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Returns to education in the Nevada hotel industry: Incentives for education in Nevada

Alan Lee Beard

University of Nevada, Las Vegas

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RETURNS TO EDUCATION IN THE NEVADA HOTEL INDUSTRY:

INCENTIVES FOR EDUCATION IN NEVADA

by

Alan Lee Beard II

Bachelor of Science
Kansas State University
1998

Bachelor of Arts
Kansas State University
1998

A thesis submitted in partial fulfillment
of the requirements for the

Master of Arts Degree
Department of Economics
College of Business

Graduate College
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The Thesis prepared by

Alan Lee Beard II

Entitled

Returns to Education in Nevada's Hotel Industry: Incentives for Education in Nevada

is approved in partial fulfillment of the requirements for the degree of

Master of Arts

Examination Committee Chair

Dean of the Graduate College

Examination Committee Member

Examination Committee Member

Graduate College Faculty Representative
ABSTRACT

Returns to Education in the Nevada Hotel Industry: Incentives for Education in Nevada

by

Alan Lee Beard II

Dr. Jeff Waddoups, Examination Committee Chair
Professor of Economics
University of Nevada, Las Vegas

The present study estimates returns to education in Nevada based on ideas found in human capital theory to provide insight into the incentives facing students or potential students in Nevada. Four industry/location categories were constructed using data from the Current Population Survey: the Las Vegas hotel industry, the hotel industry elsewhere in Nevada, all other industries in Las Vegas, and all other industries elsewhere in Nevada. Results indicate that there is a lack of a significant wage penalty for less educated workers in the hotel industry, this effect seems further compounded in Las Vegas. Furthermore, there appear to be clearer returns to education in other industries and elsewhere in Nevada. These conditions suggest that students anticipating employment in the Las Vegas hotel industry would be less likely to invest in additional units of human capital. These effects are posited to be a partial explanation why education rates in Nevada are among the lowest in the nation.
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CHAPTER 1

INTRODUCTION

Nevada has consistently been one of the lowest ranked states in the nation with respect to its residents' level of educational attainment as measured by its high school dropout and college continuation rates. In order to analyze this disturbing development in education rates, human capital theory will be used, which treats educational decisions as investment choices made by rational individuals. Rates of return to education will be estimated and interpreted using insights derived from human capital theory to explain the current trend in low levels of educational attainment. Furthermore, references will be made to the peculiarities of the local labor market, which may exacerbate the problems.

The Nevada school system has one of the highest dropout rates in the country, 7.8 percent during the 1998-1999 school year (Webster, 2000), and faces an ongoing battle to reduce the number of high school dropouts. Clark County, Nevada’s most urban county, has the highest dropout rate in the state, nine percent during the 1998-1999 school year. Lois Tarkanian, Clark County School Board member, names the appeal of jobs that do not require a high school education as a primary reason why students dropout of high school. In response to this current trend in high school dropout rates, Rep. Jim Gibbons, R-Nev., has ordered a federal probe to assess the situation (Webster, 2000). The probe would give Congress recommendations for federal legislation to aid in finding a solution. In addition to the dilemma with high school dropouts, there is also a problem with the rate at which high school graduates continue on to college. Ex-Chancellor Richard Jarvis of the University and Community College System of
Nevada reported to the state legislature that Nevada was ranked last in high school graduates continuing on to college, tied with Alaska (Ryan, 1997). The nation’s average is 57 percent, compared to 37 percent for Nevada. Like Tarkanian, then Senator Randolph Townsend, R-Reno, countered these figures by making reference to the peculiarities of Nevada’s regional labor market stating, “not every student in Nevada needs college.” Among these peculiarities is the abundance of relatively high paying jobs requiring only modest levels of skill, such as those observed in Nevada’s gaming industry. There is a limited supply of workers relative to the demand for those workers, which leads to the relatively high wages observed in Nevada.

One of the complaints directed towards the education system in Nevada is that there is not enough funding for individuals who want to attend college (Fink 1998). As a result, the state of Nevada has begun awarding Millennium Scholarships to Nevada’s high school graduates in an attempt to bolster continuation rates. The Millennium Scholarship awards the recipient up to $2,500 per year for four years and is funded by Nevada’s $1.5 billion tobacco settlement. The intuition behind offering the scholarship is that by effectively lowering the direct cost of education to Nevada residents, continuation rates will increase. However, this only captures one facet of the dilemma facing educators in Nevada. By naming the appeal of relatively high-paying jobs that require only modest levels of skill as a major source of Nevada’s educational woes, Brian Cram, former Clark County Schools Superintendent, makes reference to the high indirect cost, or high opportunity cost, of obtaining an education in Nevada.

The opportunity cost of attending college is the wages forgone during one’s time matriculated. If a college student had devoted his or her time spent in and around the classroom to wage or income producing endeavors s/he would have been paid for that productivity. The amount they would have otherwise been paid under gainful employ represents his or her opportunity cost of education. Furthermore, the amount of wages forgone during one’s period of schooling becomes relatively high in the absence of a significant wage premium for educated
workers. Hence, there is a high opportunity cost of education under such conditions. If the opportunity cost associated with attending college significantly outweighs the direct costs of education then it remains unclear whether the Millennium Scholarship program will substantially raise education rates in Nevada.

The purpose of the present study is to provide insight into the incentives facing high school students and graduates, and why education rates are so low in Nevada. The techniques employed to analyze Nevada's current educational woes consist of estimating earnings regressions and age-earnings profiles. The earnings regressions will be used to estimate rates of return to education relative to a high school education across four industry/location categories: the Las Vegas hotel industry, all other industries in Las Vegas, the hotel industry elsewhere in Nevada, and all other industries elsewhere in Nevada. Furthermore, the age-earnings profiles will also be estimated across industry/location categories and level of educational attainment to provide another perspective on how education affects earnings in Nevada.
CHAPTER 2

HUMAN CAPITAL THEORY AND THE DECISION TO INVEST: A REVIEW OF THE LITERATURE

Education rates in Nevada are among the lowest in the nation, as measured by the high school graduation rate and the college continuation rate. In order to combat these alarming statistics, a Federal probe has been commissioned to determine its causes. The current paper addresses the perceived under-education of Nevada in term of returns to education, so it may be helpful to start by explaining the theoretical basis of an empirical return to education.

Empirical Returns to Education

Workers are not homogeneous. Some workers are more productive than other workers, ceteris paribus. And the construct used to account for this difference is termed “human capital.” Human capital is comprised of an individual’s innate abilities and acquired skills, which makes them more productive. The theory used to explain the link between skills and wages, human capital theory, is a powerful analytical tool, which can be used to understand why individuals will invest in human capital. Human capital theory basically states that one’s wage varies directly with the amount of human capital one has obtained or, termed differently, individuals can expect to earn more with each additional unit of human capital acquired (i.e. education, training, etc.). The rudiments of human capital theory can be traced back to Jacob Mincer, whose 1958 study helped lay an empirical framework for estimating the return to human capital.
Mincer (1958) suggests that the reason a premium is paid for human capital is twofold. The first reason is that the development of human capital is a time intensive process. Mincer's operational model assumes that each year devoted to its acquisition postpones the individual's earnings for an additional year. Thus, the process of human capital acquisition generally shortens the earnings life of the individual. The second reason why individuals with higher amounts of training would command a higher salary is because they are posited to be more productive. Take for example someone who uses the “hunt-and-peck” method of typing versus someone trained in word processing. The training received by the person skilled in word processing would make him/her a much more proficient typist, assuming that there are no innate differences in ability.

Mincer's theory predicts that individuals with more training obtain a higher salary, ceteris paribus. Otherwise, there would be no economic incentive since a worker would expect to earn a similar wage regardless of the amount of training. Accordingly, rational individuals will undergo formal training (i.e. schooling) such that the net present value of their discounted lifetime earnings is maximized.\(^1\) Once individual preferences for training are permitted into the model, heterogeneity of labor incomes emerges. Mincer's work represents a milestone in human capital theory in that this study was one of the first to define earnings as the sum of returns to investment in human capital (i.e. training or education).

Individual, Institutional and Market Factors of Education

Mincer (1958) focused on the individual factors that determine the rate of return to human capital; however, this perspective provides only a limited analysis of human capital returns. Becker and Chiswick (1966) suggest that the rate of return on human capital for any

\(^1\) Note that the earnings differential that corresponds to a fixed difference in the amount of training is a multiplicative factor. In other words, the wage differential between persons with eight and six years of training is greater than the differential between persons with three and one years of training. One reason that the observed differential increases by a multiplicative factor is that the opportunity cost of training increases with the amount of training undertaken.
individual depends not only on individual factors, but institutional and market factors, also. Individual factors include one’s aptitude and preference for training; institutional factors include government programs such as grants and loan guarantees; and market factors are determined by the interaction of labor supply and labor demand.

