Financial Returns to Human Capital Development:

A Case Study of Former Students of Agriculture at Virginia Tech

by

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Thesis submitted to the Faculty of the

Virginia Polytechnic Institute and State University

in partial fulfillment of the requirements for the degree of

Master of Science

in

Agricultural Economics

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August, 1988

Blacksburg, Virginia

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(ABSTRACT)

The objective of this thesis was to identify and measure the effect of factors that influenced income earnings of former agricultural students. Data were obtained from a questionnaire mailed to former Virginia Tech students, all of whom were enrolled in the College of Agriculture and Life Sciences during 1977. An analysis of the 243 respondents was conducted with emphasis on educational profiles, labor market entry and participation, and personal characteristics. Models based on human capital and labor market principles were developed to explain differences in individual incomes.

Earned income models were estimated for the first job after leaving college, for the job held in 1985, and for the 1985 job in a lagged formulation. Analysis of covariance was used to estimate the empirical models. Model results for the first job starting income indicated positive returns to education and the provision of profit sharing benefits. Significantly higher starting incomes were also found for males and for those who considered pay as important or very important. In contrast, the year of job entry exhibited an inverse relationship with starting income. No significant differences in first job income were found for college major, type of placement services used, state location of the job, nature of the job (whether agricultural or not), and provision of housing benefits.

Model results for the 1985 income, as in the starting income model, indicated positive returns to the provision of profit sharing benefits. Significantly higher incomes were also associated with married respondents, urban residents, and those who ranked

oral communication skills as much needed or essential. In contrast, lower incomes were associated with those who ranked a technical skill to be much needed or essential and with those who held more previous jobs. Insignificant variables in the 1985 income model included level of education, college major, state location of the job, nature of the job, personal assessment of the importance of pay, provision of housing benefits, ranking of the need for knowledge of agricultural policy, and gender.

Results for the lagged formulation of the 1985 income model were similar to results for the 1985 income model. In adition, prior income was found to be a positive and significant determinant of 1985 incomes. Implications for academic support areas, curricula, and students were presented and discussed.

Acknowledgements

This thesis as well as my whole graduate study in a foreign country would not have been possible without the help of the Lord, special friends, faculty members, and family. Foremost, I wish to convey my deepest appreciation and gratitude to Dr. Warren Preston, for his keen insights, invaluable advice, and commendable patience to go through draft after draft of this thesis. I will forever be grateful for his profound knowledge and willingness to help which made this study a significant learning process.

I also wish to convey my gratitude to the other members of the committee who gave much of their time and advice despite their very hectic schedules. To Dr. Josef Broder, for sharing his expertise in the subject matter which greatly helped in conceptualizing this study. To Dr. William Taylor, for his thought provoking comments and suggestions which opened other possibilities and points of view. To Dr. John Ballweg of the Department of Rural Sociology, for his concern and inspiration which helped me "survive" through graduate school and without whom the possibility of graduate study would have merely been a dream.

Thanks is also given to the Agricultural Experiment Station at Virginia Tech for its support through the Cooperative State Research Service, United States Department of

Agriculture. And finally, to my family: Papa, Mama, Ate Cel, Kuya Eric, J.P., Peter, Mark, and Lola, as well as Fern, whose love and support helped keep me sane through all the insanity. To all of you, "Maraming Salamat!"

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CHAPTER I

INTRODUCTION

An enrollment depression has characterized agricultural colleges in the past ten years. According to the Fall 1986 Enrollment Report in The College of Agriculture by the Resident Instruction Committee on Organization and Policy, Division of Agriculture, National Association of State Universities and Land Grant Colleges (Suter, 1987), enrollment in agricultural programs and graduate degree levels has declined steadily since 1978. Declines in undergraduate enrollments were as much as 24 percent from 1980 to 1987. Moreover, shortages of individuals with master's and doctoral degrees in high technology disciplines within colleges of agriculture are predicted for the next 10 to 15 years. (Suter, 1987; Gelinas, 1988).

This enrollment depression has generated numerous reactions from agricultural educators (Schuh, 1986; Slocombe, 1986). In the hope of gaining more agricultural recruits, strategies ranging from an obsessive interest in recruitment to program diversification have been attempted (Gelinas, 1988). However, in their effort to increase numbers, it has been argued that agricultural colleges, especially land grant institutions,

have overlooked relevance (Schuh, 1986). Relevance is important if ties between academia, industry, and government are to be strengthened. Moreover, relevance is necessary if academic institutions are to be effective in training tomorrow's labor force.

In September 1984, then World Bank Director of Agriculture and Rural Development Edward Schuh, attacked the relevance issue by giving a diagnosis of the symptoms that paralyze land grant institutions from serving society. One such symptom is the continued emergence of alternative private research and educational organizations. These private agencies do much of the applied work and garner much of the public money previously directed towards land grants. Another symptom is the lack of international awareness that leads to a lack of involvement in the problems besetting the international economy (Schuh, 1986).

Through their colleges of agriculture, land grant institutions are training grounds for producing human resources which contribute to improvements in the agricultural industry. The importance of producing highly qualified graduates in the food and agriculture sciences is essential if continued advancements in food production are to be possible. More cost-efficient production processes are needed to meet growing food demands given limited production resources. The dynamic character of the agriculture industry is also apparent in the labor market sector. Shifting demands for graduates in certain fields of study become more pronounced as improvements in technology and scientific expertise become realities (Hildreth, 1986; Coulter, Stanton, and Goecker, 1986).

A 1985 national study conducted by the USDA assessed the employment opportunities of college graduates in the food and agricultural sciences. The report suggested that projected shortfalls of graduates with food and agricultural expertise in certain fields are expected in the years ahead. Annual employment openings are projected to exceed available supplies by about 10 percent. Supply shortfalls are projected for such areas

as basic plant and animal research, food and fiber processing, agribusiness management, and marketing. In contrast, strong competition for somewhat limited employment opportunities is projected for educators and communications and information specialists in agriculture, natural resources, and veterinary medicine (Coulter, Stanton, and Goecker, 1986).

Labor demand and supply movements in the agricultural labor market, as with any market, occur as the market seeks its clearing level. Apparent supply shortfalls and excesses exist as a result of labor demand and supply adjustments given available market information. The apparent supply shortfall in agriculture can be better understood by looking at potential employees and their entrance into the labor market. Additionally, an assessment of former agriculture students and their career development would be particularly useful in determining the effectiveness of their training. One facet of determining effectiveness is to assess the economic returns of education and training. Academia can do so by assessing the career development of their alumni.

Most studies of alumni from agricultural universities and their careers, especially in agricultural economics, have focused on curricula (Sjo, Orazem, and Biere 1970; Kropp, 1973); on student characteristics, goals, and perceptions (Dunkelberger et al., 1982; Schrimper, 1985); on monetary returns (Broder and Deprey, 1985); on training (Roberts and Lee, 1977); and markets for graduates (Schneider, 1985).

However, there is a lack of information on the relationship of a student's characteristics with incomes earned after leaving college and then some years later when contributions and experiences from the labor market can be taken into account. This is essential if career development paths in terms of monetary returns are to be examined. Hence, a study of the factors which contribute to a graduate's financial earnings is important in providing information and insight into the influence of education on labor market performance. Former students from a southern land grant university, Virginia

Polytechnic Institute and State University (Virginia Tech), are used herein as a case study.

Long committed to providing quality education, a tradition dating back to 1872, Virginia Tech trains students to hold distinctive positions in the academic, governmental, business, or international scene. How effective the academic environment is in shaping graduates armed with the essential qualifications to be productive in these areas is of considerable interest. For other than being the largest market in the economy, the general labor market is a means by which graduates earn incomes that enable them to consume, spend, and invest.

Purpose

The purpose of this study is to conduct an analysis with which agricultural colleges can describe and assess the career development of their alumni. More specifically, this study identifies and explains factors which affect the financial performance of agricultural students. It examines income earnings immediately following college and four to seven years later, when on-the-job training and other labor market experiences, become important. The information and implications of this study provide insights into how former students from colleges of agriculture perform in the labor market. Specifically, data on the educational characteristics and career profiles of the Virginia Tech alumni are also helpful in providing knowledge about academic and employment factors that contribute to a graduate's competitiveness in the labor market.

This study benefits deans of colleges of agriculture, academic department heads, administrators, school officials, and others who are concerned with declining enrollments at agricultural colleges and the improvement of current academic standards and curricula; academic support areas such as placement offices and alumni associations; incoming college freshmen who are unclear about their future in agriculture in terms of their financial opportunities in the labor market; and parents, employers, and other people who have a need for or are influenced by people trained in the various fields of agriculture.

Objectives

The objective of this study is to determine which and to what extent individual characteristics, educational backgrounds, and occupational experiences affect income earnings of agricultural students. Former Virginia Tech students are used as a case study. This thesis adds to previous studies by providing specific information and documentation of factors which influence the potential earnings of former agriculture students. Additionally, this study provides a means by which other academic institutions can assess their effectiveness in training future human resources. In so doing, this research describes and explains how these students perform, in terms of salary earned, in their chosen professions. It is hoped that a better understanding of a Virginia Tech student as a human resource and as a land grant agriculture student would greatly improve the management of academic support areas such as the placement office and the educational program or curriculum.

Specific objectives of this study are:

1. To describe general Virginia Tech student characteristics, such as: What are the personal attributes and demographic attributes of these former students? What are their educational achievement levels and college majors? What general trends are apparent in terms of labor market entry, participation, and subsequent mobility or promotion?

2. To develop a conceptual framework to measure the impact of educational, demographic, and labor market factors on earning levels.

3. To identify and measure the effect of factors which influence college students' entry level earnings in the labor market and their subsequent earnings after gaining considerable labor market experience.

4. To provide useful educational, personal, and labor market information on the career development of students to be of use to people concerned about career trends and possibilities as well as those contemplating a possible career in agriculture. From this, to derive implications regarding the development and modification of educational policies which aim at providing a sound educational base for career success.

Study Population

Data for this study are taken from the S-200 research project, conducted jointly by Southern Land Grant Universities and the Cooperative State Research Service - USDA entitled "Occupational Career Paths of Former Students in Southern Land Grant Universities". The S-200 project, conducted in 1987, is a follow-up study of the S-114 regional research study conducted in 1976 - 1977. The S-114 project had as a universe more than 40,000 agriculture students in 1862 and 1890 land grant universities in the South (as defined by the U.S. census).

As a forerunner, the S-114 study examined student characteristics, academic experiences, and attitudes about pursuing higher education in agriculture. At Virginia Tech, students sampled were selected from all academic levels (freshmen to senior) enrolled in the College of Agriculture. The S-200 as a follow-up study, further looked into the students' labor market entry and curricula assessments. Respondents for the S-200 survey were successfully located participants of the S-114 project. Respondents to the 1987 survey totaled 243.

Methods

The potential earnings of any university graduate may be influenced by a wide variety of factors--demographic, social, educational, and otherwise. Hence, a model of income earned should account for the contributions of certain individual characteristics

such as gender, age, marital status, or race; the influence made by the school such as the college major earned and educational attainment levels; the influence of the labor market such as labor force entry and participation; and the social environment such as the place of residence.

Certain academic characteristics are identified and measured for use in a general linear function using analysis of covariance (ANCOVA). The model identifies factors and reports findings that explain the earnings of former Virginia Tech students.

The output indicators chosen for study are the gross starting annual salaries earned by the respondents in their first full-time jobs after graduation and the 1985 gross annual salary level. The starting annual salary is chosen as an indicator to determine the impact of educational characteristics on initial income earnings. The 1985 salary level is chosen to determine factors which best explain variations in earnings given some labor market participation.

Thesis Organization

This thesis is divided into six parts. Chapter II introduces a conceptual framework and summarizes results from previous studies analyzing income earnings. Chapter III gives a description of the data as well as the general characteristics of the sample population. The methods used in relating important characteristics to income earned are discussed in Chapter IV. Analysis and results are discussed in Chapter V. Finally, conclusions and implications are drawn in the final chapter with a brief assessment of the models used.

CHAPTER II

LITERATURE REVIEW

Introduction

The purpose of this chapter is to give an overview of various related studies on income earnings. Previous literature concerning variations in income is diverse in scope and content. Hence, only applicable studies pertinent to this research are given emphasis. Moreover, a conceptual framework which forms the basis for analysis in this work is also presented. The chapter begins with the conceptual framework based on human capital theory, followed by a discussion of how investments in human capital embodied in educational and labor market factors affect income earnings. Additionally, the influence of inherent characteristics such as gender, marital status, and residence are

also presented. The effects of these factors and characteristics are grouped into three general categories and discussed in terms of their effects on income variability.

The factors which influence labor market earnings have been given a great deal of attention by economists and non-economists alike. Two general approaches have been used to address the subject. One approach examines the macroeconomic conditions related to income distribution (Thurow, 1970). Another approach focused on the microeconomic unit -- the individuals and their characteristics.

Focusing on tomorrow's labor resource -- the college student -- a fact file on the attitudes and characteristics of 1987 freshmen summarizes results of a survey sponsored by the American Council on Education and UCLA (Astin, 1987). This fact file indicates that one of the foremost personal goals of 76 percent of undergraduate students is "to be very well off financially". Moreover, "to be able to make more money" is among their top three reasons cited, in terms of importance, in deciding to go to college. This apparent preoccupation with material wealth and career success seems to be directed towards business careers. Interest in business careers has risen continuously since 1972 compared to other fields such as engineering, education, and computer programming (Astin, 1987). Although the choice of a college major could be an important factor in achieving financial success, it is not the only determinant of income earned.

A Conceptual Framework: Human Capital Theory

In The Wealth of Nations, Adam Smith succinctly expressed what he deemed to be important determinants of the distribution of earnings (Smith 1937, reprinted in Cannan 1965, p. 100).

> The five following are the principal circumstances which, so far as I have been able to observe, make up for a small pecuniary gain in some employments, and counter-balance a great one in others: first, the agreeableness or disagreeableness of the employments themselves; secondly, the easiness and cheapness, or the difficulty and expense of learning them; thirdly, the constancy or inconstancy of employment in them; fourthly, the small or great trust which must be reposed in those who exercise them; and fifthly, the probability or improbability of success in them.

Adam Smith's second point is the underlying basis of "human capital theory," which centers on investments, (such as education and training), which qualify individuals for success in the labor market. Human capital theory is one of the more familiar and often used theories in attempting to explain variations in income.

The term "human capital" conceptualizes individuals as embodying skills which are rented out to employers. Human capital is produced with certain costs or outlays such as educational or training expenses, which enable individuals to provide productive, useful service over time. These investments in human capital result from optimizing behavior which maximizes an individual's economic welfare. Moreover, amounts invested in human capital are determined by the rate of return on these investments. Individuals will continue to invest in human capital until the benefit from additional investment is equal to its additional cost. The compensating benefit for costs incurred is measured in terms of wages earned as a result of years of formal schooling and labor market experience after schooling (Becker and Chiswick, 1966; Ehrenberg and Smith, 1982)

Some of the various ways in which human capital can be acquired are through schooling, training, learning by doing, information assimilation, or migration. Through

any of these, a worker can increase personal productivity, thereby creating human capital. Since productive power cannot be directly measured as units of human capital, the quantifiable effects of the years of schooling or educational achievement levels and labor market experience can be examined instead (Chiswick, 1974).

The human capital approach combines both economic theory and empirical analysis. Using labor market principles with empirical results, the human capital model provides an explanation for the distribution of earnings as well as other labor market phenomena (Kiker, 1966).

Applications of the human capital theory to the determinants of the distribution of earnings can be divided into two general groups. First is the demand for education. Human capital theory suggests that the demand for education is positively related to monetary returns. That is, individuals are motivated to make higher educational investments if they perceive a positive rate of return on this investment. The existence of education-related wage differentials acts as an incentive for individuals to further invest in education (Ehrenberg and Smith, 1982). Although education related wage differentials have been well documented, most estimates of the return to schooling overlook the contribution of ability. Such contributions include the effect of an individual's inherent skills, work habits, and resourcefulness (Becker, 1975; Griliches and Mason, 1972; Ehrenberg and Smith, 1982). A review of a wide range of literature on the relationship of academic ability to accomplishment and income suggests that academic talent is related to high-level accomplishment in conjunction with several other variables (Baird, 1985).

The second application of human capital theory relates to post-school or labor market training which may be general or firm-specific. General training increases the marginal productivity of workers and is beneficial to any employer. Since employees acquire skills usable elsewhere, the investment cost of general training is usually borne

by the employee rather than the employer. Such behavior is apparent in the payment of lower wages as a consequence of on-the-job-training. Compensation for general training takes the form of increased earnings later. In contrast, specific training is beneficial both to the worker and to a certain firm. Investment costs incurred are borne by both the employer and the employee. Compensation for employees who have undergone specific training takes the form of increased earnings or fringe benefits (Ehrenberg and Smith, 1982).

Additionally, other factors deemed important in accounting for variations in earnings left unexplained by the first two include inherent characteristics such as gender, age, and race as well as socio-demographic factors such as marital status and residence. These characteristics are actually used by employers in the labor hiring process as signals or indicators of an employee's potential. Perceived differences attributable to these personal characteristics, though imperfect, are based on believed correlations with employee productivity (Spence, 1987).

A more thorough discussion of each group of factors and related studies expounding on their influence on earnings is given below.

The Educational Variables

The schooling model framework presented by Chiswick (1974) in Income Inequality assumes that an individual's earnings depend partially upon the years of formal schooling. Under simplified assumptions, Chiswick's model expressed the natural logarithm of labor market income as a linear product of two terms. One is the level of

schooling (measured in years), and the other is the average rate of return on the investment in schooling or training. He found that for the United States, differences in years explained from 17 to 51 percent of the variation in incomes of adult males within states and that the average intrastate explanatory power of the schooling variable was 29 percent. Additionally, in a study on the conditional distribution of earnings for black and white males, White and Olson (1981) showed that regardless of race, schooling increased wage rates.

Broder and Deprey (1985), in their analysis of monetary returns to bachelor's and master's alumni in agricultural economics, noted that the level of education was a positive salary determinant and that further education beyond a master's degree led to even higher salaries. Reichelderfer (1983), in her analysis of the salaries of federally employed Agricultural Economists, showed that having a Ph.D. contributed most to the salaries of the sample population. This result, however, is to be expected in government institutions due to their determination of wage levels based on educational attainment levels.

As one of the most widely used indicators of a graduate's qualification for certain positions, education should be an important determinant of earnings. For some employers the difference in educational attainment level among applicants could mean the difference between income brackets. Furthermore, education, as an essential component in the labor screening process, provides considerable insight and information about a person's potential as an employee.

In addition to education, the labor market is another source through which human capital can be acquired. Some of the important labor market factors include on-the-job training or experience.

Labor Market Variables

The General Labor Market

The labor market being a competitive market, enables people to exchange labor services for wages. Buyers of labor services (employers) are aggregated to make up labor demand and sellers (workers) make up labor supply. The pricing mechanism which governs the labor market is represented by the wage rate which is established in the market. Equilibrium or clearing of the labor market occurs when labor demand equals supply at a particular wage rate (Samuelson, 1976; Barro, 1987).

Labor supply can be seen as the substitution of consumption for leisure. Workers sell their labor services at the real wage rate which indicates the terms in which they are willing to trade employment for leisure. More leisure time means less employment and hence lower earnings and consumption. In the aggregate, labor supply or the number of workers who are willing to work will increase as the wage rate increases (Samuelson, 1976; Barro, 1987).

Employers or firms demand labor based on profit maximization. Simply put, profit can be regarded as gross revenue less factor payments by the firm. Firms generally maximize profit by expanding employment to the point where the value of the marginal product of labor equals the wage rate. To increase the wage rate, the value of the marginal product of labor must be increased. This can be done by increasing the price of the product or increasing labor productivity. Labor productivity can be increased by on-the-job-training or by gaining experience (Barro, 1987).

The Influence of Experience

Labor market experience is another benchmark by which numerous studies explain income earnings. An employee's labor force experience or tenure at a certain job is one means by which individuals acquire human capital skills for the job at hand.

A study by Rosenbaum (1980) on the hierarchical and individual effects on earnings found that each additional year of experience in a company increased earnings by nearly one percent. Moreover, the education-experience interaction on earnings by gender further showed that men with college degrees received a 1.8 percent increase in earnings per year of company experience and that men with master's degrees received a 2.5 percent increase. In contrast, there was no significant increase in earnings for women at any educational attainment level.

In addition to Rosenbaum's findings, another analysis of regional wage differentials among blacks and whites showed that an increase in experience had a positive impact on either race's wage profile. The effect was largest at lower levels of experience for whites and largest at levels exceeding 30 years for blacks (Krumm, 1987).

The Influence of Job Mobility

Job mobility or a person's movement from one employment to another may be seen either as a monetary or non-monetary shift to a better working environment. The former can be in the form of financial improvement in terms of income earned while the latter could be better benefits for employees or their families. Although movement to another employment could be detrimental, such cases tend to be more the exception than the rule. Based on the principles of human capital theory which imply mobility of

resources, individuals are assumed to maximize their economic welfare by locating in areas where returns on their human capital investments are the greatest. The net returns to shifting will be larger the greater the utility derived from the new job, the less happy one is on the current job, the smaller the costs associated with the move, the longer the expected tenure at the new job, or the higher the wage differential between jobs (Ehrenberg and Smith, 1982). Moreover, as economic theory suggests, there will come a point when diminishing marginal returns set in. That is, additional shifting will lead to smaller marginal benefits of shifting. Where the point of diminishing marginal returns occurs is hard to quantify. Relatively high job mobility levels can suggest unfavorable images for the individual in the job market. Generally, individuals will cease to shift between jobs when their estimated benefits become smaller than perceived costs.

Osberg, et al. (1986) conducted a study on the effect of the movement of employees among two or more employers across labor market segments on individual wages. Osberg, et al. observed that for movers in the marginal segment of the labor market, job mobility is a significant positive determinant of money wages. That is, those who moved from one employer to another received higher money wages. This result suggests that on the average, individuals do not perceive their first full-time employment to be an optimization of their economic welfare.

In addition to education and labor market, other factors such as the innate characteristics of individuals are also seen as determinants of earning capacity since the differing characteristics are deemed to be contributors to their earning potential. Although a number of studies which discuss the explanatory power of these variables hint at the non-rational side of the matter, this study focuses not on the discriminatory possibilities of such characteristics but merely on their usefulness in explaining income variations.

Demographic Variables

Numerous demographic characteristics of individuals have been used to explain differences in labor market earnings. Most studies have included the more common demographic dimensions such as gender, age, marital status, and place of residence. A more thorough discussion on the effects of each variable is presented below.

The Influence of Gender

Literature on the effect of gender on income earned suggests that reward structures for males and females are different even when both have similar characteristics and are in similar jobs (Ferber, Green, & Spaeth, 1986). The resulting "sex stratification" and "sex segregation" in the labor market results in male-dominated occupations providing higher salaries than female-dominated ones even if the effects of workers' education, experience, race, and sex are held constant (Lewis and Emmert, 1986).

Empirical analyses on gender-wage differentials were conducted for graduates from two different universities. Resulting differentials were found to be $2,000 for the University of Hawaii College of Business graduates (Remus and Kelley, 1983) and as much as $4,000 for the University of Georgia Agricultural Economics graduates (Broder and Deprey, 1985).

