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Essays in Labor Economics

Adam Blott
Clemson University, adam.blott@gmail.com

ESSAYS IN LABOR ECONOMICS

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Adam Nathan Blott
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Dr. Curtis Simon, Committee Chair
Dr. Michael Maloney
Dr. Thomas Mroz
Dr. Robert Tamura

ABSTRACT

The three chapters of this dissertation are closely related to one another and pertain to work flexibility. The first chapter uses an occupational choice model to estimate how workers value schedule flexibility in terms of other on the job characteristics. The second chapter also estimates how workers value flexibility using a hedonic wage approach. This method provides an estimate of how workers value schedule flexibility in terms of real wages. In the third chapter I estimate the impact of family structure on the probability that men choose a flexible job.

Flexible work schedules are becoming an increasingly important characteristic for one's occupational choice. I examine the effect of flexible work schedules on college graduates' occupational choice. Over the past 30 years flexible work schedules have become more prevalent in the work place to help employees balance work and family lives. The United States' government is advocating flexible work schedules in order to promote gender equality for men and women's occupational distribution. I estimate an occupational choice model with over 200 occupations using Census data for 1980, 1990, and 2000. Both men and women college graduates are attracted to jobs with flexible work hours, but in terms of marginal rate of substitution men are willing to sacrifice increasingly more safety on the job to obtain flexible schedules relative to women. Further, married individuals have become increasingly attracted to flexible work hours in terms of MRS; however, single mothers now value flexible work hours relative to safety less compared to 1980.

The hedonic wage model finds similar results to the occupational choice model. The results suggest that men and women value schedule flexibility differently and that workers in high and low skilled occupations value flexibility differently. Looking at men and women aggregated by occupational skill level there is little difference between the value men and women place on flexibility due the relatively large size of the standard errors on the estimated marginal willingness to pay. Women are willing to sacrifice approximately 1% of wages to obtain flexibility and men are willing to sacrifice 2% of wages.

The difference between men and women becomes starker when examining differences in occupational skill level. There is the peculiar result that men in low skilled occupations must be compensated to take on flexible schedules. In theory workers need not be compensated for schedule flexibility because if it is undesired characteristics workers do not to utilize the flexibility and thus would be unwilling to sacrifice wages. Men in high skilled occupations value schedule flexibility more than women. These results are consistent with the results from the occupational choice model which also showed that men were more willing to sacrifice physical safety on the job to obtain flexibility.

Lastly, in the occupational choice model I find that married value flexibility relatively more compared to other demographic groups. On an intuitive level it makes sense that men with working spouses would be more likely to choose jobs with flexible schedules. Families may wish to be able to coordinate their schedules in order to better balance their work and personal lives. It also provides an opportunity for individuals to

take off from work if something unexpected arises. Family structure is an important determinant in the occupational choice model and how individuals value flexible schedules. I find that having a working spouse increases the probability of choosing a job with schedule flexibility by 1-6 percentage points depending on the specification.

DEDICATION

I dedicate this manuscript to my wife Erin who has encouraged me thru the duration of my graduate studies, especially as I completed this manuscript. This is also dedicated to my parents who have supported me throughout my studies.

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I appreciate the guidance of my committee for their comments and insights on the topic. Thank you to all of the participants in the Labor Economics Workshop at Clemson University as well as the participants in the Graduate Students Workshop in the John E. Walker Department of Economics.

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CHAPTER ONE

GENDER, OCCUPATIONAL CHOICE, AND FLEXIBLE WORK HOURS

1.1 INTRODUCTION

As women become more career oriented one would expect that balancing work and lives becomes increasingly necessary. Economists have long suggested that this desire for balance has driven women's human capital investment and occupation choice. This need to balance work and family lives may have caused women to avoid occupations that might otherwise be chosen if employers were willing to adopt policies that promoted flexibility and encouraged a balance between work and family lives. Individuals must decide how to allocate their time between work and home. If individuals have at home responsibilities during the standard 9-to-5 work day, they will be limited in the number of occupations that they can choose to enter. If flexible work arrangements are available can expand the choice set for individuals. Flexible work arrangements are defined as the ability to alter one's work schedules in order to tend to unexpected family needs.

The influence of work life balance on occupational choice was first examined by Polachek (1981). He examines a model in which he explores the effect of human capital depreciation and expected time out of the labor force on occupational choice. Polachek postulates that intermittent labor force participation effects occupational choice and that the probability of entering an occupation given one's life time labor force participation varies with the occupation's atrophy rate. That is, individuals with high expected absences from the labor force are more likely to enter occupations with low atrophy rates.

One would expect that individuals who take time away from the labor force to raise families would enter occupations that least penalizes human capital depreciation. Polachek concludes that this leads to occupational sorting between men and women and that occupational segregation between men and women is not due to discrimination. Table 1.1 shows the most female and male occupations in 2000 and the differences between men and women's occupational distribution.

Budig and England (2001) estimate the wage penalty of motherhood that is due to short term exiting of the labor force to raise children. They find that each child reduces wages by approximately 7 percent when estimating a fixed effects model and controlling for various job characteristics and experience. Because it is costly to take time off work to raise a family in terms of lost wages other mechanisms are needed to reduce the cost of raising a family. Due to this effect on wages a tool is needed to reduce the costs associated with work-life balance. One such mechanism are flexible work arrangements in which individuals can vary the start or end time of their work days in order to meet their family needs.

In this paper I explore the effects of flexible work arrangements on occupational choice of young college graduates and how the effect differs between men and women and by family structure. I implement a random utility model of occupational choice taking into the working conditions of the occupation including flexible work arrangements. I find that flexible work schedules are a desirable job characteristic for men and women. However, the willingness to pay between flexible schedules and other working conditions is typically higher for men relative to women.

The remainder of the paper is structured in the following manner: in section 2, I discuss the role of the United States' government push towards flexible work week and their benefits to employers and employees. In section 3, I discuss various measures that have been used to quantify flexible work schedules and important results from preceding works. In section 4, I describe the construction of the data set. In section 5, I discuss an occupational choice model from a random utility model that DeLeire and Levy (2004) use. Next, in section 6, I present the empirical model that I use to estimate the theoretical model. In section 7, I discuss the results. In section 8, I explore one potential cause of men's greater desire for flexibility than women. Finally I conclude in section 9.

1.2 BENEFITS TO FLEXIBLE WORK ARRANGEMENTS.

Galinsky et al (2004), Landauer (1997), and Halpern (2005), discuss the benefits of flexible work schedules.[1]

From the employer's perspective flexible work arrangements can reduce absenteeism, increase employee morale, and decrease employee turnover which increases productivity and ultimately may lead to increased profit. But providing flexible work arrangements are not costless to provide and the marginal costs of providing flexible work arrangements will be equated to the marginal benefits of providing them. Because

[1] In 1982, the Federal Employees Flexible and Compressed Work Schedules Act was passed by Congress. This law allowed federal agencies to permit their employees to vary the start and end time of their work day while working a core period of the day. It also allowed employees to work a compressed schedule in which they would have every Friday off while working 10 hours per day Monday through Thursday. In 1994, agencies were directed to expand the use of flexible work arrangements to create family-friendly workplaces. The use of flexible work arrangements was advocated for by the government for numerous reasons including, increasing parental involvement in children's lives, increasing occupational equality among men and women, and increase profits for firms.

these benefits are costly one would expect that there would be a tradeoff between flexible work arrangements and wages or other desirable job attributes.

The benefits of flexible work schedules for employees are quite clear. Employees are able to adjust their work schedules in order to meet the obligations of their family lives. It is also well documented that flexible work schedules can also yield benefits to employers. Landauer (1997) shows through several case studies that flexible work schedules increase employee productivity, increases employee retention, and decreases absenteeism. Lineberry and Trumble (2000) confirm these results using data from Aon Consulting's *America @ Work* study.

Of course, if flexibility of work scheduled increased worker productivity sufficiently and universally, one would expect such flexibility to be as omnipresent as air conditioning. Presumably, the cost of providing flexible work arrangements varies across employers and within an employer, across occupations. When coordination among workers is necessary it will be more costly for the firm to implement flexible work arrangements such as in engineering firms.

Since there are benefits of flexible work schedules to both employers and employees, it is expected that flexible work schedules would be a desirable attribute of a job. Flexible work schedules can increase productivity of workers where they can be implemented. Employees gain the option value of being able to adjust their work schedules to personal lives' needs.

1.3 MEASURING FLEXIBILITY OF WORK ARRANGEMENTS

Flexible work schedules have been defined in various ways in the literature. I follow Golden (2001) and McMenamin (2007) who examine the Current Population Survey Work Schedule Supplement. In the CPS Work Schedule Supplement the question is asked "do you have a flexible work schedule, in which you can vary the start or end time of your work day?" Golden observed that flexible work schedule have increased in availability between 1985 and 1997 and that working long hours increases the probability that an individual has access to flexible work schedules. He shows that access to flexible work schedules is related to an individual's demographic group, mainly gender and education

Other measures of flexibility used in the literature measure something other than an individual's ability to influence one's work schedule. For example, Lombard (2001) uses the number of weekly hours worked and the absolute deviance from the 40 hour work week to measure workplace flexibility. However this is a measure of labor supply rather than flexibility. Booth and van Ours (2008) also use the number of weekly hours worked to measure flexibility. They argue that an additional hour worked reduces the amount of time one can spend on family activities[2].

Work schedule flexibility as measured in the CPS Work Schedule Supplements provides a measure of how individuals can influence their work day in order to meet their personal needs. It is measured by asking survey respondents the question "do you have a

[2] While it is true that by working more hours in a week an individual will have fewer degrees of freedom to choose non-work hours. However, one might be required to work 20 hours a week at a required time compared to someone who is required to work 50 hours per week whenever they choose. Under Booth and van Ours the first individual has a more flexible work week but in actuality they supply few labor hours.

flexible work schedule in which you can vary the start or end time of you work day?"[3] I use flexible work hours as my variable of interest since I believe it best measures an employee's ability to influence one's own work-life balance. The measures used by Lombard and Booth and van Ours, do not measure the ability of worker to more easily balance their work and family lives but rather how much labor is supplied.

1.4 DATA

I estimate the occupational choice model using a sample of individuals drawn from the 1980, 1990, and 2000 Censuses. These data are preferable to other data sets because of their large sample size, thus permitting me to examine occupational choice at the three-digit level. In addition to information on occupational choice, the Census data contain detailed demographic information on each individual. The large sample size of the Censuses also permits estimation of the occupational model across a wide range of demographic groups.

The Census data permit me to construct measures of workplace flexibility defined in terms of hours worked per week, as well as by whether individuals work full or part time. Measures of flexibility are also obtained from the Current Population Survey Work Schedule Supplement which asks respondents about their use of time and their ability to adjust their schedule.

[3]Other measures of flexibility are also available in the CPS Work Schedule Supplement, such as "does your company offer a formal flexible schedule program?" "how often do you work at home?" and "do you work at home for family reasons?" Unfortunately not all of these questions are asked in each of the survey years of the CPS Work Schedule Supplement. Furthermore the hours worked measures can be calculated directly from the Census.

I obtain flexible work schedules from the CPS Work Schedule Supplement for the years: 1985, 1991, 1997, 2001, and 2004. The Census data will be supplemented with working conditions data from the Occupational Information Network (O*Net).[4] In this section I will describe the construction of the data used in this analysis and discuss summary statistics of the key variables that are used.

A. Sample to be Analyzed

Although individuals are free to choose, at least in principle, any occupation at any stage of their life, in practice, a number of constraints affect older workers that are less likely to be a factor in the choices of younger workers.[5] Therefore, following DeLeire and Levy, I restrict my sample to young adults in the civilian labor force between the ages 25 and 35.

The occupational choice model requires that individuals be free to choose amongst all of the occupations, at least conditional on job characteristics. In practice, this is unlikely to be the literally the case. To come as close to this ideal as possible, I restrict the sample to individuals who have a college degree and who work at least 35 weeks per year. Individuals with less than a college degree are closed off from a large number of occupations, a side-effect of which is to produce counterintuitive results such as individuals preferring occupations that pay lower wages.[6] Individuals who work fewer than 35 weeks per year may be less than fully committed to the labor force, and may

[4] The O*Net is the successor to the Dictionary of Occupational Titles.
[5] For example, individuals acquire job-specific human capital that may tie them to a particular occupation even when conditions in that occupation have changed.
[6] College graduates are defined as those who report having a college degree in the 2000 Census, and as those who report having completed four or more years of college in the 1980 and 1990 data.

include a substantial number of individuals in temporary jobs, which do not involve a long-term job match and therefore should be studied separately.

B. Defining Flexibility of Work Schedule

There are 3 types of flexibility measures that have been studied in the literature, measures based on the hours worked per week, measures based on survey respondents, and formal flexible programs. Work flexibility is the ability to adjust one's work schedule in order to meet the needs of unexpected events in one's personal life.