An individual’s endowment level of human capital aids in the acquisition of additional units of human capital (labor was homogeneous in Mincer’s model, 1958). Individuals who can obtain education with greater ease have a lower opportunity cost of education and realize a higher return on their investment. Thus, an individual faced with this prospect would be more likely to invest. Furthermore, individuals who derive some intrinsic utility from being educated will be more likely to invest in human capital since this utility is posited to have some monetary equivalent.

The government is a specific institution that intercedes in the market for education to correct for market failure. One reason the market for education fails is because additional human capital investments typically cause a student to incur a higher interest rate since the repayment period is shorter (i.e. the earnings life of the individual is shorter), ceteris paribus. A shorter earnings life is expected to increase the risk of default on funds lent for human capital investment because there is typically no salvage value or collateral required for lent funds (i.e. student loans). Default risk causes the market for education to fail because those lending institutions may not consider individuals eligible who are willing to agree to the terms of a student loan.

Loan guarantees by the government (i.e. subsidized student loans) are given to lenders to reduce default risk and correct for market failure. By lowering the risk of default, individuals seeking to invest in human capital are faced with a lower interest rate. A lower interest rate, in turn, decreases the costs of investment outlays on human capital, increases the rate of return on human capital, and increases the net present value of lifetime earnings, which makes human capital investments more appealing.
In addition to institutional factors, there are also market factors that affect the wages of high and low-skilled workers. On the supply side, the rate at which others invest in their own human capital affects the aggregate supply of human capital. A college degree might be well compensated if there are few individuals willing and able to obtain one. On the demand side, technology-skill complementarity may increase the demand for workers with a particular skill. As such, workers trained or educated in that skill may be paid a premium for their investment. For example, typists who use word processors are more effective typists than are typists who use a typewriter because technology has made typing simpler. The interaction of supply and demand in the market for human capital implies that the marginal rate of return may increase or decrease over different investment horizons.

The analysis of individual, institutional, and market factors of education by Becker and Chiswick (1966) lay the foundation for a more comprehensive analysis of human capital theory. While the decision to invest in human capital is ultimately up to the individual, there are forces at work beyond an individual’s control that determine the rate of return to human capital facing that individual. Institutions, such as the government, intercede to increase that rate of return because there is a social benefit from an educated population, and the equilibrium in the labor markets for different skill levels develop a relative wage premium for skilled versus unskilled workers.

Social Investments in Human Capital

Investments in human capital, thus far, have focused on individual maximizing behavior, however, there is also an optimal level of human capital investment for a society (Wachtel, 1992). The individual approach to human capital investment includes only those costs and benefits accruing to the individual. However, the scope of costs and benefits must be broadened when attempting to optimize investments in human capital from a social perspective.
Investments in human capital are thought to have substantial positive externalities (i.e. benefits experienced by individuals not party to the education process). These benefits should obviously be included in estimating the social rate of return on human capital investments (Wachtel, 1992). Wachtel (1992) enumerates four specific positive externalities associated with education. First, more educated workers have lower unemployment rates. Conversely, less educated workers have higher unemployment rates and are more likely to receive unemployment compensation or other welfare-like transfer payments. Furthermore, welfare dependent individuals may find criminal activity to be a suitable substitute for work. Society may benefit from investments in education because of reduced expenditures on crime prevention, law enforcement, and welfare programs. Second, political participation and the quality of political decisions may increase through more informed and intelligent choices by constituencies. Third, the children of better-educated parents are reared in a more stable and desirable home environment. These children receive better care, guidance, and informal preschool education. Fourth, better-educated individuals are more likely to conduct research that has profound and varied benefits to society as a whole.

The distinction between private and social rates of return to human capital investment is important primarily because efficiency demands that a society should allocate its investments outlays such that the rates of return on human capital and physical capital should be equal at the margin. If the social rate of return on human capital were greater than the social rate of return on physical capital, then society would benefit by allocating more investment resources to human capital acquisition. Furthermore, if the private rate of return on human capital was less than the social rate of return on human capital, societal resources have been under allocated to investments in human capital. Another reason that the distinction between social and private perspectives is of importance concerns policy initiatives regarding education. The amount of the education subsidy (the social cost) should be determined based on the magnitude of the social benefits.
Growing Wage Inequality and Investments in Human Capital

Along with the social return on human capital, the social context in which workers earn wages may also influence human capital investment decisions. The wage of skilled and non-skilled workers creates a social context whereby the relative return to human capital may differ from the absolute return. The growth of wage inequality, measured by the college wage premium, in the 1980s and early 1990s has contributed to a change in this social context. Human capital investments have been examined to explain at least a portion of this trend.

Topel (1997) reports that college wage premiums have also exhibited an upward trend, increasing from about 70 percent in 1980 to nearly 80 percent in the early 1990s. Furthermore, college enrollment has steadily increased since around 1980. An initial supply and demand analysis would suggest that the demand for skilled workers has increased at a faster rate than the supply for such workers. However, this analysis only focuses on one subset of the labor market, the market for skilled labor. A decline in real wages of less-skilled workers would also contribute to the visible upward trend in college wage premiums.

Gottschalk (1997) also supports the finding of growing wage inequality in the United States, but finds that the increase for skilled workers has been small (a five percent increase in real weekly earnings over 1979-94). As such, there is only a small addition to the absolute incentive to invest in human capital. Rather, the more important effect that has contributed to growing wage inequality is the decrease in real earnings of workers with a high school diploma or less. Over the same time period, the real weekly earnings of relatively less-skilled workers declined by approximately 20 percent. This decrease in the wages of less-skilled workers provides a relative incentive to invest in human capital since a potential worker's employment prospects without a college degree are less appealing.

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2 The college wage premium is the percent by which college educated individuals are expected to earn more than their less educated cohorts. This represents the percent difference in wage between an individual with a college degree and a high school degree.
Topel (1997) suggests that human capital investment can be used to reduce wage inequality. According to human capital theory, the relatively high wages in the market for skilled labor have encouraged investment in skills, which should eventually lead to a higher supply of skilled workers and lower equilibrium wages for skilled workers. Further, as a growing percentage of the population develops skills through human capital investment, the supply of relatively unskilled workers will decrease, resulting in a higher equilibrium wage in the unskilled labor market. However, this may not apply in a market where the supply of less-skilled labor is already relatively scarce.

**Human Capital Theory and Human Capital Investment in the Las Vegas Hotel-Casino Industry**

Waddoups (1998) suggests that the national trend may not accurately reflect the nature of returns to skill in the Las Vegas hotel-casino industry, one of the local economy's dominant industries. The Las Vegas hotel-casino industry is an industry within the service sector characterized by a high concentration of jobs that require only modest levels of skill. Waddoups (1998) suggests that the returns to education within Las Vegas' hotel-casino industry may be lower than in other industries; as well as, the hotel-casino industry elsewhere in Nevada.

Waddoups (1998) indicates that the wage penalty for not graduating from high school with respect to a high school diploma in the Las Vegas hotel-casino industry is 6.5 percent; whereas, the penalty in other hotel sectors in Nevada is 15.2 percent. This study further notes that the addition of a college degree does not offer any significant wage advantage over the mere attendance of college or other vocational training beyond high school that did not result in at least a bachelor's degree.

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3 The "Hotel, Gaming, Recreation" industry (Nevada Department of Employment, Training, and Rehabilitation (NDETR, 1996) comprises 26.4 percent of direct employment in Clark County, the majority of which is Las Vegas.
Human capital theory suggests that investment in education would be relatively lower under such circumstances and would likely be due to a low-valuation of skills as reflected by such returns to education (i.e. low wage premiums). The implication of lower investments in human capital in Las Vegas likely manifests itself in lower rates of high school graduation and continuation on to college or other post-secondary education. The resulting low rates of graduation and continuation, while optimizing individual tastes and preferences, may lead to a rate of educational attainment below the social optimum. Such a departure from the socially optimal level of educational attainment, as indicated by educators in Nevada, begs further research into the reason for why education levels in Nevada are lower than in the rest of the nation.

The present study follows along the same lines as Waddoups (1998) by calculating wage premiums in Nevada. This research pushes forward the analysis of returns to education by using a larger data set to obtain more accurate estimates, which includes more data from the Current Population Survey, and estimating age-earnings profiles. The resulting age-earnings profiles allow for a graphical analysis of returns to varying levels of education, whereby creating a clearer picture of incentives facing potential students in Nevada. The low level of educational attainment in Nevada will be explained in terms of returns to education and its determinants. The peculiarities of the Las Vegas hotel industry are posited to be part of an explanation why education levels differ from what is observed nationally.
CHAPTER 3

DESCRIPTION OF THE DATA

The Current Population Survey (CPS) is the government monthly household survey used to monitor the labor market activities of individuals in the United States. There are approximately 50 variables measured in the CPS extracts generated by the National Bureau of Economic Research (NBER). These variables include data on employment such as: hours-worked, weekly earnings, and industry; and demographic information including: educational attainment, age, gender, ethnicity, and geographic location. The NBER extracts are comprised of individual data from interviewees across the United States each month over a 228-month time frame, 1979-1997. Since the present study estimates wage regressions for residents of Nevada, the Current Population Survey seems like an appropriate data set from which to draw information.