Despite pressures to implement equalitarian values and the extension of women's social and political rights (as embodied in Equal Employment and Equal Opportunity Policies and Regulations), women have not achieved comparable access to positions of higher rank, leadership, or prestige as men of equal qualification (Epstein, 1970). Al-

though the advent of women's liberation has considerably improved the working conditions for the "career women" of the 1980s, sex typing in numerous occupations still exists. Sex typing is theorized to be a result of early childhood socializations, reinforced by peer pressures in school, and re-encountered in the context of the labor market (Jacobs, 1987). Human capital theory explains the cause and consequence of the apparent gender-wage differential by suggesting different investment patterns between males and females. The theory proposes different labor force participation over a life cycle implying that women generally have lower and more discontinuous market activity due to marriage and maternity. This results in lower market returns for female schooling, lower market activity rates, lower observed wage rates, and a concentration in certain occupations over others (Polachek, 1978; Lloyd, 1975).

The Influence of Marital Status

In a study on the relationship between employee characteristics and firm size, Barth, Cordes, and Haber (1987) observed that unmarried male workers had a higher probability of employment at small establishments than their married counterparts. The opposite trend was observed for females. Their findings were consistent with the hypothesis that married males are perceived as more responsible, are primary wage earners, and thus are desired by employers for their smaller monitoring costs. The opposite is perceived of married females. That is, females are perceived to require more supervision in the workplace than males.

Elementary human capital principles suggest at least two reasons why married males might obtain higher earnings. First, the marriage arrangement facilitates a form of specialization wherein males are able to concentrate on labor market skills. This in

turn increases their productivity which translates into higher wages. Second, the marital arrangement can also provide better conditions for accumulating human capital. This is accomplished through financing of education and training via the spouse's earnings or savings. To the extent that this accumulation of added human capital increases productivity, earning premiums for married males will be apparent (Nakosteen and Zimmer, 1986). Although the theorized benefits of the marital arrangement could apply to either spouse, traditional gender roles have favored the human capital development of males rather than females. However, with the advent of equal employment opportunities and women's liberation, the gender-marital status-wage effect could be less evident between the sexes.

Implications

This chapter has examined the contributions of various studies which aim to identify the different determinants of income. Focusing on individuals and their unique characteristics, the general categories of variables used as measures of earning inputs included education, the labor market, and demography.

Summarizing for the analysis to be undertaken in Chapter V, it would be useful to examine the specific effects of three factors. First is the educational factor or the effect of educational attainment on income earnings. That is, higher levels of education are expected to lead to higher income levels. Second are the labor market factors such as the effect of experience and mobility on income earnings. That is, greater experience and movement from one employer to another are expected to result in higher mean salaries.

Third are the effects of socio-demographic factors such as gender and marital status on income earnings. For example, males are expected to earn higher mean salaries than females. Married individuals are also expected to earn more than their unmarried counterparts.

In summary, numerous factors that influence labor market earnings have their basis in the human capital framework. Human capital theory explains income variations through the effects of investments in human capital embodied in schooling, labor market training, and immutable personal characteristics. Individuals engage in optimizing behavior by maximizing their economic welfare as a result of added investments. Added investments continue as long as perceived returns exceed perceived costs. Moreover, investments are seen as a means by which the value of the marginal product of labor is increased. Increased value of marginal product leads to an increase in the wage rate or income earnings that enables an individual to further spend, consume, and invest.

Based on this conceptual framework, an empirical analysis of the income earnings of former Virginia Tech students should take into account the effects of their investments in human capital. More specifically, the effects of certain educational, labor market, and socio-demographic factors must be adequately represented in the analysis. That is, educational factors such as the educational attainment levels, labor market factors such as indicators of job experience and mobility, and demographic factors such as gender, marital status, and residence must be represented in the function as explanatory variables. The extent and limitations of the data from which these explanatory variables are to be derived must then be analyzed in order to delineate how these important factors are to be represented.

CHAPTER III

GENERAL ALUMNI CHARACTERISTICS

Introduction

The purpose of this chapter is to describe the general characteristics and analyze the income earning capacities of former Virginia Tech students. Data for this study are taken from the S-200 research project which surveyed former Virginia Tech students all of whom were initially enrolled in the college of agriculture and graduated between 1977 and 1979.

The S-200 project is a follow-up of the S-114 research project which was conducted during 1976 and 1977 and involved a universe of more than 40,000 agriculture students in 1862 and 1890 land grant universities in the South. These students were randomly selected from all undergraduate academic levels, freshman to senior. Involved were 13 Southern states as defined by the U.S. census, namely: Alabama, Arkansas, Florida, Georgia, Kentucky, Louisiana, Mississippi, North Carolina, Oklahoma, South Carolina,

Tennessee, Texas, and Virginia. The S-114 research study provided information about students pursuing higher education and examined background characteristics, high school and college experience, life goals, and attitudes toward agriculture and the environment. Conducted as part of a larger regional project entitled "Defining and Achieving Life Goals: A Process of Human Resource Development", the S-114 project looked into the profile of students enrolled in various curricula offered by schools and colleges of agriculture in the South. Respondents for the 1977 survey for Virginia Tech alone totaled 231 students from the college of agriculture, a 62 percent response rate from a sample size of 321.

The S-200 research project was conducted in 1987 as a ten year follow-up to the 1977 regional study. The S-200 survey was entitled "Occupational Career Paths of Former Students in Southern Landgrant Universities". It further examined the respondents' labor force entry, participation, and assessment of curricula. The 1987 survey, conducted jointly by Southern Landgrant Universities and the Cooperative State Research Service - USDA, involved a sampling frame of successfully located students identified in the 1977 survey. The survey examined educational attainment patterns, career mobility, college curriculum competencies and skills, opinions about agricultural careers, and other personal characteristics. A copy of the sample questionnaire used in the study is given in Appendix A.

Using alumni records and similar sources of information, a total of 296 (92%) of the 321 students in the 1977 sample were located. Considering that most respondents graduated between 1977 and 1979, locating respondents from addresses given ten years previously proved to be a formidable task. The major problem was that most had moved for various reasons. After two intensive mail follow-ups of those located, 243 (82%) finally responded.

This chapter analyzes results of the 1987 follow-up survey. Descriptive tables summarize the general characteristics of the 243 respondents. All sample frequencies exclude respondents whose answers are not applicable or who did not give any response. Hence, respondent totals for each table may not be 243. This chapter groups the different respondent characteristics into three: those pertaining to education, the labor market, and demographics.

Educational Characteristics

Educational statuses reported in Table 1 show that 193 (79.8%) of the respondents had majors in the College of Agriculture, 36 (14.9%) were non-agriculture majors, and 12 (4.9%) dropped out of school before graduation. The initial sample size was drawn from a list of students enrolled in the College of Agriculture. Since some respondents switched majors before graduation, the 1987 survey had respondents who earned non-agricultural degrees. For the agricultural college students, the greatest number was from the School of Forestry (28.0%), followed by animal science (19.3%) and horticulture (7.8%). The non-agricultural majors were mostly from business (2.9%), other disciplines (2.5%), and biological science (2.1%).

The proportion of students who remain in their chosen major is a determinant of how well colleges retain their students. 1987 survey results indicate that about 20 percent of students who started out in agriculture later shifted to other disciplines. Assuming that students' choices of educational careers are based on their perceptions of

industry conditions, then given what they perceive to be a declining trend in the agricultural industry, they would then seek careers outside of agriculture. Additionally, if students are also viewed as profit maximizers, they would seek majors that enable them to earn what they perceive is the best return for their human capital investments. Of course, the choice of major could also be based on non-monetary benefits such as developing a philosophy in life.

The educational attainment pattern of the respondents, as reported in Table 2, shows that about 51 percent attained at least a bachelor's degree, 16 percent attained a master's degree, with almost the same percentage for other degrees beyond a bachelor's (such as an M.B.A. or an additional computer course) and about 3.7 percent attained a doctorate. In terms of enrollment at the time of the survey, about 6 percent were in a master's program, 3.7 percent in a professional degree, and 2.5 percent in a doctorate program.

Educational attainment patterns indicate the proportion of students who continue on to higher education. Additionally, it indicates how many would later join the labor force at higher levels of educational expertise. The results show that about 44 percent of Virginia Tech students pursued additional education beyond a bachelor's. This result decreases to about 28.5 percent if only those who pursued a master's, a professional degree, or a doctorate were considered. Although only a small number obtained these degrees in the College of Agriculture, this suggests that a future professional manpower supply is available for industry.

Educational attainment levels also show the proportion of respondents who have further invested in their human capital. These students would be entering the labor force at a later date than those who have attained only a bachelor's. Based on human capital theory, their investment costs must be recovered within a relatively shorter employment span. To make this possible, higher returns or benefits should be the premium.

Table 1. Educational Majors of Former Virginia Tech Students, 1987 Survey

MAJOR	Number	Percent
Agriculture		
Forestry	68	28.0
Animal Science	46	19.3
Horticulture	19	7.8
Agronomy	18	7.4
Agricultural Economics	10	4.1
Dairy Science	8	3.3
Biochemistry & Nutri	7	2.9
Forest Management	6	2.5
Food Science	5	2.1
Agricultural Education	3	1.2
Fisheries Science	2	0.8
Floriculture	1	0.4
TOTAL	193	79.8
Non-agriculture		
Other	12	4.9
Business	7	2.9
Biological Science	5	2.1
Education	4	1.6
Engineering	3	1.2
Wildlife Fishes	3	1.2
Math Science	2	0.8
TOTAL	36	14.7
No Degree	12	4.9
Not Applicable/No Response	2	0.8

Source: Questions 2(c) and 3(d) in S-200 project, survey of Virginia Tech students

Table 2. Educational Levels Attained by Former Virginia Tech Students, 1987 Survey

LEVELS	Number	Percent
No Degree	11	4.5
Attained Bachelors	125	51.4
Enrolled in masters	14	5.8
Attained masters	39	16.1
Enrolled in Prof. Degree	1	0.4
Attained Prof. Degree	9	3.7
Enrolled in doctorate	6	2.5
Attained doctorate	0	-
Other degree beyond B.S.	38	15.6

Source: Questions 5 and 7 in S-200 Project, survey of Virginia Tech students

Labor Market Characteristics

Investments in education are one part of improving an individual's human capital. Another is through labor market participation and training. An examination of the career characteristics of Virginia Tech students would lead to a better understanding of how students join, participate, and consequently improve in the labor market. Financial returns are examined as indicators of returns on investments.

Entry

Table 3 shows that a majority of the respondents (60.5%) started their first full-time jobs between 1979 and 1980. For the job held during 1987, slightly more than a third (34.5%) entered between 1984 and 1986.

Since most respondents graduated between 1977 and 1979, results for job year entry indicate that a majority of the respondents entered into their first full-time job within a year or two after graduation. This suggests that employment opportunities were not immediately available for the respondents. For the jobs held in 1987, the year of entry was averaged to be approximately 5 to 7 years after graduation. Given the imperfections of the labor market, this result shows how people attempt to maximize employment benefits given imperfect market information. Respondents may require several years to assess labor market conditions based on available information. However after assessing market factors, some respondents either shift employment or

Table 3. Year Former Virginia Tech Students Entered First Full-Time and 1987 Job, 1987 Survey

YEAR	FIRST JOB	CURRENT JOB
	Number (%)	Number (%)
1973	1 (0.4)	-
1977	36 (14.8)	-
1979	58 (23.9)	1 (0.4)
1980	53 (21.8)	10 (4.1)
1981	19 (7.8)	19 (7.8)
1982	12 (4.9)	14 (5.8)
1983	7 (2.9)	19 (7.8)
1984	4 (1.6)	28 (11.5)
1985	1 (0.4)	27 (11.1)
1986	-	29 (11.9)
1987	-	3 (1.2)
Not applicable/ No response	52 (21.5)	93 (38.4)

Source: Questions 11(a) and 17(a) in S-200 Project, survey of Virginia Tech students

In seeking their first full-time job employment, students can make use of a number of placement agencies. Table 4 lists several sources which respondents used in obtaining their first job after leaving college. Sources cited as contributing most to the finding of this job were through direct application (27.2%), contacts of a relative or friend (17.7%), and the Dean's office, Departmental head, or faculty member (14.4%). A small percentage used private employment services or relied on self-employment (both only 2%).

Results of the use of placement agencies show that 50 percent of the respondents relied on their own efforts in finding employment. Individual initiative was seen in directly applying, in using employment advertisements, in self-employment, or in joining military service. University services and personal networks both accounted for about 20 percent of sources used. University services included the placement office and the dean or faculty department while personal networks consisted of contacts of relatives

or friends and the family business or farm. The least used source was private agencies (only 2%). This implies that students considered their own initiative as equal to or better sources for employment search than institutional agencies. Perhaps they perceived their own efforts to be a sufficient if not better means of optimizing employment welfare. This suggests that there may be room for improvement or increased awareness of academic facilities.

Table 4. Ranking of Sources which Contributed to Respondents' Finding First Full-Time Employment by Virginia Tech Students, 1987

SOURCES	Number	Percent
Direct Application	66	27.2
Contact of relative/friend	43	17.7
Dean's office, department	35	14.4
Employment Ad	22	9.1
Placement Office	18	7.4
Returned to farm/business	13	5.3
None were helpful	12	4.9
Civil service application	9	3.7
Joined military service	8	3.3
Private employment service	5	2.1
Self-employment	5	2.1
Not applicable/ No response	7	2.8

Source: Question 12 in S-200 Project, survey of Virginia Tech students

Respondents were also asked to rank, in terms of importance, factors which they felt contributed most to their decision to accept their first full-time job. Ranking for each factor ranged from "not important" to "very important", with a category for those having "no opinion". A ranking of responses given as "important" to "very important" is shown in Table 5.

Table 5 indicates that a majority of the respondents (72%) considered the job as a whole as "important" to "very important" in their decisions for accepting the first full-time job after leaving college. Considered next were the opportunity to develop new skills (71.6%) and the challenges of the work (70%). In contrast, the opportunity to travel (15.7%), the chance to be their own boss (21%), and the amount of supervision (30.9%) were considered important by the fewest respondents.

In general, findings indicate that factors considered important to very important by 60 percent or more of the respondents dealt with intrinsic work factors such as the challenges and importance of the work. Additionally, the opportunity for self-improvement such as the use of education and new skills was also considered important by a majority. Respondents apparently considered their opportunities for growth and development in the job as a basis for selection. This implies that most respondents had perceptions about how much training or improvement could be acquired on the job. This is important considering that work training is an important contributor to work productivity of the employee.

Table 5. Factors Important in Deciding First Full-Time Job Acceptance by Virginia Tech Students, 1987 Survey

Factors	Number	Percent
Job as a whole	175	72.0
Develop new skills	174	71.6
Challenges in the work	170	69.9
Importance of work	153	62.9
Opportunity to use education	147	60.5
Working conditions	126	51.9
Location of job	126	51.9
Security of job	125	51.5
Chances for advancement	122	50.2
Good work associates	115	47.4
Pay	84	34.6
Fringe benefits	80	32.9
Respect for kind of work	80	32.9
Amount of supervision	75	30.9
Chance to be own boss	51	21.0
Opportunity to travel	38	15.7

Source: Question 13(a) to 13(p) in S-200 Project, survey of Virginia Tech students

Participation

A decline in agriculturally-related occupations is apparent in the decreasing number of such employments between the first job after college and the 1987 job. For the first job, less than half (40%) had employment duties involving agriculture. This declined to a third (34.2%) for the 1987 job.

Most of the respondents diversified into non-agriculture related careers. What caused their out-migration towards the non-agricultural sector is difficult to pinpoint

given cyclical market trends. Perhaps at best, it is evidence of an adjustment trend whereby agricultural labor demand and supply can seek their clearing levels.

Table 6. Nature of First Full-Time and 1987 Job of Former Virginia Tech Students, 1987 Survey

NATURE OF JOB	FIRST JOB Number (%)	1987 JOB Number (%)
Agricultural job	97 (40.0)	83 (34.2)
Non-agricultural job	143 (58.8)	132 (54.3)
Not applicable/ No response	3 (1.2)	28 (11.5)

Source: Question 11(h) and 17(i) in S-200 Project, survey of Virginia Tech students

Starting annual salaries for the first job after college and the 1987 job shown in Table 7 are adjusted to 1985 dollars. For the first job, respondents had an average starting annual salary of $16,926 with more than a third (35%) earning in the $15,000 to $19,999 range. In comparison, for the 1987 job the respondents earned an average starting salary of $22,011 with about 25 percent earning between $15,000 to $19,999.

Results indicate that respondents started at an average of $1,410 per month for the first job and an average of $1,834 per month for the 1987 job. Since both salary figures are in real terms, this translates to a 30 percent increase in beginning monthly earnings between the first and 1987 jobs. Considering that the average year difference between the first job and the 1985 job was three years, a 30 percent increase in starting salaries between jobs was barely sufficient to cover rising costs of living. Living costs in average cities were estimated to increase between 10 to 15 percent each year (Baker, 1988).

The 1985 gross personal income figures are shown in Table 8. Unlike the open-ended questions provided for starting salary information, the survey listed ten categorical choices to obtain information on 1985 salaries. In the analysis, the midpoint of each category was used to better estimate mean values. Results indicate that the largest

number of respondents (54) had gross 1985 personal incomes between $20,000 and $24,999 or an average of $22,500. The mean 1985 gross personal income of the respondents was $24,160.

Table 7. Starting Annual Salary, First Full-Time Job After Leaving College and 1987 Job by Virginia Tech Students, 1987

STARTING ANNUAL SALARY	First Job* Number (%) (n=230)	1987 Job* Number (%) (n=155)
< $10,000	24 (10.4)	19 (12.3)
$10,000 - $14,999	73 (31.7)	17 (11.0)
$15,000 - $19,999	80 (34.8)	39 (25.2)
$20,000 - $24,999	38 (16.5)	37 (23.9)
$25,000 - $29,999	13 (5.7)	23 (14.8)
$30,000 - $34,999	-	9 (5.8)
$35,000 - $39,999	1 (0.4)	6 (3.9)
$40,000 - $49,999	1 (0.4)	5 (3.2)
Mean	$16,926.27	$22,011.38
Standard deviation	$ 5,445.85	$ 8,114.83

* adjusted in 1985 dollars

Source: Questions 11(g) and 17(g) in S-200 Project, survey of Virginia Tech students

Table 8. 1985 Gross Personal Income Categories and Midpoint Salaries of Virginia Tech Students, 1987 Survey

INCOME BRACKET	midpoint	1985 Job* Number (%)
$ 5,000 - 9,999	$ 7,500	23 (9.7)
10,000 - 14,999	12,500	21 (8.8)
15,000 - 19,999	17,500	35 (14.7)
20,000 - 24,999	22,500	54 (22.7)
25,000 - 29,999	27,500	44 (18.5)
30,000 - 34,999	32,500	32 (13.4)
35,000 - 39,999	37,500	16 (6.7)
40,000 - 49,999	50,000	10 (4.2)
50,000 - 74,999	62,500	1 (1.3)
Mean	$ 24,160	
Standard deviation	10,323	

Note: 1985 salaries are categorical choices. Midpoints are used to estimate mean values.

Source: Question 27 in S-200 Project, survey of Virginia Tech students

Job mobility indicators, based on question 17 of the questionnaire (see Appendix A), show that a majority of the respondents (56%) kept their shifting from one employment to another at a minimum. A considerable number of these, 32 percent, remained in their first job after college. The remainder worked for 3 to 13 different employers.

Job mobility can have both negative and positive connotations. It is a negative indicator if used to gauge how well employees maintain their jobs. High job mobility generally implies an unfavorable image of the employee. This is so because employers would tend to perceive highly mobile individuals as investment risks. In contrast, job mobility is a positive indicator if used as a welfare maximizing tool. If individuals are considered to be mobile resources that seek optimal returns, then job movements are positive manifestations of this optimizing behavior. Although a few of the respondents

have had from 5 to 13 employers, they constituted a small percentage (7%) of the sample population. Generally, the respondents kept their job movements at a minimum.

Fringe benefits provided to the respondents by their first full-time employers, as presented in Table 9, show that primary types such as paid vacation (67.5%), medical insurance (66.7%), and sick pay benefits (58.2%) were received by most of the respondents. Other types such as profit sharing benefits (16%), housing (12.3%), and others (5.3%) were not commonly received. Similarly, fringe benefits provided to the respondents by their 1987 employer shows that primary types such as paid vacation (57.6%), medical insurance (56%), and sick pay benefits (55.6%) were received by more than half of the respondents. The least received benefits were company-provided transportation (18.1%), housing (4.5%), and others (5.3%)

Fringe benefits are added compensations or non-monetary returns on human capital investments. Most companies offer these benefits as added incentives. Costs are often borne by the employees through reduced take-home pay. It is evident that worker health benefits such as medical, life, and accident insurance as well as sick pay were provided to at least half of the respondents. Health benefits are advantageous for both the employer and employee since provisions against loss of work productivity are insured. Furthermore, since health benefits are paid by employers, they act as incentives for employees to remain in the company.

Table 9. Company Benefits, First Full-time Job and 1987 Job held by Virginia Tech Students, 1987 Survey

Benefits	First Job	1987 Job
	Number (%)	Number (%)
Paid vacation	164 (67.5)	140 (57.6)
Medical insurance	162 (66.7)	136 (56.0)
Sick pay benefits	143 (58.8)	135 (55.6)
Life insurance	128 (52.7)	120 (49.4)
Accident insurance	126 (51.9)	110 (45.3)
Retirement benefits	114 (46.9)	114 (46.9)
Unemployment insurance	84 (34.6)	89 (36.6)
Company training program	94 (34.6)	94 (38.7)
Company-provided transportation	59 (24.3)	44 (18.1)
Dental insurance	57 (23.5)	88 (36.2)
Profit sharing benefits	39 (16.0)	58 (23.9)
Housing	30 (12.3)	11 (4.5)
Others	13 (5.3)	13 (5.3)

Source: Questions 14 and 17 in S-200 Project, survey of Virginia Tech students

Respondent Opinions

Summaries of respondent rankings on some opinion questions, as presented in Table 10, show that little more than half (54 %) "agreed/ strongly agreed" that they could have obtained their first jobs without completing any agricultural courses. Regrouping by the type of major, whether in agriculture or not, results indicate that the agricultural majors were about evenly divided in their opinion. That is, 42 percent agreed and about the same percentage (41%) disagreed. The non-agricultural majors however, mostly agreed (13%) with only 1.3 percent disagreeing and three percent having no opinion.

Since almost all of the non-agricultural majors agreed with the statement, possible variations would not be apparent due to sample selection bias.

An assessment of the value of one's coursework to the first job is essential in understanding the relationship between education and employment. Clearly, opinions on how valuable learned theories are to practical work experience is a means by which curricula gain applicability in the real world. Results indicate that respondents were divided in their views of the value of their agricultural courses. That is, although more than half agreed (54%) that they could have obtained their first job without completing any agricultural course, the remainder mostly disagreed (42%) with a small percentage (4%) having no opinion.

Table 10. Selected Opinions Held by Virginia Tech Students, 1987 Survey

OPINION QUESTION	Strongly agree/ Agree Number (%)	Disagree/ Strongly disag Number (%)	No Opinion Number (%)
"I could have obtained my first job without completing any agricultural courses."			
Agricultural majors	99 (41.60)	97 (40.76)	2 (0.8)
Non-agricultural majors	30 (12.61)	3 (1.26)	7 (2.94)

Source: Question 15(c) in S-200 Project, survey of Virginia Tech students

In choosing respondent opinions on action competencies and skills, employer preferences regarding the importance of certain traits in new recruits were considered. Results of a study done by Broder and Houston (1986) on employer assesssments of

graduates from colleges of agriculture indicated that communication skills were given the highest importance. For this study, since both oral and written communication skills were correlated (correlation coefficient = 0.33), only the former was considered. Rankings on chosen college curriculum competencies and skills, as presented in Table 11, show that a large majority (89.6%) considered oral communication skills "much needed/ essential".