There are many definitions of flexible work hours used in the literature. Many of these measures can be derived using Census data on hours worked per week. These include indicator variables for hours worked greater than 50, hours worked less than 35, and hours worked less than 30; hour deviance measures are also created, number of hours worked minus 40, absolute value of hours worked minus 40, and the standard deviation of hours worked within an occupation.

For the weekly hours worked measures I take the mean by occupation. These measures can be interpreted as the percentage of workers who work long hours or short hours. The deviance from 40 hours measures can be interpreted as the average hours from 40 that individuals in an occupation work.

In the Current Population Survey Work Schedule Supplement survey respondents are asked about their participation in flexible work arrangements. These measures are flexible work schedules, formal flexible work program, work at home at least once a week, and work at home for family reasons. I calculate the percentage of workers who have access to each measure of flexibility by occupation.

C. Sample Statistics

Summary statistics for the various flexibility measures can be found in Table 1.2 for all demographic groups combined over time. By all measures access to flexible work arrangements has increased between 1980 and 2000. The standard 40 hour work is disappearing as more workers are working over 50 hours a week at the same time more workers are working less than 35 hours per week. Individuals working more than 50 hours per week increased from 16% to 22% between 1980 and 2000; while those working less than 30 hours a week increased from 7.7% to 8.8% over the same time period.

The number of individuals with flexible schedules has rapidly increased from 12% in 1980 to 34% in 2000. Only 9% of young working college graduates participate in formal employer sponsored programs. This implies that the majority of workers who have flexible work arrangements have informal arrangements with their employers. Using the formal flexible measure would under estimate the number of people who have flexible work arrangements leading to estimates in which individuals under value flexible work arrangements.

Table 1.3 compares flexibility measures for all men and women for the pooled years 1980-2000. Notice that men tend to longer days. Twenty-seven percent of men work 50 hours or more per week while only 10% of women do the same. Women are also more likely to work part time (less than 30 hours per week) compared to men (15% vs. 4%). However approximately equal numbers of men and women are able to take advantage of flexible work arrangements or have a formal flexible work schedule program available to them.

Marital status and parental status also influence work hours[7]. Married men tend to work longer hours than do single men but parental status has little effect on men's work schedules. However, married women tend to work fewer hours per week than their single counterparts. And mothers tend to work less compared to childless women.

The percentage of workers with flexible schedules varies across occupation. In most occupations between 20% and 40% of workers have the ability to vary their start time or end time of their work day. Occupations that have 100% flexibility are small occupations such as shoe repairers. However, there are many occupations that have no flexibility available. For example, occupations that require shift work including, prison guards, crane and winch operators, and lathe operators. Occupations that access to roughly average amounts of work schedule flexibility are customer service representatives (0.31), podiatrists (0.33), legal assistants (0.35), and accountants (0.37).

The measures of flexibility will be correlated with each other since they are measuring the same job attribute in various ways. Table 1.4 shows the correlation among the numerous measures of flexibility. As expected the hourly measures are correlated among each other and the flexibility measures defined from the Current Population Survey are strongly correlated with each other with the exception of formal flexible programs. There is moderate correlation among the measures defined by hours worked per week and the CPS defined survey measures. This implies that similar results should

[7] Causation could also work in the other direction in which work hours determine marital and parental status.

be found from in the occupational choice measure when using different measures of flexibility.[8]

D. Other Occupational Attributes

These characteristics were chosen since they represent characteristics of the firm rather than characteristics of the individual who is choosing his or her occupation. This reduces the likelihood that these variables are endogenous.[9] These attributes include: physical safety on the job, human capital accumulation, self-directed, attending to others, and workplace competitiveness.[10] Physical safety on the job is a measure of risk, in terms of injury or death, which is assumed on the job. DeLeire and Levy examine the effects of risk on occupational choice and find that risk on the job is a deterrent for individuals to enter a particular occupation. Human capital accumulation represents the average commitment in years to proficiently perform the occupation. The variable self-directed measures individuals' control over their daily work tasks. Attending to others is a measure of how much help individuals are required to give to clients or their co-workers in their daily tasks. Finally, workplace competitiveness is included and measures how competitive promotions within the company are and how the firm competes with other companies for clients. Croson and Gneezy (2009) found that women may dislike competitive work environments leading to gender differences in occupational distributions.

[8] I have used various measures of flexibility in the occupational choice. There is little difference in the results among the various measures. The results are available upon request.

[9] Because there is complex matching problem between workers and firms in which heterogeneous workers to firms with different requirements, this paper side steps this difficulty and instead focuses on characteristics that should, in principle, be available – at a price – to all workers.

[10] The Occupational Information Network Database records exposure to hazardous conditions. For ease of interpretation I transform this to exposure to safe conditions by taking the negative of measure.

Summary statistics for the O*Net characteristics can be found in Table 1.5. Most of the controls used in the model are determined by an arbitrary scale and these variables are ordinal rather than cardinal, where larger number represents a greater importance, higher level, or greater exposure to the characteristics. Physical safety in the workplace is a measure of risk to individuals and smaller numbers imply a greater hazard on the job site. In order to calculate human capital accumulation I impute the value from a series of O*Net variables that measure the percent of workers within an occupation that have received training for a certain period of time. The imputed measure represents the average number of years that workers train on the job in a particular occupation. Self-directed jobs allow employees more leeway and less supervision from their bosses on assignments or projects. Attending to others is a measure of how important aiding others is on the job; occupations that score high in this area are clergy, funeral home directors and nurses while accountants, engineers, and salespersons score low. Competitive workplace is a measure of both internal and external competition at the occupation. Internal competition refers to the rivalry among coworkers for promotions while external competition refers the competition for new business or sales among firms.

1.5 OCCUPATIONAL CHOICE MODEL

I adopt the random utility model for occupational choice found in DeLeire and Levy. Individuals choose from a large but finite number of occupations. DeLeire and Levy assume a generic utility function in which an individual will receive utility from the wage he or she receives, the attributes of the occupation, and personal characteristics. This can be expressed as:

$$U_{ij} = U(X_i, W_{ij}, FLEX_j, Z_j), \tag{1.1}$$

where i represents individuals and j represents occupations. X_i is a vector of personal characteristics that include characteristics such as gender, marital status, and parental status. The wages received by an individual are a function of personal characteristics (X_i) and job attributes (Z_j):

$$W_{ij} = f(X_i, FLEX_j, Z_j). \tag{1.2}$$

Substituting equation (1.2) into (1.1) and assuming a linear functional form yields:

$$U_{ij} = \delta X_i + \gamma FLEX_j + \beta Z_j + \varepsilon_{ij}, \tag{1.3}$$

where, ε_{ij} is the error term which is independent and identically distributed as type-I extreme value. Assuming individuals are utility maximizers, occupation *j* will be chosen if:

$$U_{ij} > U_{ik} \forall j \neq k. \tag{1.4}$$

Let I_{ij} = 1 if individual i chooses occupation j and zero otherwise. Given the assumption of type-I extreme values errors the model can be estimated using McFadden's conditional logit formulation which takes the form:

$$\Pr(I_{ij} = 1) = \frac{\exp\{\delta X_i + \beta Z_j + \gamma FLEX_j\}}{\sum_{j=1}^{J} \exp\{\delta X_i + \beta Z_j + \gamma FLEX_j\}} = p_j. \tag{1.5}$$

Note that the effect of individual characteristics, δ, cannot be identified in the above equation since δX_i will drop out of the equation. Only the parameter estimates of the job characteristics can be obtained.

1.6 EMPIRICAL MODEL

I take advantage of the equivalence of the log-likelihood function of Poisson regression model to the conditional logit model. The Poisson model allows the estimation of a large number of choices that would otherwise be too computationally burdensome using the conditional logit model. Some papers that have taken advantage of this formulation are Chen and Kuo (2001) and Chen, Duann, and Hu (2005).

Woodward (1992), Guimarães, Rolfe and Woodward (1998), and Figueiredo et al (2003), that the log-likelihood function for the conditional logit model can be expressed as

$$\log L_{cl} = \sum_{j=1}^{J} n_j \log p_j, \tag{1.6}$$

and n_j is the number of individuals who choose occupation j and p_j is the probability that occupation j is chosen .

Alternatively, let n_j be independently and identically distributed as Poisson. The Poisson regression model specifies that n_j is drawn from a Poisson distribution with parameter λ_j, the probability that N_j is realized for any occupation j is

$$\Pr(N_j = n_j \mid z_j) = \frac{e^{-\lambda_j} \lambda_j^{n_j}}{n_j!},\ n_j \in [0, \infty). \tag{1.7}$$

Let λ_j be expressed as

$$\lambda_j = \exp(\alpha + z_j \beta) \tag{1.8}$$

and the expected number of individuals to choose occupation j within a given Census year is

$$E[n_j \mid z_j] = V[n_j \mid z_j] = \exp(\alpha + z_j\beta), \tag{1.9}$$

and it is shown that

$$\frac{\partial E[n_j \mid z_j]}{\partial z_j} = \lambda_j \beta. \tag{1.10}$$

The log-likelihood function can be written as

$$\log L_P = \sum_{j=1}^{J} (-\lambda_j + n_j \log \lambda_j - \log n_j !). \tag{1.11}$$

Substituting equation (1.2) into equation (1.5) yields

$$\log L_P = \sum_{j=1}^{J} [-\exp(\alpha + z_j\beta) + n_j(\alpha + z_j\beta) - \log n_j !]. \tag{1.12}$$

Taking the first order condition with respect to α and obtain

$$\frac{\partial \log L_P}{\partial \alpha} = \sum_{j=1}^{J} [n_j - \exp(\alpha + z_j\beta)] = 0, \tag{1.13}$$

and

$$\exp(\alpha) = \frac{N}{\sum_{j=1}^{J} \exp(z_j\beta)}. \tag{1.14}$$

N is the total number of individuals across all occupations. Substituting (14) into (12) and some simplification yields

$$\log L_P = \sum_{j=1}^{J} n_j \log p_j - N + N \log N - \sum_{j=1}^{J} \log n_j !. \tag{1.15}$$

Notice that the first term on the right hand side of equation (1.15) is equivalent to the right hand side of equation (1.6). The remaining terms on the right hand side of equation (1.15) are equal to a constant and n_j is an independently distributed as a Poisson

distribution and is the number of individuals who select occupation j. The estimates obtained by maximizing equation (1.15) will be identical to those obtained by maximizing (1.6), as the standard errors in both models will also be identical because they are formed by the identical Hessian matrix (Davidson and MacKinnon, 1993).[11]

The coefficient estimates of the occupational choice model can be interpreted as marginal utility. The ratio of the marginal utilities for any two characteristics is defined as the marginal rate of substitution. The marginal rate of substitution is defined as the cost to obtain one more unit of flexibility. The marginal rate of substitution between characteristic Z_j and flexibility is

$$MRS_{XF} = \frac{M\hat{U}_{FLEX}}{M\hat{U}_{Z_j}} = \frac{\hat{\gamma}_t^g}{\hat{\beta}_t^g}. \tag{1.16}$$

If $\hat{\beta} > 0$ then the characteristics is a desirable attribute of a job and the MRS between characteristic X and flexibility can be interpreted as how many units of characteristic X an individual is willing to give up to obtain an additional unit of flexibility. If $\hat{\beta} < 0$ then the characteristics is an undesirable attribute. The MRS can now be interpreted as how many units of characteristic X an individual is willing to accept in order to obtain an additional unit of flexibility.

[11] In order to yield consistent predictions across the conditional logit and Poisson model a transformation needs to be made. The Poisson model predicts the number of individuals in an occupation. The conditional logit model predicts the probabilities that an individual will choose a particular occupation. Thus to obtain predicted probabilities from the Poisson model, the predicted counts must be divided by the total predicted count of individuals across all occupations.

1.7 RESULTS

A. Pooled Data

I first estimate equation (1.15) separately for men and women across all years. In this specification I include a set of dummy variables for the year. Results are found in Table 1.6. The availability of flexible work schedules increases the utility of a particular occupation for both men and women since it provides an option value to individuals; for the remainder of the paper I measure flexibility as the ability to vary the start or end time of one's job. Demographic groups cannot be compared directly across regressions but rather marginal rates of substitution must be estimated.

The choice model estimated here makes clear that it is not possible to infer whether women prefer flexible schedules relative to men without specifying what they prefer it to. One natural measure is wages. However in DeLeire and Levy's methodology, the endogenous variable has been solved out of the model and the random utility model is estimated as a reduced form function of job characteristics. In this case one can only compare the value men and women place on flexibility relative to their preferences for other job characteristics.

There are no natural units for the occupation attributes but are measured on the same scale for men and women and the MRS should be comparable across groups. The results are displayed in Table 1.7. The estimated MRS for flexibility with physical safety is 0.83 for men with a standard error of 0.011 and 0.40 for women a standard error of

0.009.[12] Since men are willing to give up more safety relative to women, men value flexibility in terms of safety more than women. A higher MRS for flexibility with respect to some other desirable job characteristic indicates that the willingness to pay is higher. In particular if men value flexibility more than women relative to physical safety then the estimated MRS should be higher for men than for women.