The Current Population Survey

The Current Population Survey interviews 60,000 households each month (Feenberg, 1999). One adult member of each household is asked to report on the labor market activities of all other persons in the household, and a record is kept for each adult person. In other words, not every individual in the sample has spoken for him or herself, but rather may have been accounted for by the interviewee.

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4 The adult non-institutionalized population is the universe.
Each household is administered monthly interviews for four consecutive months upon entering the survey. The interviewee is then rotated out of the sample for eight months. Finally, the interviewee is administered four additional consecutive monthly interviews. Occupants of a household are not followed if they move. Instead, the new occupants of the same dwelling are interviewed in their place. Since 1979 the CPS has only asked households about their weekly wages and hours worked per week in the fourth and eighth month. These households in the fourth and eighth months are referred to as the "outgoing rotation groups" (ORG). Each year the Bureau of Labor Statistics (BLS) combines all surveys from the outgoing rotation groups into one large file. This information is subsequently compiled into extracts by NBER. The consequence of this structure is that while no individual appears twice in the same year, s/he will likely appear in the following year.

Cross-sectional data from the CPS–ORG was used for years 1990 through 1997. The observations from the CPS–ORG were excluded based on the following criteria: 1) self-employment, 2) unemployment and non-participation, 3) non-residents of Nevada, 4) age less than 18 or greater than 65, and 5) non-civilian institutionalized individuals. The CPS–ORG data were adjusted cross-sectionally to ensure that no individuals were represented twice. The descriptive statistics for the variables of interest for the data are summarized in Table 1 and Table 2 (pages 39 and 40, Appendix I).

Table 1 and Table 2 demonstrate that workers in the hotel industry shared similar characteristics whether they resided in Las Vegas or elsewhere in Nevada, with a few notable exceptions. The proportion of Black workers in Las Vegas was nearly five times as great as that

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5 Kane and Rouse (1995) suggest that the data set should be limited so as to include only those individuals who are employed, but not self-employed because unemployed and self-employed workers tend to skew the data's earnings distribution and could potentially bias the results of wage studies.

6 Cross-sectional data were gathered from 1990-1997. In order to ensure that no individual was represented in the data twice, those individuals in the eighth month of the sample were omitted by the present study for 1991-1997 since they would have most likely been represented as the fourth month of the previous year. The data form 1990 was not adjusted accordingly since those individuals in their eighth month would have been in the fourth month in 1989, which is outside the scope of the present study.
elsewhere in Nevada, ten percent and two percent, respectively. There were also a greater percentage of employees represented by a union in Las Vegas than elsewhere in Nevada, 36.4 percent and 8.5 percent respectively. The mean age was nearly the same for both locations, 38.8 years in Las Vegas and 39.1 elsewhere in Nevada. The proportion of females employed was similar between Las Vegas and elsewhere in Nevada, 47.7 percent and 50.2 percent, respectively. The proportion of full-time employees was nearly identical between Las Vegas and elsewhere in Nevada, 95.1 percent and 94.8 percent, respectively.

Workers outside the hotel industry also showed similar characteristics regardless of location. The couple of exceptions being that Las Vegas employed a higher proportion of minorities, 7.3 percent Black and 10.5 percent Hispanic, whereas, elsewhere in Nevada only 1.5 percent and 6.6 percent of the workers were Black and Hispanic, respectively. Furthermore, a higher proportion of workers had a college degree elsewhere in Nevada, 24.6 percent, than workers in Las Vegas, 16.9 percent. The proportion of females employed was similar between Las Vegas and elsewhere in Nevada, 46.0 percent and 45.3 percent, respectively. The proportion of full-time employees was nearly identical between Las Vegas and elsewhere in Nevada, 87.6 percent and 87.8 percent, respectively. This is an average of 7.3 percent lower than in the hotel industry.

Workers in the hotel industry appeared to be less educated than workers in all other industries. There were a higher proportion of high school dropouts and graduates in the hotel industry, 17.7 percent and 46.2 percent, respectively, in Las Vegas and 16.1 percent and 41.6 percent elsewhere in Nevada, respectively. The high school dropout and graduation rates for all other industries in Las Vegas were 12.2 percent and 38.5 percent, respectively. The high school dropout and graduation rates for all other industries elsewhere in Nevada were 8.9 percent and 33.7 percent, respectively. The proportions were roughly the same with respect to those workers who attended some college, but the hotel industry had less than half the proportion of college
graduates as outside the hotel industry. College graduation rates in the hotel industry were eight
and 9.2 percent for Las Vegas and elsewhere in Nevada, respectively. Whereas, college
graduation rates in all other industries were 16.9 and 24.6 percent for Las Vegas and elsewhere in
Nevada, respectively.

Method of Calculating Variables

The dependent variable is the natural log of the real hourly wage. The natural log of the
real hourly wage was calculated by dividing the average weekly earnings for each individual in
the sample by the usual number of hours worked. The average hourly wage was then adjusted for
inflation to obtain the average real hourly wage in 1990 dollars\(^7\). Finally, the natural log of the
real average hourly wage was taken to yield the dependent variable (In \(w\)).

Each individual’s age is measured in years and represented in the model as “Age”. Age
is then multiplied by itself to create “Age\(^2\)”, which allows for a non-linear age-earnings profile.
The literature on the age-earnings profile suggests that it is an inverted U-shaped function
(Pemberton, 1997). This is to say that wages increase at a decreasing rate over an individual’s
work-life. Hence the coefficient on Age is expected to be positive, but negative on Age\(^2\).

Also included as explanatory variables are, four education dummy variables. Education is
posited to make an individual more productive. As such, these variables for education represent
proxies for an individual’s human capital stock. The four education variables are: “No High
School” (less than high school diploma), “High School” (high school diploma), “Some College”
(attended college, but less than a Bachelor’s degree), and “College Degree” (Bachelor’s degree or
greater). The categories were assigned based on CPS-ORG data classifications. The data for
1990 and 1991 were coded as the highest grade of schooling attended, labeled 0-18. This variable

\(^7\) The Consumer Price Index for All Urban Consumers (CPI-U) was used to measure inflation. The CPI-U
is calculated across all U.S. items and uses 1982-1984 as the base year. This data was retrieved from the
Bureau of Labor Statistics’ website (http://146.142.4.24/cgi-bin/surveymost?cu)
for schooling was to be used in conjunction with a variable indicating whether that grade was completed.

The BLS adopted a more credential-oriented measure of educational attainment in 1992. The credential-oriented measure used by the BLS from 1992-1997 readily lends itself to the four educational categories used in the present study. The following assumptions were made when assigning cases to each of the four educational categories when the years of schooling measure was used, 1990-1991. All individuals who did not complete the 12th grade were assumed to have not graduated from high school and classified as "No High School." Furthermore, any individual who completed the 12th grade, but did not attend the 13th, was assigned to "High School". Another assumption was that the BLS would code the traditional four-year degree as 13-16, since they would be the next four values in sequence. Any individual attending the 13th grade but not completing the 16th grade was assigned to "Some college". The final assumption was that any individual who had completed the 16th grade or at least attended a higher grade was considered to have completed at least a Bachelor's degree and was classified as "College Degree".

The dummy variable "Married" indicates an individual's marital status. It takes on the value one if the individual is married, and zero otherwise. Korenman and Neumark (1991) find that married men tend to be located in higher paying job grades than their unmarried counterparts. One plausible explanation for the marriage premium is that qualities that effect earnings also affect marriage, making an individual succeed on both fronts. As such, marriage is expected to have a positive effect on wages.

The variable, "Female", indicates whether an individual is female and takes on the value one if the individual is female, and zero otherwise. The wage gap between men and women has been studied extensively, and previous research unambiguously demonstrates a wage penalty for

8 Some College would also include individuals who have completed an Associate's degree. An Associate's degree was not controlled since there was no reliable way to distinguish among individuals with less than a four-year college degree.
being female. Wright and Ermisch (1990) suggest that part of the reason that men are paid more than women is gender-based discrimination. Accordingly, the coefficient on Female is expected to be negative in line with previous research.

"Hispanic" and "Black" indicate whether an individual is of Hispanic or African decent, respectively, and control for another form of discrimination based on ethnicity. Each variable takes on the value one if the individual is Hispanic or Black, respectively, and zero otherwise. Reimers (1983) suggests that a male of either Hispanic or African decent may have difficulty obtaining wages that their level of human capital would command were they White. As such, whether an individual is Hispanic or Black is expected to have a negative effect on earnings.9

The hotel-casino industry in Las Vegas has a relatively strong union presence (Waddoups 1998). The literature on unions suggests that they put upward pressure on wages and also lead to wage compression (Freeman and Medoff, 1984). The union control implies a proxy for occupation, which is not expressly monitored in the present study. Union membership serves to distinguish lower paying front-line jobs from higher paying managerial positions, which are not unionized. "Union" takes on the value one if an individual is a member of a union, and zero otherwise; and is expected to have a positive effect on wages.

