8508689

Chuntapanich, Chirasak

DETERMINANTS OF LABOR SUPPLY IN THAILAND

City University of New York PH.D. 1985

University
Microfilms
International 300 N. Zeeb Road, Ann Arbor, MI 48106

PLEASE NOTE:

In all cases this material has been filmed in the best possible way from the available copy. Problems encountered with this document have been identified here with a check mark _√_.

1. Glossy photographs or pages _____
2. Colored illustrations, paper or print _____
3. Photographs with dark background _____
4. Illustrations are poor copy _____
5. Pages with black marks, not original copy _____
6. Print shows through as there is text on both sides of page _____
7. Indistinct, broken or small print on several pages _√_
8. Print exceeds margin requirements _____
9. Tightly bound copy with print lost in spine _____
10. Computer printout pages with indistinct print _____
11. Page(s) __________ lacking when material received, and not available from school or author.
12. Page(s) __________ seem to be missing in numbering only as text follows.
13. Two pages numbered __________. Text follows.
14. Curling and wrinkled pages _____
15. Other ____

University
Microfilms
International

DETERMINANTS OF LABOR SUPPLY IN THAILAND

by

CHIRASAK CHUNTAPANICH

A dissertation submitted to the Graduate Faculty in Economics in partial fulfillment of the requirements for the degree of Doctor of Philosophy, The City University of New York

1985

This manuscript has been read and accepted for the Graduate Faculty in Economics in satisfaction of the dissertation requirement for the degree of Doctor of Philosophy.

1/23/85 — Michael Grossman

date — Chairman of Examining Committee

1/23/85 — Michael Grossman

date — Executive Officer

PROFESSOR SALIH NEFTCI

PROFESSOR DAVID LAIBMAN

PROFESSOR MICHAEL GROSSMAN.

Supervisory Committee

The City University of New York

Abstract

DETERMINANTS OF LABOR SUPPLY IN THAILAND

by

Chirasak Chuntapanich

Adviser: Professor Michael Grossman

This Study persents a framework for analyzing the labor supply in Thailand. Data used are for males who work, and came from Thai National Statistical Office Socioeconomic Survey, 1975-76. By estimating the determinants of the first-job employment and moonlighting models, we are able to show the effect of years of schooling, work experience, family status, subregional factors, and occupational and work type.

In the analysis, special attention is given to the measurement of two types of structureal state dependence, first-job and moonlighting models. Results suggest that the gross wage elasticity of first-job labor supply has a positive sign. In contrast, the gross wage elasticity of the moonlighting labor supply has a negative effect. One possible reason for this difference concerns the nature of underemployed and inadequate income as characteristics of people.

Whether or not these first-job and moonlighting labor supplies have opposite signs for the wage elasticity depends on the negative wage elasticity of the second-job labor supply and the absolute value of the second-job wage elasticity is greater than the wage elasticity of the first-job labor supply multiplied by the time sharing ratio.

Acknowledgements

I am deeply grateful to Professor Michael Grossman for his guidance, constant encouragement, and many kindness. Without his reassurances, this study may never have been finished or started. I also wish to thank Professor Salih Neftci. His guidance and advice rescued me from unknown empirical support. Many thanks to Professor David Laibman for his most helpfulness.

I am indebted to Tony Bernard who help correcting English and, gave some suggestions for the structure of writing. I am also indebted to Dr. Tadashi Yamada, who gives some empirical advice. Finally, I'd like to thank my sisters, my brother-in-law and my wife for special supports and their patience.

TABLE OF CONTENTS

LIST OF TABLES

Page No.

CHAPTER ONE

INTRODUCTION

Thailand's population was about 44 million in 1977. Its growth rate is about 2.5 % per year, a significant reduction from the annual rate registered before 1970. In 1977 the crude death rate had fallen to about 9 per 1,000 (about the same as Europe's). Life expectancy at birth is about 58 years. The welfare of the Thai population as measured by income, health, education or social services differs substantially between urban and rural populations and among the rural population of various regions.
The Northeast followed by the North appear to rank lowest on most indicators in the 1970 census. Bangkok and/or the central region are consistently (the highest ranked on these indicators) followed by the South. The distribution of population is predominantly rural about 86.8 % of the whole population in 1970.

The reported civilian noninstitutional population in the Labor Force Survey of Thai National Statistical Office for the whole Kingdom (August 1981) was 47.6 million.

The labor force participation was reported to be 24.6 million which represented 51.6 % of the total population. The rural population accounted for 21.4 million persons in the work force, while the urban population accounted for the remaining 3.2 million persons. Those who were not in the labor force comprised 8.9 million (or 18.8 % of the total population) of whom the majority were household workers, students, and the retired or those economically inactive for other reasons. The remaining 14.1 million or 29.6 % of the total population were children less than 11 years of age. Of the 24,579,400 persons in the labor force, 98.9 % were employed. The remaining 1.1 percent were unemployed.

The labor market in rural Thailand is, on the contrary, particularly tight during peak agricultural seasons with the labor force stretched by drawing youngsters, females from household activities, and workers from nonagricultural jobs into agricultural employment that is characterized by long work hours. In the dry season, the labor force contracts with a large decline in participation by females and youngsters, a shift to off-farm employment by member of farm families and substantial reduction in work hours. In 1974, there was a significant difference in the size of the labor force between the two seasons (corresponding to a dry season between Jan. - Mar. and a rainy season between Jul. - Sep.) with the rainy season labor force 30 percent larger than the dry season labor force for the whole country.

There is not well-established or comprehensive picture of the labor market in Thailand. Researchers believe that rural unemployment is significant and underunemployment is massive, particularly during the slack agricultural periods in the dry season. No confirmed estimated have as yet been provided. Most workers in rural areas or farm areas believe that there are very limited non-agricultural and off-farm employment opportunities. Therefore, such activities accounted for small porportions of farm family income. They really do not know where to get a new job to compensate for one lost especially in the slack season. The information about jobs available to them usually comes from friends and/or relatives.

In this paper, I intend to estimate determinants of the male labor supply of Thailand. The data tape is from the Socioeconomic Surveys, 1975-76, of Thai National Statistical Office. This survey is comprised of five sample subgroups called regions as the following:

1. Greater Bangkok Metropolitan Area.
2. Central Region. (excluding Bangkok Area)
3. Northeastern Region.
4. Northern Region.
5. Southern Region.

This thesis consists of five chapters, with appendices and bibliographies. After the introduction in chapter one, chapter two will be devoted to a theoretical discussion of the development of labor supply theory. It incorporates conventional labor supply theory and more recent developments in labor supply theory. The derivation of the important model will be presented in this chapter. Chapter three will discuss techniques and estimation procedures. Chapter four will include the labor supply representing the different locations. In this case, location differences are in terms of region differences. After estimating four labor supply equations, we will combine these estimates into a single model representing the labor supply for the whole country.[1] The last chapter will summarize all the interesting results.

The methodology and estimates presented in this paper are not aimed at acheiving maximum efficiency of estimates or at eliminating all sources of specification and estimation biases; they are rather prefered methods that are less costly to execute and easier to understand. My empirical results generally indicate that all of these considerations are important quantitatively. Neglecting any of them may cause serious biases and misinterpretations.

My discussion in the next few chapters does not survey, literally, all work on labor supply. Rather, I will limit my focus to the following:

1. The quantitative aspect of labor supply is in terms of weeks worked per year, and for the most part, ignores important qualitative aspect of work effort (e.g.,

---

1) It is appropriate to pool labor supply functions for the different regions only if there are no differences in slope coefficients. If intercepts differ but slope coefficients do not, then we can pool with regional dummies. The relevant test is a Chow's test. The results of testing, I found that there are no significant differences in slope coefficients. See more details in the Appendix 1.

occupational choice).

2. This Analysis is male-individual labor supply in a static setting of certainty and complete information.

CHAPTER TWO

THEORETICAL ASPECTS

2.1 Conventional Static Model

Beginning with the pioneering study of labor force participation by Schoenberg and Douglas (1937), most empirical works on labor supply have been based on the neoclassical analysis of individual choice. The individual acts as if he had perfect certainty and perfect information, and neither saved nor borrowed, hence, utility maximization is U(L,C) subject to the real income or consumption in real term and leisure time.

For example, given the Cobb Douglas utility function:

$$U = C^{\alpha} L^{\beta} \qquad (1)$$

where C is amount of consumption, L is the time for leisure, and α, β are parameters.

The budget constraint is:

$$PC = WH + V \qquad (2)$$

where W is the wage rate, H is the hours of work and V is the nonlabor income. Assuming the price, P, is unity. The first-order condition for utility maximization, we have

$$\frac{\partial U}{\partial C} = \frac{\alpha U}{C} = \lambda ; \quad \frac{\partial U}{\partial C} = \frac{\beta U}{L} = \lambda W$$

Solve these equations

$$W = (\beta/\alpha)(C/L) \qquad (3)$$

The marginal rate of subtitution, M, is defined by

$$M = (\partial U/\partial L)/(\partial U/\partial C)$$

$$M = (\beta/\alpha)(C/L) \qquad (4)$$

and $\quad M = W$

Given $b = \dfrac{\beta}{\alpha + \beta}$, the marginal rate of subtitution

is $\quad M = [b/(1-b)](C/L) \qquad (4.1)$

If full-income is used up in that period, then $C = WH + V$.

At the reservation wage, W^*, is defined as the actual hours of work and is zero. Therefore,

$$M^* = [b/(1-b)](C/L)$$

evaluated at $C = V$, and $L = 1$ (where $L + H = 1$). $\quad$ (5)

Moreover, the individual will work if the wage he can earn, W, will exceed the value of his reservation wage, M^*.

It means $\quad H > 0$ if and only if $W > M^*$.

Let H^* be the desired hours of work. H^* will be

$$H^* = (1-b) - b(V/W) \qquad (6)$$

This simple model is sometimes citicized on the grounds that it assumes something that is contary to observed fact: the length of the working day or week is completely flexible. However, this criticism is misleading. The different hours-of-work possibilities implicit in budget lines. They do not necessarily refer to possibilities that are available with a given employer: Different points on the budget line could just as well refer to different employers. And individuals who change their hours of work may do so by changing employers. Moreover, the simple model assumes only that hours can be varied over some period of time (one year or five years); and the adjustment of hours need not be instantaneous.

This simple model can be derived from the indirect utility function. Using the indirect utility function, Roy's identity states that

$$H_i = 1 - L_i = (\partial U^*/\partial W_i) \qquad (7)$$

$$L_i = (\partial U^*/\partial P_i)/(\partial U^*/\partial W_i) \qquad (8)$$

where $U^* = U\ L_1(W_1,---,P_n),L_2(W_1,---,P_n,V),---,C_n(W_1,--,P_n,V)$

$= U^*(W_1/P_k,---,W_m/P_k,---,P_1/P_k,--,P_n/P_k,V/P_k)$

In other words, the family's optimal C_i and L_i are all determined by V and the other W's and P's which indirectly determine the level of the utility function at the family's optimum. It means that we can use the optimum utility as well as the optimum indirect utility by giving any function of prices (or wages) and income which is homogeneous of degree zero.[1]

---

1) One may start with an explicit utility function form and then derive a specification for labor supply function by first maximizing the utility function subject to the budget constraint then solving for the value of H_i at the optimum. Or one may start with an indirect utility function and use Roy's identity.

2.2 The Development of Labor Supply Studies

The development of labor supply studies concern with estimating the parameters of labor supply functions generated by maximizing an explicitly specified utility function subject to specified budget constraints. Conventional theory normally ignored the fact that individuals differ not only in terms of observation variables (i.e., the V and W) but also in terms of unobservable variables (i.e., the ϵ cr random error term). However, a key of unobservable variables plays a part in labor supply decision and appropriate specification of empirical labor supply function.

Pollak and Wales (1980 & 1981) use individual characteristics' variables (such as age, sex, race, and other observed variables) to emphasize the parameter differences in terms of the utility function differences as individuals receive the same property income (V/P) and earn the same wage rate (W/P). However, even persons in the same age-sex-race group who have the same V/P and the same W/P may have different labor supplies again due to unmeasured factors. These unmeasured factors are known to the individual who actually supplies labor but are not known to or observed by the researchers. These unobserved variables are represented by an error term, ϵ . It is assumed that ϵ is "mean-zero random variable," that is, has a mean of zero and uncorrelated with the right-hand side variables. Burtless and Hausman (1978) assume that ϵ is entered additively into the labor supply function: Such reasoning implies that affects the intercept of the labor supply schedule but not its slope.

Pencavel (1977) considers the wage effects in the context of piece-work and other payment systems. His specification of the labor supply model derives from the notion that workers may have to get "warmed up" at the start of each working day and may become fatigued later on. Earlier, Lewis (1957) had observed that individuals may consume leisure and market goods at the workplace (via coffee breaks, lush carpets, air conditioning, etc.). Unless this kind of consumption contributes directly to employee productivity and hence to the employer's revenues, employee will have to pay for such consumption.

More recently, Hanoch (1980) emphasized that weeks of work and hours of work per week are imperfect substitutes - or, equipvalently, that leisure hours during nonworking weeks, L_n, and leisure hours during working weeks, L_w, are separate arguments in the individual's utility functions. Whereas in the time allocation model, the allocation of total leisure time to working and nonworking weeks are perfect substitutes. Furthermore, Hanoch suggests that when analyzing and interpreting equations estimated with weekly hours of work as the dependent variable, the annual magnitudes (annual work hours and annual work weeks) should be used as the labor supply variables in the specification of new models. In his formulation, functions for hours of work per week are simply ratios of the functions for hours of work per year and weeks of work per year.