In choosing agricultural competencies and skills, both a general and a specific skill were considered. The ability to interpret and use soil test results was chosen to represent general laboratory or technical skills. Knowledge of U.S. agricultural policy was chosen to represent specific agricultural theory.

Results indicate that knowledge of U.S. agricultural policy was seen by 83 percent of the respondents as "not/ somewhat important". In like manner, about 74 percent considered the ability to interpret and use soil test results to be "not/ somewhat important".

An assessment of skills needed in the work environment is essential in determining what training areas are to be given more emphasis. Clearly, respondent opinions on how essential certain theoretical knowledge relates to job careers are indications of the value of training received in the classroom. As expected, oral communication skills were considered to be much needed or essential by more than half of the respondents. Communicative skills are necessary in the corporate world since interpersonal relationships are an integral part of corporate structures.

In terms of agricultural theory, a majority of the respondents considered knowledge of U.S. agricultural policy and the ability to use soil test results as not important or somewhat important to their careers. It may be the case that general agricultural theories and not specifics are needed in employment.

Table 11. Rankings for Selected College Curriculum Competencies and Skills by Virginia Tech Students, 1987 Survey

COLLEGE CURRICULUM	Not/ Somewhat Important Number (%)	Much Needed/ Essential Number (%)	Not sure Number (%)
Skill in oral communication	25 (10.4)	215 (89.6)	-
Knowledge of U.S. Ag Policy	195 (83.3)	35 (15.0)	4 (1.7)
Ability to interpret and use soil test results	172 (73.8)	58 (24.9)	3 (1.3)

Source: Question 19(a), 20(a), and 20(p) in S-200 Project, survey of Virginia Tech students

Demographic Characteristics

The study population at the time of the survey (1987) consisted of 158 (65.3%) males and 84 (34.6%) females between 27-48 years of age with a majority within the 28-31 age bracket. Due to the very narrow age distribution, possible income variations attributable to age as an explanatory variable are most likely small. Although males outnumbered females two to one, the representation of the sexes is still adequate to examine possible differences due to gender. Inherent respondent characteristics are based on questions 22, 23, and 24 in the questionnaire (see Appendix A).

The respondent's marital status (Table 12) indicates that 167 (68.7%) of the respondents were married at the time the survey was conducted and 74 (30.5%) were not. The latter was composed of those who never married (21%) and those who were no longer married (9.5%). Results indicate that roughly seven out of ten respondents were married at the time of the survey. If based on human capital principles, this suggests that more than half of the respondents would have access to greater funds for human capital investments (see Chapter II).

In terms of race or ethnicity, the respondents were predominantly white (97.1%) with a small black minority (1.2%). Hence, possible variations attributable to race as an explanatory variable cannot be examined due to limited representation. The races of the Virginia Tech students are based on responses to question 23 in the sample questionnaire (Appendix A).

Sorting by residence as shown in Table 13, 26 percent of the respondents lived outside of a city or village, 20.7 percent in a large metropolitan city (population over 500,000), 18.6 percent in a medium sized city (population between 500,000 to 50,000), and 12.8 percent in the country on a farm or ranch. Thus, 60 percent of the respondents resided in an urban area. This result suggests that more than half of the respondents are urbanized. This could mean that a majority would have higher nominal salaries due to higher living costs.

Table 12. Marital Status of Virginia Tech Students, 1987 Survey

MARITAL STATUS	Number	Percent
Married	167	68.7
Not married	74	30.5
Never married	23	9.5
No longer married	51	21.0
Not applicable/ No response	2	0.8

Source: Question 25 in S-200 Project, survey of Virginia Tech students

Table 13. Present Residence of Virginia Tech Students, 1987 Survey

TYPE OF PLACE	Number	Percent
Large metropolitan city	50	20.6
Medium-sized city	45	18.5
Smaller city	51	21.0
Outside city/ village	63	25.9
In country/ farm/ ranch	31	12.8
Not applicable No response	3	1.2

Source: Question 29(a) in S-200 Project survey of Virginia Tech students

Summary

The educational profiles of the respondents showed that 80 percent obtained their bachelor's degrees from the College of Agriculture. Furthermore, four out of ten were pursuing or have completed degrees beyond a bachelor's. Labor market entry for these students was generally within two years of graduation at an average starting annual salary of $16,917. An average of three years of labor market experience increased average starting annual salaries by 30 percent. Respondents were between the ages of 28 to 31 years old with 60 percent residing in urban areas. Two out of every three individuals surveyed were male.

This chapter summarizes the descriptive characteristics of the respondent students upon which this study is based. Educational and employment trends provided information of where the students were and how well they were doing financially. Respondent assessments of the value of their education to their careers provided insight into the training that they acquired. The tabulated information presents a better understanding of the contents of the data, both its extensiveness and its limitations. This knowledge should aid in the interpretation of the results and analysis of the model in Chapter V.

CHAPTER IV

MODEL DEVELOPMENT AND METHODS

Introduction

This chapter introduces the income models to be used in identifying and explaining factors which best estimate earnings, both the starting annual salary of the first job after college and the 1985 gross personal income. A discussion of the model specifications, the adjustment equation, and analysis technique is also presented.

The Earned Income Model

From the conceptual framework presented in Chapter II, an individual's potential earned income is hypothesized to be influenced by investments in human capital such as education and labor market training. Added influences from the environment such as the place of residence, as well as innate personal characteristics such as sex and age, and a person's marital status are also thought to be determinants of income earnings. The problem of explaining variations in earnings of former Virginia Tech students can be based on human capital and labor market principles. With this in mind, models of income earnings must then consider educational and labor market investments as well as inherent socio-demographic characteristics.

Using available educational, occupational, and demographic information, a model of income earnings as a measure of monetary returns to investments in human capital can be specified as:

1. Dependent variable:

    - earned income

2. Explanatory variables

    - educational characteristics

    - labor market characteristics

    - socio-demographic characteristics

The Starting Income Model

The gross starting annual salary for the first job after college (hereafter referred to as starting income) is used as the dependent variable to see the immediate effects of investments in education as well as innate personal characteristics on earned income. The influence of specific factors on starting income, as a measure of returns to human capital investments, are described as follows:

Dependent Variable

Starting income (ADJS) or the starting annual pre-tax salary for the first job after leaving college is used as the dependent variable. Actual nominal values of the starting annual salary earned are inflated to 1985 dollars using 1967 base year prices in order to adjust for the effects of inflation over time. Since individuals started their first full-time jobs in different years, adjusting to real terms makes starting salary values comparable. Excluded from the analysis are respondents who did not report any income, or for whom the question was not applicable or who did not give any response.

Educational Inputs

1. The educational attainment of the respondent upon entering into the first-full time job (ADV for advanced degree) is entered as a class variable of four subclasses: "No Bachelor's" if respondents did not attain a bachelor's degree, "Bachelor's" if respondents attained a bachelor's degree, "Enrolled in advanced degree" if respondents were enrolled in an advanced degree program, and "Completed advanced degree" if respondents completed an advanced degree (includes master's, professional degree, or doctorate). As discussed in the conceptual framework, the level of educational attainment is expected to have a positive impact on starting annual salary with those possessing higher educational levels earning higher salaries.

2. Major (AGMAJ) or the chosen curriculum of Virginia Tech students is entered as a categorical variable to help account for possible variations in actual earnings attributable to the college major. There are three subclasses for the variable AGMAJ: "Non-agricultural" for the non-agricultural majors, "Agricultural (non-forest)" for the non-forestry agricultural majors, and "Agricultural (forest)" for the forestry agricultural majors. Since it is anticipated that forestry agricultural majors pursued different careers than students in the college, dividing the majors into more homogeneous units can help explain some of the variation in income earnings related to the choice of major. Furthermore, since all of the respondents were initially enrolled in the college of agriculture, the results of the AGMAJ variable could determine if transferring colleges (from agriculture to non-agriculture) affects earnings.

Labor Market Inputs

1. The year in which respondents entered their first job after college (JOBYEAR) is entered as a continuous variable. Since declining trends are evident in the agricultural industry for the past 10 years, JOBYEAR can help explain if this has affected income earnings.

2. The location of the first job in terms of whether or not it is situated in the South (SOUTH) is entered as a categorical variable with two subclasses: "South" if the job is in one of 13 Southern states as defined by the U.S. Bureau of Census, and "Non-South" if otherwise. Based on human capital and labor market principles as discussed in Chapter II, individuals are expected to move to areas that optimize returns to their investments. Previous analysis on regional wage differentials done by Krumm (1987) between blacks and whites indicates that workers located in the South have the lowest wage level compared to those located in other areas of the United States. A grouping of the job's location determines if this optimal area is outside the South for the sample population.

3. The nature of the first full-time job with respect to whether it is agricultural or not (AGJOB) is entered as a binary variable with two categories: "Non-agricultural job" if the respondent's duties did not involve agriculture and "Agricultural job" if duties involved farming and/or agribusiness. Since not all agricultural majors in the study were able to gain employment in the industry, the AGJOB variable is included to determine if there is a difference in earnings between those who gained employment in the agricultural and non-agricultural sectors.

4. Uncommon employment fringe benefits such as profit sharing (PRFT) and housing (HSG) are entered as binary variables with two subclasses: "provided" and "not provided". As added monetary compensation, profit sharing benefits are expected to be a positive determinant of earnings. That is, the provision of profit sharing benefits is directly associated with earnings, with more provided at higher income levels. A direct relationship is apparent since it is expected that the respondents would include their profit shares in their reported income. In contrast, as a non-monetary compensation, housing is expected to be inversely associated with earnings. That is, as added incentives, housing benefits are offered at lower income levels to motivate employees to remain with the company for a longer time.

Demographic Input

Gender (GENDER) is entered as a class variable of two subclasses: males and females. Based on the conceptual framework presented in Chapter II, gender has been shown to be a significant factor in explaining variations in earnings with males earning significantly higher mean salaries than females.

Other Inputs

1. The contribution of certain agencies to first full-time job placement (PLCMT) is entered as a categorical variable with four subclasses. The categories include "University service" if university or academic services such as the placement office, dean's

office, or faculty member were utilized; "Private service" if private services such as a public or private employment service were used; "Individual effort" if the individual's own efforts such as civil service application, employment advertisements, direct applications, the military service, self-employment, or others were used; and "Personal network" if personal networks such as contacts of a relative or friend or a return to a family business or farm were utilized. Based on human capital theory, individuals will maximize their economic welfare given the costs of their investments. The PLCMT variable is included to determine if "whom you know" rather than "what you know" makes a difference in successfully obtaining a job.

2. The monetary aspect of the first job (PAY) ranked from not important to very important, is included as a possible explanatory class variable. Subclasses for the PAY variable include: "Not/ somewhat important", "Important/ very important", and "No opinion". PAY is used to determine how the perceived importance of monetary returns affects income earnings. Since pay is an indicator of the return to human capital investments, respondent perceptions on its importance can indicate how much financial compensation influences the selection of employment and consequently earnings. Pay is expected to be directly associated with earnings with those considering pay as important or very important earning higher incomes.

The 1985 Job Income Model

The general conceptual model for the 1985 income earning is basically similar to the starting income model. However, the 1985 income model takes into account the

added work experience and earning history of the respondents. The 1985 gross personal income, the most current income data in the survey, is used as the dependent variable to determine the effect of education, labor market training and experience, and inherent personal characteristics on earnings. The influence of specific factors on the 1985 income as a measure of returns to human capital investments, is described below.

Dependent Variable

Although most of the questions relate to the job held at the time the survey was administered, income categories were for the 1985 personal income. Hence, the dependent variable is the 1985 pre-tax personal income (INC2). Unlike the question regarding the first job starting income which was open-ended, the question regarding the 1985 gross personal income was categorical. Hence, the midpoint of each category was used to best approximate each income bracket. Respondents who entered their jobs after 1985, whose answers were not applicable, or who did not give any response were excluded from the analysis.

Educational Inputs

As was done in the starting income model, both educational inputs ADV and AGMAJ are entered as categorical variables with the same subclasses. "No Bachelor's", "Bachelor's", "Enrolled in advanced degree", and "Completed advanced degree" for the

ADV variable and "Agricultural (forest)", "Agricultural (non-forest)", and "Non-agricultural" for the AGMAJ variable. Educational attainment is expected to influence current income earnings in the same direction. That is, higher educational levels are associated with higher income earnings. However, since labor market factors are additional variables, educational factors are expected to have less explanatory influence on the 1985 income compared to starting incomes.

Labor Market Inputs

1. Comparable labor market inputs from the first job income model applicable to the 1985 job include the job's location (SOUTH2) whether in the "South" or "non-South", the nature of the job (AGJOB2) whether "agricultural" or "non-agricultural", and the provision of fringe benefits such as housing (HSG) and profit sharing (PRFT).

2. The number of jobs held (NUMJOB) before the 1985 job is included as a continuous variable. As an indicator of mobility, NUMJOB gives the total number of different employers that the respondents worked for (full-time) since their first job after leaving college. Since the influence of job mobility on earning can either be positive or negative, the effect of NUMJOB on income cannot be hypothesized a priori.

Demographic Inputs

1. As was done in the starting income model, gender (GENDER) is entered as a binary variable. Although males are expected to earn significantly higher salaries than females, the added effect of labor market experience would help determine if the gender-wage differential still exists.

2. Current marital status (MARITAL) of the respondents is entered as a categorical variable with two subclasses "Married" and "Not married". The latter includes those who are either single, separated, or divorced. Since married respondents are theorized to have better access to human capital formation, it is expected that married respondents will have higher incomes than their unmarried counterparts (see Chapter II).

3. Current residence (RESIDEN) refers to the community in which respondents resided at the time the survey was administered. RESIDEN is entered as a categorical variable with two subclasses. "Urban" includes large metropolitan cities (population greater than 500,000); medium-sized cities (population between 50,000 and 500,000); and smaller cities (population between 10,000 and 50,000). Respondents residing in the country, outside a city or village, a farm, or ranch are classified as "Non-urban". Because cost of living in cities or urban areas is higher than in the country, nominal salaries for urban residents are also expected to be higher.

Other Inputs

The respondents' rankings of certain statements regarding college curriculum competencies and skills are entered as possible explanatory categorical variables. Selected questions include respondents' ratings of skill in oral communication (ORAL) as a gauge of overall communication skills, knowledge of U.S. agricultural policy (AGPOL) as an example of broad agricultural issues, and the ability to interpret and use soil test results (TECHNICL) as an example of general laboratory or technical skills. Subclasses for each statement question are "Not/ somewhat needed", "Much needed/ essential" and "No opinion". Rankings of opinion questions are included as possible explanatory variables to indicate respondent assessments of the skills needed for the job. Since these skills are acquired and enhanced through investments in human capital, their importance to the work required leads to a better assessment of investment returns.

Adjustment Equations

To make starting salary values comparable, the actual money values of the salaries are inflated to 1985 dollars using 1967 base year prices in order to account for the effects of inflation over time. These adjustments permit comparisons of real earnings at equal purchasing powers. Consumer price indices for each year are given in Appendix B.

The equation used for adjustment is as follows:

$$ADJS = \frac{(CPI_{1985} \times INC_i)}{(CPI_i)}$$

where ADJS is the adjusted salary,

CPI_{1985} is the consumer price index for 1985,

CPI_i is the consumer price index for year i, and

INC_i is the reported starting salary in year i.

The Analysis of Covariance

Since selected explanatory factors for the income models include both continuous and categorical variables, the appropriate statistical technique is the analysis of covariance. A discussion of this statistical procedure is given below.

Analysis of covariance (ANCOVA) is essentially a combination of regression analysis and analysis of variance (ANOVA). If all independent variables on the right hand side are continuous, ANCOVA is equivalent to ordinary least squares regression. Similarly, if all independent variables are categorical or class variables, ANCOVA is equivalent to analysis of variance. ANCOVA controls for the effect of an extraneous continuous variable, called a covariate, by adjusting for the variation attributable to the covariance. Much like a control for experimental error, ANCOVA compares treatment means of each class by incorporating information supplied by the covariate. This reduces error variance and thus increases precision in testing. (Neter and Wasserman, 1974; Hinkle, Weirsma, and Jurs, 1988; Ott, 1984) ANCOVA analysis is available in SAS through the GLM (General Linear Models) procedure (SAS Institute, Inc. 1985).

In comparison to ANCOVA, ordinary least squares (OLS) is a method of obtaining estimates of parameters in a linear regression model. Under the least squares method,

a best-fitting prediction line is chosen which minimizes the sum of the squared errors of prediction for all sample points. The error of prediction is the difference between the actual and predicted values (Ott, 1984). ANCOVA essentially embodies the advantages of both ANOVA and OLS or regression.

For example, this study concerns the effects of different educational, labor market, and socio-demographic factors on income. In addition, the year in which respondents entered their job is available for each respondent. In this case, educational, labor market, and socio-demographic factors are the categorical independent variables, income earning is the dependent variable, and job year is the covariate. Since it is expected that subsequent income earnings are affected by the year in which respondents entered their jobs, the treatment effects of each categorical factor whether educational, labor market, and demographic, must then be adjusted for the covariates.

Specifically, if we are to take one categorical variable from education, say educational achievement level, ANCOVA adjusts for the effect of job year by keeping job year at its mean value. This provides a more powerful test of the effect of education since the compounding effect of job year is then partitioned out and controlled. In a logical sense, the effect of educational achievement levels on current income will not be misleading (Neter and Wasserman, 1974)

ANCOVA results are presented much like an ANOVA with adjustments for the covariate. F values are calculated using Type III sum of squares. The use of Type III sum of squares is appropriate since it indicates the added contribution of each explanatory variable given that all other variables already exist in the model. Type III sum of squares is partial sum of squares adjusted for the effect of the covariate.

From calculated F-test statistics compared to a critical F value, significant explanatory variables are then determined. Significant categorical variables indicate that at least one pair or combination of adjusted means within the class differ from each other.

In order to determine which paired comparisons are significantly different, a post hoc multiple comparison test must then be conducted. SAS does this test through the LSMEANS option which generates all pairwise comparisons between subclasses within categorical variables. LSMEANS or least squares means are the expected mean values of each subclass within a categorical variable if all covariates in the model are held at their means. Interpretation of ANCOVA results must be done with caution since the amount of statistical output generated by SAS can lead one into analyzing differences between levels within classes even if the variable as a whole is not significant.

Summary

This chapter outlined the income models used in examining variations in earned income. Conceptually, the income models incorporate human capital theory and labor market principles by expressing earnings as a linear function of education, labor market, and socio-demographic factors. To ensure that income earnings are comparable between years, an equation for adjusting the effects of inflation over time is used. This ensures that earnings can be compared among respondents. Furthermore, since explanatory factors include both continuous and categorical variables, the appropriate statistical technique is the analysis of covariance. A comparison between ANCOVA, OLS, and ANOVA is made to differentiate ANCOVA from more familiar statistical techniques. Results and analysis of the models are presented and discussed in the next chapter.

CHAPTER V

ANALYSIS AND RESULTS

Introduction

This chapter presents and interprets the ANCOVA results obtained from the specified income models. When explained in reference to theory and previous research, the models provide estimates of the amount of influence which various educational, labor market, and socio-demographic factors have on earned income. A post hoc multiple comparison test by the LSMEANS (Least squares means) procedure of SAS is used to estimate the expected mean value of each subclass of categorical variables. These expected mean values are adjusted for the effect of the covariate. Discussions of each in-

come model by the general explanatory factors of education, labor market, and demography are given.

For statistical testing, an alpha of 10 percent is specified as the tolerable probability for a Type I error. A 0.10 significance level locates the rejection region by specifying that there is a less than 10 percent probability of incorrectly rejecting the null hypothesis. That is, compared to a smaller significance level, the results will tend to err on the side of stating there is a difference when in fact there is none (Ott, 1984).

The Starting Income Model

ANCOVA results for the estimated starting income model are given in Table 14. Data used in estimating the starting income model are presented in Appendix C. Results of the LSMEANS procedure which generated all pairwise comparisons between subclasses of significant categorical variables are given in Appendix D.

Table 14. Analysis of Covariance for Starting Income, in 1985 dollars (General Linear Model)

Source of Variation	df	Sum of Squares	Mean Square	F Value	Pr > F
Regression	16	1630979759.89	101936234.99	5.16	0.0001
Error	192	3790278515.21	19741033.93		
Total	208	5421258275.10			

Source	df	Type III SS	F value
ADV	3	151853974.03	2.56 *
AGMAJ	2	19463919.65	0.49
JOBYEAR	1	133220268.41	6.75 ***
SOUTH	1	23971028.83	1.21
PLCMT	3	63187579.83	1.07
AGJOB	1	4445218.23	0.23
PAY	2	368064200.71	9.32 ***
PRFT	1	183906003.03	9.32 ***
HSG	1	36352481.29	1.84
GENDER	1	126685279.93	6.42 **

$R^2 = 0.30$
* = statistically significant at the .10 level
** = statistically significant at the .05 level
*** = statistically significant at the .01 level

Source: S-200 1987, project survey of Virginia Tech students

Table 15. Parameter Estimates for Starting Income, in 1985 dollars (General Linear Model)

Parameter		Estimate	T-statistic
INTERCEPT		$ 61124	3.70 ***
ADV	No B.S.	-	-
	B.S.	88	0.05
	Enrolled adv deg	-494	-0.23
	Completed adv deg	3384	1.50
AGMAJ	Ag (Forest)	-1010	-0.98
	Ag (Non-forest)	-586	-0.57
	Non-ag	-	-
JOBYEAR		-543	-2.60 **
SOUTH	Non-south	931	1.10
	South	-	-
PLCMT	Indiv effort	-722	-0.89
	Personal network	-459	-0.48
	Private service	2699	1.25
	University service	-	-
AGJOB	Agjob	-342	-0.47
	Non-agjob	-	-
PAY	Important/ Very impt	2955	4.13 ***
	No opinion	-5403	-1.13
	Not/ somewhat impt	-	-
PRFT	Not provided	-2751	-3.05 ***
	Provided	-	-
HSG	Not provided	1463	1.36
	Provided	-	-
GENDER	Female	-1758	-2.53 **
	Male	-	-

* = statistically significant at the .10 level
** = statistically significant at the .05 level
*** = statistically significant at the .01 level
Source: S-200 1987, project survey of Virginia Tech students

Variable Performance and Parameter Estimates

An overall fit of $R^2 = 0.30$ ($F = 5.16$) resulted, which is significant. To examine the possibility of multicollinearity, a cross correlation of all explanatory variables was run. The resulting correlation coefficients were all less than a 0.3 cutoff which is considered evidence of little if any correlation (Hinkle, Wiersma, Jurs, 1988).

Educational Variables

Table 14 on page 60 indicates that the educational variables ADV (advanced degree) and AGMAJ (agriculture major) produced mixed results. F values calculated for Type III sum of squares resulted in a significant value for the ADV variable ($F = 2.56$) and an insignificant value for the AGMAJ variable ($F = 0.49$). Insignificant results for the AGMAJ variable suggest that the choice of major, whether agriculture or not, was not an important determinant of starting income.

