total	2134	100.00
9	**Marital status**	**Number of Respondents**	**Percent**
	Others	304	14.25
	Single	1830	85.75
	Total	2134	100.00
10	**Location**	**Number of Respondents**	**Percent**
	Rural	1245	58.34
	Urban	889	41.66
	Total	2134	100.00
11	**States and Regions**	**Number of Respondents**	**Percent**
	Kachin	61	2.86
	Kayah	41	1.92
	Kayin	47	2.20
	Chin	23	1.08
	Sagaing	202	9.47
	Tanintharyi	142	6.66
	Bago	255	11.95
	Magway	171	8.01
	Mandalay	223	10.45
	Mon	90	4.21
	Rakhine	114	5.34
	Yangon	287	13.45
	Shan	132	6.19
	Ayeyawady	230	10.78
	Nay Pyi Taw	116	5.43
Total		2134	100.00

Table (B-3) Summary Statistics of Variables in Mincer Wage Model

Variables	n	Mean	Median	SD	Min	Max
Wage (‘000 kyats per month)	2,134	123.86	90	420.80	1	12750
Education (Years)	2,134	8.57	9	3.90	0	17
Experience (Months)	2,134	32.08	24	33.56	2	120
Age (Years)	2,134	23.38	22	5.97	15	50
Father Education (Years)	2,134	6.28	5	2.89	0	21

Source: Labour Force Survey (2015)