Another development in labor supply studies was provided by Mincer (1962), who demonstrated the confounding effects of transitory variation in market wages, which would "bias up" (positively) compensated own-wage effect and negatively bias the wealth or pure income effects enbodied in the effect of current wages on current labor supply. For the problem of measuring wage rate without systematic error, Boskin (1973) and Hall (1973) used the imputed wage to compute the labor supply by replacing the observed market wage rate with an instrumental variable. However, the imputed wage is failure to observed wages for non-working people.

Other researchers (Kalachek and Raines 1970, and Boskin 1973) prefered to use only those women who work as the sample for estimation. In their empirical works, the imputed wage is either jointly determined with hours of work and some measure with error.

Schultz (1980) discussed some problems in using available information on market wage rates. Such problems, he claims, are evident when observed wage rates are derived by dividing market earnings by hours worked during the relevant period, either a year or a week. Errors in reporting hours worked are thereby transmitted inversely to the measured market wage rate incorporating a downwards bias in directly estimated effects of the measured wage rate on labor supplied to the market.

Becker (1964) attempted to provide a needed corrective by adding the concept of full income which is a meaningful measure of the resource constraints. As proposed by him, full income incorporates the substitution of market goods for time, and the substitution of monetary income for nonmonetary commodities. This full income is disposed of either by spending money income on market goods or by spending time on commodities through foregone earnings.

The empirical results of the conventional studies for the uncompensated own-wage elasticity are that male labor supply is much less sensitive to wage changes than is female labor supply. Indeed, the male labor supply schedule appears to be quite smooth backward bending with respect to the wage, whereas the female schedule, according to most historical studies, is strongly positive sloped.

However, there is rather little argument on the magnitude of uncompensated wage elasticity, for either men or women. Most measures of the male gross wage elasticity range somewhat in between 0.000 and -0.4000, results of this kind appear in studies of aggregate (e.g., industrial or occupational) cross sections, aggregate time series data, and microlevel cross sections.[2] But some microlevel studies

---

2) Aggregate cross-section studies include Ashenfelter and Heckman (1974) and Finegan (1962). Aggregate time series studies include Holmes (1972), Lucas and Rapping (1970), and Owen (1969). Most first-generation or conventional work is based on microlevel cross-section data. For example, see Cohen, Rea, and Lerman (1970), Greenberg (1971), Greenberg and Kosters (1973), and the Studies in Cain and Watts (1973).

find significant positive elasticities for males. Some of the results of Kalachek and Raines (1970) imply an uncompensated wage elasticity ranging between 0.05 and 0.30. Hall (1973), Rosen and Welch (1971), and Wales (1973) also obtain positive elasticities for some subgroups in the male population. These studies use some specifications that allow the labor supply function to bend backward. Some of their observations lie on the positive-slope part of the schedule, whereas others are on the backward-bending part.

This wide range of estimates for men is the result of a variety of factors; the use of different samples, different measures of the dependent and independent variables. As the labor supply phenomenons, male participation rates are typically well above 0.50 and in many cases are close to unity. It is possible to obtain measures of labor supply and wage rates for most observations in most samples of men.

In contrast, participation rates for a variety of different groups of females (e.g., married women or women aged 25-34) have typically not been much more than 0.50 or 0.60 - and in some cases appreciably less. Most gross wage elasticities obtained in such studies of females are positive and fairly large. The range of estimates for the uncompensated own-wage elasticity for women is larger than the range of estimates for men: from 0.20 through 0.90 in most aggregation cross-section and microlevel cross-section studies of female labor supply (Hall, 1973; Kalachek and Raines, 1970). However, Leuthold's study (1968) implies an elasticity of about -0.067, while Boskin (1973) obtains elasticities as large as 1.6 for some groups of women.

Finally, the range of estimates of the gross wage elasticity of labor supply for the total labor force (males and females combined) is also quite large. Winston's (1966) Ordinary Least Square (OLS) study of an international cross section produced estimates between -0.05 and -0.11, but the range of aggregate time-series estimates for U.S. data is larger. For example, Mosbaek's (1959) OLS results generally suggest that the elasticity is negative, but Lucas and Rapping (1970), who use two-stage least squares, get a short-run elasticity between 1.35 and 1.58. Their long-run elasticity is between approximately zero if an asset variable is omitted from the supply function and 1.12 if one is included.

Virtually, all standard macroeconomics texts draw the aggregate labor supply schedule with a positive slope with respect to the wage. It may seem surprising that, as indicated earlier, the male labor supply elasticity with respect to the wage has generally been demonstrated to be negative. It may be that the time series response of labor supply to a wage change will be larger and more positive than the cross-section response. However, the sharp positive responses to wage increases in the short-run time series data and much smaller or even negative responses in long-run time series or cross-sectional data.

2.3 Socioeconomic Factors

The selection of variables for my empirical studies is based on economic theories and current labor supply model. This model provides some important information about the demand for wage rate. This demand for wage rate is expressed by the wage equations. And these equations can be further developed in terms of the instrumental variables into the labor supply equations. The wage equation specifies how the wage rate is determined by human capital taken as years of schooling, and by a number of other socioeconomic factors which act as control variables. The supply curve of hours worked shows an individual's willingness to supply the number of hours in the labor market which is determined in turn by wage rate, years of schooling, non-labor income, experience, marital status, family status, and other control variables.

Non-labor income:

Traditional economic theory considered leisure time as a normal good. Thus, an increase in income will increase the individual's demand for leisure time. If leisure activities are normal goods, the income effects will be negative. As in some of the empirical studies, (Becker, 1965; Mincer, 1962) I assume non-wage income will have a negative effect on the labor supply on hours of work. Thus, when non-wage income increases, an individual is able to enjoy more time in the nonmarket activities and spend less time in the labor market (Becker, 1964, 1965).

Wage income:

The wage rate is defined as the monetary value of work per unit of time paid. The wage rate can be used as a measure of time cost. The higher the wage rate, the more expensive the time spend on nonmarket activities.

Increased wage and income over the past decades in the United States have been accompanied by shorter workweek (Henle, 1962; Wilensky, 1967). It seems that the income effect of a wage change outweighed the substitution effect. This seems to be the same kind of effect suggested by Killingsworth. His study of adult males labor supply in different earning levels found that adult males with higher permanent hourly earnings worked fewer hours per week than adult males with lower permanent hourly earnings when the secular association with rising wage rate increased. However, an alternative explanation may be possible.

Becker (1975), in his discussion on the Theory of Allocation of Time, shows that the cost of the commodity called leisure consists entirely of foregone earnings and the cost of other commodities. For simplicity, he assumes that the cost of time is the same for all commodities. Presumably, however, it may vary considerably among commodities and at different periods. The cost of time would also tend to be less for production consumption such as sleeping time, eating time, and watching time, ect.. The opportunity cost of time is less because these commodities indirectly contribute to earnings.

The decline in hours of work can be explained in the development of the labor-leisure analysis (Becker, 1975). Roughly speaking, the secular decline in hours of work appeared to be evidence that the income effect was sufficiently strong to swamp the substitution effect, given that the productivity of consumption time is constant. In a fuller explanation, the increase in earnings can be implied by the technological improvement in the productivity of consumption time and the working time. An improvement in the productivity of consumption time would change relative commodity price and increase full income which in turn would produce substitution and income effects.

The interesting point is that these effects are precisely the opposite of those produced by improvement in the productivity of working time. Substitution has a negative effect but income has a positive effect, when considering the hours of work given that the productivity of working time is constant. Consequently, an emphasis on the secular increase in the productivity of consumption time would lead to a very different interpretation of the secular decline in hours worked. Instead of claiming that a powerful income effect swamped a weaker substitution effect, the claim would have to be that a powerful substitution effect swamped a weaker income effect.

If the productivity of both working and consumption time is increased at the same rate there would be no change in relative prices, and thus no substitution effect, because the rise in leisure time would exactly offset the decline in consumption time and marginal foregone earnings remaining unchanged. The income effect is dependent on the income elasticity of demand for time-intensive commodities as the following:

$$H \lesseqgtr 0 \quad \text{only if} \quad \eta_{ty} \gtreqless 1$$

where H is hours of worked and η_{ty} is the income elasticity of demand for time intensive. It implies that hours worked would exactly offset, or decline, or increase, if the income elasticity of demand for time intensive commodities is unity, above, or below unity, respectively.[3] In general, we expect the wage earnings have the positive effect on hours of worked. This implies that the increase in the wage earnings will increase the hours of worked.

Years of schooling:

Years of schooling is referred to as number of years of schooling which can be determined in terms of an efficiency unit of human capital. Efficiency due to more years of schooling reduces the time and money cost of production and consumption. We expect average earnings per

---

3) The productivity of working time has probably advanced more than that of consumption time, if only because of familiar reason associated with the division of labor and economics of scales.

hour to be higher for more years of schooling than in trades where less years of schooling. However, we can not be sure that the simple correlation between hours of work and years of schooling will be positive given the wage rate being held fixed. Grossman (1974) demonstrates using the household production function that, if efficiency unit increase with nonearnings and wage income being held fixed, the sign of the elasticity of time at home with respect to the efficiency unit is depended on the uncompensated price elasticity of household production as the followings:

$$\frac{Em}{Ea} = (\varepsilon_{zm} - 1) \gtreqless 0 \quad \text{as} \quad \varepsilon_{zm} \gtreqless 1$$

where $\frac{Em}{Ea}$ is the elasticity of time at home with respect to the efficiency unit and ε_{zm} is the uncompensated price elasticity of household production. If $\varepsilon_{zm} > 1$, it implies that the efficiency unit and activities time at home increase by the same direction and the result of the increase in time at home will reduce the time to work in the market.[4]

Marital status:

The fact is that married men have greater financial

---

4) See the proof in Appendix 2.

responsibilities that their single counterparts leads to a rough presumption that the former should choose a longer work week that the later. On the other hand, the labor supply of married women has been analyzed more extensively than that of married men or of other population groups. From cross-sectional analysis by city[5], it is said that the higher the income earnings of males in the city, the lower the labor supply of women.

But the secular trend of the labor supply participation of married women presents an apparent contradiction with cross-section results in the household labor supply. It was found that a negative relationship exists between wives' participation and husband incomes. Indeed, it is sometimes suggested that wives work only when their husbands' pay is inadequate. However, as the average real income of male earners has risen gradually over the years, the participation rate of wives has also risen.[6] Labor supply of married women vary substantially across

---

5) See Rees, Alber " The Economics of work and Pay" Princeton University Press, 1973.

countries and among racial or ethnic groups within countries, reflecting differences in cultural attitudes towards the proper role of wives and differences in women's labor market opportunities.

Age:

In the U.S., age might have some impact on the work week but it is not clear what this net effect will be. Because the marginal cost of leisure supply falls with old age. This factor, however, may have a greater impact on retirement decision than on the work week of the oldsters who choose to remain in the labor force. Taking productivity into account, the cost of leisure is greater for those with many working years ahead of them than those with few.

---

6) This effect may be come from two possibilities. One is the increasing schooling of women, which increases the value of the market work and also improved job opportunities for educated women. The second factor is the small average size of families. This means that there are fewer children to care for.

In very old age, physical restrictions can be an important factor in preventing them from many outdoor activities. It may involve disutility in preparing for and actually participating in those activities, due to various physical condions.

As Grez and Becker (1975) predicted, earnings tend to rise initially, reach peak in the mid-or later forties, and then declines. The rise and substantial decline in earnings is presumably due not only to the rise and fall in wage rates but also in the rise and fall in hours of work. Consumption distinctly follows the same pattern as earnings rising initially, peaking at about age 45, and falling thereafter. It is important to note that the consumption profile is less steep than the earning profile: its initial rise in gentle, and its fall less rapid than that of earnings, with earnings falling below consumption at about age 65. They also demonstrate that, with wage rates being held fixed, hours of work fall with age if the rate of interest exceeds the rate of time preference for the present (see Grez & Becker for a proof).

Annual hours worked also rise quite rapidly at young ages and then move slowly. Instead of continuing to rise, however, they peak at a relative early age, generally in the late thirties, and then decline gradually. A finding of some studies is that young persons not enrolled in school have much "unexplained" time, that is, time when they are not employed, looking for work, in training, or sick (A Report on Seven Communities, 1952-57, BLS Bull., 1277, 1960). They may be travelling or hanging around. The importance of "unexplained" time and the relative few hours worked are explained by the incentive to use time in nonmarket activities when wage rates are low. This allocation away from work and toward consumption among youth makes it difficult to estimate the earnings foregone by those persons who remain in school (Becker et. al, 1964) .

Regional factors:

Different regions have different commercial and amusement facilities and different market situations, such as unemployment rates and substitution of commodities. Urbanized regions supply more varieties of amusement, entertainment and other recreational or commercial facilities. Due to the demonstration effect, they also change people's tastes toward some peculiar activities. For instance, living in the rural areas or especially within villages, families want to utilize the same facilities as in the urbanized ares. Those costs may be relatively higher than the costs allocating for the urbanized families who spend for the same kinds of facilities. This is because of the travelling and transporting costs.

In terms of different sectors in the economy, work hours are longer in the agricultural sector than in the nonagricultural one. The wage rates can not usually be taken as comparable wages in those two sectors. The lower earning power of agricultural workers is in fact due to the availability of jobs which is very limited.

On the other hand, it is very competitive in the labor market within agricultural and rural areas. Workers are everywhere seeking jobs during the slack season. The average real wage rate is consistently constant over the long period of time. Some might estimate that the wage rate is below or just equal to the subsistent level.