The mean value of the covariate JOBYEAR or the year in which respondents entered into their first full-time job was 1979 with a standard deviation of 1.72 years. If JOBYEAR is held at its mean value, calculated least squares means determine the significant pairwise comparisons between subclasses. Pairwise comparisons are only done for significant categorical variables. Results of pairwise comparisons are given in Appendix D.

Parameter estimates for each level within the class variables are shown in Table 15. (T-statistics used to calculate for parameter estimates is based on one arbitrary set over all possible choices.) Within the significant education variable ADV, completing an

advanced degree increased the mean first job starting salary by $3384 compared to having no bachelor's degree, although the difference is statistically insignificant. Pairwise comparisons between the subclasses show that the mean starting salaries of those who completed an advanced degree were significantly higher than either those who possessed a bachelor's degree or those enrolled in advanced degree programs.

One inconsistency with the result was that those who had no bachelor's degree earned higher than those enrolled in advanced degree programs. One reason for this occurrence is statistical since the no bachelor's category had the fewest number of observations. The rest of the results were consistent with theory. That is, it gives further confirmation that those who completed higher levels of education earned higher starting salaries. This is seen in Table 15 wherein those who completed an advanced degree received the highest mean starting salary than all other categories.

Labor Market Variables

Labor market variables chosen to represent unique job features for the starting salary include the year in which respondents entered into their first job (JOBYEAR), the region in which the job was located (South or non-South, SOUTH), employment services and agencies which helped respondents find their first job (PLCMENT), the nature of the job (whether it involved agriculture or not, AGJOB), the provision or non-provision of fringe benefits such as profit sharing (PRFT) or housing (HSG), and some responses to opinion questions. Responses to these opinion questions include how important respondents considered financial returns or pay (PAY) in their decision to accept the first full-time job.

Among labor market variables which approximate features of the job, only the covariate JOBYEAR proved to be significant. The negative coefficient indicates that respondents who entered into their first job in later years received relatively lower real starting annual salaries than those who entered earlier. This might reflect the declining state of the agricultural industry in terms of financial and career opportunities. Seen another way, the relatively lower earnings of those who entered at a later date could also reflect adjustment mechanisms in the labor market. That is, later wage rates adjust by seeking market clearing levels which could be at lower market prices at a given value of marginal product. The lower market prices could be due to the depressed state of the economy, higher interest rates, or other market forces.

Other employment features such as SOUTH, PLACEMENT, or AGJOB were found to be insignificant. The result of the SOUTH variable suggests that job region was not an important determinant of starting salaries. One possible explanation for this is that first-time employees do not have sufficient labor market information to assess job offers. For some respondents, the first job after college may have been their only job offer. Alternatively, starting salary offers for graduates may have been basically the same across regions, whether in the South or otherwise. Relatively similar starting salaries are possible if employers screen new employees with the purpose of giving them corporate training once hired. Since on-the-job-training would determine their employment positions in the company, employees with general abilities and skills will be chosen with the purpose of refining these competencies for corporate needs.

For the PLCMENT variable, results indicate that the kind of agency used to search for the first job did not make a significant difference in determining first-job starting salaries. Any agency through which job search was conducted appears to be equally effective. In particular, University-related services were not different from using one's own efforts or contacts. Since one purpose of university-related services is to help

graduates obtain their first job, this result implies that they are just as effective as other means. Furthermore, the insignificance of the PLCMENT variable contradicts the statement "In the real world, it's not what you know but whom you know". Apparently, not even "whom you know" makes a difference in the first job salary.

For the AGJOB variable, results suggest that the nature of the job is not an important determinant of starting salaries. Whether or not employment duties involve agriculture, starting salaries in either case, are about equal. This result could be viewed two ways, that agricultural majors get equally better or worse jobs than their non-agricultural counterparts. If viewed positively, this result is encouraging to agricultural graduates who wish to obtain employment in the industry. Moreover, this information should also be well received by college of agriculture administrators who can challenge misconceptions that agricultural graduates earn less than their non-agricultural counterparts. Viewed another way, this result could be an indication that there is room for improvement in the agricultural sector in terms of starting salaries.

Results of the opinion question on the importance of PAY in accepting the first job were found to be significant. LSMEANS (Appendix D) indicate that those who rated PAY as "important/ very important" earned significantly higher mean starting salaries than both those who viewed PAY as "not/ somewhat important" and those who had "no opinion". The "important" group earned $2955 more than the "not important" group and $8358 more than the "no opinion" group. One reason for this result is that respondents who said that pay was "not important" likely did not really consider higher financial returns in accepting their first full-time job. Revealing their preferences, they considered non-monetary factors instead. For the "no opinion" group a poor representation of the category makes it difficult to accept the result as representative of the population. A frequency table of each category in the PAY variable showed that only one respondent had "no opinion."

For the fringe benefit variables, only PRFT (profit sharing) was found to be significant (Table 14). Parameter estimates for both fringe benefit variables are given in Table 15 on page 61. For the PRFT variable, respondents who were provided with profit sharing benefits had mean starting annual salaries $3233 higher than those who said that it was not provided. One possible explanation for this could be that financially prosperous firms offered profit sharing benefits. Another possible reason is that profit sharing returns were already reported by respondents in addition to their base salaries, thus increasing the mean for those belonging in this category. Although housing (HSG) parameter estimates indicate the opposite trend from profit sharing with respondents with housing benefits receiving lower mean starting salaries than respondents without housing benefits, this result is insignificant.

Demographic Variables

The demographic variable considered an appropriate explanatory variable for the first job starting income given data limitations was GENDER. GENDER proved to be significant in explaining variations in first job starting incomes ($F = 6.42$). Parameter estimates show that males earned an average $1758 more than females.

Results for the GENDER variable are consistent with the voluminous related literature on the salary differential between the sexes. One possible explanation based on human capital arguments is that females lack resource mobility due to personal interests and family, which greatly restrict their earnings. Combined with employer perceptions that women are greater hiring risks due to their high turnover rate, low salaries can be interpreted as risk premiums for hiring females. Employers may pass some of these risk premiums to female employees in the form of lower salaries.

The 1985 Income Model

Like the first income model, the 1985 income model uses continuous and categorical variables in an analysis of covariance. A linear function was utilized since there was no compelling justification for using other functional forms. 1985 gross personal income (using midpoints for categories) is the dependent variable.

The analysis of covariance for the estimated model is given in Table 16. An overall fit of $R^2 = 0.26$ ($F = 3.27$) resulted, which is significant. To check for possible multicollinearity, a cross correlation of all explanatory variables with each other was estimated. The resulting correlation coefficients for a majority of the variables were less than a 0.3 cutoff which is considered little if any multicollinearity (Hinkle, Wiersma, Jurs, 1988).

The defined sample population used in this analysis is confined to all respondents whose jobs at the time the survey was conducted began in 1985 or earlier. Respondents who reported that their current jobs began later than 1985 were excluded from the analysis since salary information would not correspond to other information about the job. Data used in estimating the current job income model is presented in Appendix E.

The 1985 income model has NUMJOB (number of previous full-time jobs) as the covariate. The mean number of different employers that the respondents worked for full-time since leaving college was 2.58 with a standard deviation of 1.47 employers. Pairwise comparisons for significant categorical variables are presented in Appendix F.

Table 16. Analysis of Covariance for 1985 Income, 1985 Gross Personal Income (General Linear Model)

Source of Variation	df	Sum of Squares	Mean Square	F Value	Pr > F
Regression	19	4647405324.52	244600280.24	3.27	0.0001
Error	174	13023342098.16	74846793.67		
Total	193	17670747422.68			

Source	df	Type III SS	F value
ADV	3	271995605.19	1.21
AGMAJ	2	54531588.50	0.36
NUMJOB	1	206191294.43	2.75 *
SOUTH2	1	41317860.24	0.55
AGJOB2	1	104595461.38	1.40
PRFT	1	252333218.06	3.37 *
HSG	1	21924672.31	0.29
PAY	2	134816520.91	0.90
ORAL	1	591321881.85	7.90 ***
TECHNCL	2	1131376413.17	15.12 ***
AGPOL	1	171557778.90	2.29
GENDER	1	202521679.63	2.71
MARITAL	1	395536141.65	5.28 **
RESIDEN	1	339406150.30	4.53 **

$R^2 = 0.26$
* = statistically significant at the .10 level
** = statistically significant at the .05 level
*** = statistically significant at the .01 level

Source: S-200 1987, project survey of Virginia Tech students

Table 17. Parameter Estimates for 1985 Income (General Linear Model)

Parameter		Estimate	T-statistic
INTERCEPT		$ 28283	6.19 ***
ADV	No B.S.	-	-
	B.S.	-3030	-0.89
	Enrolled adv deg	-6599	-1.67
	Completed adv deg	-4435	-1.20
AGMAJ	Ag (Forest)	559	0.26
	Ag (Non-forest)	-789	-0.37
	Non-ag	-	-
NUMJOB		-926	-1.66 *
SOUTH2	Non-South	1328	0.74
	South	-	-
AGJOB2	Agjob	-1814	-1.18
	Non-agjob	-	-
HOUSING	Not provided	1244	0.54
	Provided	-	-
PROFIT	Not provided	-2649	-1.84 *
	Provided	-	-
PAY	No opinion	6488	0.71
	Not/ somewhat impt	-1545	-1.10
	Very/Important	-	-
ORAL	Much needed/ essential	6165	2.81 ***
	Not/ somewhat needed	-	-
AGPOL	Much needed/ essential	2907	1.51
	Not/ somewhat needed	-	-
TECHNCL	Much needed/ essential	-6471	-3.89 ***
	Not sure	3119	0.55
	Not/ somewhat needed	-	-
GENDER	Female	-2606	-1.64
	Male	-	-
MARITAL	Married	3388	2.30 **
	Not married	-	-
RESIDEN	Non-urban	-3047	-2.13 **
	Urban	-	-

* = statistically significant at the .10 level
** = statistically significant at the .05 level
*** = statistically significant at the .01 level
Source: S-200 Project, survey of Virginia Tech students

Variable Performance and Parameter Estimates

Educational Variables

For the 1985 income model, the starting income educational variables ADV and AGMAJ were included and both were insignificant. Both educational variables could have been excluded from the 1985 income model without affecting the general fit. One possible explanation for this is that labor market experiences become more prominent than educational characteristics as respondents stay in the labor force longer. Another explanation could be that although an advanced degree would make a significant difference in determining the starting salary, its relative influence may be greatly reduced when other factors are taken into account over time.

Labor Market Variables

Labor market variables were chosen to approximate job training and represent unique features of the 1985 job. These variables included NUMJOB (number of previous full-time employers or jobs), SOUTH2 (the state in which the 1985 job was located--South or non-South), AGJOB2 (the nature of the job--whether it involved agriculture or not), the provision or non-provision of housing (HSG) or profit sharing (PRFT) benefits, and some opinion questions. Opinion questions involved rankings of competencies and skills acquired in college. Variables used to represent these skills are

proxy measures of interpersonal skills (ORAL - oral communication), appreciation for broad issues in agriculture (AGPOL - knowledge of U.S. agricultural policy), and technical skills (TECHNCL - ability to interpret and use soil test results).

In addition, the importance or non-importance of pay (PAY) from the first job model was also included to see if on average, respondents who considered pay as important in the selection of the first job ended up with higher paying jobs later. As with the starting income model, all "not sures" and "no opinions" were included as a separate category to account for possible differences due to being non-commital. However, all "not applicables" and "no responses" were excluded from the analysis.

NUMJOB with an F = 2.75 was found to be significant (Table 16). Parameter estimates presented in Table 17 on page 69 show a negative coefficient (inverse relation) for the NUMJOB variable. An inverse relation suggests that more job shifting is associated with lower income earnings. Consistent with labor market theory, greater job shifting is viewed to be undesirable in employees. Being so, lower salaries are associated with respondents that held a greater number of jobs.

Both labor market variables which account for the effects of unique employment features such as the location of the job (SOUTH2) and the nature of the job (AGJOB2) were insignificant. Although parameter estimates indicate that those who had non-agricultural jobs earned more than those who had agricultural jobs, this result was insignificant. In like manner, although parameter estimates for SOUTH2 indicate that respondents who had 1985 jobs in the Southern region received higher mean incomes, this difference is insignificant.

Consistent with the first income model, only the fringe benefit variable PRFT (profit sharing) at an F = 3.37 was found to be significant. Explanations for the PRFT variable are similar to those given in the first income model.

Results of the opinion questions indicate that both ORAL (skill in oral communication) at an F = 10.38 and TECHNCL (ability to interpret soil test results) at an F = 15.12 were significant. Only AGPOL (Knowledge of U.S. agricultural policy) was found to be insignificant.

Parameter estimates for oral communication skills (ORAL) show that those who ranked ORAL as "much needed/essential" had $6165 higher mean 1985 incomes than those who ranked ORAL as "not needed/ somewhat needed". One explanation for this result is that the use of oral communication skills tends to be associated with supervisory, managerial, or entrepreneural level positions wherein financial compensations are higher (Broder and Houston, 1986).

In contrast, respondents who ranked TECHNCL as "much needed/ essential" earned $6471 less than those who ranked it as "not/ somewhat needed." One explanation for this result is that those for whom the ability to interpret and use soiltest results are "much needed" or "essential" have technical level positions which are associated with lower earnings.

Finally, the PAY variable from the first income model was found to be insignificant when used as an explanatory variable for 1985 incomes. Although parameter estimates show that those who had "no opinion" earned more than both those who said pay was "important/ very important" or "not important/ somewhat important," this comparison was insignificant. This suggests that the importance or non-importance of pay for the first-job starting income may not be a substantial determinant of later incomes. It also suggests that those who viewed PAY as important in selecting the first job may not have significantly higher-paying jobs later.

Demographic Variables

Demographic variables considered appropriate explanatory factors for the 1985 job income were GENDER, MARITAL (marital status), and RESIDEN (current residence). Both MARITAL and RESIDEN were found to be significant. MARITAL with an F=4.03 and RESIDEN with an F=4.91 were both significant. Only GENDER proved to be insignificant. This suggests that gender related salary differences in the starting income model tended to diminish in the 1985 income model with increases in labor market experience. In contrast, marital status and residence became significant explanatory variables for current income.

Parameter estimates for the demographic factors are given in Table 17 on page 69. Married individuals earned an expected $3070 more than those not married. One explanation based on human capital theory is that married individuals can better maximize investments in their human capital investments due to the financial and emotional support provided by the spouse. Furthermore, employers perceive married employees to be more responsible and hence better investment risks.

For RESIDEN (residence), parameter estimates indicate that those situated in an urban area (large, medium, or small city) earned an expected $2941 higher mean income than those in non-urban areas (country, outside city, village, farm, or ranch). One reason for this is that people tend to move to places of employment which maximize returns to their investments in human capital. Since urban employment opportunities have greater financial returns (and higher living costs), urban residents tend to be associated with higher income earnings. Seen another way, "real incomes" between urban and rural residence locations may actually be equivalent. This is so because higher nominal earnings in urban areas are needed to meet higher costs of living. Lower nominal earnings in rural areas are compensated by lower living costs.

Table 18. A Summary Comparison of the Starting and 1985 Income Models

Explanatory Variable	Starting Income Model Parameter Estimate (F-value)	1985 Income Model Parameter Estimate (F-value)
Education		
ADV	2.56 *	1.21
AGMAJ	0.49	1.21
Labor Market		
PLCMENT	1.07	-
JOBYEAR	6.75 **	-
NUMJOB	-	2.75 *
SOUTH	1.21	0.55
AGJOB	0.23	1.40
PAY	9.32 ***	0.90
PROFIT	9.32 **	3.37 *
HOUSING	1.84	0.29
Opinion Questions:		
ORAL	-	7.90 ***
TECHNCL	-	15.12 ***
AGPOLICY	-	2.29
Demography		
GENDER	6.42 **	2.71
MARITAL	-	5.28 **
RESIDEN	-	4.53 **
MODEL	5.16 (R^2 = 0.30)	3.27 (R^2 = 0.26)

* = statistically significant at the .10 level
** = statistically significant at the .05 level
*** = statistically significant at the .01 level
Source: S-200 1987, project survey of Virginia Tech students

A Comparison of Models

In order to determine differences between the two income models, a comparison of the explanatory power of both models is given in Table 18. A comparison of the explanatory variables yields a better view of how much each factor contributes to the variation in earnings.

For the education factors, educational achievement (ADV) was found to be a significant determinant of the first job though not of the 1985 job earnings. The other education factor, (AGMAJ) or the choice of agricultural major was consistently insignificant for both models. Consistent with human capital theory, educational achievement is an important determinant of earnings. For the sample population, it was a significant determinant of earnings for the first job after college. If seen as a screening tool for potential employees, educational achievement is one means by which employers gauge ability. That is, those who have attained higher educational levels are generally perceived to have higher capabilities than those who have not. Hence, higher salary levels are the premium for those who have gained higher educational degrees.

Except for the provision of profit sharing benefits which was consistently significant in both models, other labor market variables had no consistent pattern of significance between the two models. That is, what were found to be significant labor market variables in the first model were not necessarily significant in the second model. This is so because labor market factors are unique to each job and hence have distinct effects on the dependent variable in each model. This makes it difficult to pinpoint which labor market variables are the best explanatory factors for earnings. Clearly, other factors must be taken into account to determine which variables best explain earnings. Perhaps other non-monetary and qualitative factors (though difficult to quantify) should also be

included. However, given data limitations, only available labor market variables could be examined.

Since inherent personal characteristics determine a respondent's uniqueness, demographic variables are important contributors to earnings. Gender was a significant determinant of starting salaries though not of later earnings. Given this trend, it seems that the gender-wage differential lessens over time. This may due to the advent of equal employment laws and awareness of equal rights. However, it could also be that other variables are picking up earning variations attributable to gender. One way of finding out is to include ADJS as an explanatory variable in a model with gender. If the effect of gender decreases, then it could be that the gender-wage differential is indeed lessened over time.

Other socio-demographic inputs such as marital status and current residence were both significant determinants of later earnings. Since these factors are based on individual preferences, they could change over time. Hence, their effect on earnings could also change depending on the respondent's choice.

Finally, a notable relationship between the two models is that the first job starting income can also be used as an explanatory variable for the 1985 income. Previous incomes are determinants of subsequent incomes because starting pays generally increase over a time period based on a certain increment of previous pays. Hence, what one is earning now can be seen as a linear function of how much one used to earn. This being the case, the first job starting annual salary (ADJS) was included as a continuous explanatory variable in a lagged formulation. Data used in estimating the lagged formulation of the 1985 income model is given in Appendix G. ANCOVA results for the lagged formulation of the 1985 income model are given in Table 19. Parameter estimates are presented in Table 20. The lagged formulation is used as a comparison tool to determine how important salary history is in determining incomes.

Table 19. Analysis of Covariance for 1985 Income Model, Lagged Formulation

Source of Variation	df	Sum of Squares	Mean Square	F Value	Pr > F
Regression	20	5211916516.90	260595825.84	3.82	0.0001
Error	162	11046280204.41	68186914.84		
Total	182	16258196721.31			

Source	df	Type III SS	F value
ADJS	1	1325684636.23	19.44 ***
ADV	3	330313616.26	1.61
AGMAJ	2	37138259.20	0.27
NUMJOB	1	82268312.03	1.21
SOUTH2	1	1749451.99	0.03
AGJOB2	1	8108911.99	0.12
PRFT	1	200210158.14	2.94 *
HSG	1	15736363.40	0.23
PAY	2	159810690.15	1.17
ORAL	1	252339580.73	3.70 *
TECHNCL	2	826745193.37	12.12 ***
AGPOLICY	1	142670975.95	2.09
GENDER	1	41852006.31	0.61
MARITAL	1	278659787.53	4.09 **
RESIDEN	1	371006292.38	5.44 **

$R^2 = 0.32$
* = statistically significant at the .10 level
** = statistically significant at the .05 level
*** = statistically significant at the .01 level

Source: S-200 1987, project survey of Virginia Tech students

Table 20. Parameter Estimates for 1985 Income Model, Lagged Formulation

Parameter		Estimate	T-statistic
INTERCEPT		$ 17290	3.10 ***
ADJS		0.64	4.41 ***
ADV	No Bachelor's	-	-
	Bachelor's	-3166	-0.87
	Enrolled adv degree	-6083	-1.49
	Completed adv degree	-59	-1.52
AGMAJ	Ag (Forest)	24	0.01
	Ag (Non-forest)	-1049	-0.48
	Non-agriculture	-	-
NUMJOB		-618	-1.10
SOUTH2	Non-South	283	0.16
	South	-	-
AGJOB2	Agjob	-525	-0.34
	Non-agjob	-	-
PRFT	Not provided	-2451	-1.71 *
	Provided	-	-
HSG	Not provided	1136	0.48
	Provided	-	-
PAY	No opinion	13157	1.49
	Not/ somewhat impt	779	0.52
	Very/ important	-	-
ORAL	Much needed/ essential	4512	1.92 *
	Not/ somewhat needed	-	-
TECHNCL	Much needed/ essential	-5721	-3.48 ***
	Not sure	597	0.11
	Not/ somewhat needed	-	-
AGPOL	Much needed/ essential	2715	1.45
	Not sure	-	-
	Not/ somewhat needed	-	-
GENDER	Female	-1233	-0.78
	Male	-	-
MARITAL	Married	2944	2.02 **
	Not married	-	-
RESIDEN	Non-urban	-3245	-2.33 **
	Urban	-	-

Source: S-200 1987, project survey of Virginia Tech students

The lagged income model had an overall statistically significant fit of $R^2 = 0.32$ ($F = 3.82$). This was higher than both income models. The added covariate ADJS had a mean value of $16,926 and a standard deviation of $5446. If the value of all covariates are held at their mean values, expected mean 1985 salaries can be determined for each level within significant categorical variables. Like the first two models, the LSMEANS procedure is used to determine which levels within categorical variables are significantly different than the others. Results of the LSMEANS procedure which yielded all pairwise comparisons between levels of significant categorical variables are given in Appendix H.

Variable Performance and Parameter Estimates

Educational Variables

For the 1985 lagged formulation model, both educational variables ADV and AGMAJ were insignificant. This result was consistent with findings for the 1985 model and explanations are similar. This suggests that educational factors such as the highest degree earned and the choice of major are not important determinants of 1985 income earnings.

Labor Market Variables

The covariate ADJS or the first job starting salaries of the respondents were found to be significant (F = 19.44). The ADJS variable was in the expected positive direction which confirms the reasoning that current incomes are functions of previous incomes. Other significant labor market variables were PRFT (profit sharing benefits), ORAL (oral communication skills), and TECHNCL (ability to use and interpret soil test results).

The provision of profit sharing benefits (PRFT) and both assessment questions ORAL and TECHNCL were found to be significant. Results were expected and are consistent with findings for the 1985 model.

Parameter estimates for the lagged formulation are shown in Table 20 on page 78. As can be noted, all significant mean salary differences between levels and directions of significance are the same as those for the 1985 income although at lower parameter estimates. For the ORAL variable, those who viewed oral communication skills as "much needed/ essential" earned an expected $4512 higher mean salary than those who said it was "not/ somewhat needed". For the TECHNCL variable, those who viewed the ability to use soil test results as "much needed/ essential" earned an expected $5721 less than those who said it was "not/ somewhat needed".