Men are also more willing to sacrifice on the job training and unstructured jobs, in exchange for greater flexibility. On average, assisting or caring for others is an undesired characteristic for men and women. The MRS for flexibility with respect to attending to others is -2.8 for women and is -1.8 for men.

B. Estimates by Decade

Next I consider whether the value of flexible work schedules has changed over time. I estimate equation (1.15) separately for men and women for each Census year. I relegate the full results to the Appendix Table A1 and focus on the marginal rates of substitution. Table 1.8 reports the MRS between flexibility and other characteristics for men and women by each year. The estimates indicate men have become increasingly will to sacrifice physical safety on the job in exchange for greater work schedule flexibility. By contrast, there is no significant trend for women. The MRS for flexibility and job safety increased by 53% between 1980 and 1990 from 0.35 to 0.60, the MRS for flexibility with safety declined by 35% to just 0.42. In only one of decadal years – 1990 – was the estimated MRS between flexible schedules and physical safety higher for women

[12] Literally speaking, the MRS for flexibility with respect to physical safety on the job for men means that the individual's utility is unchanged by compensating them with 1 unit of flexibility for sacrificing 0.83 unit of physical safety.

than for men. It is not surprising that women have such a high preference for physical job safety relative to men.

There is evidence that women have become increasingly willing to trade the opportunity for human capital accumulation on the job for flexible schedules. However the estimates indicate that men valued flexible schedules more than women in 1990 and 2000.

Both men and women were willing to sacrifice self-directed for flexible schedules in greater amounts in 2000 than in 1980. Women went from a higher MRS between flexible schedules and self-directed than men in 1980 and 1990 to a lower MRS by 2000.

C. Estimates by Marital and Parental Status

One might expect the demand for flexible schedules to vary as a function of marital and parental status. For example, women with children might be expected to have a higher demand for flexible schedules than women without children. I estimate equation (1.15) by demographic groups defined by gender, marital status, and parental status.

The occupational choice estimates can be found in Appendix Table A2 for the pooled results from 1980-2000 and the marginal rates of substitution are found in Table 1.9. Even after dividing individuals into multiple groups men value flexibility more than women in each of the marital-parental subgroups for most characteristics. For example, the MRS for flexibility with respect to physical safety is 7.94 for married men without

kids and 3.89 for married women without kids. Similarly the MRS is 1.89 for single men without kids and 0.67 for single women without kids.[13]

Of the eight demographic groups, mothers, especially single mothers, are the least willing to sacrifice physical safety for flexible schedules while fathers, especially single fathers, are the most willing to accept physical risk. The MRS for flexible schedules with respect to safety is 0.19 for single mothers and is 2.29 for single fathers. Mothers might be more risk adverse and less willing to give up flexible work arrangements than non-mothers because they are the primary care-giver to their children.

Married mothers are more willing than single mothers to accept less desirable working conditions in exchange for more flexible work arrangements. Single mothers might be more reluctant to accept positions in which they are required to work long hours. From Beers (2000) it is known that flexible work schedules are correlated with working long hours. Single mothers may want to spend more time away from work to care for their children. There might also be other attributes that single mothers find desirable that are omitted from the regressions that are causing single mothers to enter occupations where flexible work arrangements are not available.

Single fathers and married fathers have similar MRS between flexible schedules and other job attributes; this implies that fathers regardless of marital status have similar willingness to pay for flexible work arrangements in terms of various attributes. The

[13] Conversely the MRS for flexible schedules with respect to workplace competitiveness is 2.06 for married mothers and 1.09 for married fathers. This suggests that married mothers are more willing to sacrifice competitiveness than married father. This is supported by Kleinjans (2009) who finds that women have a greater distaste for competitive work environments than men.

MRS for married fathers is 2.23 and 2.29 for single fathers. Given the size of the standard errors these are not significantly different.

I now examine how MRS's varies for married and single non-parents. There is little difference in the MRS for flexibility with safety between married women and single women for any of the tradeoffs. But, for men there are differences for married and single men; the MRS is 2.00 for married men and 1.56 for single men without kids. Married men value flexibility more than single men in terms of safety.

Finally I examine how the marginal rate of substitutions for these characteristics over time for each demographic group. For married fathers, married men and women without kids, single fathers, and single women without kids, flexibility has become relatively more important between 1980 and 2000 in terms of safety. But in terms of on the job training, flexibility has become more important for each demographic group[14]. The MRS between flexibility and unstructured jobs has increased over time for demographic groups except for married and single mothers. Individuals are increasingly willing to forgo greater amounts of desirable job characteristics overtime to increase the amount of flexibility available in one's work schedule.

1.8 ALTERNATIVE SPECIFICATIONS

A. Alternative Measures of Flexibility

Various measures of flexibility have been used in the past to study the effects of flexibility on wages and in other studies. Here I explore the effects of the standard deviation of hours within an occupation, the difference from a forty hour work week, and

[14] The MRS between flexibility and on the job training for single mothers has remained roughly constant between 1980 and 2000.

the absolute difference from a forty hour work week on occupation choice. After individually examining the effects of these characteristics I explore the combined effects of these measures of flexibility with my preferred measure of flexibility.

I estimate equation 1.15 once again separately for men and women with the data pooled across the three Census years. The results can be found in Table 1.11 for women and Table 1.12 for men. Column one estimates the effects of the standard deviation of hours within an occupation on occupational choice. Occupations with larger standard deviations of hours mean that there is a greater the variance of hours worked by employees in the occupation and the more likely that individuals will work varying schedules each week. The greater the variability in hours worked per week the more likely women and men are to choose particular occupations. But the increase in marginal utility from standard deviation of hours is about one-fifth of increase from flexible schedules for both men and women. Columns 2 and 3 report the effects of hours minus forty and the absolute value of this term on occupational choice. For both women and men these effects are of about equal magnitude as the standard deviation of hours; but the impact of hours minus forty for women is relatively small (one-third the size of standard deviation of hours) on occupation choice compared to other measures.

Columns 4 through 6 include the variable flexible schedules in the specifications from columns 1 through 3. For men the addition of flexible schedules diminishes the effect of the alternative measure of flexibility. The introduction of flexible schedules causes the impact of standard deviation of hours and absolute hours minus forty to increase and the impact of hours minus forty to decrease for women.

Specification 7 includes flexible schedule and all alternative measures. These measures remain statistically significant since they are picking up different aspects of the job. Standard deviation of hours is measuring the variability in hours which are likely to be dictated by the employer rather than employees; deviation from forty and absolute deviate from forty are measures of how long individuals are working in an occupation. In this specification part time flexibility is also introduced.[15] Now, women do not like standard deviation of hours but do like part time flexibility; women want to be in control of schedules which part time flexibility allows them to do whereas standard deviation of hours their schedule is being dictated to them. The later measure does not allow individuals to meet have flexibility in order to meet personal needs.

However for men the standard deviation of hours remains positive and part time flexibility is negative. This implies that men prefer flexible schedules over part time work even if means that their employer is dictating to them when they can take off.

These results further show that flexibility and part time work are substitutes for women so they can reduce the amount of time spent at the office. The next subsection details these results by demographic group and focuses on the flexible schedule measure and part time flexibility measure. These specifications show that the impact of flexibility on occupational choice remains robust when varying measures are used separately and included at once.

[15] Part time flexibility is defined as the percentage of people in an occupation who work part time.

B. Part Time Jobs as a Substitute for Schedule Flexibility

My measure of schedule flexibility refers to the ability of an individual employee to shift around hours worked in a given day by starting or finishing work earlier or later at the margin. Such flexibility of schedules is more common in occupations in which long hours are more frequent (Golden 2001). However, such flexibility may not be sufficient to satisfy individuals who have high demands for large blocks of time to devote to non-work activities. Individuals with high demands for large blocks of time may be particularly attracted to occupations in which it is relatively easy to work part time. I measure the ease of arranging part time work in an occupation as the percentage of individuals who work part time.

Of course, this percentage is an equilibrium outcome in the market for nonwage characteristics and not merely a technological feature of the occupation. However, in the current context, it seems a reasonable approximation. In addition, the decision to work in such jobs contains an element of labor supply – that is, the demand for nonmarket time – as well as the demand for being able to rearrange a given number of hours worked. It is, the decision to work part time and the decision to work in an occupation in which part time work is relatively frequent are both conceptually and empirically distinct.

I estimate equation 1.15 and the results can be found in Table 1.13 for men and women for data pooled across years. First notice that flexibility continues to be a good for both men and women increasing marginal utility by approximately 0.6 utils for women and 1.2 utils for men an increase in flexibility on the job. Women are attracted to occupations where there is greater ease for working part time but men are attracted into

jobs that have lower opportunities for part time work. This suggests that women do value the opportunity to have access to flexibility in the workplace in order to more easily balance their personal lives and work lives. This shows a difference in the way that men and women utilize flexible work schedules. Women are using flexible work schedules as a substitute for part time employment, which also provides the ability to balance work and personal lives. Men however are attracted into flexible jobs but away from part time work this implies that men are seeking ways to balance work and personal lives without sacrificing earnings potential.

Table 1.14 shows the marginal rates of substitution between flexible work schedules and other workplace characteristics. The MRS for schedule flexibility with respect to ease to work part time is 0.34 for women and -0.31 for men. Men must be compensated with flexibility in order to accept part-time work and keep utility constant.

It is plausible that married women or mothers maybe driving the result that women are using part time work as a substitute for flexible work schedules rather than single women without kids who are more likely to be career women and who are supported by from their spouse's income for through child support. Table 1.15 reports the estimate of equation 1.15 by demographic group and Table 1.16 records the MRS's between flexibility and other workplace characteristics.

Married mothers are the most willing to sacrifice part time work in exchange for flexible work schedules but single mothers are the least willing. And single women without kids have approximately the same MRS between flexibility and part time work as

the full female sample; it thus unlikely that married women or mothers are driving the results.

It is further worth noting that single men without kids are the least willing to accept part time employment, and married fathers are least resistant to accepting part time employment. This suggests that earnings potential is more important to men than working shorter hours and that married fathers are more willing to accept part time employment in order to support their families where single men without kids do not have these obligations are able to choose jobs that do not balance work and personal lives as well as other jobs.

These results suggest that while men are willing to sacrifice safety to obtain flexible jobs in greater amounts relative to women, women value flexibility in their jobs and are willing to accept part time employment in order to balance work and personal lives. Part time work is a substitute for flexibility for women but not for men. Men are deterred from choosing jobs in where there are a large percentage of part time employees instead choosing jobs that have flexible jobs available to them. From the hours worked regression I showed that men increased their average hours worked when in a flexible job but women decreased their hours worked. Women are using flexible work schedules as a mechanism to reduce their work burden in order to increase the amount of time they have to take on personal responsibilities.

C. Endogeneity of Part Time Work

The decision to work part time is endogenous. Workers who most wish to work part time will enter occupations with the lowest cost of providing part time job

opportunities. Workers choose not only what occupation they wish to go into but also how many hours to work. This introduces bias in the estimates if it is unaccounted. In order to control for this I allow for individuals to simultaneously choosing what occupation to work and to work full time or part time.

By introducing this into the model I am accounting for the fact that workers do uniformly supply the same amount of labor and that they must also choose how much they want to work. Allowing for individuals to choose to work full time or part time is a first approximation of this decision. Some occupations may provide low cost opportunities for firms to allow part time work such as retail sales while other occupations may not such as teaching. Because firms have different costs of administering this attributes individuals and firms will match based on their preferences and costs.

In order to estimate this model I must allow each individual to choose both occupation and whether to work full time or part time simultaneously. Each occupation now has two observations one of which records the number of full time workers and the other records the number of part time workers. Individuals will choose occupation, *j* and hours, *h* if

$$U_{ijh} > U_{ikl} \forall j \neq k \text{ or } h \neq l. \tag{1.17}$$

Let I_{ijh} = 1 if individual i chooses occupation j and hours h and zero otherwise. Given the assumption of type-I extreme values errors the model can be estimated using McFadden's conditional logit formulation equation 1.5 can be reformulated as

$$\Pr(I_{ijh}=1)=\frac{\exp\{\delta X_i+\beta Z_j+\gamma FLEX_j+\eta PARTTIME_j\}}{\sum_{j=1}^{J}\exp\{\delta X_i+\beta Z_j+\gamma FLEX_j+\eta PARTTIME_j\}}=p_j. \qquad (1.18)$$

Equation 1.15 can now be re-estimated with the decision to work full time or part time embedded in the model. To capture the effects of part time work an indicator variable is included. Table 1.17 reports the results by gender.