CHAPTER THREE

TECHNIQUES AND ESTIMATION PROCEDURES

The lack of adequate data on individual characteristic for the typical individual and the greater complexity arising from aggregation in this study has lead me to use household data. These data are collected by the Socio-economic Surveys, Thai National Statistical Office. It contains useful information of each family household. The survey was conducted in a sample of Municipal Areas, Sanitary Districts, and Villages throughout the Kingdom. Data collection began in November 1975, and continued through October 1976. A representative subsample of households was interviewed each month. This survey covered all private non-institutional households residing permanently in each survey area. This excluded that part of the population living in transient hotels and rooming houses, boarding schools, military barracks, temple residents, hospital, prisons, and other such establishments as well as household temporary residents.

A total of 12,189 families were selected for the survey. They were distributed by region and community type as follows:

Region	Total	Municipal Area	Sanitary Districts	Village
Northern	2,502	612	480	1,410
Northeastern	3,336	636	585	2,115
Central	2,256	576	585	1,095
Southern	1,506	576	225	705
Greater Bangkok	2,589	1,272	786	531
Total	12,189	3,672	2,661	5,956

Note: According to the Socio-economic Survey did not explained clearly about the definition of these selected sample areas. I use the Report of Labor Force Surveys help to explain these three differences as the following: -

Municipal Areas

Within each Chungwat (or Province), a number of systematic sample blocks were drawn and the sample size was proportional to the number of blocks in each Chunwat. It seems to be easy to look the meaning of Chungwat in term of City and Municipal Area is like the urban area.

Sanitary Districts

Within each Chungwat (or province and/or city), a number of systematic sample Villages were drawn and the sample size was proportional to the number of Villages in each Chungwat. In other words, Sanitary District is like the suburban area.

Villages

The sample Villages were selected from those out of the Sanitary Dictricts by Linear systematic random sampling and the sample size was proportional to the number of Villages in the rural areas of each particular Chungwat. Following my analysis, I will treat the Village area as the rural area.

3.1 General Concepts and Definitions

The procedure of site sampling by Municipal, Sanitary, and Village areas, was based on a self-weighting, stratified, and three-stage sample design. In the first stage, sample geographic areas (in this survey is Amphoes or counties) were selected as primary sampling units, with probability of selection proportional to population size. In the second stage, areas within sample Amphoes (or counties) were stratified into three community types; Municipal Areas, Sanitary Districts and Villages. The sample of these three areas formed the probability related to its size. In the third stage, they listed all households and vacant housing units and classified the characteristic as housing and population variables.

The second-stage sample size was calculated by the following formula;

$$N_i = \frac{1}{C} \cdot \frac{1}{N} \cdot \frac{1}{P_i} \cdot \frac{M_i}{N_{ij}}$$

where N_i = Sample size (number of blocks and villages in the i^{th} Amphoe or county),

$1/C$ = the overall sampling fraction,

N = number of sample Amphoe (county) in subregion,

P_i = probability of selecting the first-stage i^{th} Amphoe (or county) in subregion,

M_i = total number of sample households in Amphoe,

N_{ij} = number of sample households in the j^{th} block as village in Amphoe.

The overall sampling fraction 1/C varies according to area as follows:

Area	Sampling Fraction
Greater Bangkok Metropolitan Area	1/300
Municipal Areas in other provinces	1/175
Villages in Sanitary Districts	1/360
Villages	1/840

Household Unit

The household was defined as a group of two or more persons who made common provision for food and other living essentials. Member of a household may pool their income and have a common budget to a greater or lesser extent and they may be related or unrelated.

Household Membership

Every person in a unit of household was included as a family member. If a family member was absent at the time of interviewing and expected to come within the next three months, he would be counted as a member.

Socio-economic Class

The classification of individual into socio-economic group was based on the main source of likelihood, status, kind of economic activity, and occupation. In general, an individual family member's class was based on the principal source of likelihood and employment status of the chief income recipient. However, if individuals had earned income from more than one source, the classification would have assumed the largest income earning from that source as the usual occupation.

Editing and Coding

In the editing and coding process, all questionaires given were examined for completness and consistency; all expenditures and income were converted to a per month basis. Income from farm and nonfarm enterprises were calculated on the basis of total annual value of products, less operating expenses. From this estimate the value of products held or withdrawn from household consumption was substracted to arrive at an estimate of money earning income.

It is generally thought that income and expenditure data are underreported in sample surveys, income to a greater degree than expenditures, and the extent of underreporting varies from different sources. However, wages and salary earnings are probably much more accurately reported than any other source of income.

3.2 Regression Estimates

1) The first wage equation

$$\begin{aligned} LNWAGE = {} & a_0 + a_1 D1 + a_2 D3 + a_3 EDUYRS + a_4 EXP \\ & + a_5 EXPSQ + a_6 SEWT2 + a_7 SEOC2 + a_8 SEOC7 \\ & + a_9 WT4 + a_{10} OC6 \end{aligned}$$

where WAGE = wage rate = $\dfrac{\text{monthly wage earnings}}{\text{usual + secondary weeks worked}}$

LNWAGE = natural log of wage rate

2) The second wage equation

$$\begin{aligned} LNWAGE = {} & b_0 + b_1 D2 + b_2 D3 + b_3 EDUYRS + b_4 EXP \\ & + b_5 EXPSQ + b_6 WT2 + b_7 WT4 + b_8 OC2 \\ & + b_9 OC7 + b_{10} WT5 \end{aligned}$$

where WAGE = wage rate = $\dfrac{\text{monthly wage earnings}}{\text{usual weeks worked}}$

LNWAGE = natural log of wage rate

3) <u>The labor supply equations</u>

$$\begin{aligned} LNWEEK = {} & d_0 + d_1 LNWAGE + d_2 NONEARN + d_3 SINGLE \\ & + d_4 EDUGT5 + d_5 FAM2 + d_6 FAM5 + d_7 ECON6 \\ & + d_8 ECON8 + d_9 ECON4 \end{aligned}$$

a) <u>The first weeks worked equation</u>

WEEK = (usual + secondary weeks worked) * 12

LNWEEK = natural log of weeks worked per year

b) <u>The second weeks worked equation</u>

WEEK = (usual weeks worked) * 12

LNWEEK = natural log of weeks worked per year

<u>The wage equations</u>

The dependent variable for wage rate equation is the natural logarithm of the estimated wage rate. The wage variable in my paper is the monthly earnings divided by weeks worked per month . The data are provided each separately for each of the regions (Northeast, South, Central, and Bangkok) in terms of different files. Therefore, I will study the coefficient determinations of the wage equations separately for the different regions before putting it together to represent the whole kingdom.

The independent variables can be explained as the following:

D1 = Municipal area is measured in term of dummy variable.

D1 = 1 if individual resides in the Municipal, else D1 = 0.

D2 = Sanitary district is measured in term of dummy variable.

D2 = 1 if individual resides in the Sanitary district, else D2 = 0.

D3 = Village is measured in term of dummy variable.

D3 = 1 if individual resides in the Village, else D3 = 0.

EDUYRS = the number of education years is measured as the following

if no formal education then EDUYRS = 0 year

if kindergarten then EDUYRS = 1 year

if lower elementary school then EDUYRS = 5 years

if upper elementary school then EDUYRS = 8 years

if lower secondary school then EDUYRS = 11 years

if upper secondary school then EDUYRS = 13 years

if vocational & technical school then EDUYRS = 14 years if study in the university or 2 or 3 years in the college then EDUYRS = 15 years

if bachelor degree then EDUYRS = 17 years

if higher than bachelor degree then EDUYRS = 20 years.

(Note: - In my interpretation of years of education for a person in the college, I presume that that person may have droped out of the university before finishing his or her study. And I add two more years study from 13 years of schooling for that kind of person.)

EXP[1] = AGE - EDUYRS - 6

Age is the age of an individual at that survey period. EDUYRS is the number of years of schooling, and 6 is the age when the child's schooling begin. This formulation of experience presumes that when schooling ends, the individual enter into the labor market. Sometimes for individuals under twenty years of age, experience when calculated according to this formula is negative. For practical convenience, they are set to zero.

---

1) This procedure of evaluating " experience " is based on a method used by Jacob Mincer (1974).

EXPSQ = EXP * EXP

The controlled variables, such as occupational workers or work type, are set in terms of dummy variables as in the following;

WT4 = 1 if usual work type of the individual is categorized as private employee or government employee,
else WT4 = 0.

WT2 = 1 if usual work type of the individual is categorized as own-account worker,
else WT2 = 0.

WT5 = 1 if usual work type of the individual is categorized as unpaid family worker,
else WT5 = 0.

OC6 = 1 if usual occupational worker of the individual is categorized as agriculture, or animal husbandry, or forest, and or fishermen and hunter worker,
else OC6 = 0.

OC2 = 1 if usual occupational worker of the individual is categorized as administrative, or executive, and or managerial worker,
else OC2 = 0.

OC7 = 1 if usual occupational worker of the individual is categorized as sales, or production and related worker, or transport equipment, and or operator and labourer,

else OC7 = 0.

SEOC2 = 1 if secondary occupational worker of the individual is categorized as administrative, or executive, and or managerial,

else SEOC2 = 0.

SEOC7 = 1 if secondary occupational worker of the individual is categorized as sales, or production and related worker, or transport equipment, and or operator and labourer,

else SEOC7 = 0.

SEWT2 = 1 if secondary work type of the individual is categorized as own-account or unpaid family worker,

else SEWT2 = 0.

Note 1) In the socio-economic handbook, they calculated the unpaid family worker earnings in terms of agricultural output sharing for the the unpaid family worker in the agricultural sector. It seems to be very possible to assume that the unpaid family worker earnings is greater than zero. Therefore, I use WT5 as a regressor in the first wage equation.

2) The classification differences between usual and secondary are determined by income of the individual. For instance, if an individual has earned income from more than one source, the classification would have assumed the largest income earnings from that source as the usual job or primary job. On the other hand, the classification would also assumed the lower income earnings from the smaller income earnings as the secondary one.

3) The major problem of most variables in occupational and work type categories were omitted from the regression estimates because those estimating parameters were not significant from zero. Therefore, those variables were omitted. For this reason, it should not be surprising to find that some variables appear in the first wage equation but not in the second wage equation.

The labor supply equations

The information for hours of work is not directly available. The Socio-economic data provided monthly weeks worked. Thus, in order to know the total weeks worked per year, the monthly weeks worked are multiplied by 12. The data consisted of usual and secondary weeks worked per month. In my analysis, the first equation will be the total weeks worked per year for usual plus secondary labor supply. In the second equation, it will be the labor supply of usual weeks worked alone.

LNWEEK = the natural logarithm of weeks worked per year

LNWAGE = the natural logarithm of wage earnings per year

NONEARN = the nonwage income which is income receipt without working in the labor market. In this case, the nonearnings income is the income receipt from land rent, or royalties, or interest, and or dividends. I set this NONEARN in term of dummy variable

NONEARN = 1 if the individual receive the nonearning income greater than 100 bahts, else NONEARN = 0.

EDUGT5 = 1 if the individual has the years of schooling greater than 5 years,

else EDUGT5 = 0.

(Note This EDUGT5 variable is not the same characteristic as that EDUYRS variable. Technically speaking, EDUGT5 is a continuous variable whereas the other is a discrete one. And in Appendix A, I performed the two-stage least square estimates testing within and without EDUGT5 in the labor supply model. The sign of the regression results remained unchanged.)

SINGLE = 1 if the individual has never married,

else SINGLE = 0.

FAM2 = 1 if the individual is head household with spouse and children,

else FAM2 = 0.

FAM5 = 1 if the individual is only head household with children,

else FAM5 = 0.

ECON8 = 1 if the individual is classified as a common labourer,

else ECON8 = 0.

ECON6 = 1 if the individual is classified as clerical, or sales & or service worker,

else ECON6 = 0.

3.3 Estimation Techniques

Imputed or predicted wage rate

To derive an imputed wage rate, one first uses data on a sample of working individuals to estimate the parameter of a wage function,[3] such as

$$W = r.X + w$$

where W is the wage rate, X is a vector of personal characteristics (age, years of working experience, years of schooling, the type of worker, occupational worker, and community area, etc.,) and w is the error term in the wage equation. In general, the estimation of the wage function techniques can be derived from several methods depending on the point of interest and the t-value of the wage parameters.

---

3) It is possible that downward bias arises if the use of predicted wage average out of the wage variation arising from demand difference between areas, (because of the lack of sufficient detail relating to location) which is necessary to identify the supply function. For individuals of a given labor quantity there is thus observed variation in supply, but little variation in predicted wage.

For simplicity, one then uses the wage function focus on the Ordinary Least Squares parameter estimates, r, to compute a "predicted" wage rate.

$$\hat{W} = \hat{r}.X$$

either for all individual workers or all people including people who work and who not working.

There are three reasons for using a predicted wage rate rather than the actual one in the hours of work equation.

a) Suppose the wage rate, W, must be estimated from earnings, e, and hours of work, H,

$$W = e/H$$

Let the labor supply model be

$$\ln H = b_0 + b_1 \ln W \qquad (1\text{-A})$$

or

$$\ln H = b_0 + b_1 \ln(e/H) \qquad (1\text{-B})$$

where b_0 and b_1 are the coefficients. The measurement error is from the estimated earnings when dividing by hours of work. If H contains measurement error, the parameter estimate of b_1 is biased toward -1.[4]

---

4) See the proof of this statement in Appendix 3

b) Suppose the structural equations of the wage rate and labor supply functions are expressed as follows:

$$\ln W_i = a_0 + a_1 X_i + u_{1i} \qquad (2)$$

$$\ln H_i = b_0 + b_1 Z_i + b_2 \ln W_i + u_{2i} \qquad (3)$$

where W_i and H_i is the wage rate and the number of hours work by an individual i, X_i and Z_i are the vector of exogenous variables used in the wage rate and the labor supply equations and u_{1i} and u_{2i} are respective random error terms.