Owens (1978) indicates that full-time workers tend to be found in higher paying jobs. A control for full-time/part-time status is used to account for this effect. One equals Full-time, zero otherwise. A current strand of the literature indicates that benefit costs per worker are higher for part-time workers than their full-time counterparts (Lettau & Buchmueller, 1999). One plausible explanation is that part-time workers are forced to accept lower wages in order to account for higher per unit benefit costs so that they remain attractive to employers. As such, the coefficient on "Full-time" is predicted to be positive as the literature suggests.

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9 It is important to note that a relatively small proportion of individuals responded as having both Black and Hispanic ancestry (only seven cases reported both). In order to ensure that those individuals were not included in more than one category, all individuals in this situation were categorized as Black. The rationale was that Black ancestry would be more visibly apparent than Hispanic ancestry.
CHAPTER 4

RETURNS TO EDUCATION USING WAGE PREMIUMS

The Mincer earnings function (Mincer, 1974) provides the basis for econometric analysis in the present study. Mincer’s model uses an ordinary least squares regression procedure whereby measures of schooling and experience are regressed against wages according to the following specification:

\[
\ln w = \alpha_0 + \beta_1 s + \beta_2 t + \beta_3 t^2 + \beta_4 x + \epsilon
\]

where \( \ln w \) is the natural log of the wage, \( s \) is schooling measured in years, \( t \) represents an individual’s years of labor market experience, \( t^2 \) is the quadratic on experience, which captures the concavity of the age-earnings profile, \( x \) represents a vector of relevant control variables, and \( \epsilon \) is a stochastic error term.

The Wage Equation for Nevada

Two modifications are made to Mincer’s model in the present study. The first modification is that \( t \) and \( t^2 \) have been substituted with “Age” and “Age^2” to produce the concavity of the age-earnings profile, since no direct information was available on years of labor market experience.\(^{10}\) The second modification is that four education dummy variables were used:

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\(^{10}\) This is a common convention found in the literature on age-earnings profiles. (See Murphy and Welch, 1990.)
No High School, High School, Some College, and College Degree; since no continuous measure for schooling was available. The dummy variable for high school was not included, thus the coefficients for the remaining variables are easily transformed into returns relative to "High School." The empirical models estimated are thus:

\[(2) \quad \ln w = \alpha_0 + \beta_1 \text{Age} + \beta_2 \text{Age}^2 + \beta_3 \text{No High School} + \beta_4 \text{Some College} \]
\[+ \beta_5 \text{College Degree} + \beta' x + \epsilon \]

where \( \ln w \) is the natural log of the real average hourly wage (in 1990 dollars). This equation is estimated for each of four industry/location categories: the Las Vegas hotel industry, all other industries in Las Vegas, the hotel industry elsewhere in Nevada, and all other industries elsewhere in Nevada.

An Ordinary Least Squares regression procedure was used to estimate the coefficients for the four equations implied by equation (2). These coefficients are displayed in Table 3 (page 41, Appendix I).

The coefficients in Table 3 are consistent with previous research. The coefficients on "Married" and "Union" were positive for all industry location categories and significant for all categories except the Las Vegas hotel industry. Waddoups (1999) suggests that the coefficient on "Union" may be insignificant because the threat effect may cause firms that employ non-union workers to offer a similar wage in order to avoid a union. The insignificance of the "Union" coefficient may indicate that the threat effect outweighs the spillover effect in the Las Vegas hotel

\[\text{Footnote: } \text{Heckman's two-step correction to ordinary least squares (Heckman, 1976) was used in order to ascertain the suitability of OLS to estimate the models. Heckman (1976) addresses the possibility that individual's may self-select into certain categories. With respect to Nevada, there is a possibility that high school dropouts in the local labor market have migrated to Nevada because of the relatively high wages. The hypothesis indicating the presence of sample selection bias was rejected. (See page 48, Appendix II).} \]
industry. Furthermore, to the extent that “Union” is a proxy for lower level occupations, one would expect a lower coefficient on the union variable. All gender and race variables exhibited a wage penalty as was expected. There was one departure from findings of the previous literature regarding the “Full-time” variable. The coefficient on “Full-time” in the Las Vegas hotel industry is negative, however this result is insignificant.

Earnings increased at a decreasing rate with age in all industry-location categories; however, the coefficient on “Age^2” is insignificant in the hotel industry elsewhere in Nevada. This implies that earnings may be a linear function for that subset of the Nevada economy. The direction and magnitude of “Age” and “Age^2” are nearly identical for the hotel industries of Las Vegas and elsewhere in Nevada, which would imply that age functions in a similar fashion in the hotel industry in Nevada regardless of location. Furthermore, the magnitude of “Age” and “Age^2” in the hotel industry is relatively low compared to other industries in Nevada. This observation suggests that labor market experience has a smaller effect on wages in the hotel industry than in other industries, or that the marginal productivity of an additional year of labor market experience is less in the hotel industry than in other industries. However, since the coefficient on “Age^2” is insignificant for the hotel industry elsewhere in Nevada, this may be little more than conjecture.

The direction and magnitude of the coefficients associated with the education dummy variables are generally consistent with theory. There is a wage penalty for high school dropouts and a progressively higher wage premium for workers who attended some college and for those who earned a college degree. An exception is that the wage premium paid to college dropouts in the hotel industry elsewhere in Nevada is larger than that for college graduates. However, it is important to note that the coefficient associated with college graduates is not statistically different.

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12 The threat effect states that non-unionized firms may offer a wage similar to a unionized firm to prevent workers from unionizing. The spillover effect suggests that as workers in the union sector lose their jobs the supply of workers in the nonunion sector increases and the prevailing wage falls (Borjas, 1996).
from the coefficient associated with high school educated workers. This suggests that the wage
paid to a college graduate is not statistically different from that paid to a high school graduate.
Furthermore, there is no significant wage penalty for high school dropouts in the hotel industry
regardless of location. This is particularly noteworthy because if there is no penalty associated
with dropping out of high school in Nevada's dominant industry, the implication is that a high
school degree is not necessary to earn a relatively high wage in the local labor market

Wage Premiums in Nevada

The coefficients on education estimated in Table 3 illustrate how a particular level of
educational attainment could influence the natural log of hourly wages, ln w; however, they are
not to be directly taken as the rate of return to education. The coefficients must be transformed in
order to ascertain the percent by which a particular level of schooling will augment wages.

The rate of return to various levels of educational attainment relative to a high school
degree was calculated such that the return was equal to the inverse natural log of the coefficient
on each education dummy variable, minus one:

\[ r = e^{-\beta} - 1 \]

where \( r \) is the rate of return, \( e \) is the inverse natural log, and \( \beta \) is the estimated parameter
coefficient on the education dummy variable given in Table 3. The resulting wage premiums are
given in Table 4 (page 42, Appendix I).

The results indicate that there is an absence of a strong wage penalty for failing to
graduate high school in the hotel industry, whether it was in Las Vegas or elsewhere in Nevada.
The wage penalties were four percent and 7.9 percent, respectively, however there is no evidence
that either wage penalty is significantly different from zero. These are, nonetheless, the lowest
penalties of any of the industry/location categories. The implication this finding has for high school dropout rates in Nevada is that there appears to be little economic incentive to graduate from high school if the individual anticipates employment in the hotel industry. Hence, students looking at their earnings potential with a high school degree as opposed to without a high school degree would be more likely to dropout of school and participate in the local labor market without the socially targeted level of education.  

This differs from other industries, where there is a clear and significant penalty associated with not graduating from high school. Wage penalties for high school dropouts in other industries are 12.1 percent in Las Vegas and 14.3 percent elsewhere in the state. The magnitude of the wage penalty increases for workers elsewhere in Nevada and in other industries, with the highest penalty observed in other industries elsewhere in Nevada at 14.3 percent.

The opposite is true of the wage premium paid to college dropouts. The highest premium observed is within the Las Vegas hotel industry, 16.4 percent, with the next highest premium being 16.1 percent for the hotel industry elsewhere in Nevada. The wage premium for college dropouts appears to be influenced positively by Las Vegas and by the hotel industry, wage premiums of 14.9 percent and 9.1 percent for other industries in Las Vegas and elsewhere in Nevada, respectively.

The wage premium for a college degree appears to be influenced positively by Las Vegas and by other industries, with the highest premium, 40.8 percent, in other industries in Las Vegas. The wage premium paid to a college degree is higher in other industries in Las Vegas and elsewhere in Nevada, 40.8 percent and 36.1 percent, respectively; whereas, the wage premium in the Las Vegas hotel industry is only 26.8 percent. One notable difference; however, is that the wage premium paid to college graduates is lower than that paid to college dropouts in the hotel.