Scheduling flexibility remains a desirable attribute of occupations for both men and women; this increases marginal utility for both groups of individuals. Ease to work part time decreases utility for men and women but being in an occupation with part time flexibility increases the desirability of the job for women and decreases it for men. This shows that even when controlling for the endogeneity of the part time work women still like part time flexibility. Women are willing to sacrifice flexible schedules for ease of working part nearly one-to-one; this suggests that women prefer the ability to obtain flexibility by various means to better balance work and personal lives.

D. Occupation Skill Level Segmentation

Occupational choice models also face the difficulty that not all jobs are available to all individuals. This can lead to results that do not match with economic theory. For example, consider the NBA; pro basketball players get paid millions of dollars but yet only there are only 450 NBA players in the nation. Playing in the NBA is a desirable job that thousands of college students try to become pros each year. Because only a limited number of people are NBA players and not every job is available to every person, the occupational choice model may show results that are not in line with economic theory such as higher wages having negative marginal utility.

In order to address this problem I segment the data into low skilled occupations and high skilled occupations. High skilled occupations likely attract individuals with a broader range of choices, where low skilled occupations may attract workers with a more limited choice set. High skilled occupations are defined as having greater than or equal to the median levels of mathematical reason skills and inductive reasoning skills.[16] There are roughly equal numbers of low and high skilled occupations.

Table 1.18 reports the results by skill level for men and women. From Table 1.17, part time flexibility attracted women into occupations but was a deterrent for men. In Table 1.18 workers in high skilled occupations are deterred from jobs with high part time flexibility while workers in low skilled occupations are attracted to these jobs; this holds true for both men and women. However it remains true that women are still more attracted to part time flexibility relative to men regardless of occupation segmentation.

The results discussed here show that men and women like flexibility in their jobs. Men are more willing to sacrifice to obtain flexible schedules but are not willing to use part time flexibility to obtain work and personal lives balance. Women however are willing to utilize both flexibility and part time flexibility. However when looking at high occupations versus low skilled occupations only workers in low skilled occupations were willing to make the tradeoff between flexible schedules and part time flexibility. Workers in high skilled occupations needed to be compensated to accept occupations with high part time flexibility.

[16] Alternative definitions of high skilled occupations were examined and the results remain robust.

1.9 CONCLUSION

My results show that flexible work hours are an important determinant of an individual's occupation choice. Flexible work hours allow individuals to more easily balance work and family lives. While both men and women enjoy flexible work hours, men rather than women are willing to sacrifice more in order to obtain flexible work hours. This sacrifice may come in the form of less safety of the work site or more independence of the job through an unstructured job.

Over time flexible work hours have become more influential for individuals in determining occupational outcomes. This is especially true for married individuals but not single mothers. Single mothers were either pushed into less flexible occupations or actively sought them out in order to obtain a schedule that matched their child's. This could be due to various reasons including increases in technological use which make it easier to stay in contact with co-workers. Why flexible work hours have become important is a question that is left unanswered for another paper.

The fact that men are more willing to sacrifice desirable job characteristics in greater amounts may seem puzzling at first glance. However this is occurring at a time when women are entering the labor force in greater numbers and men are looking for ways to balance work and personal lives. The logit results show that there is a positive correlation between female labor force participation and the probability that men choose flexible jobs.

My results show that men and women are sorting into different occupations based on preferences for flexibility and that flexible work schedules is an important determinant

in occupational choice models. Differences in flexible work schedules account for approximately 33% of the occupational gender gap among young college graduates. As the need for personal and work life balance evolves the desire for flexible work arrangements will continue to increase and be an important determinant of occupational choice for college graduates.

1.10 TABLES

Table 1.1: Most Female and Male Occupations in 2000

Most Female		Most Male	
Occupation	Percentage Female	Occupation	Percentage Female
Dental hygienists	0.954	Electrical engineer	0.129
Speech therapists	0.952	Farm managers	0.134
Dietitians and nutritionists	0.925	Metallurgical and materials engineers	0.136
Librarians	0.781	Atmospheric and space scientists	0.146
Public transportation attendants	0.750	Funeral directors	0.155
Proofreaders	0.744	Aerospace engineer	0.159
Legal assistants	0.730	Civil engineers	0.173
Library assistants	0.678	Engineers (Other)	0.178
Pharmacists	0.642	Surveyors and Cartographers	0.180
Physicians' assistants	0.627	Police and Detectives	0.181

Note: Occupation listed are at least 25% college graduates

Table 1.2: Flexibility Measures over Time			
	1980	1990	2000
Hours Deviance Measures			
Hours-40	1.617	2.323	2.428
	(10.043)	(10.539)	(10.342)
|Hours-40|	5.240	5.935	6.131
	(8.719)	(9.013)	(8.676)
Std. Dev. Of Hours within an Occupation	8.961	9.647	9.499
	(2.290)	(2.092)	(1.871)
Hours Worked per Week Indicators			
30-	0.077	0.084	0.088
	(0.266)	(0.277)	(0.284)
35-	0.117	0.122	0.127
	(0.321)	(0.327)	(0.333)
50+	0.160	0.201	0.223
	(0.367)	(0.401)	(0.417)
Direct Measures			
Flexible Hours	0.118	0.287	0.341
	(0.165)	(0.271)	(0.265)
Formal Flexible Program	-	0.090	0.096
	-	(0.064)	(0.064)
Work at Home 1+ times a week	-	0.140	0.151
	-	(0.135)	(0.149)
Work at Home Family Reasons	-	0.009	0.010
	-	(0.012)	(0.012)
Number of Individuals	899182	1144565	1275918
Number of Jobs	203	205	205
Note: Standard deviations are in parenthesis.			

Table 1.3: Flexibility Measures Women vs. Men			
	Women	Men	All
Hours Deviance Measures			
Hours-40	-1.129	4.632	2.172
	(9.734)	(10.084)	(10.336)
|Hours-40|	5.187	6.296	5.822
	(8.314)	(9.138)	(8.813)
Std. Dev. Of Hours within an Occupation	9.363	9.435	9.404
	(1.882)	(2.226)	(2.086)
Hours Worked per Week Indicators			
30-	0.145	0.038	0.083
	(0.352)	(0.191)	(0.277)
35-	0.208	0.058	0.122
	(0.406)	(0.235)	(0.328)
50+	0.098	0.273	.0199
	(0.297)	(0.446)	(0.399)
Direct Measures			
Flexible Hours	0.321	0.339	0.331
	(0.160)	(0.178)	(0.171)
Formal Flexible Program	0.098	0.088	0.092
	(0.058)	(0.068)	(0.064)
Work at Home 1+ times a week	0.139	0.151	0.146
	(0.144)	(0.142)	(0.143)
Work at Home Family Reasons	0.011	0.009	0.010
	(0.012)	(0.012)	(0.012)
N	1416536	1901202	3319665
Row Percent	42.7	57.3	100
Note: Standard deviations are in parenthesis.			

Table 1.4: Correlations of Various Flexibility Measures

	Hours - 40	|Hours-40|	Std. Dev.	30-Hours	35-Hours	50+ Hours	Flexible Hours	Formal Flexible Program
|Hours-40|	0.248							
Std. Dev.	0.144	0.907						
30-Hours	-0.248	0.180	0.227					
35-Hours	-0.241	0.155	0.197	0.995				
50+ Hours	0.283	0.221	0.154	0.447	0.480			
Flexible Hours	0.220	0.252	0.222	0.056	0.060	0.182		
Formal Flexible Program	0.002	-0.099	-0.108	-0.019	-0.012	0.016	0.573	
Work at Home for Family Reasons	0.045	0.103	0.098	0.072	0.079	0.162	0.456	0.086

Table 1.5: Average Levels of Work Characteristics			
			Scale
Exposure to Safe Conditions	-2.110	-5	0
	(1.013)		
On the Job Training Required (Years)	0.800	0	10
	(0.774)		
Unstructured Job	3.798	0	5
	(0.490)		
Assisting or Caring for Others	2.791	1	7
	(1.078)		
Level of Competition	2.853	0	5
	(0.508)		
Number of Jobs	205		
Note: Standard deviations are in parenthesis.			

Table 1.6: Pooled Poisson Regressions Occupational Choice		
	Female	Male
Flexible Work Schedules	0.359	0.490
	(0.008)	(0.006)
Exposure to Safe Conditions	0.894	0.589
	(0.005)	(0.002)
On the Job Training Required	0.118	0.070
	(0.003)	(0.002)
Unstructured Job	0.606	0.721
	(0.006)	(0.005)
Assisting or Caring for Others	-0.127	-0.273
	(0.002)	(0.002)
Level of Competition	0.282	0.771
	(0.004)	(0.003)
1980	-0.809	-0.046
	(0.005)	(0.004)
1990	-0.163	-0.014
	(0.004)	(0.004)
Constant	5.063	3.301
	(0.025)	(0.019)
Log Likelihood	-156252	-326126

Note: There are 203 occupations in 1980 and 205 for 1990 and 2000. Exposure to safe conditions is the negative of exposure to hazardous conditions which is recorded by the surveyors. Standard errors are in parenthesis.

Table 1.7: Marginal Rate of Substitutions Pooled Results

	Female	Male
Exposure to Safe Conditions	0.402	0.833
	(0.009)	(0.011)
On the Job Training Required	3.031	7.053
	(0.098)	(0.226)
Unstructured Job	0.593	0.680
	(0.016)	(0.010)
Assisting or Caring for Others	-2.826	-1.799
	(0.078)	(0.025)
Level of Competition	1.275	0.636
	(0.033)	(0.008)

Note: Standard errors are in parenthesis and are calculated using the delta-method. The MRS can be interpreted as the number of units of a characteristic an individual is willing to give up to obtain an additional unit of flexibility. Flexibility is defined as the ability to vary the start or end time of one's work day.

Table 1.8: Marginal Rates of Substitution Over Time by Gender		
	Female	Male
Exposure to Safe Conditions		
1980	0.351	0.400
	(0.026)	(0.024)
1990	0.599	0.538
	(0.017)	(0.017)
2000	0.423	0.635
	(0.013)	(0.017)
On the Job Training Required		
1980	1.295	0.782
	(0.096)	(0.049)
1990	1.984	13.215
	(0.073)	(2.084)
2000	3.070	5.262
	(0.132)	(0.274)
Unstructured Job		
1980	0.562	0.246
	(0.043)	(0.015)
1990	0.937	0.508
	(0.035)	(0.018)
2000	0.621	0.687
	(0.022)	(0.020)
Assisting or Caring for Others		
1980	-11.868	-1.761
	(2.378)	(0.112)
1990	-11.085	-1.505
	(1.031)	(0.050)
2000	-3.262	-1.277
	(0.127)	(0.035)
Level of Competition		
1980	-109.149	0.472
	(322.935)	(0.029)
1990	1.119	0.512
	(0.034)	(0.015)
2000	1.393	0.536
	(0.049)	(0.013)

Note: Standard errors are in parenthesis and are calculated using the delta-method. The MRS can be interpreted as the number of units of a characteristic an individual is willing to give up to obtain an additional unit of flexibility. Flexibility is defined as the ability to vary the start or end time of one's work day.

Table 1.9: Marginal Rate of Substitution between Flexibility and other Characteristics

	Married Kids		Married No Kids		Single Kids		Single No Kids	
	Female	Male	Female	Male	Female	Male	Female	Male
Exposure to Safe Conditions	0.313	2.231	0.468	1.976	0.188	2.293	0.441	1.557
	(0.016)	(0.030)	(0.017)	(0.033)	(0.047)	(0.298)	(0.015)	(0.024)
On the Job Training	2.058	5.270	3.786	7.941	1.167	5.960	3.638	10.162
	(0.129)	(0.098)	(0.224)	(0.283)	(0.314)	(1.265)	(0.195)	(0.484)
Unstructured Job	0.512	1.115	0.606	1.559	0.307	1.515	0.665	1.868
	(0.030)	(0.018)	(0.026)	(0.037)	(0.083)	(0.252)	(0.027)	(0.047)
Assisting or Caring for Others	-5.268	-3.263	-2.449	-2.372	-1.763	-2.022	-2.527	-1.835
	(0.450)	(0.046)	(0.105)	(0.040)	(0.484)	(0.233)	(0.100)	(0.028)
Level of Competition	2.058	1.087	1.162	1.010	0.896	0.862	1.147	0.962
	(0.147)	(0.012)	(0.048)	(0.015)	(0.244)	(0.089)	(0.043)	(0.014)

Note: Standard errors are in parenthesis and are calculated using the delta-method. The MRS can be interpreted as the number of units of a characteristic an individual is willing to give up to obtain an additional unit of flexibility. Flexibility is defined as the ability to vary the start or end time of one's work day.