If $$E(u_{1i} \cdot u_{2i}) = 0 \quad ,\text{for } u_{1i} \neq u_{2i}$$
$$= \delta_u^2 \quad , \text{for } u_{1i} = u_{2i}$$

These equations can be fitted by the Ordinary Least Square estimates. However, if $\mathrm{cov}(u_{1i},u_{2i}) \neq 0$ or if u_{1i} and u_{2i} are correlated, then $\ln W_i$ and u_{2i} are correlated and the parameter estimate of b_1 is biased. This is a recursive model with correlated errors. As a result, the wage rate coefficient will have a downward bias if the labor supply equation is fitted through the OLS estimates.

c) If the wage rate and the labor supply equations are

$$\ln W_i = a_0 + a_1 X_i + a_3 \ln H_i + u_{1i} \qquad (4)$$

$$\ln H_i = b_0 + b_1 \ln W_i + b_2 Z_i + u_{2i} \qquad (5)$$

Here this is reverse causality from H to W. This is called " a full simutaneous model ".

Introducing the labor supply model (for Usual plus Secondary weeks worked)

Suppose the individual would be willing to work additional hours at his usual or primary job when his usual job earnings is below the subsistence level. However, his usual job offers only limited hours of work. Thus, he will seek to work probably parttime on his secondary job under a flexible self-determined schedule. This practice follows from the marginal nature of underemployment on the usual job, which makes flexibility in hours a secondary-job requirement.

Perlman (1969) comments that it might seem logical to obtain the possibility of a negatively sloped labor supply curve for the secondary worker. The crucial determinant of whether the secondary supply schedule on his second job is positively or negatively sloped at a particular wage is the basis of his desire for extra income. If he wishes to fulfill a more or less set of consumption pattern, then his schedule will be backward-sloping and his number of underemployed hours will fall with an increase in his first-job wage. On the other hand, if his inability to reach undefined higher income levels with his first-job income leads him to seek for the secondary job, his labor supply schedule will be forward-sloping, and he will have more underemployed hours with higher first-job wages.

Suppose the total hours or weeks worked is equal to the total hours or weeks worked in the first job plus the total hours or weeks worked in the second job as the following:

$$H = H_1 + H_2 \qquad (1)$$

where H is the total hours or weeks worked by the individual. And H_1, H_2 is the total hours or weeks worked for the first and second jobs, respectively.

Cross-sectional studies of lower income groups have suggested that there is a negative relationship between wage rates and the total number of hours worked during the year (Taussig and Joslyn, 1932; Warner and Abegglen, 1955; and Warner and Abegglen, 1955). In view of the longer work weeks and higher incomes, there is reason to believe that although the relationship prevails at lower wage rates, it does not also prevail at higher wage rates. It is possible that the higher income groups may actually have forward-bending labor supply - for instance, male schoolteachers or some other category of worker might feel his first job income inadequate because it does not permit him to reach the higher indefinite and changing consumption standards of those he considers his social peers. On the other hand, the lower income groups may work the shorter hours - hardworking people with an increase in wage earnings tended to regard themselves perhaps as already working to the limit and hence as having no chance to work more.

Assuming the total hours or weeks worked is a function of the wage rate alone, $H = f(W)$

Therefore,

$$\frac{\partial \ln H}{\partial \ln W} = k_1 . \frac{\partial \ln H_1}{\partial \ln W} + k_2 . \frac{\partial \ln H_2}{\partial \ln W} \quad (2)$$

or

$$\delta_W = k_1 . \delta_{W_1} + k_2 . \delta_{W_2} \quad (2a)$$

It implies that the uncompensated wage elasticity of the total is equal to the wage elasticity of the first job times its share plus the wage elasticity of the second job times its share. However, it may be possible that the left-hand side equation is greater or less than zero.

$$\delta_W \gtrless 0 \quad \text{as} \quad k_1 . \delta_{W_1} \gtrless -k_2 . \delta_{W_2}$$

For instance, take the case of low income individual who already works the maximum number of hours on both jobs. This low income worker might be assumed to have a negative sloped supply curve if his goal is a fixed broader subsistence than his first-job income allows. On the other hand, the high income individual might feel his first-job income inadequate because it does not permit him to reach the higher indefinite and changing consumption standards of those he considers his social peers.

The first case:

$$\delta_W < 0 \quad \text{as} \quad k_1 . \delta_{W_1} < -k_2 . \delta_{W_2}$$

It means that if $\delta_W < 0$ and $\delta_{W_1} > 0$. It implies δ_{W_2} must be negative and $|\delta_{W_2}| > k_1/k_2 . \delta_{W_1}$

The second case:

$$\delta_W > 0 \quad \text{as} \quad k_1 . \delta_{W_1} > -k_2 . \delta_{W_2}$$

It means that if $\delta_W > 0$ and $\delta_{W_1} > 0$. It implies δ_{W_2} can be either negative or positive. However, $|\delta_{W_2}| < k_1/k_2 . \delta_{W_1}$.

This basic point is that, given δ_{W_1} being positive, δ_W and δ_{W_1} could have opposite signs if and only if $\delta_{W_2} < 0$ and $|\delta_{W_2}| > k_1/k_2 . \delta_{W_1}$.

VARIABLES	SYMBOL	HYPOTHESIZE
Log of weekly earnings	LNWAGE	a
Municipal	D1	+
Sanitary District	D2	a
Village	D3	-
Years of schooling	EDUYRS	+
Working experience	Exp	+
Experience squares	EXPSQ	-
Secondary occupational worker (in administration, executive and managerial)	SEOC2	a
Secondary work type (in own-account or unpaid family worker)	SEWT2	a
Secondary occupational worker (in sales, production and related worker, transport equipment operator and labourer)	SEOC7	a
Usual work type (in private employee and government employee)	WT4	a
Usual occupational worker (in agriculture, animal husbandry, forest, fisherman, hunter)	OC6	a
Usual work type (in own-account)	WT2	a
Usual occupational worker (in administrative, executive, and managerial)	OC2	a

VARIABLES	SYMBOL	HYPOTHSIZE
Usual occupational worker (in sales, production and related worker, transport equipment, operator and labourer)	OC7	a
Usual work type (unpaid family worker)	WT5	a
Nonearnings income (rent, royalties, interest, and dividends)	NONEARN	-
Years of education greater than five	EDUGT5	+
Unmarried males	SINGLE	-
Head household with spouse and children	FAM2	+
Head household with children	FAM5	+
Classified as labourer	ECON8	a
Classified as farm worker	ECON4	a
Classified as clerical or sales	ECON6	a

a = ambiguous

CHAPTER FOUR

EMPIRICAL RESULTS

This study is based on the assumption that weeks worked is one dimension of an important economic problem - the allocation of human resource between work and leisure. So far as I am aware, there have been very few studies of a cross-sectional nature on weeks worked labor supply in Thailand. Several studies dealt with labor force participation rate and labor utilization approaches. However, the evidence for the labor force participation rate approach is not enough to determine the labor supply level and unfortunately it is not available in many libraries. All the evidence that I had came from the labor utilization literature such as the Phillippine Economic Journal (1975) and some Labor Force Reports of Thai National Statistic (1970 -81). Mostly, they simply emphasized that rural unemployment was significant and rural underemployment massive. The World Bank (1980) study of income and consumption in Thailand explained those phenomenons, suggesting that there are very limited nonagricultural and off-farm employment opportunities, and that such activities account for small proportions of farm family incomes.

The main interest of my study will be to provide the comparison between the usual plus secondary weeks worked employments and the usual weeks worked employment in the determination of the labor supply. In this study, the labor supply means the individual male who is between 11-65 years of age as reported in the Socioeconomic Data (1975-76) of Thai National Statistical Office. The first part of the regression tables is concerned with the Ordinary Least Square estimates for people who work. The last two regression tables are analysed with Two-Stage Least Square estimates for people who work. In the first-four regressions, I will provide regression estimates within separate regions (such as Northeast, Central, South, and Bangkok).

As explained earlier, the individual's wage rate is calculated by dividing his monthly earnings by monthly weeks worked. And the annual weeks worked is multiplied by 12. Furthermore, all dependent variables are natural log transformed.

4.1 Ordinary Least Square Estimates

4.11 Dependent variable = wage earnings

(Usual + Secondary weeks worked)

Consider Table 1, all independent variables in these wage equations have the expected signs and are very highly significant. D3 and SEOC7 in Northeastern region, D1 and WT4 in Southern region, and WT4 in the greater Bangkok region, are statistically insignificant. The F-statistical tests are extremely significant (about 0.0001) in all four regression results. In the first column, R^2 explained 54 percent representing the wage function for the northeast, 57 percent in the central, 40 percent in the south, and 41 percent in the Bangkok regions.[1] My explanatory power, R^2, are not too high as some researchers predicted - even in the cross-sectional analysis. The high R^2 might imply all explanatory variables provide an adequate goodness of fit to the model. On the other hand, my earnings function is directly estimated. It is not the subject of choice like the labor supply model or any other model.

Roughly speaking, the values of parameters in the regression results compared to the same variable regressed against a different regional level are very closely

TABLE 1 THE OLS ESTIMATES

THE WAGE FUNCTIONS

DEPENDENT VARIABLES = LNWAGE

HOURS OF WORK = USUAL + SECONDARY WORKED WEEKS

(t - Value)

Males	Northeast	Central	South	Bangkok
Intercept	3.919 (37.74)	4.435 (46.23)	4.359 (80.32)	4.426 (34.66)
D1	0.276 (3.912)	0.104 (1.601)	0.032* (1.062)	0.117 c (1.457)
D3	-0.057 * -(0.934)	-0.175 -(3.128)	-0.216 -(5.043)	-0.277 -(3.353)
EDUYRS	0.093 (10.27)	0.049 (5.894)	0.086 (23.56)	0.079 (8.706)
EXPSQ	-0.0006 -(4.94)	-0.0007 -(6.77)	-0.0006 -(11.17)	-0.0006 -(4.54)
EXP	0.046 (7.159)	0.042 (8.142)	0.053 (17.32)	0.045 (6.374)
SBW02	-0.515 -(5.452)	-0.359 -(3.535)	-0.749 -(5.4[illegible])	-0.248 -(2.588)
SEC02	-1.18[illegible] -(4.719)	-1.343 -(1.718)	-1.382 -(6.13)	-1.792 -(5.73)
SEC07	-0.159 * -(1.129)	-0.146 b -(1.718)		-1.373 b -(1.763)
WC4	0.222 (3.031)	0.451 (6.624)	-0.012* -(0.409)	0.108* (1.406)
OC6	-0.941 -(15.33)	-0.946 -(16.61)	-0.728 -(10.33)	-0.414 -(6.068)
R^2	0.5472	0.576	0.4078	0.417
$\bar{R}^2$	0.543	0.5726	0.4048	0.4084
N	1,106	1,233	1,779	682

* = insignificant, and a, b, and c represented 5, 10, 15 significant, repectively

related. These vales differed within a range from high to low approximately 50 percentage points. All of parameters have the expected signs. The sample size is about 1,106 in the northeast followed by 1,233 in the central, 1,779 in the south, and 682 in Bangkok.

Subregional differences

The literature on labor force participation has often pointed to the differences between areas. Greenhalgh (1979) mentioned that the biased estimates could arise in the use of money wage variable without diviation of regional differences if there were significant cost of living variation between areas. As following his suggestion, the differences seem to be strong in some subregions. For example taking Bangkok as

---

1) Chiswick (1974) finds that R^2 is higher for earning than income when the regression is regressed on years of schooling, working experience, and some other regional dummies. For his estimates of regression results,

Adjusted R^2 for white males:

	Income	Earnings
for 49 states:	.22	.63
for 39 states:	.14	.64

the standard, the wage earning differences between Municipal (D1) and Village (D3) are some 12 percentage points higher than the central. This does not hold for the south and the northeast since the coefficient parameters of D1 are insignificant.

Table 1-1 Comparason at Different Subregional Level[a]

	Municipal (D1)	Sanitary Districts (D2)	Village (D3)	Differences (D1) - (D3)
Northeast	0.276	C	-0.057*	0.333*
Central	0.104	C	-0.175	0.279
South	0.032*	C	-0.216	0.248*
Bangkok	0.117	C	-0.277	0.394

* = statistical insignificant, C = constant

a = transforming this result from Table 1.

Clearly these wage earning differences in part reflect differences in the degrees of urbanization between regions and the degrees of ruralization within the region and outside the region. One part of this result confirms Bertrand (1980) finding that rural wages vary significantly in

Thailand in response to particular areas. The wage experience in the south and in the central regions strongly indicates that a perfect elasticity of labor supply does not characterize significant parts of the rural economy. additionally to my results of finding, the degrees of wage differrential exist not only in the rural areas or the Village areas as Bertrand's finding (1980), but also differ significantly in the Municipal areas or urban areas.

EDUYRS

The results of the statistical procedures show that years of schooling is highly positively associated with wage earnings. If EDUYRS will increase by one year, the increase in the wage earnings will be 9.3 percent in the northeast, 4.9 percent in the central, 8.6 percent in south, and 7.9 percent in Bangkok. These results are almost similar to Chiswick (1974) and Becker (1975) estimates. According to Thai National Statistical Office labor force report (1970-76), the poorest regional area is in the northeast, followed by the south. As Chiswick mentions, people in the poorer regional areas would have higher rates of return from an increase in the years of schooling than

than people in the higher income areas. The effect of schooling on the wage earning regression shows the northeast has the highest rate of return, followed by the south which confirms his analysis. And all coefficients of EDUYRS are significant at 1 percent level.

EXP and EXPSQ

I followed Mincer's suggestion by using EXP variable instead of age variable in the wage earning function.[2] Coefficients of EXP is not the rate of return, therefore, we can not compare these coefficients with EDUYRS's coefficients.