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13 The present study may overstate the attractiveness of dropping out of high school due to the possibility of selection bias. Since unemployed individuals were excluded, the present study only observes those high school dropouts that are working. Thus, there exists the possibility that there may be a higher unemployment rate for less educated individuals, though not specifically treated here.
industry elsewhere in Nevada. But the wage premium for a college degree, 13.6 percent, is not statistically different from that of a high school graduate. These results suggest that a college degree may not be particularly valuable to an individual who is working or anticipates working in the hotel industry.
CHAPTER 5

RETURNS TO EDUCATION USING AGE-EARNINGS PROFILES

Estimating wage premiums to illustrate returns to a particular level of education is useful to show how education augments earnings. However, when dummy variables are used to measure schooling, the resulting coefficients used to measure the rates of return only affect the model’s intercept. The slope for each age-earnings profile with respect to each level of educational attainment thus remains the same. When a separate regression is conducted for each level of educational attainment, the resulting age-earnings profiles provide a different perspective on the pay-off, or lack thereof, to education, which allows the earnings path of workers to be compared to one another.

The Equation for Age-Earnings Profiles in Nevada

An OLS regression procedure was used to estimate coefficients for the following specification:

\[ \ln w = \alpha_0 + \beta_1 \text{Age} + \beta_2 \text{Age}^2 + \beta' \mathbf{x} + \epsilon \]

The specification incorporates an age and age-squared component to capture the concavity of the age-earnings profile, a vector of relevant control variables, and a stochastic error term. The estimated coefficients are calculated for each level of educational attainment across

24
each industry/location category. The estimated coefficients are found in Table 5, Table 6, Table 7, and Table 8, respectively (pages 43, 44, 45, and 46, respectively; Appendix I).

Once coefficients were estimated for each age-earnings specification, the mean for each variable was substituted into the equation, with the exception of “Age” and “Age².” Age was allowed to vary from 18-65 in order to generate the age-earnings profiles. The resulting age-earnings profiles allow for a graphical analysis of differences in returns to education in Nevada, which illustrates differences in the slopes and intercepts of each age-earnings profile. Since the appeal of relatively high paying jobs in the Las Vegas hotel industry has been posited to explain relatively large high school dropout and low college continuation rates in Nevada, this seems like a logical place to begin our analysis. Age-earnings profiles are given for the Las Vegas hotel industry in Figure 1 (page 50, Appendix III).

The Las Vegas Hotel Industry

Individuals in the Las Vegas hotel industry that dropout of high school appear to have relatively constant earnings across the earnings life. They experience a flat age-earnings profile and would also seem to realize a slightly diminishing real wage later in their earnings life. High school graduates, in contrast, exhibit an inverted U-shaped age-earnings profile. High school dropouts are predicted to initially receive a higher wage than their high school graduating counterparts. This wage gap is predicted to diminish over the next fourteen years until the age-earnings profile for high school graduates finally overtakes that of high school dropouts at the age of thirty-three. The typical high school student, who observes this type of labor market payoff, may be averse to graduating from high school because of the high opportunity cost of education, which leads to a lower stream of discounted lifetime earnings.

College dropouts are expected to earn more than high school graduates at age eighteen, as is consistent with human capital theory. However, the age-earnings profile for high school
dropouts still initially exceeds that of even college dropouts through age twenty. Furthermore, individuals who attended some college demonstrate a much steeper age-earnings profile, which is consistent with Mincer’s earnings function except that the age-squared coefficient is sufficiently large to create a steep decline in earnings once individuals’ peak at 44 years of age.

The regression equation estimated for college graduates in the Las Vegas hotel industry failed to achieve significance at even a modest level, p-value = 0.113. This may indicate that the proposed model does not accurately describe how differences in wages are generated among college-educated individuals in the Las Vegas hotel industry.

The Hotel Industry Elsewhere in Nevada

The results from the data for the hotel industry elsewhere in Nevada were found to be insignificant for the most part according to the F statistics reported in Table 7 (page 45, Appendix I). The only model that demonstrated statistical significance was for college dropouts, which increased at a decreasing rate across the earnings life.

All Other Industries in Las Vegas

The estimated regression equations were similar in slope for both high school dropouts and graduates for all other industries in Las Vegas, found in Figure 2 (page 51, Appendix III). Both curves exhibited an inverted-U shaped pattern. The only readily visible difference between the two age-earnings profiles was the intercept. Consistent with human capital theory, the age-earnings profile estimated for high school graduates is at all points above the age-earnings profile estimated for high school dropouts. This observation can further be extended to the estimated regression equations for “Some College” and “College Degree”. The slope of each successive

\[14\] Unfortunately the data set was not sufficiently large to provide reliable estimates for age-earnings profiles for levels of education within the hotel industry elsewhere in Nevada (p-values < .05), with the exception of those workers having attended some college. As such, there is no basis for a meaningful comparison among age-earnings profiles, and little discussion can be devoted to this subset of the data.
level of education is steeper than its immediately less educated cohort, giving the age-earnings profiles a "stacked" appearance. Wages for all education levels peak at approximately the same point in the life cycle, between 45 and 48 years of age.

All Other Industries Elsewhere in Nevada

All other industries combined elsewhere in Nevada exhibited similar results to all other industries combined within Las Vegas with a few notable exceptions. Figure 3 (page 52, Appendix III) illustrates that the estimated age-earnings profiles were flatter than those observed for other industries in Las Vegas. All curves increased at a decreasing rate, but there was not as sharp a decrease once the age-earnings profiles peaked. Furthermore, the age-earnings profiles peaked later in life, between 49 and 52 years of age, with the exception of high school graduates, which peaked slightly earlier at age 45. Each age-earnings profile exhibited a standard inverted U-shape. The age-earnings profile for high school dropouts, high school graduates, and college dropouts all followed a similar path until age 45, when wages for high school graduates peaked and began to diverge from those of high school dropouts and college dropouts. The age-earnings profile for college graduates was at all points above the age-earnings profiles for their less educated cohorts. All Age and Age-squared coefficients were significant at the .05 level.

High School Dropouts

High school dropouts are projected to earn a higher initial wage in the Las Vegas hotel industry than if they were to work in other industries either in Las Vegas or elsewhere in Nevada, Figure 4 (page 53, Appendix III). High school dropouts can expect to earn approximately 24 to 29 percent more per hour than their cohorts who work in other industries at age 18, elsewhere in
Nevada and Las Vegas, respectively. This difference diminishes for workers in other industries elsewhere in Nevada until overtaking it at age 33; however, workers in other industries in Nevada will never realize the wage of the counterparts employed in the hotel industry. Furthermore, Nevada high school dropouts working in other industries elsewhere in Nevada earn fifteen percent more than their cohorts employed in other industries in Las Vegas.

The implication for high school dropouts in Las Vegas is that if one does not complete high school then the cost of not doing so is abated by employment in the hotel industry. Furthermore, if a student anticipates employment in the hotel industry, then s/he may be less likely to graduate since the penalty for failing to graduate is less within in the major industry of the local labor market. Conversely, if a student anticipates employment in another industry, then the steeper penalty for dropping out of high school may provide him/her with a stronger incentive to graduate. As such, the extent to which the typical high school student views employment in the hotel industry as a possibility could plausibly influence his/her decision whether to graduate.

High School Graduates

High school graduates in Las Vegas make similar wages regardless of whether they are employed in the hotel industry or in other industries, Figure 5. Furthermore, high school graduates working elsewhere in Nevada in other industries earn similar wages to their counterparts employed in Las Vegas, whether it is in the hotel industry or other industries. Based on the age-earnings profiles in Figure 5 (page 54, Appendix III), there does not appear to be much variation in wages among high school educated workers in Nevada. This lack of differentiation would not imply any incentive or disincentive to graduate from high school based on this sole perspective of inter-industry or inter-location differences.

15 Percentages were calculated based on the peak wages with respect to the appropriate curve, regardless of the age at which the wage peaked. Unless the percent difference between age-earnings profiles for a specific age is specifically stated.
College Dropouts and College Graduates

The age-earnings profiles for both college dropouts and college graduates across industry and location exhibit a similar pattern, Figure 6 and Figure 7, respectively (pages 55 and 56, Appendix III). The age-earnings profile for workers in the Las Vegas hotel industry is initially larger than those of workers elsewhere or in other industries. However, the age-earnings profiles of workers in other industries, regardless of location, eventually overtake that of workers in the Las Vegas hotel industry. The only noticeable difference being that this occurs earlier in the earnings life for college graduates than for college dropouts, age 35 and age 39, respectively. It is important to note once again that the model for college graduates in the Las Vegas hotel industry failed to be significant; p-value = 0.113.

The age-earnings profile for workers with some college in the hotel industry elsewhere in Nevada was added because it was significant. The profile roughly starts and ends at the same wage as that for all other industries, regardless of location; however, it follows a much more linear path, still increasing at a decreasing rate, but not peaking during the earnings life. Human capital theory suggests that the age-earnings profile exhibits an inverted-U shape, but there does not appear to be any absolute depreciation of human capital along any point in the earnings life as is typically observed.