Demographic Variables

Consistent with results for the 1985 income model, both MARITAL (marital status) and RESIDEN (current residence) were found to be significant. Only GENDER

was found to be insignificant ($F = 0.61$). The insignificance of the gender variable in the lagged formulation suggests that the gender wage differential has decreased. This is seen in the lower parameter estimate between males and females in the lagged model. A statistical explanation is also apparent in the inclusion of ADJS as an explanatory variable. Since the gender variable already affects the covariate ADJS, its contribution to the variation in income was already picked up by the ADJS variable.

Parameter estimates for the demographic variables are given in Table 20 on page 78. Similar to the 1985 income model, married respondents earned an expected $2944 more than their unmarried counterparts and urban residents earned an expected $3245 more than non-urban residents. Explanations for these results are similar to those given for the 1985 model.

Summary

Income functions for the starting income after college and the 1985 income were constructed and estimated using analysis of covariance. ANCOVA was used to determine if different categorical variables such as educational achievement, nature of the job, or gender were significant determinants of earnings. All pairwise comparisons between levels within significant categorical variables were estimated using least squares means.

In terms of explanatory power, selected educational, labor market, and socio-demographic factors for the first-job starting income model explained 30 percent of the variation in starting incomes. Significant explanatory variables included educational achievement (ADV) for education factors; year of work entry (JOBYEAR), importance

of pay (PAY), provision of profit sharing (PRFT) benefits, for labor market factors; and GENDER for demographic characteristics.

In comparison, explanatory variables for the 1985 job income model explained 26 percent of the variation in personal incomes. Significant explanatory variables included the number of previous full-time jobs (NUMJOB), provision of profit sharing benefit (PRFT), the importance of oral communication skills (ORAL), and the ability to interpret and use soil test results (TECHNCL) for labor market variables; and marital status (MARITAL) and current residence (RESIDEN) for demographic factors. A summarized comparison of both income models was given to help determine differences between the two income models.

Explanatory variables for the lagged formulation explained 32 percent of the variation in 1985 income leaving 68 percent unexplained. Significant explanatory variables included ADJS (first job starting annual salary in real terms), provision of profit sharing benefits (PRFT), opinion questions ORAL (oral communication skills) and TECHNCL (ability to interpret and use soil test results), and demographic factors MARITAL (marital status) and RESIDEN (current residence).

Given the large amount of information presented, it is necessary to provide insight regarding the importance and contribution of each model. From statistical results presented and the comparison of both models, it can be noted that each model has a unique advantage. The first income model considered factors which immediately affected earnings after respondents have invested on education. The second model further added labor market features to capture the effect of job experience. The lagged model combined the explanatory characteristics of both models by including the first model's dependent variable as an explanatory variable to the second model.

CHAPTER VI

SUMMARY AND CONCLUSIONS

Summary

The objective of this study was to identify and measure the effects of educational backgrounds, occupational experiences, and individual characteristics on earned incomes of former agricultural students. This thesis presented general Virginia Tech student characteristics, educational achievement levels, and trends in labor market entry, participation, and earnings.

Data for this study were obtained from the S-200 research project which surveyed labor force entry, participation, and curricula assessments of former Virginia Tech students, a majority of whom graduated in agriculture. General characteristics of Virginia

Tech students in the sample showed that roughly two-fifths pursued or completed additional education beyond a bachelor's. Labor market entry for the respondents was generally within two years after graduation at an average starting annual salary of $16,917. Socio-demographic characteristics indicated that respondents were between the ages of 28 to 31 years old, with 60 percent residing in urban areas. Moreover, two-thirds of the students surveyed were male.

Income models were conceptualized based on the human capital framework, which posits that individuals embody skills aquired through investments in education and training. Based on this theoretical framework, earned incomes of the respondents were expressed as a linear function of educational, labor market, and socio-demographic factors. Two income indicators were chosen: starting income on the first job following college and 1985 income. Both income models were analyzed using analysis of covariance, the appropriate statistical technique given continuous and categorical variable specifications.

Explanatory variables used to determine starting incomes included the level of education, major in college, year of job entry, job location, nature of the job, provision of benefits, job placement agency, and gender. In addition, respondent opinions on the importance of pay in accepting the first job after leaving college were included. Comparable explanatory variables were included in the 1985 job income model. The number of previous jobs held, marital status, current residence, and assessments of college curricula were also included in the 1985 income model.

In the starting income model, this research found higher annual starting salaries for men compared to women. Higher annual salaries were found for respondents who completed an advanced degree compared to those who were enrolled in advanced degree programs or those who did not complete a bachelor's. Significantly higher annual starting salaries were noted for those who joined the labor market earlier, were provided

profit sharing benefits, and who rated pay as an important aspect in choosing their first job.

In the 1985 income model, this research found significantly higher incomes for married respondents compared to those who were not. Higher incomes were determined for urban residents compared to non-urban residents. Higher salaries were also found for those who were given profit sharing benefits and who kept their job shifting to a minimum. In addition, those who ranked oral communication skills as much needed or essential earned higher mean incomes, whereas those who viewed a technical skill as much needed or essential earned lower incomes.

Finally, in the 1985 lagged income model, results were found to be similar to those of the 1985 income model. Moreover, previous income was found to be a positive and significant determinant of 1985 income.

Conclusions

For deans of colleges of agriculture, academic department heads, and administrators, the analysis of the earnings of former agriculture students indicated that higher education was a significant determinant of income for the first job though not for the 1985 job. The finding, however, was confounded by the survey sampling technique. That is, respondents who obtained advanced degrees entered the labor force later than their counterparts who did not. In addition, no significant differences in incomes were found between those who graduated from the college of agriculture and those who transferred into other colleges.

Although results of the use of placement agencies suggest that students did equally well in obtaining their first job whether they used university-related services or not, the test for determining the contribution of each agency was not clearly defined. This is so because students could have followed up job employment advertisements in the placement office on their own and reported it as their own effort.

For college of agriculture students, it is encouraging to note that the gender-wage differential declined after some labor market experience was gained. This gives support to women considering a career in agriculture. Furthermore, with the advent of equal employment laws, awareness of equal rights, and better market information, women may face improved employment opportunities in the future.

For agricultural employers, results suggest that potential employees are aware that communication skills are important for the job. This implies that students have some idea of what is needed to improve in the labor market. Additionally, employment opportunities were perceived by the respondents to be in all sectors and not solely in agriculture. This is seen in the substantial number of agricultural graduates obtaining employment in the non-agricultural sector. This being the case, non-agriculture employers can view agricultural majors as added sources of manpower.

For agricultural employees, results of the study indicated that although males initially had an advantage in the first job, the gender-wage differential decreased over time as more labor market experience was acquired. In terms of job mobility, results indicate that lower incomes were associated with higher job mobility. However, since data on job tenure were relatively short, testing the effect of job mobility on income was incomplete. That is, adjustments for those who entered the labor market at a later date due to the pursuit of graduate studies should be taken into account. Social factors such as marital status and the place of residence are clearly individual choices although married employees in the sample earned higher incomes than their unmarried counterparts. Addi-

tionally, urban residents earned higher salaries than non-urban residents. However, since costs in urban areas are also higher than non-urban areas, the trade-off resulting from higher expenses may result in there being no real difference. Furthermore, based on the results of the lagged formulation model, it appears that previous incomes are significant determinants of later earnings.

Further Research

Clearly, the use of data gathered from more students belonging to different colleges or majors and from different landgrant universities would provide further insight and understanding into the effects of numerous educational, demographic, and labor market factors on potential earnings. Additional data on non-monetary variables or non-market factors such as job security or salary trade-offs such as personal benefits over time, though difficult to quantify, could greatly aid in explaining the variation in the income earning models.

Though an examination of the different educational, demographic, and occupational factors provides deeper understanding with regard to the characteristics of the agricultural labor supply, further insight can be gained by examining employer and industry assessments or the demand side. References to labor markets with regard to demand conditions and possibilities will prove useful in combining resources that better prepare students in attaining and improving career potentials.

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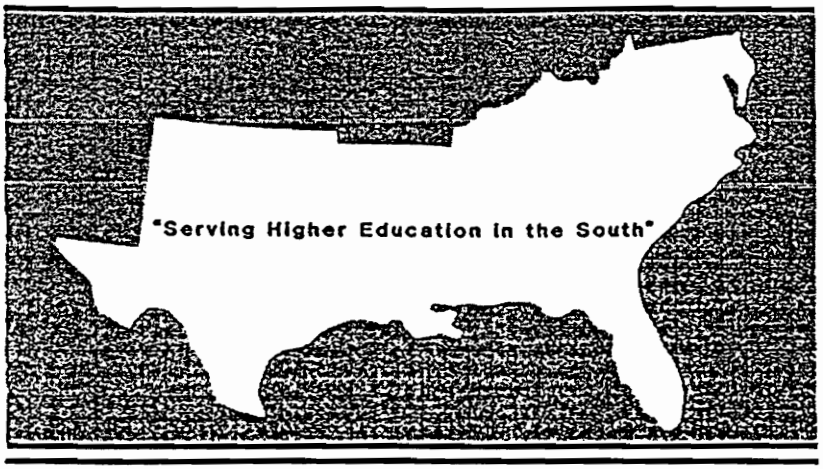
Appendix A
Sample Questionnaire

OCCUPATIONAL CAREER PATHS OF FORMER STUDENTS IN SOUTHERN LANDGRANT UNIVERSITIES

1986-87



Questionnaire

A Research Project Conducted Jointly by Southern Landgrant Universities

and

The Cooperative State Research Service United States Department of Agriculture

INSTRUCTIONS

Please read and answer each question carefully. For some questions you are asked to circle the answer that applies most closely. Other questions require you to write the answer in the blank provided.

Please do not omit or skip a question unless the answer you select is followed by a statement "Go to Q__ on page __."

Your responses are confidential. Only aggregate data will be assembled for our report. This is the same policy we followed with the 1977 survey you completed while you were enrolled in undergraduate courses.

To ensure the success of our sampling design, we have assigned you a serial number. This also allows us to keep your answers confidential. No information will be released which will make it possible to identify the person who supplied it. The serial number is indicated on the questionnaire. When the questionnaire is returned to us, it is checked against our master list. If we have not received a questionnaire from a respondent, we will send a follow-up reminder. The serial numbers will permit us to do so.

While your participation is voluntary, we know that we can count on your assistance to return the completed questionnaire promptly. An envelope is enclosed for your use. No postage is required.

Serial Number: _____

Occupational Career Paths: Former Students
in Southern Land Grant Universities

Part 1: Educational Attainment

This series of questions is about your educational experiences since you were enrolled in college in 1977. Please circle the number that corresponds to your response.

1. Did you complete a bachelor's degree at a college or university?

   No . . . 1 (Go to Q2) Yes . . . 2 (Go to Q3)

2. If you did not graduate from a college or university:

   a. What is the highest year of college completed?

      Freshman . . . 1 Sophomore . . 2
      Junior . . . . 3 Senior 4

   b. What is the name of the college or university you last attended?

      _____

   c. What was your curriculum or major at the time you left college? _____

      _____

   d. Do you plan to return to college to complete your Bachelor's degree in the next few years?

      Yes, someday . . . . . 1 (Continue with Q2e)
      Yes, currently enrolled . . 2 (Go to Q5)
      No . . . . . 3 (Go to Q10)
      Do not know . . . . . 4 (Go to Q10)

   e. If you return to college someday, would you major in some field of agriculture?

      No 1
      Yes . . . . . 2 } (Now go to Q10)
      Undecided . . . 3

3. What was the month and year of your graduation with a Bachelor's degree?

   a. Month: _____ b. Year: _____

   c. What is the name of this college or university? _____

   d. What was the curriculum or major in which you graduated? _____

      _____

   e. Was this curriculum or major in a division, college, or school of agriculture?

      No . . . 1 Yes . . . 2

4. In my opinion, my undergraduate agricultural curriculum courses . . .
(Circle one number for each item)

	NO	YES	DON'T KNOW
a. Gave attention to my needs as an individual . . .	1	2	3
b. Emphasized basic academic subjects (Math, Science, English, etc.)	1	2	3
c. Provided me with the broad education needed to enter nonagricultural jobs	1	2	3
d. Offered practical work experience	1	2	3
e. Emphasized production agriculture	1	2	3
f. Prepared me to find employment	1	2	3
g. Prepared me for jobs in agricultural business . .	1	2	3

5. Are you currently enrolled in an advanced degree program?

No . . . . . 1 (Go to Q7)
Yes, a Master's degree . . . . 2 (Go to Q6)
Yes, a professional degree . . 3 (Go to Q6)
Yes, a doctorate . . . . . 4 (Go to Q6)

6. If currently enrolled in an advanced degree program:

a. What is your major, discipline, or specialty area?

_____

b. What is the name of this university?

_____ (Go to Q9)

7. Have you completed any additional education beyond a Bachelor's degree?

No, never completed or enrolled . . . . . 1 (Go to Q10)
No, but plan to enroll in the future . . . . . 2 (Go to Q10)
Yes, a Master's degree . . . . . 3 (Go to Q8)
Yes, a professional degree (M.D., D.V.M., etc.) . . 4 (Go to Q8)
Yes, a Doctorate (Ph.D., Ed.D., etc.) . . . . . 5 (Go to Q8)
Other (describe) _____ . . 6 (Go to Q8)

8. If you completed an advanced degree after college:

a. What year was your most recent advanced degree received? _____

b. What is the name of the university from which you received your highest degree? _____

c. What is the major, discipline, or specialty area of this advanced degree?

_____

9. Was your major (discipline or specialty area) located in a division, college, or school of agriculture?

No . . . 1 Yes . . . 2

Part 2: Career Mobility

The following questions are about the employers and kinds of full-time work you have done since leaving college. Consider a full-time job as one that involves 6 hours or more of work a day for 4 or more days a week, outside your home.

10. Have you been employed full-time at any time since leaving college?

Yes, self-employed full-time . 1 (Continue with Q11)
Yes, employed full-time . . . . 2 (Continue with Q11)
No, still in college . . . . . 3 (Go to Q21 on page 10)
No, looking for employment . . 4 (Go to Q21 on page 10)
No, full-time homemaker . . . . 5 (Go to Q21 on page 10)
No, employed part-time . . . . 6 (Go to Q21 on page 10)
No, unable to work . . . . . 7 (Go to Q21 on page 10)

11. What year did you begin your first full-time job after leaving college?

a. Year _____ How long was this after leaving college? _____ Months

b. What was the name of your first full-time employer and where was this job located?

Name of your employer: _____

City: _____ State: _____ Zip _____ Country: _____

c. Were you self-employed on this job?

No . . . 1 Yes . . . 2

d. What kind of business or industry was this? (e.g. banking, farm implement sales, state agency) _____

e. What position or job title did you have? _____

f. What was the nature of the work you did in this position? (Please describe)

_____

g. What was your starting annual salary on this job? $_____

h. Did your duties in your first full-time job involve farming or agricultural business in any way?

No . . . 1 Farming . . . 2 Agri-business . . . 3

12. Which one of the following contributed most to finding your first full-time job? (Circle only one)

Placement office of college or university 1
Dean's office, departmental head, or faculty member . . . 2
Public employment service 3
Private employment service 4
Civil service application (local, state, federal) 5
Employment ad (newspaper, magazine, radio, TV, etc.) . . 6
Direct application to employer 7
Contacts of a relative or friend 8
Returned to family business or farm 9
Joined military service 10
Self-employment 11
None of these were of any help 12

13. How important was each of the following in your decision to accept this first full-time job? (Circle one number on each line)

	NOT IMPORTANT	SOMEWHAT IMPORTANT	IMPORTANT	VERY IMPORTANT	NO OPINION
a. Pay	1	2	3	4	5
b. Fringe benefits	1	2	3	4	5
c. Importance of work . .	1	2	3	4	5
d. Chance to be my own boss	1	2	3	4	5
e. Security of job	1	2	3	4	5
f. Working conditions . .	1	2	3	4	5
g. Challenges in the work	1	2	3	4	5
h. Chances for advancement	1	2	3	4	5
i. Opportunity to use my education	1	2	3	4	5
j. Opportunity to develop new skills	1	2	3	4	5
k. Respect people have for this kind of work . . .	1	2	3	4	5
l. Opportunities to travel	1	2	3	4	5
m. Good work associates .	1	2	3	4	5
n. Job as a whole	1	2	3	4	5
o. Amount of supervision .	1	2	3	4	5
p. Location of job	1	2	3	4	5

14. Which of the following insurance and fringe benefits did your company provide you on your first full-time job after college? (Check all that apply)

Medical . . [ ]	Unemployment . . . [ ]	Retirement (excluding Social Security) . . [ ]
Dental . . [ ]	Paid Vacation . . [ ]	
Accident . [ ]	Profit Sharing . . [ ]	Company-Provided Transportation . . . [ ]
Life . . . [ ]	Company Training Programs . . . . . [ ]	Housing . . . . . [ ]
Sick Pay . [ ]		Other (specify _____)[ ]

15. Given your experience on your first full-time job after leaving college, how strongly do you agree or disagree with the following? (Circle one number on each line)

	STRONGLY AGREE	AGREE	DISAGREE	STRONGLY DISAGREE	NO OPINION
a. I have applied much of what I learned in my agricultural courses	1	2	3	4	5
b. My most useful agricultural courses were those emphasizing practical applications . . .	1	2	3	4	5
c. I could have obtained my first job without completing any agricultural courses	1	2	3	4	5
d. Overall, I consider my first job about equal to what most students in other college majors obtain	1	2	3	4	5
e. Much of the coursework I took in agriculture was of little help on my first job .	1	2	3	4	5
f. I consider my choice of college major in agriculture a wise decision	1	2	3	4	5

16. a. How many months were you employed in your first full-time job?
_____ months (Includes promotions)

b. Are you still employed in your first full-time job?

No, I have a new job . . . . . 1 (Continue with Q17)
No, I returned to college . . . . 2 (Go to Q19)
No, full-time homemaker . . . . . 3 (Go to Q19)
No, unable to find work . . . . . 4 (Go to Q19)
No, working part-time . . . . . 5 (Go to Q19)
Yes, employed full-time . . . . . 6 (Go to Q19)

Please consider here your current full-time job.

17. For how many different employers (firms) have you worked full-time since leaving college? _____

a. What year did you begin your current full-time job? _____ Year

b. What is the name of your current employer and where is this current job located?

Name of your employer: _____

City: _____ State: _____ Zip _____ Country: _____

c. Are you self-employed?

No . . . 1 Yes . . . 2

d. What kind of business or industry is this? (e.g. banking, farm implement sales, state agency)

_____

e. What position or job title do you have? _____

f. What is the nature of the work you do in this position? (Please describe)

_____

g. What was your starting annual salary for your current job? $_____

h. How long have you been employed in your current full-time job? (Give response in total number of months) _____ months

i. Do your duties in your current job involve farming or agricultural business in any way?

No . . . 1 Yes . . . 2

j. Which one of the following contributed most to finding your current job? (Circle only one)

Placement office of college or university 1
Dean's office, departmental head, or faculty member . . . 2
Public employment service 3
Private employment service 4
Civil service application (local, state, federal) 5
Employment ad (newspaper, magazine, radio, TV, etc.) . . 6
Direct application to employer 7
Contacts of a relative or friend 8
Returned to family business or farm 9
Joined military service 10
Promotion or job transfer within company 11
Self-employment 12
None of these were of any help 13

k. Which of the following insurance and fringe benefits did your company provide you on your current job? (Check all that apply)

Medical . . [ ]	Unemployment . . . [ ]	Retirement (excluding Social Security) . . [ ]
Dental . . [ ]	Paid Vacation . . [ ]	
Accident . [ ]	Profit Sharing . . [ ]	Company-Provided Transportation . . . [ ]
Life . . . [ ]	Company Training Programs . . . . . [ ]	Housing . . . . . [ ]
Sick Pay . [ ]		Other (specify _____)[ ]

18. How satisfied are you with the following aspects of your current job? (Circle one number on each line)

	VERY DIS-SATISFIED	DIS-SATISFIED	SATISFIED	VERY SATISFIED	NO OPINION
a. Pay	1	2	3	4	5
b. Fringe benefits	1	2	3	4	5
c. Importance of work . .	1	2	3	4	5
d. Chance to be my own boss	1	2	3	4	5
e. Security of job	1	2	3	4	5
f. Working conditions . .	1	2	3	4	5
g. Challenges in the work	1	2	3	4	5
h. Chances for advancement	1	2	3	4	5
i. Opportunity to use my education	1	2	3	4	5
j. Opportunity to develop new skills	1	2	3	4	5
k. Respect people have for this kind of work . . .	1	2	3	4	5
l. Opportunities to travel	1	2	3	4	5
m. Good work associates .	1	2	3	4	5
n. Job as a whole	1	2	3	4	5
o. Amount of supervision .	1	2	3	4	5
p. Location of job	1	2	3	4	5

Part 3: College Curriculum Competencies and Skills

To improve your own career experiences, how would you rate the extent to which you needed or did not need to acquire the following competencies and skills in your college education? (Circle one number on each line)

	NOT NEEDED	SOMEWHAT NEEDED	MUCH NEEDED	ESSENTIAL	NOT SURE
19. Action Competencies:					
a. Skill in setting organizational goals and objectives	1	2	3	4	5
b. Skill in project and/or program evaluation	1	2	3	4	5
c. Skill in effective group leadership	1	2	3	4	5
d. Skill in oral communication . . .	1	2	3	4	5
e. Skill in motivating and managing others	1	2	3	4	5
f. Skill at using problem-solving techniques	1	2	3	4	5
g. Skill in negotiating employee/employer differences	1	2	3	4	5
h. Skill in computer use	1	2	3	4	5
i. Skill in handling consumer/customer relations	1	2	3	4	5
j. Skill in written communication .	1	2	3	4	5
k. Skill in finance and cost management	1	2	3	4	5
l. Skill in setting personal goals .	1	2	3	4	5
m. Skill in personal time management	1	2	3	4	5
n. Skill in basic statistical techniques	1	2	3	4	5
o. Skill in public speaking	1	2	3	4	5

How would you rate the extent to which you needed or did not need the following types of knowledge from your college agricultural courses for your career. (Circle one number on each line)

	NOT NEEDED	SOMEWHAT NEEDED	MUCH NEEDED	ESSENTIAL	NOT SURE
20. Agricultural Competencies:					
a. Knowledge of U.S. agricultural policy	1	2	3	4	5
b. Ability to set up farm record systems	1	2	3	4	5
c. Ability to evaluate agricultural investment alternatives	1	2	3	4	5
d. Knowledge of natural resource property rights	1	2	3	4	5
e. Awareness of world food problems	1	2	3	4	5
f. Knowledge of economically important forest resources . . .	1	2	3	4	5
g. Ability to estimate the quantity of forest products on a site . .	1	2	3	4	5
h. Knowledge of livestock/poultry breeds and characteristics . . .	1	2	3	4	5
i. Ability to identify basic feed nutrient requirements for livestock and poultry	1	2	3	4	5
j. Knowledge of basic methods for controlling livestock/poultry diseases	1	2	3	4	5
k. Ability to identify major agronomic crops grown in U.S. . .	1	2	3	4	5
l. Knowledge of distinctive characteristics of annual, biennial, and perennial plants .	1	2	3	4	5
m. Knowledge of plant nutrient requirements	1	2	3	4	5
n. Knowledge of micro-organism functions in soils	1	2	3	4	5
o. Knowledge of environmental effects of water management on water quality	1	2	3	4	5

		NOT NEEDED	SOMEWHAT NEEDED	MUCH NEEDED	ESSENTIAL	NOT SURE
p.	Ability to interpret and use soil test results	1	2	3	4	5
q.	Knowledge of landscape design and selection of plant materials . .	1	2	3	4	5
r.	Knowledge of basic agricultural production systems	1	2	3	4	5
s.	Knowledge of agricultural mechanics	1	2	3	4	5
t.	Knowledge of efficient production in agriculture	1	2	3	4	5
u.	Knowledge of agricultural chemicals and their uses	1	2	3	4	5
v.	Ability to calibrate planters and spraying equipment	1	2	3	4	5
w.	Knowledge of agricultural economics	1	2	3	4	5

Part 4: Opinions about Agricultural Careers

21. Next are a few statements about careers in agriculture. Please indicate whether you strongly disagree, disagree, agree, strongly agree, or have no opinion for each of the following statements. (Circle one number on each line)

		STRONGLY DISAGREE	DISAGREE	AGREE	STRONGLY AGREE	NO OPINION
a.	Agriculture graduates lack awareness of issues facing agriculture	1	2	3	4	5
b.	Most agricultural occupations are not suitable for women . .	1	2	3	4	5
c.	There are good career opportunities in agriculture .	1	2	3	4	5
d.	People in agriculture need more understanding of the ethics related to their work	1	2	3	4	5
e.	There is a lack of information about agricultural employment opportunities	1	2	3	4	5

	STRONGLY DISAGREE	DISAGREE	AGREE	STRONGLY AGREE	NO OPINION
f. Most people working in agriculture have incomes equal to persons in other industries	1	2	3	4	5
g. Most professionals in agriculture deserve to receive more recognition for their work than they do at present	1	2	3	4	5
h. Agriculture is a declining industry	1	2	3	4	5

Part 5: Personal Characteristics

Your responses to this final set of questions will help us understand what you and other former college students report about your experiences since 1977.