Table 1-2 EXP and EXPSQ comparison

	Northeast	Central	South	Bangkok
EXP	0.046	0.042	0.053	0.045
EXPSQ	-0.0006	-0.0007	-0.0006	-0.0006

Note: This table is transformed from Table 1.

These coefficient of experience parameters are very similar to the Mincer's estimates. At the same token, my estimated parameters of EXPSQ are also very similar to Mincer's estimates and all EXPSQ signs are negative. The experience squares means accelerating worked experience in the earning profile. The earnings as regressing on experience and experience squares tend to rise initially, reach peak in the mid or later forties, and then decline.[3]

Controlled variables

As mentioned in the previous section, all controlled variables are dummy variables. SEWT2 is the self-employed or unpaid family member category for secondary work type. The coefficients have negative signs for all regions. These negative effects of the SEWT2 coefficient to the earning function might represent an underreporting by the above category, somewhat below the actual level compared with other

---

2) Mincer (1974) mentioned that observed aged profile of an individual reflect only invesment behavior. Elements of chance, of changing market opportunities, and of biopsychological developments are important. Nontheless, there is evidence that work experience is much more important than age in affecting productivity and earnings.

categories of workers.

SEOC2 - the secondary occupational job in administrative, or executive, and managerial - have the expected sign, however, the highest negative coefficient parameter is for Bangkok followed by the south, the central region and by the northeast. This type of occupational worker required more years of schooling and experience. These regression results fulfiled Chiswick (1974)'s finding on the rate of return to years of education. As he pointed out, in areas which had more educated people, the rate of return to years of education should be lower than the place that had less educated ones. This can be implied by my results in the sense that that SEOC2 worker may not work in occupations related to his own skill. And the labor demanded is very low for the unqualified worker. Therefore, it is not surprising to find the negative correlation between earnings and SEOC2. And SEOC2 coefficient in Bangkok is the highest negative value because educated workers in this area are very highly competitive.

---

3) There is invisible decline at those later ages in weekly earnings. Apparently, declines in worked week per year are the main factor in the decline of annual earnings during the preretirement years.

SEOC7 - the secondary occupational job in production and related worker, transport equipment operator, and labourer - results are not very interesting because these coefficients in the northeast and the south regions regression are not significant. The rest have statistical significance at 10 percent and the signs are negative.

WT4 - the usual work type job in private or government employee - variables in the south and in Bangkok regressions are statistical insignificant. However, these coefficients in the northeast and the central regressions are very highly significant at 1 percent level and also have the nonnegative signs.

OC6 - the usual occupational job in farm, animal husbandry and forest worker - results are very interesting to point out that, in the northeast and the central regressions, the majority of OC6 workers is based on the rice production which is relatively low wage earnings. In the south, the majority of OC6 worker is based on rubber production which is relatively higher in wage earnings compared to the OC6 in the northeast and the central. On the other hand, OC6 regression result in Bangkok has the lowest negative coefficient value because the production is located near or even in the market place. Therefore, it is not surprising to see that the parameter of OC6 ranging from high to low in different regression results as follows: -0.414, -0.728, -0.941, and -0.946 representing regressions in Bangkok, the south, the northeast and the central, respectively.

4.12 Dependent variable = Wage earnings

(Usual weeks worked)

In Table 2, all variables in the wage rate equations have the expected signs and are very highly statistical significant except for some variables such as OC2 in the northeast region, D2, OC2, and WT5 in the central region, WT4 and OC2 in the south region, and D2, WT4, OC2 and CC7 in the great Bangkok. The values for the F-tests are very low (F = 0.0001) in all four regression results. In the first column, the regression result gives us R^2 = 44 percent, which compares to the second column R^2 = 43 percent, or to the third column R^2 = 36 percent, and to the forth column R^2 = 37 percent. All of these R^2s' are very acceptional test in the cross-sectional analysis. The sample size is 1,106 for the northeast, 1,193 for the central, 1,788 for the south and 710 for Bangkok.

The values of parameters in the regression results compared across different regions for the same variables show similar magnitudes. And the signs of parameters are also similar to those presented in Table 1. For this reason, we need not restate the explanation of the results for some variables.

TABLE 2 THE OLS ESTIMATES

THE WAGE FUNCTIONS

DEPENDENT VARIABLES = LNWAGE
(T - VALUE)
HOURS OF WORK = USUAL WORKED WEEKS

Males	Northeast	Central	South	Bangkok
Intercept	4.149 (35.75)	4.259 (39.25)	4.361 (79.44)	4.232 (38.91)
D2	-0.276 -(4.084)	-0.088 * -(1.348)	-0.048 c -(1.584)	-0.059 * -(0.412)
D3	-0.388 -(5.971)	-0.341 -(5.475)	-0.268 -(6.88)	-0.231 -(3.94)
EDUYRS	0.098 (11.06)	0.069 (7.958)	0.087 (23.07)	0.096 (11.32)
EXPSQ	- 0.0005 -(4.462)	-0.0007 -(6.798)	-0.0006 -(11.37)	-0.0007 -(6.269)
EXP	0.043 (6.913)	0.052 (8.814)	0.054 (17.39)	0.0589 (9.133)
WT2	-0.552 -(8.178)	-0.688 -(10.83)	-0.584 -(6.278)	-0.533 -(6.6)
WT4	0.239 (3.372)	0.379 (5.396)	-0.008 * -(0.246)	0.061 * (0.762)
OC2	-0.112 * -(0.694)	0.0338 * (0.212)	0.091 * (1.134)	0.006 * (0.04)
OC7	0.167 c (1.537)	0.089 * (0.844)	0.157 (3.136)	0.012 * (0.108)
WT5	-0.447 -(5.045)	-0.409 -(5.092)	-0.139 * -(0.817)	-0.357 a -(2.27)
R^2	0.4543	0.4385	0.3682	0.3879
$\bar{R}^2$	0.4493	0.4337	0.3646	0.3793
N	1,106	1,193	1,788	710

* = Statistical insignificant
a, b and c represented 5, 10, 15 statistical significants respectively.

Subregional differences

D2 - Sanitary District or suburban area - coefficient in the northeast and in the south are statistical significant at 1 percent and 15 percent levels, respectively. And the rest of D2s' parameter are not significant. However, all the signs are negatively correlated with wage earnings. D3 - Village or rural area - variables all have the expected signs in the four regression results and are statistically significant at 1 percent level. These results compare the well-being of people living, in terms of the locational differences, particularly in the Village differences. Starting from the northeast, D3's parameter is -0.388, whereas in the central, the south, and Bangkok, D3s' parameters are -0.341, -0.268, and -0.231, respectively.

Table 2-1 presents a comparison of the degrees of urbanization and ruralization differences. The cost of living differences can determine in term of the degrees of urbanization and ruralization. In the first column, the row values for D1 - D3 (the differences between D1 and D3) determines the degrees of urbanization. As in the table 2-1, the degrees of urbanization indicates that the central region has degrees of urbanization of 0.279 whereas Bangkok's is 0.394. It implies that Bangkok has higher degrees of

Table 2-1 Comparison of the degrees of urbanization and ruralization differences

Independent	Northeast	Central	South	Bangkok
	The wage equation from Table 1		(usual + secondary)	
D1	0.276	0.104	0.032*	0.117
D3	-0.057*	-0.175	-0.216	-0.277
	The wage equation from Table 2		(usual)	
D2	-0.276	-0.088*	0.048	-0.059*
D3	-0.388	-0.341	-0.268	-0.231
dif(D1 - D3)	0.333*	0.279	0.248*	0.394
dif(D2 - D3)	0.112	0.253*	0.316	0.127*

* = statistical insignificant

urbanization than the central region. On the other hand, the row values for D2 - D3 (the differences between D2 and D3) determines the degrees of ruralization. It indicates that the northeast region has a higher degrees of ruralization than the south. The lower degrees of differences between D2 and D3 means higher degrees of ruralization results.

Controlled variables

WT2 - the individual's work type is self-employed - coefficients have the negative signs and all parameters are very highly statistical significant (t = 0.0001). If we regard the WT2 as a self-employed worker for the economy as a whole, then the regression results might be a good proxy of self-employed income earnings. This is because the number of self-employed workers in agriculture accounts for 75 percent of the total labor force (Thai labor force report , 1975-76). Additionally, these categories of workers have very low income earnings compared to those in other sectors.

The results of finding, WT4 coefficients have the expected positive signs which act the same way as the WT4 coefficients in the Table 1. However, half of these parameter estimates in this model are highly significant.

OC2 parameters are all statistical insignificant. We will accept the null hypothesis that OC2's parameters are not different from zero.

OC7 parameters have the positive signs and most of them are not significant.

WT5 - the unpaid family worker - parameters have the negative signs. The coefficient parameter is determined that, if a one percent increases in WT5 given other things being held constant, the decline in the wage income is 44 percentage points in the northeast regression, 40 percentage points in the central, and 35 percentage points in Bangkok.

TABLE 3 OLS ESTIMATES

THE WEEKS WORKED FUNCTIONS

DEPENDENT VARIABLES = LNWEEK
(T - VALUE)

WEEKS WORKED = (USUAL + SECONDARY) * 12

Males	Northeast	Central	South	Bangkok
Intercept	4.181 (98.69)	4.46 (74.63)	3.917 (88.93)	4.46 (40.41)
LNWAGE	-0.157 -(12.43)	-0.121 -(10.62)	-0.014 b -(1.853)	-0.135 -(7.016)
NONEARN	0.140 (4.39)	0.195 (7.18)	0.389 (13.6)	0.30 (7.522)
SINGLE	-0.129 -(4.515)	-0.054 -(2.135)	-0.016 c -(1.572)	-0.106 -(2.944)
EDUGT5	0.186 (6.022)	0.148 (5.784)	0.031 (3.23)	0.134 (3.982)
FAM2	0.036 c (1.47)	-0.04 b -(1.955)	0.017 b (1.869)	0.013 * (0.472)
FAM5	0.161 (2.901)	-0.003 * -(0.058)	-0.018 * -(0.921)	-0.005 * -(0.048)
ECON6	0.110 (3.293)	0.067 (2.391)	-0.001 * -(0.135)	0.112 (3.24)
ECON8	0.102 (3.34)	-0.025 * -(0.742)	-0.01 * -(0.629)	-0.036 * -(0.742)
ECON4	0.025 * (0.569)	-0.04 * -(1.256)	-0.087 a -(2.393)	0.004 * (0.09)
R^2	0.2042	0.2153	0.1177	0.2259
$\bar{R}^2$	0.1977	0.2096	0.1133	0.2157
N	1,114	1,233	1,806	691

* = Statistical insignificant

a, b, and c represented 5, 10, and 15 percent statistical significant, respectively.

4.13 Dependent variable = Weeks worked
(Usual + Secondary)

The dependent variables, LNWEEK, in Table3 are calculated to take account of the usual plus secondary weeks worked. The total weeks worked are multiplied by 12. If the individual did not report the number of weeks worked or they are unemployed person, we did not take those persons into account of the labor supply regression. These Ordinary Least Square estimates are performed separately for different regional levels. These labor supplies are for males. And the regression estimates are the natural logarithms of number of weeks worked. The sample size is varied at the different regional level. For instance, the sample size for the regression in the northeast is 1,114, in the central, 1,233, in the south, 1,806, and in Bangkok, 691.

LNWAGE

The OLS estimates of the determination of male labor supply provide interesting results. The estimated wage elasticities are negative, but they are very highly significant at 1 percent level. The negative coefficients of LNWAGE are unexpected results. It shows that as the wage goes up the individual will supply fewer weeks worked in the labor market. Technically, the sign is indeterminant a prior stage to the labor supply equation when this equation is fitted by the Ordinary Least Square estimates. First, I suspect that these results are partly due to the measurement error in the weeks worked variable as the wage variable is the monthly earnings divided by monthly weeks worked. Due to this error, the probability limit of the estimated wage elasticity would tend toward -1.

NONEARN

The coefficient estimates of NONEARN are positive and very highly statistically significant. And these pure income effects are very large. It shows that as the nonearning income goes up the individual will supply more weeks worked in the labor market. Theoretically, these NONEARN coefficients have the wrong signs.

Comparing between the LNWAGE and NONEARN coefficients with the empirical studies in the U.S. findings, the LNWAGE coefficient is ambiguous but the NONEARN coefficient has the negative effect to the labor supply equation. And some might argue that my regression results have shown the inverse relationship to the U.S. studies in both LNWAGE and NONEARN coefficients. First, I will claim that the source of data is different in the sense that the U.S. data is characteristic of fully developed countries. However, the Thai socioeconomic data represent conditions relative to the developing or underdeveloping countries. Second, I will claim that the uncompensated wage elasticity from the empirical studies can probably be either positive or negative in sign (see the previous discussion in Chapter two). Third, this labor supply is considerably different from the usual labor supply. Since it combines the labor supply of the first and second jobs into the total labor supply of the individual. It may be possible that the theoretical labor supply function reacts the same way as the first-job labor supply. However, the second-job labor supply might have some kinds of characteristics that make his own working time different from the theoretical one (see more details in Chapter three). And because of that, the total uncompensated wage elasticity may be positive (or negative) depending on whether the first-job wage elasticity is greater (or less) than the second-job wage elasticity multiplied by the minus sign of the time sharing ratio, (k_2/k_1).

Controlled variables

SINGLE

The coefficient estimates of SINGLE are negative and very highly statistically significant, except for the labor supply of the south which is statistically significant at 15 percent. However, the regression estimates of SINGLE in the south also has a negative sign. The coefficient estimates of SINGLE are ranging from the maximum -1.6 percentage points in the south regression to the minimum -12.9 percentage points in the northeast regression.