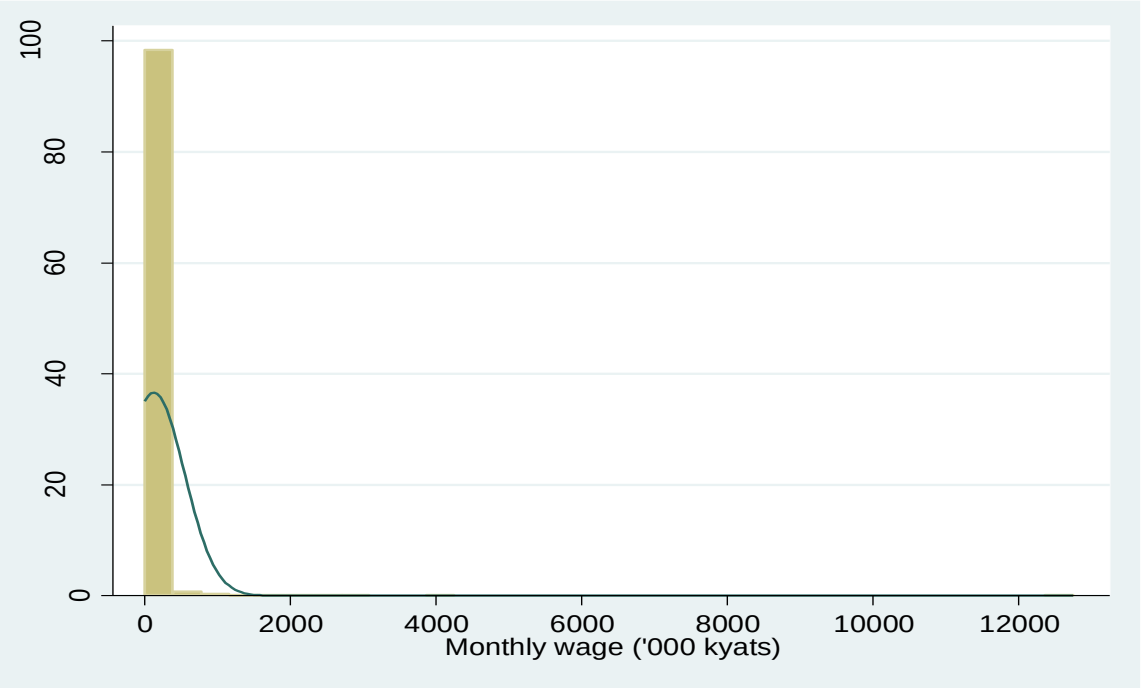

Figure (B-1) (a) Histograms of Monthly Wage

Figure (B-1) (b) Histograms of Monthly Wage

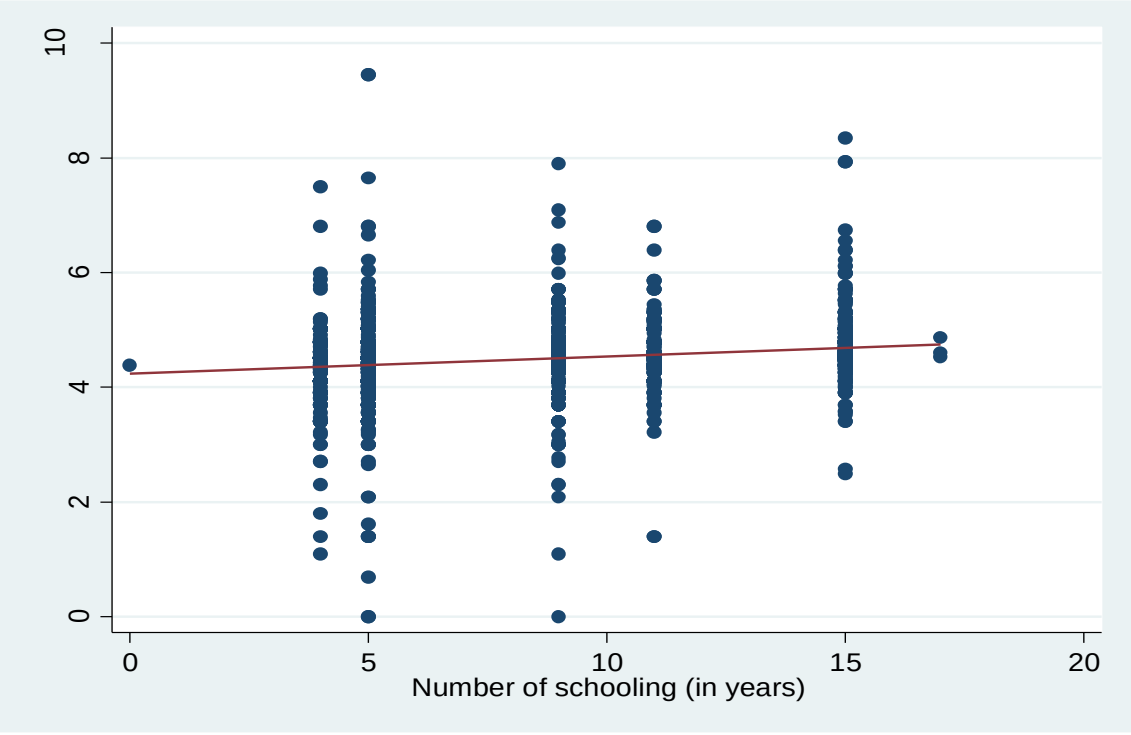

Figure (B-2) (a) Scatter Diagram of Log Monthly Wage and Education

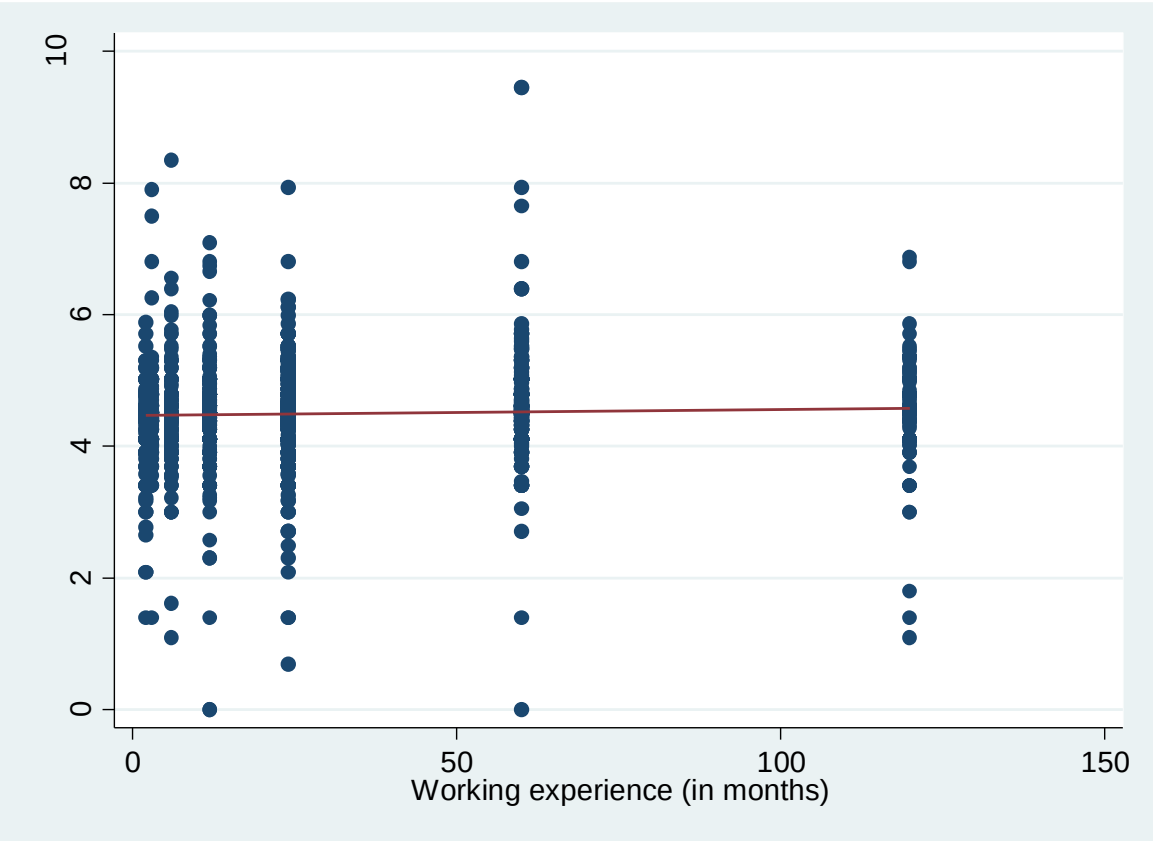

Figure (B-2) (b) Scatter Diagram of Log Monthly Wage and Experience