Furthermore, the age-earnings profile of workers employed in other industries in Las Vegas was at all points above that of their counterparts employed elsewhere in Nevada. This suggests that Las Vegas pays a premium over elsewhere in Nevada to workers who have dropped out of college. Taken together with the initially higher wage of college dropouts in the Las Vegas hotel industry, this suggests that the typical college student in Las Vegas may have a stronger economic incentive to abandon his/her education if s/he anticipates employment in Las Vegas, and more specifically, in the Las Vegas hotel industry.
Wage Compression Between Industries

Another result that further exacerbates the problem of low return to education is the degree of wage compression in the Las Vegas hotel industry. The wage for high school dropouts peaks at $7.61/hr, and the wage for a college dropout peaked at $9.69/hr. The model for college graduates was not emphasized because it was found to be insignificant (i.e. there is little evidence to suggest that there is a wage premium paid to college graduates above high school dropouts). Using these two values there is only a $2.08 per hour range within which wages are projected to fall. As such, this amounts to the highest educated workers only earning 21.5 percent more than their least educated counterparts. Using this same methodology for all other industries in Las Vegas and elsewhere in Nevada, the calculated ranges are $5.36 per hour and $2.79 per hour, or 42.1 and 24.3 percent, respectively. There is a greater degree of wage dispersion in other industries in Las Vegas as compared to the hotel industry in Las Vegas.

The smaller wage gap between college graduates and high school dropouts is another way to view the low valuation placed on education. If a premium were paid for each incremental unit of education, as theory would suggest, then the observed age-earnings profiles would be “stacked” progressively higher. Furthermore, the labor market that places the highest value on education would also be expected to have the highest wage gap. Conversely, if a labor market values education at a relatively low rate, then a more narrow wage gap would emerge, as is the case of the Las Vegas hotel industry. The observed differences in wage gaps suggests that within Las Vegas there is a relatively small value placed on education, which would imply a lower rate of return to education. Individuals anticipating employment under such conditions would have less of an economic incentive to invest in further education, and perhaps even experience a disincentive.

Other industries exhibit clearer returns to education than does the hotel industry. And given the prevalence of the hotel industry in Las Vegas and the rest of Nevada, it is not
unreasonable to propose that returns to education within that industry factors into an individual's human capital investment strategy. As such, individuals at the margin whether to pursue the next level of educational attainment may be influenced not to invest given that the payoff to education is relatively small in one of the regional economy's most visible industries. Such findings would go far to help explain why Nevada and, more specifically, Las Vegas have some of the lowest education levels in the country, and why residents of Nevada don't continue on to obtain additional education after high school, providing they even choose to graduate at all.
CHAPTER 6

CONCLUSION

The current state of Nevada’s educational system, as measured by the high school dropout rate and college continuation rate, has caused much concern among Nevada’s educators. Individuals like Clark County School Board Member, Lois Tarkanian, and former Senator, Randolph Townsend have attributed much of the state’s academic woe to the appeal of relatively high paying jobs that require only modest levels of skill. Both officials make indirect reference to the opportunity cost of obtaining an education in Nevada, an important concept that is often overlooked.

The opportunity cost of obtaining an education is not tuition and books, but the foregone earnings over the period of matriculation during which one earns or makes progress toward a degree. This cost of obtaining an education appears to be particularly high in Las Vegas. The rapid growth of the regional economy’s dominant industry, the hotel-casino industry, has resulted in a high demand for relatively unskilled laborers, an industry driven by low-skilled jobs.

Regression results indicate that wages in the hotel-casino industry are initially higher for lower levels of educational attainment than in other industries or elsewhere in Nevada. A high school dropout in the Las Vegas hotel-casino industry can initially earn more than high school graduates from all other industry-location categories. These findings suggest that there may be a higher opportunity cost of education for workers or potential workers in the Las Vegas hotel-casino industry than in other industries or elsewhere in Nevada. This higher opportunity cost, in turn, raises the overall economic cost of obtaining an education, hence rendering it less affordable.
than the alternative, which is to enter the workforce without the socially targeted level of education.

Individuals respond to incentives, and if the peculiarities of the local labor market are such that obtaining an education is not well compensated, then individuals would be less likely to obtain one. As such, a typical high school student faced with the decision whether to graduate from high school and/or continue on to college may find it too expensive to obtain further education given the relatively high wages paid in the hotel-casino industry. If officials in Nevada want students to continue their education, they must create programs to reduce the cost of doing so. And while there is little that officials can do to lower the opportunity cost of education, this is not to say that officials are powerless to affect an individual's cost of education. Nevada officials could still reduce the direct cost of obtaining an education in Nevada.

In order to boost college continuation rates; as well as, secondarily increasing high school graduation rates, the State of Nevada has allocated funds from its recent $1.5 billion tobacco settlement. The Millennium Scholarship program afforded by this money is designed to give Nevada high school graduates $2,500 per year over four years. The intuition behind these scholarships is that by effectively reducing the direct costs of college attendance, the college continuation rate and the high school graduation rate will increase in Nevada.

Patton (2001) reports that approximately 76 percent of the 4,249 students who received aid from the Millennium Scholarship program in its first semester benefited from the program. The remaining 1,000 of those students must now repay the scholarship money because they failed to meet the scholarship criteria. This is higher than the sixty-eight percent retention rate for Millennium Scholarship recipients who attended UNLV. In order to make this statistic more meaningful, it may be helpful to contrast it with the retention rate for new freshmen at UNLV,
which is eighty-seven percent\textsuperscript{16}. These figures, taken together, suggest that the Millennium Scholarship recipients may be less likely to succeed than their counterparts. Although, without information on college enrollment over time, no determination as to the effectiveness of the Millennium Scholarship can be made\textsuperscript{17}. The Millennium Scholarship program appears to be a step forward in the fight to bolster education rates in Nevada, but it is unclear whether this legislation will be sufficient to cure all that ails the educational system in Nevada.

Workers' labor market experience has shown them that education is not as important in the Las Vegas hotel-casino industry as it is elsewhere in Nevada or in other industries. Consequently, if a student anticipates employment in the hotel industry, the lack of a clear wage penalty for dropping out of school may influence his/her decision to graduate or otherwise invest in additional units of human capital. While lowering the direct costs of education will undoubtedly entice some high school graduates who are indifferent between beginning their careers and attending college to continue on to college, the magnitude by which college continuation rates may increase as a result of the current policy initiative is ambiguous.

\textsuperscript{16} This figure was obtained through the UNLV Registrar's office, and may overstate the retention rate of UNLV freshman since it does not factor in a student's grade point average.

\textsuperscript{17} Based on the information available at the present time, a truly meaningful analysis of the Millennium Scholarship program's effectiveness is not possible. Undoubtedly, this information will surface in the coming months.
BIBLIOGRAPHY


Table 1

Summary Statistics on Workers in the Hotel Industry

<table>
<thead>
<tr>
<th>Variable</th>
<th>Las Vegas</th>
<th>Std. Dev.</th>
<th>Elsewhere in Nevada</th>
<th>Std. Dev.</th>
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<td>Age</td>
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Number in Sample 1157 305

Table 2

Summary Statistics on Workers in All Other Industries

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<td>0.328</td>
<td>---</td>
</tr>
<tr>
<td>College Degree</td>
<td>0.169</td>
<td>---</td>
<td>0.246</td>
<td>---</td>
</tr>
</tbody>
</table>

Number in Sample | 4047      | 2851      

Table 3
Estimates of Natural Log of Hourly Wages for Workers in the Hotel Industry and All Other Industries

<table>
<thead>
<tr>
<th>Variable</th>
<th>Hotel Industry Elsewhere in Nevada</th>
<th>All Other Industries Elsewhere in Nevada</th>
</tr>
</thead>
</table>
|                           | Las Vegas | Las Vegas | Las Vegas | Las Vegas | Las Vegas | Las Vegas | Las Vegas | Las Vegas | Las Vegas | Las Vegas | Las Vegas | Las Vegas | Las Vegas | Las Vegas | Las Vegas | Las Vegas | Las Vegas | Las Vegas | Las Vegas | Las Vegas | Las Vegas | Las Vegas | Las Vegas | Las Vegas | Las Vegas | Las Vegas | Las Vegas | Las Vegas | Las Vegas | Las Vegas | Las Vegas | Las Vegas | Las Vegas | Las Vegas | Las Vegas | Las Vegas | Las Vegas | Las Vegas | Las Vegas | Las Vegas | Las Vegas | Las Vegas | Las Vegas | Las Vegas | Las Vegas | Las Vegas | Las Vegas | Las Vegas | Las Vegas | Las Vegas | Las Vegas | Las Vegas | Las Vegas | Las Vegas | Las Vegas | Las Vegas | Las Vegas | Las Vegas | Las Vegas | Las Vegas | Las Vegas | Las Vegas | Las Vegas | Las Vegas | Las Vegas | Las Vegas | Las Vegas | Las Vegas | Las Vegas | Las Vegas | Las Vegas | Las Vegas | Las Vegas | Las Vegas | Las Vegas | Las Vegas | Las Vegas | Las Vegas | Las Vegas | Las Vegas | Las Vegas | Las Vegas | Las Vegas | Las Vegas | Las Vegas | Las Vegas | Las Vegas | Las Vegas | Las Vegas | Las Vegas | Las Vegas | Las Vegas | Las Vegas | Las Vegas | Las Vegas | Las Vegas | Las Vegas | Las Vegas | Las Vegas | Las Vegas | Las Vegas | Las Vegas | Las Vega
Table 4