According to the taste interpretation, it is less financial responsibilities accompany with single men which cause a lower taste for income, and thus lower the weeks worked to the market. Because most single men group are young and act like adults in the labor market.[4]

---

4) As Becker (1965) mentions in the age-profile for the single men. The relative size of the never married group of course declines sharply with age, as more and more enter the ranks of married, which implies that successively higher age bracket contains ever "purer" concentration of person commited to an unmarried life is very low.

FAM2

We will expect, in general, to find a positive relationship between the individual who is a male head of household with spouse and children and the supply of weeks worked, because this individual has much more financial responsibilities than a single man. The regression results for coefficients of FAM2 in both the northeast and the south regressions are positively correlated with the labor supply equations. However, the coefficient of FAM2 for the central is negatively correlated with the supply of weeks worked. And this negative relationship to the supply is a wrong sign.

FAM5

The FAM5 regression coefficient for the northeast has the expected positive sign and is very highly statistically significant. However, the rest of the other regression results are statistically insignificant. The positive effect of both FAM2 and FAM5 to the supply of weeks worked confirms strongly that married men have financial responsibilities to support their families more so than the single men.

ECON6, ECON8, and ECON4

ECON6 coefficients have the positive effect on the labor supply equations. And almost all of ECON6 coefficients are of high statistical significance at the 5 percent level except for the south regression where this coefficient is not significant.

ECON8 coefficient in the northeast regression has a positive relationship to the labor supply equation. However, the rest of the other regression results are statistical insignificant.

ECON4 coefficient in the south regression has a negative sign and is very highly statistically significant at the 5 percent level. However, the rest of the other regression results are not significant.

EDUGT5

EDUGT5 coefficients have positive effects on the labor supply equations and they are highly statistically significant. Given other variables being held fixed in the household production function, education in term of efficiency units, the positive sign of EDUGT5 coefficient implies that the uncompensated price elasticity of household production, ε_{zm}, is less than 1.

TABLE 4 OLS ESTIMATES

THE WEEKS WORKED FUNCTION

DEPENDENT VARIABLES = LNWEEK
(T - VALUE)
WEEKS WORKED = Usual * 12

Males	Northeast	Central	South	Bangkok
Intercept	4.041 (59.08)	4.181 (65.14)	3.996 (94.64)	4.115 (39.10)
LNWAGE	-0.072 -(5.852)	-0.09 -(7.604)	-0.027 -(3.741)	-0.076 -(4.165)
NONEARN	-0.151 -(5.332)	-0.15 -(5.708)	-0.089 -(3.265)	-0.061 b -(1.742)
SINGLE	-0.133 -(5.254)	-0.10 -(3.987)	-0.022 a -(2.198)	-0.091 -(2.868)
EDUGT5	0.196 (7.092)	0.178 (7.089)	0.032 (3.452)	0.121 (3.926)
FAM2	0.04 b (1.789)	-0.021 * -(1.037)	0.003 * (0.313)	-0.029 * -(1.112)
FAM5	0.173 (3.56)	-0.033 * -(0.616)	-0.027 * -(1.386)	-0.026 * -(0.297)
ECON6	0.119 (3.989)	0.14 (5.103)	0.007 * (0.734)	0.133 (4.223)
ECON8	0.092 (3.315)	-0.023 * -(0.696)	-0.022 * -(1.408)	-0.059 * -1.304)
ECON4	-0.073 b -(1.842)	-0.041 * -(1.20)	-0.131 -(3.753)	-0.047 * -(1.33)
R^2	0.1291	0.1271	0.0272	0.086
$\bar{R}^2$	0.122	0.1205	0.0224	0.0744
N	1,114	1,193	1,829	721

* = Statistical insignificant

a, b and c represented 5, 10, and 15% statistical significants respectively.

4.14 Dependent variable = Weeks worked

(Usual)

The dependent variable, LNWEEK, in Table 4 are calculated to take account of the usual weeks worked alone. The total weeks worked are multiplied by 12. These OLS estimates are also tested for the different regional levels. These labor supplies are for males. And the regression estimates are the natural logarithms of number of weeks worked. The sample sizes varied at the different regional levels. For instance, the sample size used in the northeast regression is 1,114, in the central, 1,193, in the south, 1,829, and for Bangkok, 721.

LNWAGE

The OLS estimates for the wage elasticities are negative, but they are highly significant at 1 percent level. The negative coefficients of LNWAGE are unexpected results. It shows that as the wage goes up the individual will supply fewer weeks worked in the labor market. The sign is indeterminant a prior stage to the labor supply equation when these equations are fitted by the OLS estimates. First, I suspect that these results are partly due to the measurement errors in the weeks worked variable as the wage variable is the monthly earnings divided by monthly weeks worked. Due to this error, the probability limit of the estimated wage elasticity would tend toward -1.

Table 4-1 Comparison between the two labor supplies

Labor supply and Dependent variabl	Northeast	Central	South	Bangkok
Usual + Secondary				
LNWAGE	-0.157	-0.121	-0.014b	-0.135
Usual				
LNWAGE	-0.072	-0.09	-0.027	-0.076

b = significant at 10 percent level.

Note: These labor supplies are transformed from Table 3 & 4.

We will see that the slope coefficients of LNWAGE are highly significant for all labor supply models except for the south regression of usual plus secondary weeks worked, which is significant at the 10 percent level. And their slope coefficients all have minus signs. It is very interesting to point out that the slope coefficients of LNWAGE are smaller for the usual labor supply models than for the usual plus secondary labor supply models. Except for the south regression of the usual plus secondary model, the wage coefficient is larger (or smaller negative value) than the other model at the same regional regression. It may be possible that the lower significance test of this coefficient causes its value to change to below its true value.

NONEARN

The coefficient estimates of NONEARN are negative and highly significant except for Bangkok becomes significant only at the 10 percent level. It shows that as the nonearning income goes up, the individual will supply less weeks worked in the market. This negative pure income effect confirmed the theoretical model.

Controlled variables

SINGLE

The coefficient estimates of SINGLE are negative and very highly significant. The coefficient estimates are ranging from the maximum -0.09 precentage points in the Bangkok regression to minimum -0.151 in the northeast regression.

FAM2

The coefficient estimate of FAM2 for the northeast regression is positive and at 10 percent significant. However, the rest of other regression results are not significant.

FAM5

For FAM5, only the coefficient estimate for the northeast emerges as statistically significant. This significant coefficient has the positive effect on the labor supply.

ECON6, ECON8, and ECON4

ECON6 coefficients have the positive effect on the labor supply equations. And almost all of ECON6 coefficients are highly statistically significant at the 1 percent level, except that the regression representing the south is not significant.

ECON8 coefficient in the northeast regression has a positive relationship to the labor supply equation. However, the rest of other regression results are not significant.

ECON4 coefficients have the negative effect on the labor supply equations. However, the regression representing both the northeast and the south are significant and the rest are not.

EDUGT5

EDUGT5 coefficients have the positive effect on the labor supply equations and they are highly significant. The positive effect of EDUGT5 coefficient implies that the uncompensated price elasticity of household production is less than 1 by holding wage rate and nonearning income being held fixed.

TABLE 5

TWO - STAGE LEAST SQUARE ESTIMATE

THE WEEK WORKED FUNCTION

DEPENDENT VARIABLE = LNWEEK

WEEKS WORKED = (USUAL + SECONDARY) * 12

Males	Parameter estimate	Standard error	T-ratio	Prob-T
Intercept	4.042	0.052	77.352	0.0001
I.LNWAGE	-0.039	0.009	-4.11	0.0001
NONEARN	0.272	0.017	16.005	0.0001
SINGLE	-0.032	0.011	-2.771	0.0056
EDUGT5	0.052	0.011	4.845	0.0001
FAM2	0.009	0.009	0.9	0.3680
FAM5	0.032	0.023	1.37	0.1707
ECON6	0.028	0.011	2.443	0.0146
ECON8	0.018	0.015	1.199	0.2302
NORTHEAT	-0.007	0.011	-0.587	0.5573
SOUTH	-0.071	0.013	-5.307	0.0001

R^2 = 0.1312

N = 4,782

4.2 Two-Stage Least Square Estimates

The dependent variable, LNWEEK, is calculated as usual plus secondary weeks worked as shown in the Table 5. The labor supply now represents the separate labor supply for each region pooled into a single equation. The weeks worked is multiplied by 12. As the dependent variable is in terms of the natural logarithm of annual weeks worked. This estimate also used the wage rate as the instrumental variable by predicting from all exogenous variables in the wage earning function into the labor supply model. This labor supply represents the labor supply for the individual males. The ECON4 variable is omitted from the regression analysis because it is highly insignificant. Furthermore, two regional variables - NORTHEAT and SOUTH - are added into the regression estimate for the controlled variables.

The results show that R^2 explained 13 percent and the sample size is 4,782 for working men only. The overall standard error, on average, is approximately 0.02.

The Two-stage Least Square estimate of the labor supply provides interesting results. I.LNWAGE variable is a predicted wage rate in terms of the natural logarithm of the wage earnings. The estimating wage elasticity is negative, but highly significant. Theoretically, the negative sign of the wage coefficient implies that the income effect outweighed the substitution effect. As in the empirical studies, the sign of this parameter is ambiguous which contradicts the full theory of the labor supply. On the other hand, I will claim that my labor supply model is, in fact, similar to the moonlighting labor supply model. This estimation procedure combined two sources of jobs - usual (or first) and secondary jobs.

This kind of model might be considered the better estimate of the labor supply in Thailand under two conditions. First, the attainable income from the first job (in my case, the usual job) is very low by any customary standard or in which worker attachment is based on factors other than income. For example, it is about 80 percent of the total population engaged in the agricultural production or related work (see Thai National Statistical Office, Labor Force Survey, 1975). The self-employed workers in the agricultural sector are 75 percent of the total labor force (see also Thai National Statistical Office, Labor Utilization, 1975). Bertrand's (1980) estimates of the labor productivity in the agricultural area is nearly zero. Second, they have little or no opportunity for extra work, or over time on their primary job. As Spoelstra and Isarangkun (1976) found, the very small unemployment rate for the Thai economy leads them to suspect that there may be a great deal of underemployment. In view of the moonlighting model, the negative wage elasticity seems to be possible in that the overall labor supply in Thailand characterizes closely that of the low income people who mostly works longer hours at his primary job.[5]

The coefficient estimate of NONEARN is positive but very significant. And this pure income effect is large. As explained earlier, this effect implies that leisure is not a normal good as in the previous assumption. This means that an increase of one percent in the nonearning income is associated with a 27.2 percentage points increase in the individual supplies to the market. And this analysis reflects negative pure income elasticity of demand for leisure and is consistent with the main theory of the underemployment.

Among other variables, SINGLE and FAM5 are significant at the 1 and 20 percent levels, respectively, and the signs are the same as the hypothesize. The single or unmarried male variable has a negative effect on the labor supply. But FAM5 or head of household with children has the positive effect. This FAM5 variable represents the characteristics of the married man with children but no spouse. This result confirms the empirical studies that married men have more financial responsibilities than do single men. Furthermore, the effect of FAM2 coefficient is not significant. ECON6 coefficient has the positively significant effect of the labor supply at 5 percent level of significance. ECON8 and NORTHEAT coefficients are not significant. The regional effect of the SOUTH coefficient has a negative sign and is very highly significant.

If we compare between Table 3 and Table 5, the sign of the coefficients remained the same as before (obtained from the OLS estimates) and after (using the instrumental variable) except for the NONEARN coefficient changing from a negative to a positive sign. Thus, the instrumental variable estimate of the labor supply does not show any remarkable difference from the OLS estimates.

However, in Table 6, the regression estimate of Two-stage Least Square used usual weeks worked alone.

---

5) See the previous dicussion and the last section of Chapter 3.

TABLE 6

TWO - STAGE LEAST SQUARE ESTIMATE

THE WEEKS WORKED FUNCTION

DEPENDENT VARIABLE = LNWEEK

WEEKS WORKED = (USUAL) * 12

Males	Parameter estimate	Standard error	T-ratio	Prob-T
Intercept	2.919	0.075	38.846	0.0001
I.LNWAGE	0.157	0.014	11.473	0.0001
NONEARN	-0.018	0.017	-1.060	0.2891
SINGLE	0.035	0.013	2.591	0.0096
EDUC15	-0.012	0.013	-0.875	0.3818
FAM2	0.003	0.010	0.352	0.7250
FAM5	0.032	0.024	1.315	0.1890
ECON6	0.034	0.012	2.858	0.0043
ECON8	0.016	0.016	1.037	0.2996
NORTHEAT	-0.006	0.012	-0.520	0.6027
SOUTH	-0.092	0.014	-6.516	0.0001

R^2 = 0.0933

N = 4,790

The estimating results are very similar to the labor supply studies in the U.S. as in the following:

Among other variables, the wage variable plays the most important role of the labor supply study. The sign of the wage rate instrumental variable in this regression result changes from negative (obtained from the OLS estimates) to positive. And its coefficient is greater than other coefficients in the OLS estimates and also is highly significant. This wage elasticity is also quite large compared with the other studies of the male labor supply[6]. NONEARN coefficient has a negative sign and is significant at 30 percent level. SINGLE coefficient has a positive sign and is very significant at 1 percent level. However, the value of this parameter is very low. According to the previous discussion, this positive effect of SINGLE coefficient to the supply seems to be possible if this parameter is relatively smaller than both FAM2 and FAM5 (or either one of them) parameters. Unfortunately, both FAM2 and FAM5 parameters are not significant. Other variables

6) It is evident that most measures of male gross wage elasticity range somewhat in between 0 to -0.40. But some microlevel studies find significant positive elasticity for male.

are less important in the labor supply model. ECON6 coefficient has a positive sign and is very highly significant. SOUTH coefficient has a negative sign and is very significant. The rest of the variables are not significant.