Table 1.10: Marginal Rates of Substitution between Flexibility and other Characteristics

	Married Kids		Married No Kids		Single Kids		Single No Kids	
	Female	Male	Female	Male	Female	Male	Female	Male
Exposure to Safe Conditions								
1980	0.339	0.347	0.392	0.395	0.333	0.332	0.319	0.488
	(0.052)	(0.038)	(0.047)	(0.049)	(0.125)	(0.401)	(0.040)	(0.043)
1990	0.598	0.319	0.630	0.629	0.325	-0.023	0.597	0.691
	(0.031)	(0.028)	(0.033)	(0.034)	(0.106)	(0.269)	(0.028)	(0.027)
2000	0.350	0.891	0.509	0.753	0.178	0.547	0.451	0.362
	(0.022)	(0.031)	(0.025)	(0.034)	(0.064)	(0.215)	(0.021)	(0.024)
On the Job Training Required								
1980	1.498	0.545	1.441	0.865	1.156	0.659	1.101	1.303
	(0.245)	(0.060)	(0.176)	(0.111)	(0.438)	(0.816)	(0.138)	(0.125)
1990	1.858	2.105	2.072	264.206	0.768	-0.094	2.190	-12.158
	(0.122)	(0.269)	(0.139)	(1285.567)	(0.267)	(1.069)	(0.137)	(1.864)
2000	2.142	3.486	4.080	7.555	1.112	3.542	3.653	49.925
	(0.163)	(0.169)	(0.334)	(0.894)	(0.420)	(2.194)	(0.273)	(60.538)
Unstructured Job								
1980	0.655	0.168	0.519	0.259	0.791	0.214	0.516	0.425
	(0.109)	(0.018)	(0.065)	(0.031)	(0.331)	(0.253)	(0.068)	(0.037)
1990	1.126	0.203	0.788	0.619	0.509	-0.021	0.974	1.087
	(0.081)	(0.018)	(0.051)	(0.039)	(0.188)	(0.244)	(0.060)	(0.056)
2000	0.568	0.678	0.667	0.811	0.303	0.638	0.658	0.564
	(0.042)	(0.026)	(0.040)	(0.043)	(0.116)	(0.285)	(0.037)	(0.041)
Assisting or Caring for Others								
1980	8.703	-2.202	-6.232	-1.537	-5.554	-0.793	-6.847	-1.572
	(2.405)	(0.252)	(1.295)	(0.195)	(3.436)	(0.959)	(1.598)	(0.143)
1990	8.877	-1.211	-4.811	-1.571	13.243	0.044	-5.752	-1.600
	(0.989)	(0.110)	(0.445)	(0.091)	(14.077)	(0.501)	(0.530)	(0.067)
2000	-4.888	-2.114	-3.102	-1.431	-1.962	-0.883	-2.849	-0.661
	(0.486)	(0.083)	(0.192)	(0.068)	(0.777)	(0.352)	(0.163)	(0.044)
Level of Competition								
1980	-1.283	0.397	12.007	0.436	5.901	0.280	2.699	0.655
	(0.205)	(0.043)	(6.813)	(0.054)	(5.763)	(0.337)	(0.520)	(0.059)
1990	1.987	0.301	0.952	0.557	0.813	-0.017	0.942	0.700
	(0.133)	(0.026)	(0.051)	(0.029)	(0.279)	(0.194)	(0.045)	(0.026)
2000	1.637	0.688	1.296	0.621	0.922	0.349	1.380	0.336
	(0.128)	(0.023)	(0.073)	(0.027)	(0.358)	(0.132)	(0.075)	(0.022)

Note: Standard errors are in parenthesis and are calculated using the delta-method. The MRS can be interpreted as the number of units of a characteristic an individual is willing to give up to obtain an additional unit of flexibility.

Table 1.11: Alternative Measures of Flexibility- Women

	(1)	(2)	(3)	(4)	(5)	(6)	(7)
Flexible Schedule				0.406	0.554	0.350	0.376
				(0.010)	(0.010)	(0.010)	(0.010)
Std. Dev. Of Hours	0.073			0.082			-0.085
	(0.001)			(0.001)			(0.003)
Hours - 40		0.026			0.016		0.007
		(0.001)			(0.001)		(0.003)
|Hours - 40|			0.074			0.083	0.131
			(0.001)			(0.001)	(0.004)
Part Time Flexibility							1.125
							(0.093)
Real Weekly Wages	1.755	1.490	1.684	1.651	1.366	1.582	1.653
	(0.008)	(0.009)	(0.008)	(0.009)	(0.010)	(0.009)	(0.011)
Safe Conditions	1.146	1.207	1.160	0.981	0.989	1.011	0.988
	(0.004)	(0.004)	(0.004)	(0.004)	(0.005)	(0.004)	(0.005)
OJT	-0.154	-0.144	-0.178	-0.147	-0.130	-0.168	-0.185
	(0.003)	(0.003)	(0.003)	(0.003)	(0.004)	(0.004)	(0.004)
Unstructuredness	0.544	0.512	0.503	0.303	0.323	0.247	0.225
	(0.006)	(0.006)	(0.006)	(0.006)	(0.007)	(0.006)	(0.007)
Assisting or Caring for Others	-0.066	-0.013	-0.068	-0.092	-0.049	-0.089	-0.084
	(0.002)	(0.002)	(0.002)	(0.002)	(0.002)	(0.002)	(0.002)
Competitiveness	-0.232	-0.184	-0.225	-0.206	-0.152	-0.217	-0.217
	(0.005)	(0.005)	(0.005)	(0.005)	(0.005)	(0.005)	(0.005)
1980	-0.548	-0.603	-0.515	-0.556	-0.624	-0.519	-0.499
	(0.006)	(0.006)	(0.006)	(0.006)	(0.006)	(0.006)	(0.006)
1990	-0.029	-0.039	-0.002	-0.037	-0.050	-0.004	0.025
	(0.004)	(0.004)	(0.004)	(0.005)	(0.004)	(0.005)	(0.005)
Constant	-5.203	-2.895	-4.320	-3.934	-1.718	-2.889	-2.973
	(0.051)	(0.057)	(0.048)	(0.053)	(0.060)	(0.049)	(0.073)

Note: The standard deviation of hours is calculated within occupations measuring the variability of hours worked. Real weekly wages is expressed as the natural logarithm of weekly wages expressed in 2000 dollars.

Table 1.12: Alternative Measures of Flexibility- Men

	(1)	(2)	(3)	(4)	(5)	(6)	(7)
Flexible Schedule				0.987	0.783	0.906	0.817
				(0.008)	(0.008)	(0.008)	(0.008)
Std. Dev. Of Hours	0.116			0.098			0.098
	(0.001)			(0.001)			(0.002)
Hours - 40		0.163			0.135		0.000
		(0.001)			(0.001)		(0.004)
|Hours - 40|			0.119			0.096	0.055
			(0.001)			(0.001)	(0.004)
Part Time Flexibility							-5.870
							(0.124)
Real Weekly Wages	2.475	1.666	2.345	2.365	1.638	2.261	1.554
	(0.007)	(0.006)	(0.006)	(0.007)	(0.007)	(0.007)	(0.007)
Safe Conditions	0.590	0.859	0.615	0.408	0.640	0.441	0.697
	(0.002)	(0.003)	(0.002)	(0.003)	(0.003)	(0.003)	(0.003)
OJT	-0.191	-0.210	-0.223	-0.186	-0.191	-0.206	-0.157
	(0.002)	(0.002)	(0.002)	(0.002)	(0.002)	(0.002)	(0.002)
Unstructuredness	0.610	0.339	0.511	0.236	0.088	0.158	0.110
	(0.005)	(0.005)	(0.005)	(0.005)	(0.005)	(0.005)	(0.005)
Assisting or Caring for Others	-0.335	-0.276	-0.337	-0.321	-0.293	-0.319	-0.279
	(0.002)	(0.002)	(0.002)	(0.002)	(0.002)	(0.002)	(0.002)
Competitiveness	0.115	0.130	0.127	0.144	0.136	0.141	0.160
	(0.004)	(0.004)	(0.004)	(0.004)	(0.004)	(0.004)	(0.004)
1980	0.401	0.462	0.470	0.378	0.418	0.428	0.354
	(0.004)	(0.004)	(0.004)	(0.004)	(0.004)	(0.004)	(0.004)
1990	0.235	0.273	0.287	0.231	0.255	0.271	0.218
	(0.004)	(0.004)	(0.004)	(0.004)	(0.004)	(0.004)	(0.004)
Constant	-11.586	-4.304	-9.959	-9.866	-3.535	-8.450	-3.355
	(0.042)	(0.041)	(0.039)	(0.043)	(0.043)	(0.040)	(0.053)

Note: The standard deviation of hours is calculated within occupations measuring the variability of hours worked. Real weekly wages is expressed as the natural logarithm of weekly

Table 1.13: Occupational Choice Marginal Utilities		
	Women	Men
Flexible Scheduling	0.550	1.234
	(0.010)	(0.007)
Real Weekly Wages	1.807	1.602
	(0.011)	(0.008)
Flexibility to Work PT	1.630	-3.779
	(0.026)	(0.031)
Safe Conditions	0.889	0.518
	(0.004)	(0.003)
OJT	-0.143	-0.122
	(0.003)	(0.002)
Unstructuredness	0.316	0.237
	(0.007)	(0.005)
Assisting or Caring for Others	-0.075	-0.208
	(0.002)	(0.002)
Competitiveness	-0.165	0.236
	(0.005)	(0.004)
1980	-0.586	0.192
	(0.006)	(0.004)
1990	-0.028	0.151
	(0.005)	(0.004)
Constant	-4.820	-3.994
	(0.064)	(0.053)

Table 1.14 Estimated MRS Between Flexibility and Job Attributes		
	Women	Men
Real Weekly Wages	0.300	0.775
	(0.006)	(0.006)
Flexibility to Work PT	0.336	-0.311
	(0.008)	(0.003)
Safe Conditions	0.602	2.244
	(0.012)	(0.019)
OJT	-3.685	-9.775
	(0.110)	(0.190)
Unstructuredness	1.679	4.676
	(0.049)	(0.103)
Assisting or Caring for Others	-7.206	-6.006
	(0.249)	(0.066)
Competitiveness	-3.099	5.332
	(0.098)	(0.095)

Table 1.15: Occupational Choice By Demographic Group with Part Time Flexibility Measure

	Women				Men			
	Married No Kids	Married Kids	Single Kids	Single No Kids	Married No Kids	Married Kids	Single No Kids	Single Kids
Flexible Scheduling	0.641	0.504	0.550	0.277	1.326	1.401	0.978	0.904
	(0.019)	(0.019)	(0.016)	(0.046)	(0.016)	(0.012)	(0.013)	(0.082)
Real Weekly	2.188	1.351	1.946	1.171	1.923	1.227	1.831	1.113
	(0.021)	(0.020)	(0.017)	(0.047)	(0.017)	(0.013)	(0.014)	(0.086)
Flexibility to Work PT	1.616	1.462	1.804	1.171	-3.910	-6.575	-1.361	-3.773
	(0.051)	(0.048)	(0.040)	(0.118)	(0.068)	(0.057)	(0.045)	(0.343)
Safe Conditions	0.873	0.986	0.843	0.840	0.525	0.568	0.484	0.391
	(0.008)	(0.009)	(0.007)	(0.020)	(0.006)	(0.004)	(0.005)	(0.029)
OJT	-0.196	-0.058	-0.174	-0.066	-0.167	-0.041	-0.195	-0.102
	(0.007)	(0.007)	(0.005)	(0.017)	(0.005)	(0.004)	(0.004)	(0.026)
Unstructuredness	0.328	0.380	0.265	0.301	0.159	0.483	0.032	0.097
	(0.013)	(0.012)	(0.010)	(0.030)	(0.011)	(0.009)	(0.008)	(0.057)
Assisting or Caring for Others	-0.107	-0.014	-0.098	-0.046	-0.232	-0.123	-0.290	-0.223
	(0.004)	(0.004)	(0.003)	(0.010)	(0.004)	(0.003)	(0.003)	(0.021)
Competitiveness	-0.209	-0.169	-0.147	-0.088	0.219	0.280	0.198	0.361
	(0.009)	(0.009)	(0.008)	(0.023)	(0.008)	(0.006)	(0.006)	(0.043)
1980	-0.379	-0.921	-0.487	-0.797	0.238	0.426	-0.102	-0.589
	(0.010)	(0.011)	(0.009)	(0.026)	(0.008)	(0.006)	(0.007)	(0.045)
1990	0.100	-0.139	0.008	-0.395	0.188	0.237	0.058	-0.423
	(0.009)	(0.009)	(0.007)	(0.022)	(0.008)	(0.006)	(0.006)	(0.041)
Constant	-8.575	-3.322	-6.525	-3.763	-7.190	-3.685	-5.394	-5.032
	(0.125)	(0.119)	(0.100)	(0.287)	(0.112)	(0.084)	(0.086)	(0.556)