22. Are you male or female?

Male . . . 1 Female . . . 2

23. How do you describe yourself? (Circle only one number)

American Indian 1
Black 2
Mexican-American or Chicano . . . 3
Puerto Rican 4
Other Latin-American Origin 5
Oriental or Asian American 6
White 7
Other 8

24. What was your age at your last birthday? _____ years of age

25. What is your current marital status?

Married . . . 1 No Longer Married . . . 2 Never Married . . . 2

26. How many children do you support? _____ children

27. Which category would you estimate best describes your total personal income before taxes in 1985? Exclude the income of other family members, if possible.

Under $10,000 1
$10,000 to $14,999 . . 2
$15,000 to $19,999 . . 3
$20,000 to $24,999 . . 4
$25,000 to $29,000 . . 5
$30,000 to $34,999 . . 6
$35,000 to $39,999 . . 7
$40,000 to $49,999 . . 8
$50,000 to $74,999 . . 9
$75,000 or more 10

28. Do you presently operate a farm or ranch?

No . . . 1 (Go to Q29)

Yes . . 2 (Go to Q28 a, b, and c)

a. How many acres were owned and leased in your farm/ranch operation in 1985?

Total . . . . . _____ acres

Own . . . . . _____ acres

Leased from others . . . . _____ acres

Leased to others . . . . . _____ acres

b. About what was your 1985 approximate gross farm income (including government payments, custom work performed for others, and production sales, but excluding hunting and oil or gas lease income)? $_____

c. On a scale from 0 to 10 where 0 means "very dissatisfied", 5 means neither dissatisfied nor satisfied, and 10 means "very satisfied", rate your level of satisfaction with farming or ranching as an occupation. (Circle one number)

0	1	2	3	4	5	6	7	8	9	10
Very Dissatisfied					Neither				Very Satisfied	

29. In which type of place do you now reside and where would you prefer to live? (Circle one number for each column under a and b)

	a. I now live in	b. I prefer to live in
Large metropolitan city (population over 500,000) . . .	1	1
Medium-sized city (population 50,000 to 500,000) . . .	2	2
Smaller city (population 10,000 to 50,000)	3	3
In the country (outside of a city or village)	4	4
In the country on a farm or ranch	5	5

30. How many times since leaving college have you changed the city, county, and state in which you live? (If answer is never, enter 0 in each space)

a. City: _____ times b. County: _____ times c. State: _____ times

31. Since leaving college, what is the total amount of time you have been unemployed, between jobs? _____ weeks (Enter 0 if none)

Appendix B
Consumer Price Index 1967 = 100

YEAR	CPI
1967	100.0
1968	104.2
1969	109.8
1970	116.3
1971	121.3
1972	125.3
1973	133.1
1974	147.7
1975	161.2
1976	174.3
1977	181.5
1978	195.4
1979	217.4
1980	246.8
1981	272.4
1982	289.1
1983	298.4
1984	311.1
1985	322.2
1986	328.4
1987	340.4

Source: Agricultural Statistics, 1986 (USDA, United States Government Printing Office, Washington: 1986);
Monthly Labor Review
Bureau of Labor Statistics, United States Department of Labor, April 1988, Vol. 11, No. 4

Appendix C
First Job Starting Income Model Raw Data

ADJS	AGMAJ	ADV	AGJOB	SEX	SOUTH	JOBYEAR	PLCMT	PAY	PRFT	HSG	NOAG	EQUAL
.	2	0	2	1	0	78	.	2	1	1	1	1
15666.1	2	1	1	1	1	80	3	1	1	1	1	2
15976.9	2	1	1	0	1	77	4	2	1	1	2	3
13011.0	1	3	1	0	1	81	1	2	1	1	2	1
13191.4	1	1	2	1	1	78	3	1	1	1	2	2
16717.4	1	1	1	1	1	82	2	1	1	1	2	2
24852.9	1	1	2	1	1	77	3	2	1	1	2	1
22846.4	1	1	1	1	1	80	4	1	1	1	2	2
20611.6	2	1	1	1	1	78	4	2	2	1	2	2
16489.3	1	1	1	1	1	78	3	1	1	1	1	2
10374.4	2	1	1	0	1	79	3	1	1	1	1	2
6527.6	1	1	2	1	1	80	4	1	1	1	1	2
12957.1	1	1	1	0	1	83	3	1	1	1	1	1
13055.1	1	1	2	1	1	80	3	1	1	1	2	1
20281.8	1	1	1	1	0	78	3	2	1	1	1	1
18525.8	1	1	2	1	1	79	2	1	1	1	1	2
14840.3	1	1	1	0	0	78	3	1	1	1	1	2
16489.3	1	1	2	0	0	78	1	1	1	1	2	1
9799.1	1	1	1	1	1	77	3	1	1	1	1	3
17624.4	1	1	2	1	1	80	1	1	1	1	2	2
18962.6	2	1	1	1	1	78	.	1	1	1	3	1
29680.7	2	1	1	1	1	78	3	2	2	1	1	2
25633.3	1	3	1	1	0	82	1	2	2	1	2	2
14785.2	0	1	1	1	1	81	1	1	2	1	1	1
20059.8	1	1	1	0	1	77	1	1	1	1	1	1
.	1	1	1	0	1	78	3	1	1	1	1	2
19787.1	1	1	2	1	1	78	3	1	1	1	2	1
18797.7	2	1	1	1	1	78	1	1	2	1	1	1
8279.7	2	1	2	0	0	81	4	1	1	1	2	1
15829.7	1	1	1	1	1	78	3	2	2	1	1	2
16864.5	1	1	2	1	0	77	1	2	1	1	1	1
21436.0	1	1	1	1	1	78	1	1	1	1	2	1
24691.5	0	1	1	1	1	73	3	2	2	1	.	.
.	2	2	2	1	1	79	1	1	2	1	1	2
17043.7	2	1	1	1	1	79	3	2	1	1	2	1
11489.7	2	.	1	1	1	78	1	1	1	1	1	2
15666.1	1	3	1	0	1	80	3	1	1	1	2	1
11096.8	2	3	2	1	1	80	4	3	1	2	1	2
16421.6	1	1	1	1	0	78	3	2	1	1	1	2
17042.0	2	1	2	0	1	77	1	1	1	1	2	1
.	1	1	1	0	1	79	4	2	.	.	1	2
15013.4	0	2	1	1	1	80	3	1	1	1	1	2
14820.6	2	1	1	1	1	79	1	1	1	1	2	2
14820.6	1	1	1	0	1	79	4	1	1	1	1	2

ADJS	AGMAJ	ADV	AGJOB	SEX	SOUTH	JOBYEAR	PLCMT	PAY	PRFT	HSG	NOAG	EQUAL
16489.3	1	1	2	0	1	78	4	2	1	1	2	2
.	1	3	2	0	1	82	1	1	1	1	2	2
13055.1	2	3	1	1	1	80	1	1	1	1	2	3
.	1	.	1	1	1	80	1	2	1	2	1	1
23085.0	1	1	1	1	1	78	3	2	2	1	1	1
29680.7	2	1	1	1	0	78	4	2	1	1	1	2
13577.3	1	1	2	1	1	80	1	1	1	1	2	1
.	2	1	1	0	1	79	3	1	1	1	1	2
21302.5	2	1	1	1	0	77	3	1	1	1	1	3
23499.2	1	1	2	0	1	80	1	2	2	1	2	2
.	0	1	1	0	1	79	3	2	1	1	3	3
17155.4	1	1	2	1	1	78	1	1	1	1	2	1
14820.6	2	1	1	1	0	79	1	1	1	2	2	2
23085.0	2	1	1	1	0	78	4	2	2	1	1	2
13338.5	2	1	1	1	1	79	3	1	1	1	2	1
14015.9	1	1	2	0	1	78	1	1	1	1	2	2
.	1	1	2	0	1	78	3	1	1	1	1	2
16196.4	2	1	1	1	1	83	4	2	1	1	1	1
15666.1	0	1	1	1	1	80	.	2	1	1	3	1
14201.7	2	1	1	1	1	77	1	1	1	1	2	2
17752.1	1	1	1	0	1	77	3	1	1	1	2	2
21765.8	1	.	2	1	1	78	1	2	1	2	2	2
.	1	1	.	0	.	.	.	.	.	.	.	.
13191.4	0	0	1	1	1	78	3	1	2	2	1	2
10953.2	1	3	2	0	1	80	1	1	1	1	1	2
12532.9	1	1	2	0	1	80	4	1	1	1	1	2
14820.6	2	1	1	1	1	79	1	2	1	1	2	2
8224.7	2	1	1	1	0	80	3	1	1	1	1	2
7833.1	1	1	2	1	1	80	3	1	1	2	2	1
26110.2	0	3	1	0	0	80	3	1	1	2	1	1
17313.7	2	1	2	1	1	78	1	2	2	1	2	1
17932.9	1	1	2	0	0	79	2	2	1	1	2	1
14752.3	0	2	1	0	1	80	4	1	1	1	1	1
20007.8	2	1	2	1	1	79	4	1	1	1	2	2
19787.1	1	1	2	1	1	78	4	1	1	1	1	2
16864.5	1	1	2	1	1	77	3	2	1	1	2	1
10356.8	1	1	2	1	1	84	3	1	1	1	2	2
11828.2	0	1	1	0	1	81	3	1	1	1	3	2
17624.4	1	1	2	1	1	80	1	2	2	1	2	2
14840.3	2	1	2	1	1	78	1	2	2	2	2	2
14820.6	1	1	1	1	0	79	4	1	1	1	1	1
19787.1	2	2	1	1	1	78	1	2	1	1	2	1
16302.7	1	2	2	1	1	79	3	2	1	1	2	1
21290.7	1	1	2	1	1	81	3	1	1	1	2	3
15976.9	1	1	2	1	1	77	1	2	1	1	2	2
27323.1	0	1	1	1	0	81	1	2	2	1	1	3
16971.6	2	1	1	0	1	80	3	1	1	1	1	1
17276.1	1	3	2	0	1	83	1	2	1	1	2	2
15013.4	1	1	1	0	1	80	3	.	1	1	1	2
13191.4	0	1	1	0	1	78	3	1	1	1	2	2
16864.5	1	1	2	1	1	77	3	1	1	1	1	2
29680.7	0	1	1	0	0	78	2	2	2	1	1	2
18277.1	1	1	2	0	1	80	1	1	1	1	2	1
.	1	.	.	1	.	.	3	1	1	1	2	2
14079.6	1	1	2	0	0	79	3	2	1	1	2	1

ADJS	AGMAJ	ADV	AGJOB	SEX	SOUTH	JOBYEAR	PLCMT	PAY	PRFT	HSG	NOAG	EQUAL
17784.7	2	1	1	1	1	79	4	2	1	1	1	2
19582.7	0	1	1	0	1	80	3	1	1	1	1	2
14820.6	2	1	2	1	1	79	4	2	1	1	1	2
15664.8	1	1	2	1	1	78	3	1	1	1	2	1
13338.5	2	1	1	1	1	79	3	1	1	1	2	2
20699.3	2	1	1	0	1	81	1	2	2	1	2	1
5335.4	2	1	1	1	0	79	1	1	1	2	1	1
19582.7	1	1	2	1	1	80	4	2	1	1	1	1
18946.4	1	3	1	0	1	82	3	1	1	1	1	2
20060.9	1	.	2	1	1	82	4	1	1	1	2	2
13055.1	1	2	2	0	1	80	1	1	1	1	2	2
15143.9	1	2	2	0	1	80	1	1	1	1	2	1
10172.2	2	1	1	1	1	81	3	2	1	2	1	2
16154.4	1	1	1	1	1	77	4	2	1	1	1	2
14193.8	2	1	1	1	1	81	3	1	1	1	2	2
.	1	1	1	0	1	77	3	2	1	2	1	2
16156.6	2	3	1	1	1	84	4	2	2	1	1	2
18525.8	1	1	2	1	1	79	3	1	1	2	2	1
22230.9	1	1	2	1	0	79	4	2	1	1	2	1
.	1	1	1	0	1	78	3	1	1	1	1	2
13055.1	0	1	1	0	1	80	3	1	1	1	2	1
11236.8	1	1	1	0	1	81	3	1	2	1	1	2
18525.8	1	1	2	1	1	79	1	1	1	1	2	1
26994.0	1	3	1	1	0	83	3	2	1	1	1	1
19582.7	1	1	2	1	1	80	1	1	1	1	2	1
16489.3	2	1	1	1	1	78	3	1	1	1	1	2
15858.0	2	1	1	1	1	79	3	1	2	1	1	2
12957.1	1	3	2	0	1	83	3	1	1	2	2	2
8485.8	2	1	2	0	1	80	3	1	1	1	1	2
14015.9	2	1	1	1	1	78	3	1	2	1	1	2
13707.9	1	2	2	0	1	80	3	1	1	1	1	2
11608.4	1	2	2	1	1	78	3	1	1	1	1	2
10444.1	0	2	1	1	1	80	3	1	1	1	1	2
.	2	1	1	1	0	78	3	2	1	1	1	3
17313.7	1	1	2	0	1	78	3	2	1	1	2	1
19787.1	2	1	1	0	1	78	3	2	1	1	1	2
26110.2	1	2	2	0	1	80	1	1	1	1	2	1
15666.1	2	2	1	1	1	80	1	1	1	1	2	1
13338.5	0	1	1	1	1	79	3	1	1	1	3	3
8892.4	1	1	1	0	1	79	3	1	1	1	1	2
16196.4	1	3	2	1	1	83	3	1	1	1	1	2
16489.3	1	1	2	1	1	78	3	2	1	1	2	1
10503.7	2	1	1	1	1	78	3	1	2	1	1	2
23713.0	2	1	1	1	1	79	3	2	1	1	1	2
26677.1	1	1	2	1	1	79	4	1	2	1	1	2
11856.5	1	1	2	1	1	79	4	1	2	2	1	3
14820.6	1	1	1	1	0	79	3	2	1	1	1	2
15413.4	2	1	1	1	0	79	3	2	2	1	1	3
15089.3	1	2	1	1	0	77	3	1	1	1	2	2
12428.2	2	3	1	1	0	84	3	1	1	1	2	2
14015.9	1	1	1	0	1	78	3	1	1	1	1	2
12781.5	0	1	1	1	1	77	3	1	1	2	1	2
.	2	2	1	1	1	78	3	1	1	1	1	1
.	0	1	1	1	0	80	3	1	1	2	1	1
13590.6	2	1	1	1	1	81	3	1	1	1	2	2

ADJS	AGMAJ	ADV	AGJOB	SEX	SOUTH	JOBYEAR	PLCMT	PAY	PRFT	HSG	NOAG	EQUAL
17752.1	1	1	2	1	1	77	3	2	1	1	2	3
13338.5	2	1	1	1	1	79	3	1	1	1	1	2
23077.7	2	1	1	1	1	77	3	1	1	1	1	2
28159.2	2	1	2	1	1	79	3	2	1	1	2	3
7420.2	1	1	2	0	1	78	4	1	1	1	1	2
.	1	1	2	1	1	78	4	1	1	1	1	1
25633.3	1	3	2	1	1	82	4	2	2	1	2	1
21436.0	2	1	1	1	1	78	1	2	1	1	2	1
17784.7	1	1	1	0	1	79	3	1	1	1	1	2
14193.8	0	1	1	0	1	81	4	2	1	1	1	2
16291.4	2	1	1	1	1	78	4	1	1	1	2	3
16489.3	2	1	2	0	0	78	3	1	1	1	2	3
23085.0	2	1	1	1	1	78	3	2	2	2	1	2
12366.9	2	1	2	1	1	78	4	1	1	2	2	2
14193.8	1	2	2	1	1	81	3	2	1	1	2	1
23077.7	1	1	1	1	1	77	3	2	2	1	1	3
22154.6	2	1	1	1	0	77	3	1	1	1	1	2
10226.2	1	1	2	0	1	79	1	1	1	1	2	1
14675.4	0	1	1	0	1	78	3	1	1	1	1	2
17219.5	2	1	1	1	1	77	1	1	2	1	1	2
10444.1	1	1	2	0	1	80	3	1	1	1	1	2
20748.9	2	1	2	1	1	79	3	1	1	1	2	1
17742.3	1	1	1	0	1	81	4	2	1	1	2	1
16489.3	2	1	1	1	1	78	3	2	1	2	1	1
18277.1	2	1	1	0	1	80	3	1	1	1	1	2
19787.1	1	1	2	0	0	78	4	1	1	2	2	1
26079.1	0	1	1	0	1	82	1	2	1	1	3	2
15013.4	1	1	1	1	1	80	1	1	1	1	2	1
11096.8	2	1	1	1	0	80	4	1	1	1	2	2
17043.7	1	1	2	0	1	79	3	1	1	1	2	2
22190.1	2	1	1	1	1	77	3	1	2	2	1	2
14820.6	1	1	2	1	0	79	4	1	2	2	1	2
26747.8	0	1	1	1	1	82	1	2	2	1	.	2
14380.2	0	1	1	1	1	80	3	1	1	1	1	2
23120.1	2	1	2	1	1	79	1	1	2	1	2	2
.	0	1	1	1	0	79	4	2	1	1	1	2
13055.1	1	1	1	0	1	80	4	1	1	1	1	2
16971.6	2	1	2	0	1	80	3	1	1	1	2	1
7833.1	1	2	1	0	1	80	4	2	1	1	1	2
23610.2	1	1	1	1	0	77	2	2	1	1	2	2
13338.5	1	2	2	1	1	79	3	1	1	1	2	1
14193.8	1	1	1	0	1	81	3	1	1	1	1	2
24804.7	0	1	1	1	1	80	3	1	1	2	3	1
16996.0	1	1	2	1	1	82	4	2	1	1	1	1
20888.2	0	1	1	1	0	80	3	2	1	2	1	1
14820.6	2	1	2	1	1	79	3	1	1	1	1	2
15976.9	1	1	2	0	1	77	4	1	1	1	2	1
14675.4	2	2	2	1	1	78	1	1	1	1	2	2
24454.0	2	3	2	1	1	79	1	2	2	1	2	1
17752.1	1	1	2	1	1	77	4	2	1	1	2	2
19704.8	2	1	1	1	1	77	1	1	1	1	2	2
11749.6	1	1	1	0	1	80	3	1	1	1	1	2
17752.1	1	1	2	1	1	77	3	1	1	1	2	3
22230.9	1	1	2	0	1	79	3	2	2	1	2	3
16489.3	1	1	1	1	1	78	3	1	1	1	1	2

ADJS	AGMAJ	ADV	AGJOB	SEX	SOUTH	JOBYEAR	PLCMT	PAY	PRFT	HSG	NOAG	EQUAL
20060.9	0	3	2	1	1	82	1	1	1	1	1	2
15976.9	1	2	2	0	0	77	3	1	1	1	1	2
17784.7	.	1	2	1	1	79	4	1	1	2	1	3
21302.5	2	1	1	1	1	77	4	1	1	1	1	1
19266.8	1	1	1	0	0	79	4	2	1	1	2	1
19582.7	2	1	1	1	1	80	3	1	1	1	2	2
14015.9	1	1	2	0	0	78	1	1	1	1	2	1
11828.2	0	1	1	1	1	81	4	1	1	1	1	2
17754.9	2	1	2	1	1	80	3	1	1	1	1	1
17752.1	1	1	2	1	1	77	4	1	1	1	1	2
23499.2	1	2	1	1	1	80	4	2	1	1	1	2
.	1	1	2	1	1	77	4	1	2	2	3	3
10651.2	1	1	2	0	1	77	3	1	1	1	2	2
13338.5	0	0	1	1	1	79	.	2	1	1	1	3
22289.9	0	0	2	1	1	82	3	2	2	1	1	2
3521.3	0	2	1	1	1	84	4	1	1	1	1	2
.	0	0	1	1	1	79	3	2	1	1	1	1
12426.4	1	0	2	1	1	77	4	1	1	2	1	2
13407.6	0	1	1	0	1	80	3	2	1	1	1	1
39574.2	1	0	1	1	1	78	4	2	2	1	1	1
20888.2	1	3	1	0	1	80	3	1	1	1	2	2
23499.2	0	0	1	1	1	80	4	2	1	1	1	2
.	1	1	1	0	1	81	3	1	1	1	1	1
18895.8	0	3	1	0	1	83	4	1	1	1	1	3
20107.9	0	2	1	1	0	81	3	1	1	2	1	1
15000.0	0	3	1	1	1	85	3	1	1	1	2	1
.	1	0	.	0	.	.	.	.	.	.	.	.
8915.9	0	1	2	1	1	82	3	1	1	1	1	3
13055.1	0	0	1	1	0	80	.	1	1	1	1	1
12037.2	0	0	1	1	0	78	3	2	1	1	1	2
13314.0	0	0	1	0	1	77	4	2	2	1	1	2
.	0	1	1	1	1	81	4	1	1	1	3	2

Appendix D
Least Squares Means for First Job Income Model

LEAST SQUARES MEANS FOR FIRST JOB INCOME MODEL

Parameter	ADJS Lsmeans	Std Err Lsmeans	Prob > ITI Ho: Lsmean (I) = Lsmeans (J)
			I/J 1 2 3 4
ADV			
B.S.	15987.40	1730.15	1 .
Complete adv	19283.34	1808.75	2 0.009 .
Enrlld adv	15406.09	2000.22	3 0.603 0.013 .
No B.S.	15899.63	2464.68	4 0.963 0.134 0.817 .
PAY			1 2 3
Very/ impt	20415.11	982.74	1 .
No opinion	12056.97	4733.92	2 0.012 .
Not/smwhat imp	17460.27	992.63	3 0.001 0.260 .
GENDER			Ho: Lsmean 1 = Lsmean 2
Female	15765.13	1791.88	0.0121
Male	17523.01	1703.77	