Table 6-1 Comparison of the OLS with 2LS estimates

Dependent Variable = LNWEEK

WEEK = (Usual + Secondary)

Independent	OLS	Independent	2LS
Intercept	4.273	Intercept	4.042
LNWAGE	-0.086	I.LNWAGE	-0.039
NONEARN	0.214	NONEARN	0.272
SINGLE	-0.068	SINGLE	-0.032
EDUGT5	0.101	EDUGT5	0.052
FAM2	0.008*	FAM2	0.009*
FAM5	0.031*	FAM5	0.032*
ECON6	0.047	ECON6	0.028 a
ECON8	0.017*	ECON8	0.018*
ECON4	-0.043 a		
		NORTHEAT	-0.007*
		SOUTH	-0.071

* = Statistical insignificant, a = at 5 percent significant

Source: See Table 5 and Appendix B

Table 6-1 presents the comparison of the OLS with 2LS estimates in the labor supply of usual plus secondary weeks worked. It indicates that the sign of all independent variables in both regression estimates are the same. The R^2 of the OLS estimate is larger than that of 2LS estimate. The OLS wage elasticity is about -0.08 whereas the 2LS wage elasticity is -0.039.

Table 6-2 Comparison between Two Labor Supplies

Dependent variable = LNWEEK

Model 1 Independent	Parameter estimate	Model 2 Independent	Parameter estimate
Intercept	4.042	Intercept	2.919
I.LNWAGE	-0.039	I.LNWAGE	0.157
NONEARN	0.272	NONEARN	-0.018*
SINGLE	-0.032	SINGLE	0.035
EDUGT5	0.052	EDUGT5	-0.012*
FAM2	0.009*	FAM2	0.003*
FAM5	0.032*	FAM5	0.033*
ECON6	0.028 a	ECON6	0.034
ECON8	0.018*	ECON8	0.016*
NORTHEAT	-0.007*	NORTHEAT	-0.006*
SOUTH	-0.071	SOUTH	-0.092
R^2 = 0.1312, N = 4,781		R^2 = 0.033, N = 4,790	

* = Statistical insignificant, a = 5 percent significant

Source: See Table 5 and 6.

Table 6-2 presents the regression results of the labor supply for usual plus secondary jobs in the model 1 and for usual job in the model 2. The regressions are estimated by Two-stage procedure. R^2 explains 13 percent for model 1 and 9 percent for model 2.

The intercept of these two models is very much different for model 1 is higher than model 2. The differences of the intercept terms indicate that the individual might react differently to the decision to work or not to work. Other coefficient parameters are very similar to each other comparing between both models except for the wage rate and single coefficients. The single coefficient for model 1 is positive but for model 2 it is negative. However, the value of the parameter is almost the same.

The predicted wage elasticity in model 1 (or moonlighting model) is negative whereas in model 2 it is positive. The positive wage elasticity for model 2 is simply closely characteristic of the theoretical model. On the other hand, the wage elasticity for the moonlighting model can be simplified as the wage elasticity of both jobs which is negative because the wage elasticity of the second job is negative and the absolute value of w_2 is greater than w_1 multiplied by the time sharing ratio, k_1/k_2.[7]

In the theoretical labor supply model, we can not directly see the differences between hours and weeks worked labor supply. However, in the moonlighting model, it produces much differences between the two models. For instance, the individual works regularly 50 hours per week on his first job but 20 hours per week on his second job. Applying this to the hours worked model, these differences can be shown in terms of the time sharing ratio between both jobs as in the following;

Let s be the time sharing ratio between both jobs. Therefore,

$$s = k_2/k_1 = 20/50 = 2/5$$

where k_1 is the time sharing for the first job and k_2 is the time sharing for the second job. However, the weeks worked model emphasizes that there is no differences of both time sharings. Because the interviewer does not take account of how many hours or days the individual works during a week. And, to some extent, that if the number of weeks worked in both jobs is equal, then the ratio of the time sharing is

7) See more details in Chapter 3.

equal to one. Therefore, the moonlighting labor supply model taking weeks worked as the dependent variable as in our model, implied that the total wage elasticity can be negative as the wage elasticity of the first job is less than the wage elasticity of the second job multiplied by minus one as follows:

$$\delta_W < 0 \quad \text{as} \quad \delta_{W_1} < -\delta_{W_2}$$

Furthermore, using the hours worked as the dependent variable in the moonlighting model may not be a correct interpretation of this model. Since, the working unit of the second job does not depend on the hours of work but depends on other factors such as income, or consumption factor. For example, the self-employed worker for the second job might continue to work during that week until a certain income level. Sometimes, the hours of work might be shorter or longer than another week. Sales person might work long hours if he can not sell his products to the customers. And he might work short hours if he can sell his products to some limit. For this reason, he will consider his second job as a unit of work in terms of weeks rather than hours.

CHAPTER FIVE

SUMMARY AND CONCLUSIONS

An important finding of this study is that the moonlighting model has a strong impact for male labor supply in Thailand. This model strongly demonstrates that it might seem logical to obtain the possibility of negatively sloped labor supply curve. The crucial determinant of whether the supply schedule on his two jobs is positively or negatively sloped is dependent on whether the wage elasticity of his primary job is stronger or weaker than the wage elasticity of his secondary job. This finding reaffirms in an interesting way that the wage elasticity of the individual on his secondary job must be negative and stronger than the wage elasticity on his primary job.

The first finding in the wage earning functions with separate regions, is that the degrees of wage differrential exist not only in the rural areas but also significantly in the urban areas. The wage differrential can be determined as the cost of living differences. The cost of living in turn determines the degrees of both urbanization and ruralization. However, some parameters in the subregions are not significant. Therefore, we can not fully develop the comparative picture of the degrees of both urbanization and ruralization. In our findings, the degrees of urbanization in Bangkok is higher than in the central region and the degrees of ruralization in the northeast region is somewhat higher than in the south region.

The second finding shows that human capital such as years of education has a significant effect on his own wage rate. And this education effect is similar to the U.S. findings. The results for years of education reaffirms that people in the poorer regional area will have a higher rate of return from an increase in the years of schooling than people in the higher income area. It also implies that one's education can be improved, either by providing opportunities and environment for education and extending to every location of the country, especially to the rural or Village area, will increase the work effort. Such inducements to education may enable the person to transfer from the low paying occupation to the high paying occupation or provide better opportunity to get the availability jobs.

The other finding is that the estimated return of schooling years is somewhat higher than the parameter of working experience. However, the experience paramaters are very similar to the Mincer's experience estimates. On the secondary occupation which required more years of education, the wage earnings is very low in the area where there are more educated people than less educated people.

Another finding from the estimation of two labor supply models is that the wage rate coefficients have the wrong sign in the labor supplies when these equations are fitted by OLS estimates. These results are partly due to errors of measurement in the weeks worked variable. Due to these errors, the probability limit of the estimated wage elasticity will tend toward -1. But when the labor supply functions are fitted by the method of the instrument, these errors of measurement are mostly eliminated. This is because the estimated wage elasticity in the usual labor supply became positive and very highly significant. However, in the case of the moonlighting labor supply model, the wage elasticity is still negative and very highly significant. Since it combines the labor supply of the first (or usual as in the former case) and secondary jobs into the total labor supply of the individual. It is evident that the second-job labor supply might have some impact as to how the individual makes his own working time different from the theoretical labor supply. For instance, using the hours worked as the dependent variable in the moonlighting model may not be a correct interpretation of this model. Since the individual supplied the secondary job does not depend on the hours of work directly but depends on other factors such as income or consumption. For example, the self-employed worker with the secondary job might continue to work to a certain income level. Sometimes, the hours of work might be shorter or longer than in another week. Another example is that a salesperson might work long hours if he can not sell his items easily to the customers. For this reason, he will consider his secondary job as a unit of work in term of weeks rather than hours as the theoretical model. This strong negative wage elasticity of this secondary labor supply swamped the wage elasticity of the usual supply and causes the wage elasticity of the moonlighting labor supply is negative.

The last finding is that single males have less financial responsibilities than the married males. The coefficient estimate of nonearning income is positive but very significant for the moonlighting model. It means that leisure is not a normal good. This positive pure income effect is very consistent with underemployment hypothesis.

Appendix 1

The concept is to test whether the separate labor supplies for the different regions can be pooled. I use the Chow's test. The test is the following:

$$F_{n_1,n_2} = \frac{\text{the differences between RSS} = (S_1 - S_2)/N_1}{S_2/N_2}$$

The significant test must be less than one. (Because F_{table} is about one for the large number of observations) As the results of the regression, we have

	Northeast (1)	Central (2)	South (3)	Bangkok (4)	Total
RSS	852.369	878.832	932.79	461.678	3125.669
$n_i - k = N_i$	1,097	1,224	1,779	673	4,765

where i = 1, 2, 3, and 4, and k is a number of the independent variables in the equation.

RSS of all four regions is 2519.78, and the number of degrees of freedom is 4,791.

First, testing for all regions

$$F_{N_{total},N_{all}} = \frac{(S_{total} - S_{all})/N_{\cancel{total}}}{S_{all}/N_{all}}$$

$$= \frac{(3125.669 - 2519.78)/4{,}765}{2519/4{,}791}$$

$$F_{N_{total}, N_{all}} = 0.241$$

Therefore, we accept the hypothesis is that they are the same slope.

Second, testing for separated region

1) comparing between Northeast and Central

$$F_{2,1} = \frac{(878.832 - 852.369)/1,233}{852.369/1,097}$$

$$= 0.089$$

Therefore, we accept the hypothesis that there is no differences between slopes.

2) comparing between Northeast and South

$$F_{3,1} = \frac{(932.79 - 852.369)/1,779}{852.369/1,097}$$

$$= 0.058$$

Therefore, we accept H_0

I do the same way as the above showing. The results are

$F_{1,4} = 0.08$

$F_{2,4} = 0.042$

$F_{3,2} = 0.52$

$F_{3,4} = 0.832$

which are significant to accept the hypothesis that there is no difference between the slope of the regions.

Appendix 2

Let the utility function consist of the good market, X, and two persons in the family.

$$U = U(X, Z_m, Z_f)$$

where X is good purchased in the market, Z_m is commodity produced at home using male time alone, and Z_f is commodity produced at home using female time alone.

Let the home production functions be:

1) Male production

$$Z_m = a_m . m$$

2) Female production

$$Z_f = a_f . f$$

where a_m and a_f are parameters which, in this case, it represents the marginal product of male and of female, respectively. On the other hand, Z_m and Z_f are analogous to a leisure time measured in efficiency units. Put differently, a_m and a_f depend on the level of technology in the household and technology is purely factor augmenting.

Given the good and time constraints,

$$I = P.X = V + W_m . t_m + W_f . t_f$$

where W is the wage rate, H is hours of work, V is nonearning income, and P is the good market price. Let the total available time is, T, where

$$T_m = t_m + m$$

$$T_f = t_f + f$$

Therefore, the full income is

$$S = V + W_m \cdot T + W_f \cdot T = P.X + W_m \cdot m + W_f \cdot f$$

where $T = T_m = T_f$. The full income can also express in term of the shadow price of Z_m and Z_f as follows:

$$S = P.X + \pi_m \cdot Z_m + \pi_f \cdot Z_f$$

where $\pi_m = W_m/a_m$ is the shadow price of Z_m and $\pi_f = W_f/a_f$ is the shadow price of Z_f.

The equilibrium slutsky demand function is

$$\begin{aligned} E(Z_m) = \; & [(1 - s_f - k_m)\eta_m + k_m \cdot \sigma_{mm}]\, E(W_m) \\ & + [(1 - s_m - k_f)\eta_m + k_f \cdot \sigma_{mf}]\, E(W_f) \\ & + s_v \cdot \eta_m \cdot E(V) + k_m(\eta_m - \sigma_{mm})E(a_m) + k_f(\eta_m - \sigma_{mf})E(a_f) \end{aligned}$$

and

$$\begin{aligned} E(m) = \; & [(1 - s_f - k_m)\eta_m + k_m \cdot \sigma_{mm}]\, E(W_m) \\ & + [(1 - s_m - k_f)\eta_m + k_f \cdot \sigma_{mf}]\, E(W_f) \\ & + s_v \cdot \; _m \cdot E(V) + [k_m(\eta_m - \sigma_{mm}) - 1]\, E(a_m) \\ & + k_f(\eta_m - \sigma_{mf})E(a_f) \end{aligned}$$

If, the increase in the productivity of male alone by holding V, W_m, W_f, a_f fixed, we will have

$$\frac{E(m)}{E(a_m)} = k_m(\eta_m - \sigma_{mm}) - 1$$

However, the uncompensated price elasticity for Z_m is

$$- \frac{E(Z_m)}{E(a_m)} = k_m (\eta_m - \sigma_{mm}) = \varepsilon_{Zm}$$

Therefore,

$$\frac{E(m)}{E(a_m)} = (\varepsilon_{Zm} - 1) \gtrless 0 \text{ as } \varepsilon_{Zm} \gtrless 1$$

If $\varepsilon_{Zm} > 1$, it implies that the increase in the efficiency unit will increase the male time at home and the result of the increase in time at home will reduce the time to work in the market. on the other hand, if $\varepsilon_{Zm} < 1$, the opposite result is still hold.