Table 1.16: MRS Between Flexibility and Other Characteristics by Demographic Group								
	Women				Men			
	Married Kids	Married No Kids	Single No Kids	Single Kids	Married No Kids	Married Kids	Single No Kids	Single Kids
Real Weekly Wages	0.289	0.369	0.278	0.231	0.693	1.160	0.533	0.817
	(0.009)	(0.015)	(0.008)	(0.041)	(0.011)	(0.015)	(0.008)	(0.099)
Flexibility to Work PT	0.395	0.344	0.303	0.235	-0.322	-0.205	-0.663	-0.231
	(0.018)	(0.018)	(0.011)	(0.048)	(0.007)	(0.002)	(0.022)	(0.029)
Safe Conditions	-0.713	-0.501	-0.632	-0.316	-2.368	-2.326	-1.910	-2.200
	(0.023)	(0.020)	(0.019)	(0.055)	(0.040)	(0.027)	(0.032)	(0.270)
OJT	-3.176	-8.230	-3.029	-3.990	-7.742	-32.626	-4.855	-8.546
	(0.142)	(0.972)	(0.128)	(1.208)	(0.238)	(2.703)	(0.119)	(2.285)
Unstructuredness	1.886	1.290	1.983	0.871	7.153	2.715	19.079	7.956
	(0.098)	(0.070)	(0.101)	(0.184)	(0.448)	(0.055)	(3.190)	(4.203)
Assisting or Caring for Others	-5.941	-35.284	-5.465	-6.111	-5.798	-11.828	-3.371	-4.069
	(0.298)	(10.389)	(0.249)	(1.767)	(0.122)	(0.299)	(0.059)	(0.548)
Competitiveness	-2.882	-2.851	-3.403	-2.924	6.190	5.117	4.984	2.501
	(0.143)	(0.175)	(0.181)	(0.828)	(0.244)	(0.121)	(0.179)	(0.386)

Table 1.17: Occupational Choice Full Time Part Time Decision Embedded		
	Women	Men
Flexible Schedules	0.576	1.291
	(0.008)	(0.006)
Part Time	-1.677	-2.917
	(0.009)	(0.011)
Part Time Flexibility	0.549	-4.502
	(0.024)	(0.026)
Real Weekly Wages	1.720	1.627
	(0.009)	(0.007)
Safe Conditions	0.939	0.551
	(0.004)	(0.002)
OJT	-0.127	-0.121
	(0.003)	(0.002)
Unstructuredness	0.365	0.226
	(0.006)	(0.004)
Assisting or Caring for Others	-0.092	-0.202
	(0.002)	(0.001)
Competitiveness	-0.150	0.243
	(0.004)	(0.003)
1980	-0.626	0.256
	(0.005)	(0.003)
1990	-0.033	0.194
	(0.004)	(0.003)
Constant	-4.431	-4.158
	(0.055)	(0.043)
Note: Individuals choose both occupation and to work part time or full time simultaneously.		

Table 1.18: Occupational Choice Model FT PT Decision Embedded by Skill

	Women		Men	
	Low Skilled	High Skilled	Low Skilled	High Skilled
Flexible Schedules	0.315	0.583	1.136	1.112
	(0.015)	(0.011)	(0.012)	(0.007)
Part Time	-1.040	-2.002	-2.484	-3.109
	(0.013)	(0.012)	(0.019)	(0.014)
Part Time Flexibility	2.876	-1.205	1.301	-9.316
	(0.029)	(0.043)	(0.034)	(0.041)
Real Weekly Wages	2.860	1.011	3.946	0.726
	(0.016)	(0.011)	(0.013)	(0.007)
Safe Conditions	0.997	1.042	0.391	0.656
	(0.007)	(0.005)	(0.005)	(0.003)
OJT	-0.072	-0.102	-0.608	0.020
	(0.008)	(0.003)	(0.007)	(0.002)
Unstructuredness	0.117	0.102	-0.277	0.122
	(0.009)	(0.009)	(0.008)	(0.006)
Assisting or Caring for Others	0.140	-0.077	-0.492	-0.109
	(0.005)	(0.002)	(0.005)	(0.002)
Competitiveness	-0.127	-0.045	0.568	0.278
	(0.008)	(0.005)	(0.008)	(0.004)
1980	-0.419	-0.759	0.606	0.087
	(0.009)	(0.005)	(0.007)	(0.003)
1990	0.088	-0.125	0.411	0.040
	(0.007)	(0.004)	(0.006)	(0.003)
Constant	-12.143	1.487	-18.624	2.588
	(0.092)	(0.074)	(0.081)	(0.051)

CHAPTER TWO

THE IMPLICIT PRICE OF FLEXIBLE SCHEDLES: A HEDONIC WAGE ANALYSIS

2.1 INTRODUCTION

In Chapter 1, the preferences of individuals were estimated using a random utility model of occupational choice. The estimates revealed that men had a relatively stronger preference for schedule flexibility than women, while women had a greater preference for jobs offering greater availability of part-time employment – even if the women, in fact, worked full time. These findings are not entirely surprising. Men, who tend to work full time, may place a relatively high value on being able to manipulate their start and stop times at work, holding constant their full time work schedule. By contrast, women may have relatively higher demands for large blocks of time to devote to home production, including, possibly, the raising of children.

Nonetheless, one would naturally like to have some check on these findings. An alternative way to estimate men's and women's preference parameters is via a hedonic wage regression. Of course, one would ideally obtain the same estimated parameters regardless of the way in which the model is estimated. However, there are reasons why these estimates could, in fact differ. For example, a key maintained hypothesis in the random utility model is that of independence of irrelevant alternatives (IIR). Imposing IIR on the data when it is inappropriate could lead to biased and inconsistent parameter estimates

I estimate the value individuals place on scheduling flexibility using a hedonic wage model. Flexible work schedules have two simultaneous effects on wages; flexible

work schedules is an amenity that workers are willing to sacrifice wages to obtain and thus workers would be willing to pay to obtain flexible work schedules. Flexible work schedules may also be productivity enhancing, see Landauer (1997), leading to increased wages since workers are paid their marginal products in a competitive labor market.

Weeden (2003) estimates the effects of flexible schedules and locations on wages. She defines flexible work arrangements as is there a corporate policy which allows employees to vary the timing of their work days. She finds a wage premium for flexible work arrangements of 6-11% depending on the specification. She finds similar results for flexible location as well, in which an employee has the ability to work from various locations rather than one office location. Winder (2009) estimates the model from Weeden's paper controlling for firm characteristics. She finds that this reduces the wage premium found by Weeden by approximately one-third.

In this chapter I investigate the marginal willingness to pay for flexible work arrangements, specifically schedule flexibility, using a hedonic wage framework. I find that the marginal willingness to pay is higher for college educated men relative to women. These results are consistent with the results I find in the random utility model.

By investigating the relationship between wages and flexible work schedules I will be able to identify the shape of the hedonic wage function. In the next section I will discuss the theoretical framework of the hedonic wage function, including the supply and demand framework. In section 3 I discuss the identification issues that arise under the hedonic model and possible solutions to the endogeneity issue. In section 4 I estimate the various models and discuss the results. I finally conclude in section 5.

2.2 THEORY

Rosen (1974) was one of the first to discuss the hedonic wage model in which workers will sort into different firms based on their preferences and the cost of the firm to provide the amenity. The hedonic model is often used to express the trade-offs between wages and risk that are made to induce workers to accept more risk on the job. Here I will discuss the tradeoff that must be made between wages and flexibility. I assume that flexibility is costly to the firm and that workers must accept lower wages in order to gain greater flexibility.

Firms maximize profits by choosing the amount of capital, labor, and flexibility that they will employ. Programs to improve flexibility for workers are costly to employers but also provide benefits including lower pay for workers and lower absenteeism.[17] Following Kniesner and Leeth (2010) firms maximize profits:

$$\max \Pi = R(n, k, E(\mathit{flex}); \mu) - W(\mathit{flex})n - p_k k - p_e \mathit{flex} \tag{2.1}$$

where,

$\Pi \equiv$ profit,
$R(\cdot) \equiv$ revenue,
$n \equiv$ number of workers,
$k \equiv$ quantity of capital,
$\mathit{flex} \equiv$ quantity of flexibility provided
$\mu \equiv$ efficiency of flexibility on production of output,
$W(\mathit{flex}) \equiv$ the market wage function, and
$p_k \equiv$ unit price of capital.

[17] See Landauer (1997)

Labor, capital, and flexibility increase revenue at decreasing rates, and all cross derivatives are positive. Under perfect competition firms will increase their use of labor and capital until the marginal revenue product equals its marginal cost. Firms will increase flexibility until the marginal benefits (lower wages) equals the marginal cost of implementing the program. Since firms have different costs of implementing flexible schedules the optimal level of flexibility will vary across firms. Firms with low costs of implementing flexible schedules will provide greater flexibility than firms with high costs.

Figure 2.1 shows the isoprofit curves of two firms. The isoprofit curve shows the tradeoff between wages and flexibility holding constant profit and employing the optimal quantities of labor and capital. In order to keep profits constant wages must fall as the flexibility increases and firms with high costs of providing flexibility will need greater reductions in wages to keep profits constant compared to a low cost provider of flexibility. Firm A maximizes profits by offering workers flexibility equal to f_a where the firm's isoprofit curve is tangent to the market wage function. Firm B has lower costs of providing flexibility than firm A and will maximize profits by providing flexibility equal to f_b and lower wages. If there are sufficiently large number of firms then each point on the hedonic wage function represents a tangency for some company.

Workers similarly face a maximization problem. Workers maximize utility

$$u = U(c, flex) \tag{2.2}$$

where c is consumption. Assuming no outside income $c = W(flex)$. Through substitution and differentiating of (1.2) worker's optimal level of flexibility is

$$-\frac{\delta U}{\delta c}W' = \frac{\delta U}{\delta\, flex}. \tag{2.3}$$

The right hand side can be interpreted as the marginal benefit of increased flexibility which is the direct gain in utility. The left hand side of equation (2.3) can be interpreted as the marginal cost, which is the loss of wages and lower consumption. Because preferences differ among individuals the optimal amount of flexibility will vary. Workers with a high desire for flexibility will sort into jobs with high levels of flexibility and workers a mild taste for flexibility will sort into jobs with low flexibility.

Figure 2.2 shows worker's indifference curves which show the tradeoff between wages and flexibility that workers must make. Workers maximize their utility when their indifference curve is tangent to the market wage function. Worker C has a high marginal rate of substitution between flexibility and wages so that he chooses a job with low flexibility and higher wages; this person has only mild interest in flexibility. However worker D has a stronger desire for flexibility and is willing to accept lower wages to maximize her utility.

The hedonic wage function measures the supply and demand of labor across the flexibility spectrum. A shortage of workers in inflexible jobs will drive wages up causing some workers to leave flexible jobs while some firms will implement policy that promote flexibility in order to reduce wage costs. The slope of the hedonic wage function measures the willingness of workers to obtain flexibility while sacrificing wages; this provides an estimate of workers' willingness to pay for flexibility. Simultaneously hedonic wage function measures the reduction in wages that firms must pay to increase

flexibility in the work place. The hedonic wage function can be seen in Figure 2.3 where it maps out a set of tangencies between isoprofit curves and indifference curves.

2.3 IDENTIFICATION ISSUES

Rosen (1974) proposed a method to estimate the consumers' marginal willingness to pay (MWTP) for a particular characteristic of a good; in this case workers are paying for scheduling flexibility on the job through decreased wages. Rosen's method provided a theoretical framework for the hedonic regression which could recover the MWTP through a two-stage approach. The two-stage procedure uses variation in implicit prices, obtained through geographically distinct markets, to identify the MWTP function.[18]

Rosen's hedonic model has become a popular method for valuating job characteristics such as risk despite econometric problems. Bartik (1987), Bishop and Timmins (2011) discuss these problems. A source of endogeneity that is difficult to over using exclusion restrictions is that the implicit price of flexibility varies systematically with the quantity consumed, unless one assumes that the hedonic wage function is linear. Typically MWTP is only estimated rather than trying to recover the hedonic wage function.

Here I outline the endogeneity issue, unobserved preferences affect both the quantity of flexibility consumed and the price of flexibility. Consider Bartik's (1987) example that stresses the sorting that will naturally occur. Suppose housing units owned by carpenters will be better maintained. Households with greater desire for well-maintained housing will choose carpenter landlords, without knowing their landlord's

[18] Alternatively, one could allow for the hedonic price function to be non-linear to identify the MWTP function.

occupation. The endogeneity problem emphasized here will causes the instruments, supplier traits- that is occupational attributes- to produces biased results of the MWTP function.

Formally, the endogeneity problem is outlined for concreteness which is based on Epple's (1987) model. Consider a quadratic hedonic wage function given by

$$W(\mathit{flex}_j;\beta) = \beta_0 + \beta_1 \mathit{flex}_j + \frac{\beta_2}{2}\mathit{flex}_j^2 + \beta_3 Z_j, \tag{2.4}$$

where, j indexes occupations, W_j measures the wage of occupation j with occupational attributes Z_j and occupational flexibility flex_j. The linear wage gradient associated with the hedonic wage function is:

$$W'(\mathit{flex}_j;\beta) = \frac{\partial W(\mathit{flex}_j;\beta)}{\partial \mathit{flex}_j} = \beta_1 + \beta_2 Z_j, \tag{2.5}$$

where, $W'(\mathit{flex}_j;\beta)$ denotes the implicit price of schedule flexibility.