Percent by which Wages Exceeds (Lags) Wages of High School Educated Worker (CPS-ORG Data)

(Relative to "High School")

<table>
<thead>
<tr>
<th></th>
<th></th>
<th></th>
<th></th>
</tr>
</thead>
<tbody>
<tr>
<td>Hotel Ind. Las Vegas</td>
<td>-4.0%</td>
<td>16.4%*</td>
<td>26.8%*</td>
</tr>
<tr>
<td>Hotel Ind. Elsewhere in NV</td>
<td>-7.9%</td>
<td>16.1%*</td>
<td>13.6%</td>
</tr>
<tr>
<td>All Other Inds. Las Vegas</td>
<td>-12.1%*</td>
<td>14.9%*</td>
<td>40.8%*</td>
</tr>
<tr>
<td>All Other Inds. Elsewhere in NV</td>
<td>-14.3%*</td>
<td>9.1%*</td>
<td>36.1%*</td>
</tr>
<tr>
<td>All Industries across the U.S.**</td>
<td>-20.8%*</td>
<td>12.0%*</td>
<td>50.7%*</td>
</tr>
</tbody>
</table>

Source: Calculated using parameter estimates in Table 3.
* Wage premium (penalty) is significant at the .05 level of significance.
** Estimates are from Waddoups (1998). This estimate uses CPS-ORG data for the entire U.S. for the year 1996 only.
Table 5
Estimated Age-Earnings Profiles for Workers in the Las Vegas Hotel Industry

<table>
<thead>
<tr>
<th>Variable</th>
<th>No High School</th>
<th>High School</th>
<th>Some College</th>
<th>College Degree</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>Coefficient</td>
<td>t statistic</td>
<td>Coefficient</td>
<td>t statistic</td>
</tr>
<tr>
<td>Constant</td>
<td>2.105</td>
<td>7.522*</td>
<td>1.592</td>
<td>7.766*</td>
</tr>
<tr>
<td>Age</td>
<td>0.003</td>
<td>0.212</td>
<td>0.025</td>
<td>2.541*</td>
</tr>
<tr>
<td>Age Squared</td>
<td>-0.00004</td>
<td>-0.255</td>
<td>-0.00026</td>
<td>-2.177*</td>
</tr>
<tr>
<td>Married</td>
<td>0.014</td>
<td>0.285</td>
<td>0.048</td>
<td>1.446</td>
</tr>
<tr>
<td>Female</td>
<td>-0.108</td>
<td>-2.200*</td>
<td>-0.173</td>
<td>-5.475*</td>
</tr>
<tr>
<td>Black</td>
<td>-0.070</td>
<td>-0.833</td>
<td>-0.113</td>
<td>-2.274*</td>
</tr>
<tr>
<td>Hispanic</td>
<td>-0.201</td>
<td>-3.888*</td>
<td>-0.104</td>
<td>-2.199*</td>
</tr>
<tr>
<td>Union</td>
<td>0.127</td>
<td>2.601*</td>
<td>0.017</td>
<td>0.518</td>
</tr>
<tr>
<td>Full-time</td>
<td>-0.083</td>
<td>-0.785</td>
<td>0.034</td>
<td>0.440</td>
</tr>
<tr>
<td>Number in Sample</td>
<td>205</td>
<td>535</td>
<td>324</td>
<td>93</td>
</tr>
<tr>
<td>R Squared</td>
<td>0.117</td>
<td>0.096</td>
<td>0.202</td>
<td>0.139</td>
</tr>
<tr>
<td>F Statistic</td>
<td>3.261**</td>
<td>6.966**</td>
<td>9.953**</td>
<td>1.691</td>
</tr>
</tbody>
</table>

* Coefficient is significant at the .05 level of significance.
** Model is significant at the .05 level of significance.
Table 6

Estimated Age-Earnings Profiles for Workers in the Hotel Industry Elsewhere in Nevada

Hotel Industry Elsewhere in Nevada

<table>
<thead>
<tr>
<th>Variable</th>
<th>No High School</th>
<th></th>
<th>High School</th>
<th></th>
<th>Some College</th>
<th></th>
<th>College Degree**</th>
<th></th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>Coefficient</td>
<td>t statistic</td>
<td>Coefficient</td>
<td>t statistic</td>
<td>Coefficient</td>
<td>t statistic</td>
<td>Coefficient</td>
<td>t statistic</td>
</tr>
<tr>
<td>Constant</td>
<td>2.399</td>
<td>5.031*</td>
<td>0.819</td>
<td>1.579*</td>
<td>1.807</td>
<td>4.261*</td>
<td>-1.519</td>
<td>-0.795</td>
</tr>
<tr>
<td>Age</td>
<td>-0.026</td>
<td>-1.001</td>
<td>0.051</td>
<td>2.332*</td>
<td>0.018</td>
<td>0.737</td>
<td>0.165</td>
<td>1.733</td>
</tr>
<tr>
<td>Age Squared</td>
<td>0.00031</td>
<td>1.002</td>
<td>-0.00059</td>
<td>-2.285*</td>
<td>-0.00014</td>
<td>-0.462</td>
<td>-0.00215</td>
<td>-1.763</td>
</tr>
<tr>
<td>Married</td>
<td>-0.027</td>
<td>-0.286</td>
<td>0.059</td>
<td>0.765</td>
<td>0.217</td>
<td>2.743*</td>
<td>0.222</td>
<td>1.454</td>
</tr>
<tr>
<td>Female</td>
<td>-0.119</td>
<td>-1.262</td>
<td>-0.060</td>
<td>-0.795</td>
<td>-0.235</td>
<td>-3.104*</td>
<td>-0.024</td>
<td>-0.145</td>
</tr>
<tr>
<td>Black</td>
<td>-0.046</td>
<td>-0.199</td>
<td>-0.445</td>
<td>-1.362</td>
<td>-0.292</td>
<td>-0.756</td>
<td>0.163</td>
<td>0.424</td>
</tr>
<tr>
<td>Hispanic</td>
<td>-0.181</td>
<td>-1.941</td>
<td>-0.139</td>
<td>-1.253</td>
<td>-0.680</td>
<td>-3.914*</td>
<td>---</td>
<td>---</td>
</tr>
<tr>
<td>Union</td>
<td>0.328</td>
<td>2.531*</td>
<td>0.171</td>
<td>1.206</td>
<td>0.179</td>
<td>1.257</td>
<td>---</td>
<td>---</td>
</tr>
<tr>
<td>Full-time</td>
<td>0.004</td>
<td>0.026</td>
<td>0.136</td>
<td>0.555</td>
<td>-0.118</td>
<td>-0.698</td>
<td>0.514</td>
<td>1.350</td>
</tr>
</tbody>
</table>

Number in Sample | 49 | 127 | 101 | 28
R Squared        | 0.247 | 0.090 | 0.322 | 0.360
F Statistic      | 1.644 | 1.467 | 5.451*** | 1.972

* Coefficient is significant at the .05 level of significance.
** Coefficients where not estimated for Hispanic or Union. Hispanic exhibited a low level of tolerance and added little information to the model, which made computations problematic. Union was equal to 0 for all observations, hence the Union coefficient could not be estimated.
***Model is significant at the .05 level of significance.
Table 7

Estimated Age-Earnings Profiles for Workers in All Other Industries in Las Vegas

All Other Industries in Las Vegas

<table>
<thead>
<tr>
<th>Variable</th>
<th>No High School</th>
<th>High School</th>
<th>Some College</th>
<th>College Degree</th>
</tr>
</thead>
<tbody>
<tr>
<td>Variable</td>
<td>Coefficient</td>
<td>t statistic</td>
<td>Coefficient</td>
<td>t statistic</td>
</tr>
<tr>
<td>Constant</td>
<td>1.204</td>
<td>7.535*</td>
<td>1.178</td>
<td>10.524*</td>
</tr>
<tr>
<td>Age</td>
<td>0.038</td>
<td>3.999*</td>
<td>0.043</td>
<td>7.267*</td>
</tr>
<tr>
<td>Age Squared</td>
<td>-0.00041</td>
<td>-3.459*</td>
<td>-0.00048</td>
<td>-6.356*</td>
</tr>
<tr>
<td>Married</td>
<td>0.082</td>
<td>2.032*</td>
<td>0.078</td>
<td>3.532*</td>
</tr>
<tr>
<td>Female</td>
<td>-0.227</td>
<td>-5.692*</td>
<td>-0.247</td>
<td>-11.513*</td>
</tr>
<tr>
<td>Black</td>
<td>-0.233</td>
<td>-3.005*</td>
<td>-0.124</td>
<td>-3.251*</td>
</tr>
<tr>
<td>Hispanic</td>
<td>-0.168</td>
<td>-4.116*</td>
<td>-0.130</td>
<td>-3.838*</td>
</tr>
<tr>
<td>Union</td>
<td>0.301</td>
<td>5.385*</td>
<td>0.260</td>
<td>9.528*</td>
</tr>
<tr>
<td>Full-time</td>
<td>0.086</td>
<td>1.551</td>
<td>0.153</td>
<td>4.551*</td>
</tr>
</tbody>
</table>