Appendix 3

Suppose that the labor supply function in the population is

$$H_t = bW_t \tag{1}$$

where H_t is the natural logarith of weeks worked, W_t is the natural logarith of the weekly wage rate, and the subscript t denotes a true value.[1] If E_t is the natural logarithm of annual earnings, then

$$H_t = b(E_t - H_t) \tag{2}$$

Suppose that the observed number of weeks worked (H) is subject to measurement error, so that

$$H_t = H - u \tag{3}$$

where u is uncorrelated with H_t and W_t. Substitute (3) into (2) to obtain

$$\begin{aligned} H - u &= bW_t \\ H &= bW_t + u \\ &= b(W_t - u) + u(1 + b) \end{aligned}$$

or

$$H = bW + v, \tag{4}$$

where $W = W_t - u$ and $v = (1 + b)u$.

---

(1) Equation (1) does not contain an intercept because all variables are expressed as deviations from their respective means.

If the population parameter b is estimated by ordinary least squares, then the sample estimate is

$$B = \frac{\sum HW}{\sum W^2} \tag{5}$$

or

$$B = b + \frac{\sum vw}{\sum w^2} \tag{6}$$

Take probability limits of equation (6) to obtain

$$\text{plim } B = b - (1 + b)\frac{\sigma_u^2}{\sigma_w^2} \tag{7}$$

where σ_u^2 is the variance of u, σ_w^2 is the variance of w, and $\sigma_w^2 = \sigma_{w_t}^2 + \sigma_u^2$.

Let b and $\sigma_{w_t}^2$ equal zero or there is no variation in wage rate, so that all the variation in the wage rate is due to measurement error in weeks worked. Then

$$\text{plim } B = -1 \tag{8}$$

In general,

$$\text{plim } B \lessgtr 0 \text{ as } \frac{\sigma_u^2}{\sigma_w^2} \gtrless \frac{b}{1+b} \tag{9}$$

Note finally that

$$\text{plim } B - b = -(1+b)\frac{\sigma_u^2}{\sigma_w^2} < 0 \tag{10}$$

The last equation indicates that the probability limit of wage elasticity obtained by ordinary least squares would always be smaller tham the corresponding population parameter.[2]

2) The estimated wage parameter is always smaller than the population parameter. Equation (9) and (10) assume that b exceeds minus one. If b were smaller than minus one (negative and greater than one in absolute value) earnings or consumption of the market goods would be negatively correlated with wage rate. Such correlation are extremely unlikely and can be ruled out for all practical purposes.

Appendix A-1

TWO — STAGE LEAST SQUARE ESTIMATE

THE WEEKS WORKED FUNCTION

DEPENDENT VARIABLE = WEEK

WEEKS WORKED = (USUAL) * 12 , without EDUGT5

Males	Parameter estimate	Standard error	T-ratio	Prob-T
Intercept	22.648	1.937	11.688	0.0001
I.LNWAGE	4.23	0.333	12.679	0.0001
NONEARN	-1.26	0.521	-2.417	0.0157
SINGLE	0.179	0.384	0.466	0.6406
FAM2	-0.337	0.325	-1.035	0.3003
FAM5	0.821	0.773	1.062	0.2881
ECON6	1.232	0.391	3.15	0.0016
ECON8	-0.650	0.490	-1.325	0.1850
NORTHEAT	-0.874	0.375	-2.328	0.0199
SOUTH	-0.810	0.621	-1.304	0.1922

R^2 = 0.0836

N = 5,021

This appendix shows the estimate of Two-stage Least Square without EDUGT5 variable as the regressor.

The dependent variable is not the natural logarithm term as in the Table 6. I tried to run the estimate with the natural logarithm of the dependent variable to make a comprehensive comparison between this table and Table 6 but, unfortunately, some part of my data tape was worn out. Therefore, this is the last result that I have. And the appendix A-2 will compare the signs of the independent variables in this table with Table 6. It is conclude that EDUGT5 and EDUYRS variables are different characteristics. Since the regression with EDUGT5 variable reacts the same way as the regression without it as the following:

Appendix A-2

Table 6 Independent	Signs	Appendix A Independent	Signs
Intercept	+	Intercept	+
I.LNWAGE	+	I.LNWAGE	+
NONEARN *	-	NONEARN	-
SINGLE	+	SINGLE *	+
EDUGT5 *	+		
FAM2 *	+	FAM2 *	-
FAM5 *	+	FAM5 *	+
ECON6	+	ECON6	+
ECON8 *	+	ECON8 *	-
NORTHEAT *	-	NORTHEAT	-
SOUTH	-	SOUTH *	-

Note: * is not significant

Appendix B

ORDINARY LEAST SQUARE ESTIMATE

THE WEEKS WORKED FUNCTION

DEPENDENT VARIABLE = LNWEEK

WEEKS WORKED = (USUAL + SECONDARY) * 12

Males	Parameter estimate	Standard error	T-ratio	Prob-T
Intercept	4.273	0.031	135.414	0.0001
LNWAGE	-0.086	0.005	-15.542	0.0001
NONEARN	0.214	0.014	15.255	0.0001
SINGLE	-0.068	0.010	-6.372	0.0001
EDUGR5	0.101	0.010	9.571	0.0001
FAM2	0.008	0.009	0.973	0.3305
FAM5	0.031	0.022	1.401	0.1612
ECON6	0.047	0.010	4.353	0.0001
ECON3	0.017	0.014	1.212	0.2254
ECON4	-0.043	0.018	-2.390	0.0169

R^2 = 0.1695

N = 4,782

BIBLIOGRAPHY

Abbott, M., and O. Ashenfelter(1976). "Labor Supply, Commodity Demand and the Allocation of Time." Review of Economic Studies 43: 389-411.

Ashenfelter, O., and J.J. Heckman(1974). "The Estimation of Income and Substitution Effects in a Model of Family Labor Supply." Econometrica 42: 73-85.

Barlow, R., H.E. Brozer, E. Harvey, and J.N. Morgan(1969). "Economic Behavior of the Affluent," The Brooking Institution, fourth ed. (especially chapter 4).

Barzel, P.(May 1973). "The Determination of Daily Hours and Wages." Quarterly Journal of Economics, Vol.87.

Becker, G.S.(1965). "A Theory of the Allocation of Time." Economic Journal 75: 493-517.

__________.(1975a). "Human Capital," 2nd ed., New York: Columbia University Press.

__________.(1975b). "The Allocation of Time over the Life Cycle," in G. Ghez and G.S. Becker, The Allocation of Time and Goods over the Life Cycle, pp. 83-132. New York: Columbia University Press.

Ben-Porath, Y.(May/June 1973). "Labor Force Participation Rates and the Supply of Labor." Journal of Political Economy 81: No.3.

Bertrand, T.(April 1980). "Thailand: Case Study of Agricultural Input and Output Pricing," World Bank Staff Working Paper, No.385.

Boskin, M.J.(1973). "The Economics of Labor Supply," in Cain and Watts, eds. pp. 163-81. New York: Academic Press.

Burtless, G., and J.A. Hausman(1978). "The Effect of Taxation on Labor Supply: Evaluating the Gary Income Negative Tax Experiment." Journal of Political Economy 86: 1103-30.

Cain, G.G., and H.W. Watts eds.(1973). Income Maintenance and Labor Supply. New York: Academic Press.

Chiswick, B.R.(1974). "Income Inequality," New York. Columbia University Press for the National Bureau Of Economic Research.

Cogan, J.(1980). "Married Women's Labor Supply: A Comparison of Alternative Estimation Procedures," in Smith, ed. pp. 90-118.

Cohen, M.S., S.A. Rea, and R.I. Lerman(1970). "A Micro Model of Labor Supply," BLS Staff Paper No.4, U.S. Department of Labor Washington, D.C.: Government Printing Office.

Douglas, P.(1934). "The Theory of Wages," New York Mcmillan Co., (chapter 12).

Greenberg, D.H.(1971). "Income Guarantees and Working Poor in New York City: The Effect of Income Maintenance Programs on the Hours of Work of Male Family Heads." Report R-658-NYC. The Rand Corporation.

______________.(1972). "Problem of Model Specification and Measurement: The Labor Supply Function." Report R-1085-EDA. The Rand Corporation.

Greenberg, D.H., and M. Kosters(1973). "Income Guarantees and the Working Poor: The Effect of Income-Maintenance Programs on the Hours of Work of Male Family Heads," in Cain Watts, eds. 14-101.

Greenhalgh, C.A.(1979). "Male Labor Force Participation in Great Britain." Scottish Journal of Political Economy 26: 275-86.

Grossman, M.(1974). "Health, Hours, and Wages," In the Economics of Health and Medical Care, edited by Mark Perlman. Proceedings of a conference sponsored by the International Economics Association. London: Macmillan.

Hall, R.E.(1973). "Wages, Income and Hours of work in the U.S. Labor Force," in Cain and Watts, eds. 102-162.

Hanoch, G.(1980). "A Multivariate Model of Labor Supply: Methodogy and Estimation," in Smith, ed. 249-326.

Heckman, J.J., M.R. Killingsworth, and T.E. MaCurdy(1981). "Empirical Evidence on Static Labor Supply Model: A Survey of Recent Developments," in Hornstien, Grice, and Webb, eds. 75-122.

Henle, P.(1962). "Recent Growth of Paid Leisure for U.S. Workers," Monthly Labor Review 84: 249-57.

Hill, C.R.(1973). "Income Determinants of Labor Supply: in Income Maintenance and Labor Supply," in Cain and Watts eds.

Holmes, J.M.(1972). "The Keynesian Aggregate Supply Function for Labor." Journal of American Statistical Association 67: 797-802.

Johnston, J.(1960). "Econometric Methods," 2nd ed., McGraw-Hill Book Company.

Kalachek, E.D., and F.Q. Raines(1970). "Labor Supply of Lower-Income Worwers," Government Printing Office, Washington, D.C., pp. 159-86.

Killingsworth, M.R.(1983). "Labor Supply," Cambridge Survey of Economic Literature, Cambridge University Press.

Lancaster, K.J.(1966). "A New Approach to Consumer Theory." Journal of Political Economy 75: No.2.

Larson, D.A.(1981). "Labor Supply Adjustment over the Business Cycle." Industrial and Labor Relation Review 34: pp. 591-5.

Layard, R., M. Barton, and A. Zabalza(1980). "Married Women's Participation and Hours." Econometrica 47: 51-72.

Leibenstein, H.(1957). "The Theory of Underemployment in Backward Economics." The Journal of Political Economy 65: 91-101.

Leuthold, J.H.(1978). "The Effect of Taxation on the Hours Worked by Married Women." Industrial and Labor Relation Review 31: 520-6.

Lewis, H.G.(1957). "Hours of Work and Hours of Leisure," in Industrial Relation Research Association: 195-206.

Lucas, R.E., and L. Rapping(1970). "Real Wages, Employment and Inflation," in E.S. Phelps, A.A. Alchian, C.C. Holt, D.T. Mortensen, G.C. Archibald, R.E. Lucas, Jr., L.A. Rapping, S.G. Winter, Jr., J.P. Gould, D.F. Gordon, A. Hynes, D.S. Nichols, P.J. Taubman, and M. Wikinson, Microeconomic Foundation of Employment and Inflation Theory, pp. 257-305. New York: Norton.

Meesaok, O.A.(1979). "Income, Consumption and Povery in Thailand, 1962/63 to 1975/76," World Bank Staff Working Paper, No. 364.

Mincer, J.(1962). "Labor Force Participation of Married Women: A Study of Labor Supply," in NBER, Aspects of Labor Economics, pp. 63-97. Princeton, N.J. Princeton University Press.

_________.(1974). "Schooling, Experience and Earnings." New York: NBER.

Meyer, S.L.(1975). "Data Analysis For Scientists and Engineers," Northwestern University, John Wiley & Son, Inc., New York.London.Sydney.Toronto.

Mosbaek, E.(1959). "Fitting a Static Supply and Demand Function for Labor." Weltwirtschaftliches Archiv 82: 132-40.

Nakamura, M., A. Nakamura, and C. Dullas(1979). "Job Opportunies, Offered Wages, and the Labor Supply of Married Women." American Economic Review 69(5): 787-805.

Oshima, H.T. and B. Bruno(1975). "Trends in Growth and Distribution Income in Selected Asian Countries." The Phillippine Economic Journal 30: 480-519.

Owen, L.L.(1969). "Strategy for a Broad of Experimentation in Income Maintemence Policy Purposes." American Economic Review 58: 754-72.

Pencavel, J.(1977). "Work Effort, on-the-job Screning, and Alternative Methods of Remuneration," in R.G. Ehrenberg, ed., Research in Labor Economics 1: 225-58. Greenwich, Conn.: JAI Press.

Perlman, R.(1969). "Labor Theory," John Wiley & Sons, Inc.

Pollak, R.A., and T.J. Wales(1980). "Comparison of the Quadratic Expenditure System and Translog Demand Systems with Alternative Specification of Demographic Effects." Econometrica 48: 595-612.

Rees, A.(1979). "The Economics of Work and Pay," Princeton University Press.

Rosen, S., and F. Welch(1971). "Labor Supply and Income Redistribution." Review of Economics and Statistics 53: 278-82.

Spoelstra, N., and C. Isarangkun(1976). "Labor Absorption in Thailand." The Phillippine Economic Journal 30: 238-72.

Taussig, F.W., and C.S. Joslyn, "American Business Leaders," Macmillan; (1932).

Thai National Statistical Office, Labor Force Report(1970-81). Thai Government Printing Office.

Warner, W.L., and J.C. Abegglen(1955). "Occupational Mobility in American Business and Industry, 1928-52," University of Minnesota Press.

__________.(1955). "Big Business Leaders in American," Harper and Brothers.

Wilensky, H.L.(1967). "Impact of Change in Work and Leisure," Monthly Labor Review 90: 21-22.

Winston, G.C.(1966). "An International Comparison of Income and Hours of Work." Review of Economics and Statistics 48: 28-39.