Source: S-200 1987, project survey of Virginia Tech students

Appendix E
1985 Job Income Model Raw Data

OBS	INC2	SEX	MARITAL	RESID	ADV	AGMAJ	NUMJOB	JBSTATE2	AGJOB2	PRFT	HSG	PAY	SOILTST	ORAL	AGPOL
1	27500	1	2	1	0	2	5	1	1	1	1	2	1	2	1
2	32500	1	1	1	1	2	2	0	1	2	1	1	1	2	1
3	32500	0	1	1	1	2	1	1	1	1	1	2	1	2	1
4	17500	0	1	1	3	1	4	0	1	2	1	2	1	2	1
5	27500	1	2	2	1	1	4	0	2	2	1	1	1	2	1
6	22500	1	1	1	1	1	2	1	1	2	1	1	1	2	1
7	27500	1	2	2	1	1	2	1	1	2	1	2	1	2	1
8	22500	1	1	2	1	1	1	1	1	1	1	1	2	2	1
9	32500	1	2	2	1	2	3	1	1	2	1	2	1	2	1
10	17500	1	1	1	1	1	4	1	2	1	1	1	1	2	1
11	27500	0	2	1	1	2	2	1	1	1	1	1	1	2	1
12	17500	1	1	2	1	1	2	1	2	1	1	1	2	2	1
13	17500	0	1	2	1	1	1	1	1	1	1	1	1	2	1
14	17500	1	2	1	1	1	3	1	1	1	1	1	2	2	1
15	27500	1	1	1	1	1	2	0	2	1	1	2	1	2	1
16	27500	1	1	1	3	1	1	.	1	1	2	1	1	2	1
17	17500	1	1	2	1	1	2	1	2	1	1	1	2	2	2
18	22500	0	2	2	1	1	3	0	1	2	1	1	1	2	1
19	37500	0	2	2	3	1	2	1	1	2	1	1	1	2	2
20	17500	1	1	1	1	1	1	1	1	1	1	1	1	2	1
21	17500	1	1	1	1	1	2	1	1	1	1	1	1	2	1
22	27500	1	1	1	1	2	1	1	1	1	1	1	2	2	1
23	22500	1	2	1	1	2	2	1	1	2	1	2	1	2	1
24	32500	1	1	1	3	1	2	0	2	1	1	2	1	2	1
25	22500	1	1	1	1	0	3	1	1	2	1	1	1	1	1
26	32500	0	1	1	1	1	1	1	1	1	1	1	1	1	1
27	27500	0	1	1	1	1	3	1	1	1	2	1	1	2	1
28	45000	1	1	1	1	1	2	1	1	2	1	1	1	2	1
29	27500	1	1	1	3	2	1	1	1	2	1	1	1	2	1
30	7500	0	1	1	3	2	5	.	.	.	.	1	1	2	1
31	62500	1	1	1	1	1	3	0	1	1	1	2	1	2	1
32	45000	1	1	2	1	1	4	1	2	1	1	2	1	2	1
33	27500	1	1	.	1	1	3	1	1	1	1	1	2	1	1
34	45000	1	1	1	3	0	3	1	1	2	1	2	.	2	.
35	.	1	1	1	2	2	1	1	2	2	1	1	1	2	1
36	22500	1	1	1	1	2	1	1	1	1	1	2	1	2	1
37	22500	1	1	2	.	2	3	1	2	1	1	1	1	2	1
38	17500	0	1	1	3	1	1	1	1	1	1	1	1	2	1
39	37500	1	1	1	3	2	4	0	2	2	1	3	1	2	1
40	27500	1	1	1	1	1	1	1	1	1	1	2	1	2	1
41	7500	0	1	1	1	2	5	.	.	.	.	1	2	2	1
42	12500	0	1	1	1	1	2	1	2	1	1	2	1	2	1
43	32500	1	2	1	2	0	1	1	1	1	1	1	1	2	1
44	22500	1	1	2	1	2	2	0	1	1	2	1	2	2	1
45	7500	0	1	2	1	1	5	.	.	.	.	1	1	1	1
46	27500	0	1	2	1	1	1	1	2	1	1	2	1	2	2
47	7500	0	1	1	3	1	5	.	.	.	.	1	2	2	1
48	22500	1	1	2	3	2	1	1	1	1	1	1	1	2	2
49	37500	1	1	1	.	1	1	1	1	1	2	2	.	2	.
50	45000	1	1	1	1	1	1	1	1	2	1	2	1	2	1
51	45000	1	1	1	3	2	4	0	1	2	2	2	1	2	1
52	12500	1	2	1	1	1	4	1	2	1	1	1	2	2	1
53	.	0	1	1	1	2	5	.	.	.	.	1	1	2	2
54	32500	1	2	1	1	2	5	1	1	1	2	1	1	2	1
55	37500	0	1	1	1	1	2	1	1	1	1	2	1	2	1

OBS	INC2	SEX	MARITAL	RESID	ADV	AGMAJ	NUMJOB	JBSTATE2	AGJOB2	PRFT	HSG	PAY	SOILTST	ORAL	AGPOL
56	17500	0	2	1	1	0	3	1	1	2	1	2	.	2	.
57	22500	1	1	2	1	1	1	1	2	1	1	1	2	2	1
58	17500	1	1	1	1	2	3	1	1	1	1	1	1	2	1
59	12500	1	1	2	1	2	3	0	2	1	1	2	1	2	1
60	32500	1	1	1	1	2	2	1	1	1	1	1	1	2	1
61	7500	0	1	2	3	1	5	.	.	.	.	1	2	2	1
62	7500	0	1	2	1	1	5	.	.	.	.	1	2	2	1
63	17500	1	2	2	1	2	1	1	1	1	1	2	1	1	1
64	22500	1	2	1	1	0	5	0	1	2	1	2	1	2	1
65	62500	1	1	2	1	2	2	1	2	2	1	1	1	2	1
66	17500	0	2	1	.	1	5	0	2	1	1	1	1	2	1
67	22500	0	1	2	1	1	5	.	.	.	.	1	2	2	1
68	17500	1	1	2	.	1	2	1	2	1	1	2	1	2	1
69	7500	0	1	1	1	1	5	.	.	.	.	.	.	.	.
70	17500	1	2	1	1	0	2	1	1	2	1	1	1	2	1
71	17500	0	1	1	3	1	2	1	1	1	1	1	1	2	1
72	22500	0	2	1	3	1	5	.	.	.	.	1	2	2	1
73	22500	1	1	2	1	2	2	1	2	1	1	2	1	2	1
74	12500	1	2	1	1	2	4	0	1	2	1	1	2	1	2
75	17500	1	1	2	1	1	3	1	2	1	1	1	2	2	2
76	27500	0	2	1	3	0	1	0	1	1	2	1	3	2	3
77	37500	1	1	1	1	2	1	1	2	2	1	2	2	2	1
78	27500	0	2	1	1	1	2	0	2	2	1	2	1	2	1
79	32500	0	1	1	2	0	5	.	.	.	.	1	1	2	1
80	22500	1	1	2	1	2	1	1	2	1	1	1	1	2	1
81	22500	1	1	2	1	1	1	1	2	1	1	1	2	2	1
82	37500	1	1	1	3	1	5	.	.	.	.	2	1	2	1
83	7500	1	1	1	1	1	1	1	2	1	1	1	2	2	1
84	7500	0	2	1	1	0	3	1	1	1	1	1	1	2	1
85	12500	1	1	2	1	1	2	1	2	1	2	2	2	2	1
86	22500	1	1	2	1	2	3	0	2	1	1	2	1	2	2
87	22500	1	2	1	3	1	2	1	2	1	1	1	1	2	1
88	12500	1	1	1	2	2	3	1	1	1	1	2	1	1	1
89	32500	1	2	1	2	1	1	1	2	1	1	2	2	2	2
90	22500	1	2	2	1	1	5	.	.	.	.	1	1	2	2
91	27500	1	1	2	1	1	2	1	2	2	1	2	1	2	1
92	45000	1	1	1	1	0	1	0	1	2	1	2	1	2	1
93	32500	0	1	1	1	2	1	0	1	1	2	1	1	2	1
94	22500	0	1	2	3	1	1	1	2	1	1	2	1	2	2
95	17500	0	2	1	3	1	5	.	.	.	.	.	1	2	1
96	7500	0	1	2	1	0	5	.	.	.	.	1	1	2	1
97	22500	1	1	1	1	1	1	1	2	1	1	1	2	2	1
98	32500	0	1	1	3	0	3	0	1	2	1	2	1	2	1
99	22500	0	1	1	3	1	3	0	2	2	1	1	2	2	1
100	12500	1	1	2	.	1	3	.	2	1	1	1	2	2	1
101	7500	0	1	1	1	1	5	.	.	.	.	2	1	2	2
102	37500	1	1	1	1	2	3	1	1	1	1	2	1	2	1
103	17500	0	2	1	3	0	2	0	1	1	1	1	1	2	1
104	17500	1	1	2	1	2	1	1	2	1	1	2	2	2	1
105	32500	1	1	2	1	1	2	1	2	2	1	1	1	2	1
106	22500	1	1	2	1	2	3	1	1	1	1	1	1	2	1
107	27500	0	2	1	1	2	1	1	1	2	1	2	1	2	1
108	17500	1	2	1	1	2	2	1	1	1	1	1	1	2	1
109	22500	1	1	2	1	1	1	1	1	2	1	2	1	2	1
110	32500	0	2	1	3	1	1	1	1	1	1	1	1	2	1

OBS	INC2	SEX	MARITAL	RESID	ADV	AGMAJ	NUMJOB	JBSTATE2	AGJOB2	PRFT	HSG	PAY	SOILTST	ORAL	AGPOL
111	22500	1	2	2	.	1	3	1	2	2	1	1	1	2	1
112	27500	0	1	2	2	1	5	.	.	.	.	1	2	1	1
113	12500	0	1	1	2	1	4	1	1	2	1	1	2	2	1
114	17500	1	1	1	1	2	1	1	1	1	2	2	1	2	1
115	12500	1	1	2	1	1	1	.	2	1	1	2	1	2	1
116	27500	1	2	2	1	2	1	1	1	1	1	1	2	2	1
117	12500	0	2	1	1	1	4	1	1	2	1	2	2	2	1
118	32500	1	1	1	3	2	1	1	1	2	1	2	1	2	1
119	37500	1	1	1	1	1	2	1	2	1	1	1	1	2	1
120	27500	1	1	2	1	1	2	0	2	2	1	2	2	2	2
121	7500	0	2	1	3	1	5	1	1	1	1	1	1	1	1
122	27500	0	2	1	3	0	4	0	1	2	1	1	1	2	1
123	22500	0	1	1	1	1	4	1	1	2	1	1	1	2	1
124	32500	1	1	1	1	1	2	1	1	1	1	1	2	2	2
125	27500	1	1	1	3	1	2	1	1	1	1	2	1	2	1
126	17500	1	1	2	1	1	2	1	2	2	1	1	1	2	1
127	32500	1	1	1	1	2	5	1	1	1	1	1	1	2	1
128	32500	1	1	1	3	2	2	1	1	2	1	1	2	2	2
129	27500	0	1	2	3	1	2	1	2	1	1	1	1	2	1
130	7500	0	1	2	1	2	5	.	.	.	.	1	2	2	1
131	27500	1	1	1	1	2	1	1	1	2	1	1	2	2	2
132	22500	0	1	1	2	1	5	.	.	.	.	1	2	2	1
133	27500	1	1	2	1	1	2	0	2	1	2	1	1	2	1
134	22500	1	2	1	2	0	2	1	1	2	1	1	1	2	1
135	.	1	2	2	1	2	5	1	1	1	1	2	1	2	1
136	22500	0	1	1	1	1	5	1	1	1	1	2	1	1	1
137	17500	0	1	1	1	2	4	1	1	2	1	2	1	1	1
138	17500	0	2	1	2	1	5	.	.	.	.	1	1	2	2
139	7500	1	2	1	2	2	5	.	.	.	.	1	1	2	3
140	22500	1	1	1	3	0	2	.	1	1	1	1	1	2	1
141	17500	0	2	1	1	1	1	1	1	1	1	1	1	1	1
142	32500	1	1	2	3	1	1	1	2	1	1	1	1	2	1
143	22500	1	1	2	1	1	1	1	2	1	1	2	1	2	1
144	7500	1	2	1	1	2	4	1	1	1	1	1	1	2	1
145	22500	1	2	1	1	2	1	1	1	1	1	2	1	1	1
146	.	1	.	.	1	1	1	1	2	2	1	1	.	.	.
147	12500	1	2	2	1	1	1	1	2	2	2	1	1	2	2
148	27500	0	1	1	1	1	4	1	2	2	1	2	2	2	1
149	17500	1	1	1	1	2	3	0	2	2	1	2	1	2	1
150	7500	1	2	1	2	1	5	.	.	.	.	1	1	2	2
151	12500	0	2	1	3	2	5	1	1	1	1	1	1	2	1
152	12500	0	1	1	1	1	5	.	.	.	.	1	1	2	1
153	37500	1	1	1	1	0	1	1	1	1	2	1	1	2	1
154	7500	1	2	2	2	2	5	.	.	.	.	1	1	2	1
155	22500	0	2	1	1	0	3	1	1	1	1	1	1	2	1
156	27500	1	2	1	1	2	3	0	1	1	1	1	2	2	1
157	22500	1	1	1	1	1	1	1	2	1	1	2	2	2	1
158	22500	1	2	2	1	2	5	1	1	2	1	1	1	2	1
159	22500	1	2	1	1	2	3	1	1	1	1	1	1	2	1
160	37500	1	1	1	3	2	1	1	2	1	1	2	1	2	1
161	27500	0	2	1	1	1	5	1	2	1	1	1	1	2	1
162	12500	1	1	2	1	1	1	1	2	1	1	1	2	2	1
163	22500	1	1	1	3	1	3	1	2	1	1	2	2	2	2
164	32500	1	1	2	1	2	1	1	1	1	1	2	1	2	1
165	22500	0	2	1	1	1	2	1	1	1	1	1	2	2	2

OBS	INC2	SEX	MARITAL	RESID	ADV	AGMAJ	NUMJOB	JBSTATE2	AGJOB2	PRFT	HSG	PAY	SOILTST	ORAL	AGPOL
166	27500	0	2	1	1	0	2	0	1	2	1	2	1	1	1
167	22500	1	1	2	1	2	1	1	1	1	1	1	2	2	1
168	7500	0	2	2	1	2	5	.	.	.	.	1	1	1	2
169	62500	1	1	1	1	2	2	1	1	2	1	2	1	2	1
170	17500	1	1	2	1	2	4	1	2	1	1	1	1	2	1
171	17500	1	1	2	2	1	2	1	2	1	1	2	1	2	1
172	27500	1	1	1	3	1	3	0	2	2	1	2	1	2	2
173	27500	1	1	2	1	2	5	1	1	1	1	1	1	2	1
174	12500	0	2	1	1	1	4	0	2	1	1	1	2	2	1
175	22500	0	2	2	1	0	2	1	1	1	1	1	1	2	1
176	45000	1	1	1	1	2	5	.	1	1	1	1	1	2	1
177	7500	0	1	2	1	1	1	1	2	1	1	1	2	2	1
178	22500	1	1	2	1	2	2	1	2	1	2	1	2	2	1
179	22500	0	2	1	1	1	1	1	1	1	1	2	1	2	1
180	27500	1	1	1	1	2	1	1	1	1	2	2	1	2	1
181	7500	0	1	1	1	2	5	.	.	.	.	1	1	2	1
182	22500	0	2	2	1	1	3	0	2	1	2	1	1	2	2
183	32500	1	1	1	1	0	1	1	1	1	1	2	1	2	1
184	17500	1	1	2	3	1	1	1	1	1	1	1	1	2	1
185	27500	0	2	1	1	2	4	1	2	1	1	1	1	2	1
186	32500	1	1	1	1	1	3	0	2	1	1	1	1	2	1
187	32500	1	1	2	1	2	5	1	2	1	1	1	1	2	2
188	12500	1	1	2	1	1	1	0	2	1	2	1	2	2	1
189	37500	1	1	1	1	0	1	1	1	2	1	2	.	2	.
190	22500	1	1	2	3	0	2	1	1	1	1	1	1	2	1
191	32500	0	2	1	1	2	2	0	1	2	1	1	1	2	1
192	22500	1	2	1	1	0	3	1	2	2	1	2	1	1	1
193	27500	0	1	2	1	1	2	1	1	1	1	1	1	2	1
194	22500	1	1	2	1	2	1	1	2	1	1	1	2	2	2
195	17500	0	2	1	2	1	3	1	1	2	1	2	2	2	2
196	32500	1	1	1	1	1	2	1	1	1	1	2	1	2	1
197	17500	1	1	2	2	1	2	1	1	1	1	1	1	2	1
198	22500	0	1	1	1	1	2	1	1	1	1	1	1	2	1
199	32500	1	1	1	3	0	1	1	1	1	2	1	3	2	3
200	22500	1	2	2	1	1	1	1	2	1	1	2	1	2	1
201	27500	1	2	1	1	0	2	1	1	1	1	2	1	2	1
202	27500	1	1	2	1	2	1	1	2	2	1	1	1	2	1
203	37500	0	1	1	1	1	5	1	1	1	1	1	1	2	1
204	22500	1	2	2	2	2	4	1	2	2	1	1	1	2	1
205	27500	1	1	2	3	2	2	1	2	2	1	2	1	2	1
206	32500	1	1	1	1	1	2	0	2	2	1	2	2	2	2
207	32500	1	1	2	1	2	1	1	1	1	1	1	1	2	1
208	32500	0	2	1	1	1	2	1	2	1	1	1	1	2	2
209	27500	1	1	1	1	1	1	1	2	1	1	1	1	2	2
210	22500	0	1	2	3	1	2	1	1	1	1	2	2	2	1
211	22500	1	2	1	3	1	3	1	1	2	1	1	1	2	1
212	27500	1	2	1	3	0	1	1	2	1	1	1	1	2	1
213	17500	0	1	1	2	1	3	1	2	1	1	1	2	1	1
214	37500	1	1	2	1	.	1	1	2	1	2	1	2	2	1
215	45000	1	1	2	1	2	1	1	1	1	1	1	1	1	1
216	27500	0	1	1	1	1	4	1	2	1	1	2	1	2	1
217	27500	1	1	1	1	2	1	1	1	1	1	1	1	2	1
218	22500	0	1	1	1	1	4	0	2	2	1	1	1	2	1
219	45000	1	1	1	1	0	3	1	1	1	1	1	1	2	1
220	27500	1	2	1	1	2	1	1	1	1	2	1	1	2	1

OBS	INC2	SEX	MARITAL	RESID	ADV	AGMAJ	NUMJOB	JBSTATE2	AGJOB2	PRFT	HSG	PAY	SOILTST	ORAL	AGPOL
221	12500	1	1	2	1	1	1	1	2	1	1	1	2	2	1
222	27500	1	1	2	2	1	3	1	1	2	1	2	1	2	1
223	7500	1	1	2	1	1	1	1	2	2	2	1	2	1	2
224	17500	0	1	1	1	1	4	1	1	1	1	1	1	2	1
225	27500	1	1	2	0	0	3	1	1	2	1	2	1	1	1
226	37500	1	2	1	0	0	1	1	2	1	1	2	1	2	2
227	12500	1	1	1	2	0	2	1	1	2	1	1	1	1	1
228	17500	1	1	2	0	0	2	1	2	1	1	2	2	2	2
229	22500	1	1	2	0	1	3	1	1	1	1	1	2	2	1
230	12500	0	1	2	1	0	3	1	1	1	1	2	1	1	1
231	37500	1	1	2	0	1	1	1	1	2	1	2	2	2	2
232	7500	0	1	2	3	1	5	.	.	.	.	1	1	2	1
233	45000	1	2	1	0	0	1	1	1	1	1	2	1	1	1
234	12500	0	1	2	1	1	1	1	1	1	1	1	.	2	.
235	32500	0	2	1	3	0	1	1	1	1	1	1	1	2	2
236	27500	1	1	2	2	0	1	0	1	1	2	1	1	2	1
237	32500	1	1	1	3	0	2	1	1	2	1	1	3	2	3
238	32500	0	1	.	0	1	5	.	.	.	.	.	.	.	.
239	7500	1	2	2	1	0	1	1	1	1	1	1	.	1	.
240	.	1	.	2	0	0	5	0	1	1	1	1	.	2	1
241	22500	1	1	1	0	0	4	0	1	1	1	2	1	2	1
242	12500	0	2	2	0	0	2	1	1	2	1	2	1	1	1
243	37500	1	1	2	1	0	4	1	1	2	1	1	1	2	1

Appendix F
Least Squares Means for 1985 Job Income Model

LEAST SQUARES MEANS FOR 1985 JOB INCOME MODEL

Parameter	ADJS Lsmeans	Std Err Lsmeans	Prob > ITI
PROFIT			Ho: Lsmean 1 = Lsmean 2
Not Provided	23782.87	3870.92	0.0680
Provided	26431.72	3837.24	
ORAL			Ho: Lsmean 1 = Lsmean 2
Much need/ess	28189.77	3724.16	0.0055
Not/ smwhat	22024.83	4147.75	
SOILTST			Ho: Lsmean 1 = Lsmean 2
Much need/ess	*	*	*
Not sure	*	*	*
Not/ smwhat	*	*	*
MARITAL			Ho: Lsmean 1 = Lsmean 2
Married	26801.39	3788.72	0.0227
Not married	23413.21	3924.23	
RESIDEN			Ho: Lsmean 1 = Lsmean 2
Non-urban	23583.93	3928.82	0.0346
Urban	26630.66	3775.68	

* - Non-estimable

Source: S-200 1987, project survey of Virginia Tech students

Appendix G
1985 Job Income Model Raw Data (Lagged Formulation)