Continueing, Rosen's methodology the coefficients of demand (MWTP) and supply (marginal willingness to accept) functions for scheduling flexibility are sought to be recovered from the equilibrium relationship:

$$W'(\mathit{flex}_j^d;\beta) = \alpha_1 + \alpha_2 \mathit{flex}_j^d + \alpha X_j^d + \upsilon_j^d \tag{2.6}$$

and

$$W'(\mathit{flex}_j^s;\beta) = \gamma_1 + \gamma_2 \mathit{flex}_j^s + \gamma X_j^s + \upsilon_j^s, \tag{2.7}$$

where, X_j^d and X_j^s represent characteristics of workers and firms in occupation j respectively. And x and y represent unobserved idiosyncratic shocks to preferences for workers and marginal costs for firms.

The problem that is faced here is that $flex_j^d$ is correlated with υ_j^d because of the sorting of workers and firms. That is workers with the highest MWTP will sort into firms with the lowest marginal cost of providing schedule flexibility. This can be seen by noting that $flex_j^s = flex_j^d$ in equilibrium and substituting equation (2.5) into (2.6) and rearranging to yield:

$$flex_j = \frac{1}{\beta_2 - \alpha_2}[(\alpha_1 - \beta_1) + \alpha_3 X_j^d + \upsilon_j^d]. \tag{2.8}$$

Equation (2.8) makes it clear that schedule flexibility will be correlated with υ_j^d.

Traditionally, equation (2.6) will be estimated using instrumental variables with the typical instrument being supply function shifters. This solution is not available in the present case because suppliers are heterogeneous and workers and firms will sort. That is υ_j^d will determine the firm that an individual will work for and so X_j^s cannot be used as an instrument for $flex_j^d$.

Various authors have proposed alternative instruments to deal with this endogeneity problem. Bartik (1987) suggests using market indicator variables as instruments. In order to introduce exogeneity into the model, Kahn and Lang (1988) suggest that the market indicators should be interacted with individual's demographic characteristics such as gender or marital status. The idea is that there will be a source of exogenous variation among firms across markets and thus there will be exogenous variation in the equilibrium quantity of schedule flexibility chosen among individuals. However these instruments require strong assumptions regarding preferences across

markets and the instruments may not induce sufficient variation in the work amenity (Bishop and Timmins 2011).

I assume that preferences for schedule flexibility are homogenous across markets and that these markets will induce sufficient variation to identify the marginal willingness to pay for flexibility. When choosing an occupation individuals take the implicit price of schedule flexibility as given and choose the amount of flexibility to consume that maximize their utility based on their preferences. Preferences are determined by a vector of observed characteristics X_j^d and unobserved taste shifters υ_j^d. These assumptions lead to typical econometric model where schedule flexibility is endogenous and is a function of exogenous variables X_j^d, and finally υ_j^d is the residual.

The econometric problem then becomes equation (2.4) with the error term introduced:

$$W(flex_{jk};\beta) = \beta_0 + \beta_{1k} flex_{jk} + \frac{\beta_{2k}}{2} flex_{jk}^2 + \beta_{3k} Z_{jk} + \varepsilon_{jk}. \tag{2.9}$$

where *k* indexes geographic market.[19] And the hedonic wage gradient for market *k* becomes

$$W'(flex_{jk};\beta) = \frac{\partial W(flex_{jk};\beta)}{\partial flex_{jk}} = \beta_{1k} + \beta_{2k} Z_{jk}. \tag{2.10}$$

Let individuals' indirect utility be specified as

$$\begin{aligned} U(Z_{ij}, X_i^d;\alpha) &= \alpha_{0k} + \alpha_{1k} flex_{ik} + \frac{1}{2}\alpha_2 flex_{ik}^2 \\ &+ \alpha_{3k} X_i^d flex_{ik} + \upsilon_{ik}^d Z_{ik} + (I_i - W(flex, \varepsilon;\beta)) \end{aligned} \tag{2.11}$$

[19] Markets are defined by four Census regions, North, South, Midwest, and West.

I_i represents household income and the first order condition for schedule flexibility becomes

$$\alpha_{1k} + \alpha_2 \, flex_{ik} + \alpha_{3j} X_i^d + \upsilon_{ik}^d - \beta_{1k} - \beta_{2k} \, flex_{ik} = 0. \tag{2.12}$$

Before the marginal willing to pay can be estimated the implicit price of schedule flexibility must be estimated using equation (2.9) to calculate (2.10). The MWTP can be identified in the second stage regression of

$$(\beta_{1k} + \beta_{2k} \, flex_{ik}) = \alpha_{1k} + \alpha_2 \, flex_{ik} + \alpha_{3k} X_i^d + \upsilon_{ik}^d. \tag{2.13}$$

The resulting estimated MWTP will biased due to the sorting process that will naturally occur between those with the greatest demand for flexibility and firms with the lowest cost of providing scheduling flexibility.

2.4 DATA

I use the Current Population Survey Work Schedule Supplement for the years 1985, 1991, 1997, 2001, and 2004 to estimate the hedonic wage function using Rosen's methodology.[20] The data are further merged with occupational descriptors from the Occupational Information Network (O*Net) using the methodology from Chapter 1.[21] I now use individual level data to estimate the implicit price of schedule flexibility.

The sample is restricted to individuals between the ages of 25 and 65 and working.[22] The data include typical demographic data including, gender, marital status, age, and wages. Table 2.1 reports the descriptive statistics for the full sample and by

[20] These are all of the CPS supplements that include information on flexible schedules.
[21] For a description of the O*Net data see the Data Section in Chapter 1.
[22] This is a departure from chapter 1 in which I examined only young workers ages 25-35. I do this in order to expand the sample size since I am working with CPS Work Schedule Supplement which is a relatively small data set compared to the Census.

gender. Men and women are represented in roughly equally across the country and have equal access to flexible jobs. However 43% of men are college graduates while only 33% of women this likely contributes to the wage gap in which men earn over $300 more week than women do on average.

Further the sample is restricted to workers who are employed for at least 39 weeks throughout the year. This reduces the likely that workers are observed in temporary jobs in which they are willing to deal with less than optimal job packages in order to find the a better match. I also restrict the sample to those working in non-military jobs.

Because not all individuals will be able to choose all jobs I divide the sample by high and low skilled occupations in an attempt to control for this selection problem.[23] High skilled occupations are defined as occupations that utilize higher than median levels of mathematical reasoning and inductive reasoning. The real weekly wage gap between high and low skilled occupations is approximately $260 per week. The hourly wage gap is approximately $5 per hour. High and low skilled occupations are distributed roughly equally across the four regions.

High skilled occupations are four percentage points more likely to have access to flexible schedules relative to low skilled occupations. This could be correlated with workers' ability in that workers with higher skills can be trusted with more independence. Table 2.3 shows the correlation be schedule flexibility and various occupational attributes. Notice that there is strong positive correlation between schedule flexibility and occupational attributes. In order to account for the matching problem based on skill I

[23] One way to control for selection in to occupations would be to look at a single occupation such as doctors. However there are a limited number of individuals in each occupation

isolate high skilled occupations and low skilled occupations and separately estimate the marginal willingness to pay for schedule flexibility.

2.5 RESULTS

In the first stage of my estimation I recover the market hedonic wage function; these estimates are then used to in the second stage to recover the linear marginal willingness to pay function which varies for men and women. Thesecond stage estimates the hedonic wage function. From the hedonic wage function the MWTP can be calculated for men and women. I first analyze the full data set using both real weekly wages and real hourly wages as the dependent variable. It may be the case that not all college graduates have the same set of occupations to choose from, in order to account for this I estimate the MWTP separately for workers in high and low skilled occupations.

A. Pooled Data

I first estimate equation (2.9), the hedonic wage gradient for individuals in all occupations; the results can be found in Table 2.4. I estimate equation (2.9) using both the log real weekly wages and log real hourly wages as the dependent variable. The implicit prices of occupational characteristics on wages are estimated by region. The sign on schedule flexibility interacted with the various region is of the expected sign and are associated with higher wages.

Using these results, the implicit price of schedule flexibility is calculated for each region using equation (2.10). The implicit price of schedule flexibility is then used as the dependent variable for equation (2.14) and the results can be found in Table 2.5. The

estimated coefficients vary by sign between specifications when the real weekly wage and the real hourly wage are used to calculate the implicit price.[24]

The MWTP for men and women is displayed in Table 2.6. The estimated MWTP for men is -0.021 and women is -0.10 for real weekly wages. Under the first specification measuring wages in weekly terms, men are willing to pay two percent of their wages to obtain flexible hours while women are willing to sacrifice one percent of their wages to obtain flexible hours. This implies that men's MWTP for schedule flexibility is greater than women's.

For MWTP in terms of the real hourly wages, men must be compensated 4.5 of their wages and women 0.1 percent. However the standard error on women's MWTP is large and the null hypothesis that MWTP is significantly different from zero cannot be rejected; but men's MWTP is significantly different from zero. This implies that there is productivity gain for men but not women, as men are compensated for having flexible schedules whereas women pay a premium to obtain schedule flexibility.[25]

The marginal willingness to pay for schedule flexibility differs depending upon the specification of real weekly wages or real hourly wages. This suggests that the number of hours worked per week effects the MWTP. Because the availability of flexible schedules are correlated with hours worked per week, real hourly wages better estimate the MWTP for individuals, (Golden 2001). These effects could be further compounded by selection into low and high skilled occupations.

[24] The preferred specification is using real hourly wages as one does not need to worry about labor supply effects when looking at weekly wages.

[25] Alternatively, flexible schedules could be an undesirable characteristic of the job for men. However this would not be consistent with the occupational choice results from Chapter 1 which show that schedule flexibility increases utility for both men and women.

B. High and Low Skilled Occupations

Estimates of the preference parameters could be biased and inconsistent if not all college graduates are able to choose from jobs in each and every occupation. Workers of course want the highest paying job with excellent amenities but these jobs are not available to all workers. Consider NBA players many high school and college players aspire to play basketball professional and earn millions of dollars to play the game they love, but only a few elite players will have this opportunity. This shows that not all individuals have the same opportunities available to them and assuming that they do could lead to biased results. To examine the sensitivity of the estimates to this assumption, I divided the occupations into two broad skill groups, with highly skilled occupations defined as those that use above-average levels of mathematical reasoning and inductive reasoning, and less-skilled occupations those that use average or below-average levels in at least one of those facilities. High skilled workers are more likely to have access to flexible schedules and place a different value on the amenity that low skilled workers value differently.

I estimate the two stage hedonic wage model using both real weekly wages and real hourly wages for each occupation skill group. In Table 2.7 the estimated wage gradient is estimated for high and low skilled occupations using real hourly wages as the dependent variable. For workers in high skilled occupations, schedule flexibility varies positively with wages in each region at a decreasing rate, but for low skilled occupations there is a wage penalty associated with schedule flexibility for each region.

Table 2.8 reports the estimated hedonic wage function for both high and low skilled occupations. For workers in low skilled occupations schedule flexibility increases the wage premium that workers must be compensated with to accept the amenity. However this is offset for women by the interaction term between the female indicator variable and schedule flexibility which is negative. The MWTP will be used to better identify how workers value schedule flexibility in both high skilled and low skilled occupations.

I report the marginal willingness to pay for schedule flexibility in Table 2.9 by gender for high and low skilled occupations. The MWTP is of the predicted sign, negative, for women and men in high skilled occupations; these groups are willing to sacrifice 6.5% to 23% of wages in exchange for schedule flexibility. Workers in high skilled occupations are likely to have a greater willingness to pay due to income effects, in which they are more willing to give up wages when earning more money. But for men in low skilled occupations the sign of the MWTP is positive but not statistically different from zero, implies that men in low skilled occupations must be compensated to accept jobs with flexible schedules. This could be caused by the fact that men in low skilled occupations do not like flexible schedules and so they must be compensated to put up with it. If this were the case men in low skilled occupations would not have to take advantage of the policy. It seems more likely that the effect is small and negative that is

men in low skilled occupations would give up relatively little to obtain flexible schedules.[26]

The real hourly wage specification has a similar estimated wage gradient (Table 2.10) and hedonic wage function (Table 2.11) as the real weekly wage. The signs of the hedonic wage function are the same as the real hourly wage specification. The estimated MWTP can be found in Table 2.12. Again similar patterns are found for MWTP using real weekly wages. The MWTP for women in low skilled occupations is 3.7% of wages and 22% for women in high skilled occupations. The MWTP for men in high skilled occupations is 47%; but again men in low skilled occupations would need to be compensated to accept flexible schedules.[27]

2.6 CONCLUSIONS

The hedonic wage model estimates how workers value scheduling flexibility which is a mechanism that allows individuals to more easily balance home and work lives. Flexibility has increasingly become commonplace in the workplace and important for firms to offer as part of compensation packages. It is important for human resources to know how to estimate the value of compensation packages when schedule flexibility is included. The hedonic wage model allows this to be done.