Number in Sample

<table>
<thead>
<tr>
<th>Variable</th>
<th>No High School</th>
<th>High School</th>
<th>Some College</th>
<th>College Degree</th>
</tr>
</thead>
<tbody>
<tr>
<td>Number in Sample</td>
<td>492</td>
<td>1559</td>
<td>1311</td>
<td>685</td>
</tr>
<tr>
<td>R Squared</td>
<td>0.231</td>
<td>0.240</td>
<td>0.237</td>
<td>0.159</td>
</tr>
<tr>
<td>F Statistic</td>
<td>18.163**</td>
<td>61.342**</td>
<td>50.537**</td>
<td>15.995**</td>
</tr>
</tbody>
</table>


* Coefficient is significant at the .05 level of significance.

** Model is significant at the .05 level of significance.
Table 8

Estimated Age-Earnings Profiles for Workers in All Other Industries Elsewhere in Nevada

<table>
<thead>
<tr>
<th>Variable</th>
<th>No High School</th>
<th>High School</th>
<th>Some College</th>
<th>College Degree</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>Coefficient</td>
<td>t statistic</td>
<td>Coefficient</td>
<td>t statistic</td>
</tr>
<tr>
<td>Constant</td>
<td>1.139</td>
<td>4.849*</td>
<td>1.379</td>
<td>9.199*</td>
</tr>
<tr>
<td>Age</td>
<td>0.038</td>
<td>2.685*</td>
<td>0.039</td>
<td>4.839*</td>
</tr>
<tr>
<td>Age Squared</td>
<td>-0.00037</td>
<td>-2.034*</td>
<td>-0.00043</td>
<td>-4.230*</td>
</tr>
<tr>
<td>Married</td>
<td>0.058</td>
<td>0.950</td>
<td>0.063</td>
<td>2.184*</td>
</tr>
<tr>
<td>Female</td>
<td>-0.237</td>
<td>-4.090*</td>
<td>-0.283</td>
<td>-10.229*</td>
</tr>
<tr>
<td>Black</td>
<td>-0.025</td>
<td>0.155</td>
<td>-0.308</td>
<td>2.693*</td>
</tr>
<tr>
<td>Hispanic</td>
<td>-0.219</td>
<td>3.619*</td>
<td>-0.060</td>
<td>1.044</td>
</tr>
<tr>
<td>Union</td>
<td>0.308</td>
<td>2.955*</td>
<td>0.271</td>
<td>6.743*</td>
</tr>
<tr>
<td>Full-time</td>
<td>0.165</td>
<td>2.177*</td>
<td>0.138</td>
<td>3.287*</td>
</tr>
<tr>
<td>Number in Sample</td>
<td>253</td>
<td>962</td>
<td>936</td>
<td>700</td>
</tr>
<tr>
<td>R Squared</td>
<td>0.278</td>
<td>0.230</td>
<td>0.271</td>
<td>0.194</td>
</tr>
<tr>
<td>F Statistic</td>
<td>11.733**</td>
<td>35.578**</td>
<td>43.094**</td>
<td>20.771**</td>
</tr>
</tbody>
</table>


* Coefficient is significant at the .05 level of significance.
** Model is significant at the .05 level of significance.
APPENDIX II

SAMPLE SELECTION MODEL
## Summary of Sample Selection Model

<table>
<thead>
<tr>
<th>Variable</th>
<th>Sample Selection Model</th>
<th>OLS Model</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>Coefficient</td>
<td>z-statistic</td>
</tr>
<tr>
<td>Constant</td>
<td>1.098</td>
<td>13.096*</td>
</tr>
<tr>
<td>Age</td>
<td>0.048</td>
<td>12.412*</td>
</tr>
<tr>
<td>Age Squared</td>
<td>-0.001</td>
<td>-10.925*</td>
</tr>
<tr>
<td>Married</td>
<td>0.082</td>
<td>8.350*</td>
</tr>
<tr>
<td>Female</td>
<td>-0.219</td>
<td>-23.286*</td>
</tr>
<tr>
<td>Black</td>
<td>-0.168</td>
<td>-7.782*</td>
</tr>
<tr>
<td>Hispanic</td>
<td>-0.215</td>
<td>-4.604*</td>
</tr>
<tr>
<td>Union</td>
<td>0.164</td>
<td>13.466*</td>
</tr>
<tr>
<td>Full-time</td>
<td>0.166</td>
<td>10.646*</td>
</tr>
<tr>
<td>No High School</td>
<td>-0.033</td>
<td>-2.067*</td>
</tr>
<tr>
<td>Some College</td>
<td>-0.137</td>
<td>-7.082*</td>
</tr>
<tr>
<td>College Degree</td>
<td>-0.019</td>
<td>-0.131</td>
</tr>
<tr>
<td>Las Vegas</td>
<td>0.092</td>
<td>5.007*</td>
</tr>
<tr>
<td>Hotel Industry</td>
<td>0.318</td>
<td>15.596*</td>
</tr>
<tr>
<td>No High School*Hotel</td>
<td>0.059</td>
<td>1.604</td>
</tr>
<tr>
<td>Some College*Hotel</td>
<td>0.031</td>
<td>1.072</td>
</tr>
<tr>
<td>College Degree*Hotel</td>
<td>-0.126</td>
<td>-2.833*</td>
</tr>
<tr>
<td>No High School*Las Vegas</td>
<td>0.026</td>
<td>0.772</td>
</tr>
<tr>
<td>Some College*Las Vegas</td>
<td>0.040</td>
<td>1.736</td>
</tr>
<tr>
<td>College Degree*Las Vegas</td>
<td>0.024</td>
<td>0.888</td>
</tr>
<tr>
<td>Lambda</td>
<td>-0.072</td>
<td>-0.958</td>
</tr>
</tbody>
</table>

| Number in Sample          | 8360        | 8360         |
| R Squared                | 0.3030      | 0.3029       |
| F Statistic              | 181.25**    | 190.75**     |


* Coefficient significant at the .05 level of significance.

** Model is significant at the .05 level of significance.
APPENDIX III

FIGURES

49
Figure 1

Age-Earnings Profile for the Las Vegas Hotel Industry

Source: Calculated using parameter estimates in Table 5.
Figure 2

Age-Earnings Profile for All Other Industries in Las Vegas

Source: Calculated using parameter estimates in Table 7.
Figure 3

Age-Earnings Profile All Other Industries Elsewhere in Nevada

Source: Calculated using parameter estimates in Table 8.
Figure 4

Estimated Age-Earnings Profiles for High School Dropouts

Source: Calculated using parameter estimates for No High School in Table 5, Table 7, and Table 8.
Figure 5

Estimated Age-Earnings Profiles for High School Graduates

Source: Calculated using parameter estimates for High School in Table 5, Table 7, and Table 8.
Figure 6

Estimated Age-Earnings Profiles for College Dropouts

Source: Calculated using parameter estimates for Some College in Table 5, Table 6, Table 7, and Table 8.
Figure 7

Estimated Age-Earnings Profiles for College Graduates

Source: Calculated using parameter estimates for College Degree in Table 5, Table 7, and Table 8.
VITA

Graduate College
University of Nevada, Las Vegas

Alan Lee Beard II

Local Address:
11 Pinyon Tree Circle
Henderson, Nevada 89014

Home Address:
2195 Bennett Road
Kelowna, British Columbia V1V 2C4

Degrees:
Bachelor of Science, Economics, 1998
Kansas State University

Bachelor of Arts, Psychology, 1998
Kansas State University

Secondary Major, Industrial and Labor Relations, 1998
Kansas State University

Psychological Technician’s Certificate, Industrial/Organizational Psychology, 1998
Kansas State University

Thesis Title: Estimating Returns to Education in the Nevada Hotel Industry: A Perspective on Incentives for Education in Nevada

Thesis Examination Committee:
Chairperson, Dr. Jeff Waddoups, Ph. D.
Committee Member, Dr. Djeto Assane, Ph. D.
Committee Member, Dr. Lew Karstensson, Ph. D.
Graduate Faculty Representative, Dr. Pearl Brewer, Ph. D.