Table (B-4) Correlation Matrix

	Lnwage	**educ**	**exp**
lnwage	1		
educ	0.1801***	1	
	(0.000)		
exp	0.0485**	-0.0354	1
	(0.025)	(0.102)	

Note: **=significant at 5% level, and ***=significant at 1% level.

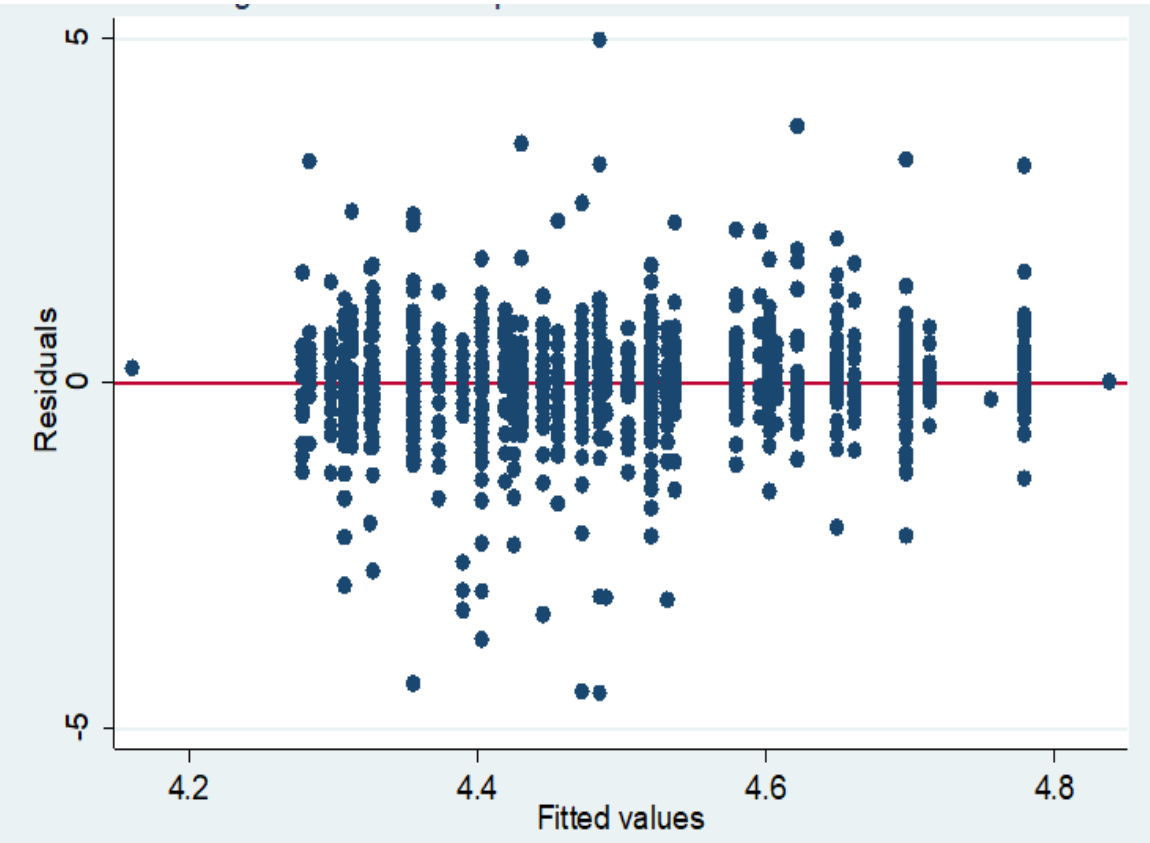

Figure (B-3) Relationship between Residuals and Fitted Values

APPENDIX C