INC2	ADJS	SEX	MARITAL	RESID	ADV	AGMAJ	JBYEAR2	NUMJOB	JBSTATE2	AGJOB2	PRFT	HSG	PAY	SOILTST	ORAL	AGPOL
27500	.	1	2	1	0	2	85	5	1	1	1	1	2	1	2	1
32500	15666.1	1	1	1	1	2	81	2	0	1	2	1	1	1	2	1
32500	15976.9	0	1	1	1	2	82	1	1	1	1	1	2	1	2	1
17500	13011.0	0	1	1	3	1	.	4	0	1	2	1	2	1	2	1
27500	13191.4	1	2	2	1	1	84	4	0	2	2	1	1	1	2	1
22500	16717.4	1	1	1	1	1	83	2	1	1	2	1	1	1	2	1
27500	24852.9	1	2	2	1	1	81	2	1	1	2	1	2	1	2	1
22500	22846.4	1	1	2	1	1	85	1	1	1	1	1	1	2	2	1
32500	20611.6	1	2	2	1	2	85	3	1	1	2	1	2	1	2	1
17500	16489.3	1	1	1	1	1	81	4	1	2	1	1	1	1	2	1
27500	10374.4	0	2	1	1	2	83	2	1	1	1	1	1	1	2	1
17500	6527.6	1	1	2	1	1	83	2	1	2	1	1	1	2	2	1
17500	12957.1	0	1	2	1	1	.	1	1	1	1	1	1	1	2	1
17500	13055.1	1	2	1	1	1	84	3	1	1	1	1	1	2	2	1
27500	20281.8	1	1	1	1	1	82	2	0	2	1	1	2	1	2	1
27500	44380.2	1	1	1	3	1	77	1	.	1	2	1	2	1	2	1
17500	18525.8	1	1	2	1	1	82	2	1	2	1	1	1	2	2	2
22500	14840.3	0	2	2	1	1	81	3	0	1	2	1	1	1	2	1
37500	16489.3	0	2	2	3	1	83	2	1	1	2	1	1	1	2	2
17500	9799.1	1	1	1	1	1	77	1	1	1	1	1	1	1	2	1
17500	17624.4	1	1	1	1	1	.	2	1	1	1	1	1	1	2	1
27500	18962.6	1	1	1	1	2	78	1	1	1	1	1	1	2	2	1
22500	29680.7	1	2	1	1	2	84	2	1	1	2	1	2	1	2	1
32500	25633.3	1	1	1	3	1	84	2	0	2	1	1	2	1	2	1
22500	14785.2	1	1	1	1	0	85	3	1	1	2	1	1	1	1	1
32500	20059.8	0	1	1	1	1	77	1	1	1	1	1	1	1	1	1
27500	.	0	1	1	1	1	79	3	1	1	1	2	1	1	2	1
45000	19787.1	1	1	1	1	1	85	2	1	1	2	1	1	1	2	1
27500	18797.7	1	1	1	3	2	78	1	1	1	2	1	1	1	2	1
7500	8279.7	0	1	1	3	2	.	5	.	.	.	.	1	1	2	1
62500	15829.7	1	1	1	1	1	85	3	0	1	1	1	2	1	2	1
45000	16864.5	1	1	2	1	1	85	4	1	2	1	1	2	1	2	1
27500	21436.0	1	1	.	1	1	81	3	1	1	1	1	1	2	1	1
45000	24691.5	1	1	1	3	0	80	3	1	1	2	1	2	.	2	.
.	.	1	1	1	2	2	84	1	1	2	2	1	1	1	2	1
22500	17043.7	1	1	1	1	2	79	1	1	1	1	1	2	1	2	1
22500	11489.7	1	1	2	.	2	84	3	1	2	1	1	1	1	2	1
17500	15666.1	0	1	1	3	1	80	1	1	1	1	1	1	1	2	1
37500	11096.8	1	1	1	3	2	84	4	0	2	2	1	3	1	2	1
27500	16421.6	1	1	1	1	1	82	1	1	1	1	1	2	1	2	1
7500	17042.0	0	1	1	1	2	.	5	.	.	.	.	1	2	2	1
12500	.	0	1	1	1	1	83	2	1	2	1	1	2	1	2	1
32500	15013.4	1	2	1	2	0	80	1	1	1	1	1	1	1	2	1
22500	14820.6	1	1	2	1	2	81	2	0	1	1	2	1	2	2	1

INC2	ADJS	SEX	MARITAL	RESID	ADV	AGMAJ	JBYEAR2	NUMJOB	JBSTATE2	AGJOB2	PRFT	HSG	PAY	SOILTST	ORAL	AGPOL
12500	.	1	1	2	.	1	81	3	.	2	1	1	1	2	2	1
7500	14079.6	0	1	1	1	1	.	5	.	.	.	.	2	1	2	2
37500	17784.7	1	1	1	1	2	85	3	1	1	1	1	2	1	2	1
17500	19582.7	0	2	1	3	0	85	2	0	1	1	1	1	1	2	1
17500	14820.6	1	1	2	1	2	79	1	1	2	1	1	2	2	2	1
32500	15664.8	1	1	2	1	1	83	2	1	2	2	1	1	1	2	1
22500	13338.5	1	1	2	1	2	.	3	1	1	1	1	1	1	2	1
27500	20699.3	0	2	1	1	2	81	1	1	1	2	1	2	1	2	1
17500	5335.4	1	2	1	1	2	82	2	1	1	1	1	1	1	2	1
22500	19582.7	1	1	2	1	1	.	1	1	1	2	1	2	1	2	1
32500	18946.4	0	2	1	3	1	82	1	1	1	1	1	1	1	2	1
22500	20060.9	1	2	2	.	1	85	3	1	2	2	1	1	1	2	1
27500	13055.1	0	1	2	2	1	.	5	.	.	.	.	1	2	1	1
12500	15143.9	0	1	1	2	1	84	4	1	1	2	1	1	2	2	1
17500	10172.2	1	1	1	1	2	.	1	1	1	1	2	2	1	2	1
12500	16154.4	1	1	2	1	1	79	1	.	2	1	1	2	1	2	1
27500	14193.8	1	2	2	1	2	81	1	1	1	1	1	1	2	2	1
12500	.	0	2	1	1	1	81	4	1	1	2	1	2	2	2	1
32500	16156.6	1	1	1	3	2	84	1	1	1	2	1	2	1	2	1
37500	18525.8	1	1	1	1	1	81	2	1	2	1	1	1	1	2	1
27500	22230.9	1	1	2	1	1	79	2	0	2	2	1	2	2	2	2
7500	.	0	2	1	3	1	84	5	1	1	1	1	1	1	1	1
27500	13055.1	0	2	1	3	0	85	4	0	1	2	1	1	1	2	1
22500	11236.8	0	1	1	1	1	.	4	1	1	2	1	1	1	2	1
32500	18525.8	1	1	1	1	1	83	2	1	1	1	1	1	2	2	2
27500	26994.0	1	1	1	3	1	.	2	1	1	1	1	2	1	2	1
17500	19582.7	1	1	2	1	1	84	2	1	2	2	1	1	1	2	1
32500	16489.3	1	1	1	1	2	.	5	1	1	1	1	1	1	2	1
32500	15858.0	1	1	1	3	2	84	2	1	1	2	1	1	2	2	2
27500	12957.1	0	1	2	3	1	85	2	1	2	1	1	1	1	2	1
7500	8485.8	0	1	2	1	2	.	5	.	.	.	.	1	2	2	1
27500	14015.9	1	1	1	1	2	78	1	1	1	2	1	1	2	2	2
22500	13707.9	0	1	1	2	1	.	5	.	.	.	.	1	2	2	1
27500	11608.4	1	1	2	1	1	81	2	0	2	1	2	1	1	2	1
22500	10444.1	1	2	1	2	0	81	2	1	1	2	1	1	1	2	1
.	.	1	2	2	1	2	83	5	1	1	1	1	2	1	2	1
22500	17313.7	0	1	1	1	1	83	5	1	1	1	1	2	1	1	1
17500	19787.1	0	1	1	1	2	82	4	1	1	2	1	2	1	1	1
17500	26110.2	0	2	1	2	1	.	5	.	.	.	.	1	1	2	2
7500	15666.1	1	2	1	2	2	.	5	.	.	.	.	1	1	2	3
22500	13338.5	1	1	1	3	0	.	2	.	1	1	1	1	1	2	1
17500	8892.4	0	2	1	1	1	84	1	1	1	1	1	1	1	1	1
32500	16196.4	1	1	2	3	1	83	1	1	2	1	1	1	1	2	1
22500	16489.3	1	1	2	1	1	78	1	1	2	1	1	2	1	2	1
7500	10503.7	1	2	1	1	2	85	4	1	1	1	1	1	1	2	1
22500	23713.0	1	2	1	1	2	79	1	1	1	1	1	2	1	1	1
.	26677.1	1	.	.	1	1	79	1	1	2	2	1	1	.	.	.
12500	11856.5	1	2	2	1	1	79	1	1	2	2	2	1	1	2	2
27500	14820.6	0	1	1	1	1	80	4	1	2	2	1	2	2	2	1
17500	15413.4	1	1	1	1	2	.	3	0	2	2	1	2	1	2	1
7500	15089.3	1	2	1	2	1	.	5	.	.	.	.	1	1	2	2
12500	12428.2	0	2	1	3	2	.	5	1	1	1	1	1	1	2	1
12500	14015.9	0	1	1	1	1	.	5	.	.	.	.	1	1	2	1
37500	12781.5	1	1	1	1	0	77	1	1	1	1	2	1	1	2	1
7500	.	1	2	2	2	2	.	5	.	.	.	.	1	1	2	1

INC2	ADJS	SEX	MARITAL	RESID	ADV	AGMAJ	JBYEAR2	NUMJOB	JBSTATE2	AGJOB2	PRFT	HSG	PAY	SOILTST	ORAL	AGPOL
22500	.	0	2	1	1	0	85	3	1	1	1	1	1	1	2	1
27500	13590.6	1	2	1	1	2	84	3	0	1	1	1	1	2	2	1
22500	17752.1	1	1	1	1	1	77	1	1	2	1	1	2	2	2	1
22500	13338.5	1	2	2	1	2	.	5	1	1	2	1	1	1	2	1
22500	23077.7	1	2	1	1	2	85	3	1	1	1	1	1	1	2	1
37500	28159.2	1	1	1	3	2	79	1	1	2	1	1	2	1	2	1
27500	7420.2	0	2	1	1	1	83	5	1	2	1	1	1	1	2	1
12500	.	1	1	2	1	1	78	1	1	2	1	1	1	2	2	1
22500	25633.3	1	1	1	3	1	84	3	1	2	1	1	2	2	2	2
32500	21436.0	1	1	2	1	2	78	1	1	1	1	1	2	1	2	1
22500	17784.7	0	2	1	1	1	81	2	1	1	1	1	1	2	2	2
27500	14193.8	0	2	1	1	0	84	2	0	1	2	1	2	1	1	1
22500	16291.4	1	1	2	1	2	78	1	1	1	1	1	1	2	2	1
7500	16489.3	0	2	2	1	2	.	5	.	.	.	.	1	1	1	2
62500	23085.0	1	1	1	1	2	82	2	1	1	2	1	2	1	2	1
17500	12366.9	1	1	2	1	2	84	4	1	2	1	1	1	1	2	1
17500	14193.8	1	1	2	2	1	83	2	1	2	1	1	2	1	2	1
27500	23077.7	1	1	1	3	1	84	3	0	2	2	1	2	1	2	2
27500	22154.6	1	1	2	1	2	84	5	1	1	1	1	1	1	2	1
12500	10226.2	0	2	1	1	1	.	4	0	2	1	1	1	2	2	1
22500	14675.4	0	2	2	1	0	84	2	1	1	1	1	1	1	2	1
45000	17219.5	1	1	1	1	2	83	5	.	1	1	1	1	1	2	1
7500	10444.1	0	1	2	1	1	.	1	1	2	1	1	1	2	2	1
22500	20748.9	1	1	2	1	2	85	2	1	2	1	2	1	2	2	1
22500	17742.3	0	2	1	1	1	81	1	1	1	1	1	2	1	2	1
27500	16489.3	1	1	1	1	2	78	1	1	1	1	2	2	1	2	1
7500	18277.1	0	1	1	1	2	.	5	.	.	.	.	1	1	2	1
22500	19787.1	0	2	2	1	1	85	3	0	2	1	2	1	1	2	2
32500	26079.1	1	1	1	1	0	82	1	1	1	1	1	2	1	2	1
17500	15013.4	1	1	2	3	1	81	1	1	1	1	1	1	1	2	1
27500	11096.8	0	2	1	1	2	85	4	1	2	1	1	1	1	2	1
32500	17043.7	1	1	1	1	1	84	3	0	2	1	1	1	1	2	1
32500	22190.1	1	1	2	1	2	.	5	1	2	1	1	1	1	2	2
12500	14820.6	1	1	2	1	1	79	1	0	2	1	2	1	2	2	1
37500	26747.8	1	1	1	1	0	82	1	1	1	2	1	2	.	2	.
22500	14380.2	1	1	2	3	0	83	2	1	1	1	1	1	1	2	1
32500	23120.1	0	2	1	1	2	.	2	0	1	2	1	1	1	2	1
22500	.	1	2	1	1	0	82	3	1	2	2	1	2	1	1	1
27500	13055.1	0	1	2	1	1	84	2	1	1	1	1	1	1	2	1
22500	16971.6	1	1	2	1	2	80	1	1	2	1	1	1	2	2	2
17500	7833.1	0	2	1	2	1	84	3	1	1	2	1	2	2	2	2
32500	23610.2	1	1	1	1	1	79	2	1	1	1	1	2	1	2	1
17500	13338.5	1	1	2	2	1	79	2	1	1	1	1	1	1	2	1
22500	14193.8	0	1	1	1	1	.	2	1	1	1	1	1	1	2	1
32500	24804.7	1	1	1	3	0	80	1	1	1	1	2	1	3	2	3
22500	16996.0	1	2	2	1	1	82	1	1	2	1	1	2	1	2	1
27500	20888.2	1	2	1	1	0	83	2	1	1	1	1	2	1	2	1
27500	14820.6	1	1	2	1	2	80	1	1	2	2	1	1	1	2	1
37500	15976.9	0	1	1	1	1	84	5	1	1	1	1	1	1	2	1
22500	14675.4	1	2	2	2	2	81	4	1	2	2	1	1	1	2	1
27500	24454.0	1	1	2	3	2	82	2	1	2	2	1	2	1	2	1
32500	17752.1	1	1	1	1	1	80	2	0	2	2	1	2	2	2	2
32500	19704.8	1	1	2	1	2	77	1	1	1	1	1	1	1	2	1
32500	11749.6	0	2	1	1	1	80	2	1	2	1	1	1	1	2	2
27500	17752.1	1	1	1	1	1	77	1	1	2	1	1	1	1	2	2

INC2	ADJS	SEX	MARITAL	RESID	ADV	AGMAJ	JBYEAR2	NUMJOB	JBSTATE2	AGJOB2	PRFT	HSG	PAY	SOILTST	ORAL	AGPOL
7500	14820.6	0	1	2	1	1	.	5	.	.	.	.	1	1	1	1
27500	16489.3	0	1	2	1	1	78	1	1	2	1	1	2	1	2	2
7500	.	0	1	1	3	1	.	5	.	.	.	.	1	2	2	1
22500	13055.1	1	1	2	3	2	80	1	1	1	1	1	1	1	2	2
37500	.	1	1	1	.	1	80	1	1	1	1	2	2	.	2	.
45000	23085.0	1	1	1	1	1	78	1	1	1	2	1	2	1	2	1
45000	29680.7	1	1	1	3	2	.	4	0	1	2	2	2	1	2	1
12500	13577.3	1	2	1	1	1	.	4	1	2	1	1	1	2	2	1
.	.	0	1	1	1	2	.	5	.	.	.	.	1	1	2	2
32500	21302.5	1	2	1	1	2	.	5	1	1	1	2	1	1	2	1
37500	23499.2	0	1	1	1	1	82	2	1	1	1	1	2	1	2	1
17500	.	0	2	1	1	0	83	3	1	1	2	1	2	.	2	.
22500	17155.4	1	1	2	1	1	78	1	1	2	1	1	1	2	2	1
17500	14820.6	1	1	1	1	2	.	3	1	1	1	1	1	1	2	1
12500	23085.0	1	1	2	1	2	.	3	0	2	1	1	2	1	2	1
32500	13338.5	1	1	1	1	2	79	2	1	1	1	1	1	1	2	1
7500	14015.9	0	1	2	3	1	.	5	.	.	.	.	1	2	2	1
7500	.	0	1	2	1	1	.	5	.	.	.	.	1	2	2	1
17500	16196.4	1	2	2	1	2	83	1	1	1	1	1	2	1	1	1
22500	15666.1	1	2	1	1	0	.	5	0	1	2	1	2	1	2	1
62500	14201.7	1	1	2	1	2	.	2	1	2	2	1	1	1	2	1
17500	2130.2	0	2	1	.	1	79	5	0	2	1	1	1	1	2	1
22500	17752.1	0	1	2	1	1	.	5	.	.	.	.	1	2	2	1
17500	21765.8	1	1	2	.	1	81	2	1	2	1	1	2	1	2	1
7500	.	0	1	1	1	1	.	5	.	.	.	.	.	.	.	.
17500	13191.4	1	2	1	1	0	85	2	1	1	2	1	1	1	2	1
17500	10953.2	0	1	1	3	1	.	2	1	1	1	1	1	1	2	1
22500	12532.9	0	2	1	3	1	.	5	.	.	.	.	1	2	2	1
22500	14820.6	1	1	2	1	2	80	2	1	2	1	1	2	1	2	1
12500	8224.7	1	2	1	1	2	.	4	0	1	2	1	1	2	1	2
17500	7833.1	1	1	2	1	1	85	3	1	2	1	1	1	2	2	2
27500	26110.2	0	2	1	3	0	80	1	0	1	1	2	1	3	2	3
37500	17313.7	1	1	1	1	2	78	1	1	2	2	1	2	2	2	1
27500	17932.9	0	2	1	1	1	.	2	0	2	2	1	2	1	2	1
32500	14752.3	0	1	1	2	0	.	5	.	.	.	.	1	1	2	1
22500	20007.8	1	1	2	1	2	79	1	1	2	1	1	1	1	2	1
22500	19787.1	1	1	2	1	1	78	1	1	2	1	1	1	2	2	1
37500	16864.5	1	1	1	3	1	.	5	.	.	.	.	2	1	2	1
7500	10356.8	1	1	1	1	1	84	1	1	2	1	1	1	2	2	1
7500	11828.2	0	2	1	1	0	.	3	1	1	1	1	1	1	2	1
12500	17624.4	1	1	2	1	1	82	2	1	2	1	2	2	2	2	1
22500	14840.3	1	1	2	1	2	85	3	0	2	1	1	2	1	2	2
22500	14820.6	1	2	1	3	1	84	2	1	2	1	1	1	1	2	1
12500	19787.1	1	1	1	2	2	84	3	1	1	1	1	2	1	1	1
32500	16302.7	1	2	1	2	1	79	1	1	2	1	1	2	2	2	2
22500	21290.7	1	2	2	1	1	.	5	.	.	.	.	1	1	2	2
27500	15976.9	1	1	2	1	1	80	2	1	2	2	1	2	1	2	1
45000	27323.1	1	1	1	1	0	81	1	0	1	2	1	2	1	2	1
32500	16971.6	0	1	1	1	2	81	1	0	1	1	2	1	1	2	1
22500	17276.1	0	1	2	3	1	83	1	1	2	1	1	2	1	2	2
17500	15013.4	0	2	1	3	1	.	5	.	.	.	.	.	1	2	1
7500	13191.4	0	1	2	1	0	.	5	.	.	.	.	1	1	2	1
22500	16864.5	1	1	1	1	1	77	1	1	2	1	1	1	2	2	1
32500	29680.7	0	1	1	3	0	84	3	0	1	2	1	2	1	2	1
22500	18277.1	0	1	1	3	1	85	3	0	2	2	1	1	2	2	1

INC2	ADJS	SEX	MARITAL	RESID	ADV	AGMAJ	JBYEAR2	NUMJOB	JBSTATE2	AGJOB2	PRFT	HSG	PAY	SOILTST	ORAL	AGPOL
22500	22230.9	0	1	2	3	1	.	2	1	1	1	1	2	2	2	1
22500	16489.3	1	2	1	3	1	.	3	1	1	2	1	1	1	2	1
27500	20060.9	1	2	1	3	0	83	1	1	2	1	1	1	1	2	1
17500	15976.9	0	1	1	2	1	82	3	1	2	1	1	1	2	1	1
37500	17784.7	1	1	2	1	.	79	1	1	2	1	2	1	2	2	1
45000	21302.5	1	1	2	1	2	77	1	1	1	1	1	1	1	1	1
27500	19266.8	0	1	1	1	1	83	4	1	2	1	1	2	1	2	1
27500	19582.7	1	1	1	1	2	80	1	1	1	1	1	1	1	2	1
22500	14015.9	0	1	1	1	1	80	4	0	2	2	1	1	1	2	1
45000	11828.2	1	1	1	1	0	82	3	1	1	1	1	1	1	2	1
27500	17754.9	1	2	1	1	2	81	1	1	1	1	2	1	1	2	1
12500	17752.1	1	1	2	1	1	77	1	1	2	1	1	1	2	2	1
27500	23499.2	1	1	2	2	1	82	3	1	1	2	1	2	1	2	1
7500	.	1	1	2	1	1	77	1	1	2	2	2	1	2	1	2
17500	10651.2	0	1	1	1	1	84	4	1	1	1	1	1	1	2	1
27500	13338.5	1	1	2	0	0	.	3	1	1	2	1	2	1	1	1
37500	22289.9	1	2	1	0	0	85	1	1	2	1	1	2	1	2	2
12500	3521.3	1	1	1	2	0	85	2	1	1	2	1	1	1	1	1
17500	.	1	1	2	0	0	80	2	1	2	1	1	2	2	2	2
22500	12426.4	1	1	2	0	1	79	3	1	1	1	1	1	2	2	1
12500	13407.6	0	1	2	1	0	85	3	1	1	1	1	2	1	1	1
37500	39574.2	1	1	2	0	1	78	1	1	1	2	1	2	2	2	2
7500	20888.2	0	1	2	3	1	.	5	.	.	.	.	1	1	2	1
45000	23499.2	1	2	1	0	0	80	1	1	1	1	1	2	1	1	1
12500	.	0	1	2	1	1	81	1	1	1	1	1	1	.	2	.
32500	18895.8	0	2	1	3	0	83	1	1	1	1	1	1	1	2	2
27500	20107.9	1	1	2	2	0	81	1	0	1	1	2	1	1	2	1
32500	15000.0	1	1	1	3	0	85	2	1	1	2	1	1	3	2	3
32500	.	0	1	.	0	1	.	5	.	.	.	.	.	.	.	.
7500	8915.9	1	2	2	1	0	85	1	1	1	1	1	1	.	1	.
.	13055.1	1	.	2	0	0	84	5	0	1	1	1	1	.	2	1
22500	12037.2	1	1	1	0	0	.	4	0	1	1	1	2	1	2	1
12500	13314.0	0	2	2	0	0	81	2	1	1	2	1	2	1	1	1
37500	.	1	1	2	1	0	83	4	1	1	2	1	1	1	2	1

Appendix H
Least Squares Means for 1985 Income Model, Lagged Formulation

LEAST SQUARES MEANS FOR 1985 INCOME MODEL, LAGGED FORMULATION

Parameter	ADJS Lsmeans	Std Err Lsmeans	Prob > ITI
PRFT			Ho: Lsmean 1 = Lsmean 2
Not provided	25910.02	3742.03	0.0885
Provided	28361.29	3723.14	
ORAL			Ho: Lsmean 1 = Lsmean 2
Much need/ess	29391.56	3599.79	0.0561
Not/ smwhat	24879.76	4078.38	
SOILTST			Ho: Lsmean 1 = Lsmean 2
Much need/ess	*	*	*
Not sure	*	*	*
Not/ smwhat	*	*	*
MARITAL			Ho: Lsmean 1 = Lsmean 2
Married	28607.62	3666.34	0.0449
Not married	25663.69	3802.58	
RESIDEN			Ho: Lsmean 1 = Lsmean 2
Non-urban	25513.14	3794.25	0.0209
Urban	28758.18	3662.34	

* - Non estimable

Source: S-200 1987, project survey of Virginia Tech students

VITA

Maria Cristina "Tina" Pineda Almero was born in Quezon City, Philippines on the 21st of October. The third child of Pepito M. Almero and Angeles A. Pineda, Tina graduated from the Ateneo de Manila University where she earned her degree in A.B. Economics - Honors in March, 1985.

Until May of 1986, Tina worked as a research assistant at the Asian Institute of Management in Makati, Philippines. The research project was under the ASEAN Regional Study Promotion Program which involved several South East Asian nations. In the Fall of 1986, she began graduate work at Virginia Tech. She completed her degree in M.S. Agricultural Economics in the summer of 1988.