The results suggest that men and women value schedule flexibility differently and that workers in high and low skilled occupations value flexibility differently. Looking at men and women aggregated by occupational skill level there is little difference between

[26] Combine the large standard errors with the fact that the results might be biased and it is plausible to believe that men in low skilled occupations are willing to sacrifice wages for schedule flexibility.
[27] The MWTP for men in high skilled occupations seems implausibly high. The hedonic wage model has not dealt with the endogeneity issue that is at hand here and is likely yielding biased estimates.

the value men and women place on flexibility due the relatively large size of the standard errors on the estimated marginal willingness to pay. Women are willing to sacrifice approximately 1% of wages to obtain flexibility and men are willing to sacrifice 2% of wages.

The difference between men and women becomes starker when examining differences in occupational skill level. There is the peculiar result that men in low skilled occupations must be compensated to take on flexible schedules. In theory workers need not be compensated for schedule flexibility because if it is undesired characteristics workers do not to utilize the flexibility and thus would be unwilling to sacrifice wages. Men in high skilled occupations value schedule flexibility more than women. These results are consistent with the results from the occupational choice model which also showed that men were more willing to sacrifice physical safety on the job to obtain flexibility.

2.7 TABLES

Table 2.1 Descriptive Statistics by Gender

	Full Sample	Women	Men
Real Weekly Wages	742.827	526.781	899.316
	(449.709)	(328.603)	(460.702)
Real Hourly Wages	18.196	14.446	20.912
	(10.238)	(8.219)	(10.689)
Schedule Flexibility	0.234	0.243	0.228
	(0.424)	(0.429)	(0.420)
Northeast Region	0.227	0.226	0.228
	(0.419)	(0.419)	(0.419)
South Region	0.237	0.231	0.241
	(0.425)	(0.422)	(0.428)
Midwest Region	0.263	0.273	0.256
	(0.440)	(0.446)	(0.437)
West Region	0.273	0.269	0.275
	(0.445)	(0.444)	(0.447)
Female	0.420	-	-
	(0.494)		
Married	0.676	0.612	0.722
	(0.468)	(0.487)	(0.448)
Age	38.678	37.829	39.293
	(9.763)	(9.766)	(9.717)

Table 2.2: Descriptive Statistics by Occupational Skill		
	Low Skilled Occupation	High Skilled Occupation
Real Weekly Wages	574.563	834.808
	(377.570)	(459.305)
Real Hourly Wages	14.877	20.010
	(8.867)	(10.480)
Schedule Flexibility	0.208	0.249
	(0.406)	(0.432)
Northeast Region	0.210	0.237
	(0.407)	(0.425)
South Region	0.241	0.235
	(0.428)	(0.424)
Midwest Region	0.265	0.263
	(0.441)	(0.440)
West Region	0.285	0.266
	(0.451)	(0.442)
Female	0.459	0.399
	(0.498)	(0.490)
Married	0.656	0.687
	(0.475)	(0.464)
Age	38.154	38.964
	(9.893)	(9.681)
Note: High skilled occupations are defined has requiring higher than median levels of mathematical reasoning and inductive reasoning.		

Table 2.3: Correlation of Scheduling Flexibility with Various Occupational Characteristics	
	Flexibility
Physical Safety	0.110
Human Capital Accumulation	-0.001
Self-Directed	0.188
Attending to Others	0.013
Workplace Competitiveness	0.036
Responsibility for Outcome	0.065
Frequency of Decision Making	0.227
Writing Skills	0.512
Speaking Skills	0.512
Monitoring Ability	0.422
Negotiation Skills	0.506
Instructing Others	0.384
Critical Thinking	0.521
Coordinating With Others	0.387

Table 2.4: Estimated Wage Gradient

	Log Real Weekly Wages				Log Real Hourly Wages			
	Northeast	Midwest	South	West	Northeast	Midwest	South	West
Flexibility*Region	1.299	1.116	2.023	1.316	1.729	1.279	2.426	1.417
	(0.546)	(0.524)	(0.519)	(0.531)	(0.440)	(0.422)	(0.418)	(0.427)
Flexibility^2*Region	-0.288	-0.389	-1.132	-0.596	-1.107	-1.077	-1.960	-0.844
	(0.744)	(0.734)	(0.712)	(0.749)	(0.599)	(0.591)	(0.573)	(0.602)
Region Dummy		1.050	0.331	0.743		0.600	0.055	0.361
		(0.286)	(0.276)	(0.277)		(0.230)	(0.222)	(0.223)
Physical Safety on the Job	0.104	0.133	0.165	0.113	0.048	0.052	0.095	0.071
	(0.028)	(0.027)	(0.026)	(0.024)	(0.023)	(0.022)	(0.021)	(0.020)
Human Capital Accumulation	0.204	0.181	0.140	0.231	0.169	0.142	0.115	0.163
	(0.036)	(0.036)	(0.035)	(0.032)	(0.029)	(0.029)	(0.028)	(0.026)
Self-Directed	0.531	0.260	0.378	0.386	0.277	0.139	0.206	0.223
	(0.052)	(0.053)	(0.049)	(0.048)	(0.042)	(0.043)	(0.039)	(0.039)
Attending to Others	-0.007	-0.021	-0.011	-0.003	0.017	-0.005	0.001	0.011
	(0.016)	(0.015)	(0.016)	(0.015)	(0.013)	(0.012)	(0.013)	(0.012)
Workplace Competitiveness	0.140	0.172	0.175	0.088	0.065	0.102	0.088	0.034
	(0.035)	(0.034)	(0.033)	(0.032)	(0.028)	(0.027)	(0.026)	(0.026)
Constant	3.215				0.832			
	(0.201)				(0.162)			

Table 2.5: Hedonic Wage Function		
Dependent Variable:	Log Real Weekly Wages	Log Real Hourly Wages
Schedule Flexibility	-0.021	0.045
	(0.014)	(0.019)
Female	-0.017	-0.011
	(0.010)	(0.014)
Female*Flexible	0.027	-0.033
	(0.021)	(0.029)
Married	0.013	-0.011
	(0.009)	(0.013)
Age	0.001	0.001
	(0.000)	(0.001)
1985	-0.062	-0.066
	(0.026)	(0.036)
1991	-0.037	-0.054
	(0.026)	(0.036)
2001	-0.016	0.000
	(0.032)	(0.045)
2004	-0.036	-0.032
	(0.045)	(0.062)
Constant	0.234	-0.776
	(0.032)	(0.043)

Table 2.6: Marginal Willingness to Pay

	Log Real Weekly Wages	Log Real Hour Wages
Women	-0.010	0.001
	(.021)	(.029)
Men	-0.021	0.045
	(0.014)	(0.019)

Table 2.7: Estimated Wage Gradient Real Hourly Wages

	Low Skilled Occupations				High Skilled Occupations			
	Northeast	Midwest	South	West	Northeast	Midwest	South	West
Flexibility*Region	-0.219	-0.223	1.286	-0.244	2.132	1.502	2.050	2.789
	(0.599)	(0.558)	(0.562)	(0.555)	(0.716)	(0.736)	(0.687)	(0.764)
$Flexibility^2$*Region	1.077	0.224	-0.594	1.350	-1.236	-0.758	-1.198	-2.683
	(0.833)	(0.786)	(0.776)	(0.789)	(0.968)	(1.031)	(0.950)	(1.081)
Region Dummy		0.441	-0.021	0.092	-0.622		-0.265	0.049
		(0.327)	(0.318)	(0.317)	(0.464)		(0.440)	(0.453)
Physical Safety on the Job	-0.046	0.013	0.034	0.080	0.139	0.084	0.148	0.078
	(0.034)	(0.030)	(0.029)	(0.026)	(0.038)	(0.037)	(0.035)	(0.038)
Human Capital Accumulation	0.215	0.166	0.176	0.145	0.136	0.108	0.037	0.123
	(0.057)	(0.052)	(0.052)	(0.041)	(0.038)	(0.037)	(0.035)	(0.035)
Self-Directed	0.164	0.117	0.129	0.178	0.267	0.085	0.130	0.071
	(0.061)	(0.058)	(0.053)	(0.052)	(0.080)	(0.079)	(0.074)	(0.079)
Attending to Others	-0.020	-0.055	-0.060	-0.021	0.011	0.029	0.023	0.038
	(0.024)	(0.019)	(0.021)	(0.020)	(0.020)	(0.019)	(0.019)	(0.019)
Workplace Competitiveness	0.131	0.071	0.085	0.025	0.025	0.110	0.094	0.062
	(0.044)	(0.043)	(0.040)	(0.039)	(0.036)	(0.035)	(0.034)	(0.034)
Constant	1.551				1.436			
	(0.238)				(0.323)			

Table 2.8: Hedonic Wage Function		
Real Hourly Wages Schedule	Low Skilled Occupations	High Skilled Occupations
Flexibility	0.058	-0.227
	(0.076)	(0.049)
Female	0.018	-0.034
	(0.051)	(0.039)
Female*Flexible	-0.140	0.159
	(0.110)	(0.076)
Married	-0.060	0.084
	(0.047)	(0.036)
Age	0.002	-0.003
	(0.002)	(0.002)
1985	-0.251	0.083
	(0.110)	(0.189)
1991	-0.206	0.137
	(0.110)	(0.189)
1997		0.130
		(0.217)
2001	0.038	0.195
	(0.141)	(0.204)
2004	-0.295	
	(0.177)	
Constant	1.367	-0.843
	(0.144)	(0.206)

Table 2.9: Marginal Willingness to Pay- Real Hourly Wages		
	Low Skilled Occupations	High Skilled Occupations
Women	-0.065	-0.103
	(0.086)	(0.089)
Men	0.058	-0.227
	(0.076)	(0.049)

Table 2.10: Estimated Wage Gradient Real Weekly Wages

	Low Skilled Occupations				High Skilled Occupations			
	Northeast	Midwest	South	West	Northeast	Midwest	South	West
Flexibility*Region	-1.853	-1.228	-0.360	-2.093	1.999	1.848	2.559	4.107
	(0.820)	(0.765)	(0.770)	(0.760)	(0.818)	(0.840)	(0.784)	(0.873)
$Flexibility^2$*Region	3.543	2.100	1.955	4.056	-0.758	-0.801	-1.534	-4.380
	(1.141)	(1.076)	(1.063)	(1.080)	(1.105)	(1.178)	(1.085)	(1.234)
Region Dummy		0.969	0.234	0.555	-0.667		-0.405	0.118
		(0.447)	(0.436)	(0.434)	(0.530)		(0.502)	(0.517)
Physical Safety on the Job	0.001	0.086	0.090	0.114	0.202	0.171	0.223	0.130
	(0.047)	(0.041)	(0.040)	(0.035)	(0.043)	(0.042)	(0.040)	(0.043)
Human Capital Accumulation	0.236	0.236	0.205	0.235	0.151	0.112	0.047	0.147
	(0.077)	(0.071)	(0.071)	(0.057)	(0.043)	(0.043)	(0.040)	(0.040)
Self-Directed	0.350	0.183	0.254	0.265	0.437	0.183	0.272	0.171
	(0.084)	(0.079)	(0.073)	(0.071)	(0.091)	(0.091)	(0.085)	(0.090)
Attending to Others	-0.072	-0.106	-0.110	-0.077	0.000	0.032	0.031	0.048
	(0.032)	(0.027)	(0.029)	(0.027)	(0.022)	(0.021)	(0.021)	(0.022)
Workplace Competitiveness	0.220	0.096	0.187	0.112	0.096	0.216	0.180	0.110
	(0.061)	(0.059)	(0.055)	(0.053)	(0.041)	(0.040)	(0.039)	(0.039)
Constant	4.358				4.162			
	(0.325)				(0.368)			

Table 2.11: Hedonic Wage Function		
Real Weekly Wages Schedule	Low Skilled Occupations	High Skilled Occupations
Flexibility	0.079	-0.477
	(0.090)	(0.099)
Female	0.035	-0.095
	(0.060)	(0.079)
Female*Flexible	-0.151	0.355
	(0.131)	(0.155)
Married	-0.094	0.166
	(0.056)	(0.072)
Age	0.000	-0.006
	(0.003)	(0.003)
1985	-0.278	0.164
	(0.131)	(0.384)
1991	-0.242	0.291
	(0.131)	(0.383)
1997		0.313
		(0.439)
2001	0.066	0.415
	(0.168)	(0.414)
2004	-0.372	
	(0.210)	
Constant	4.732	-1.191
	(0.171)	(0.417)

Table 2.12: Marginal Willingness to Pay- Real Weekly Wages		
	Low Skilled Occupations	High Skilled Occupations
Women	-0.037	-0.218
	(0.124)	(0.159)
Men	0.079	-0.477
	(0.090)	(0.099)

2.8 FIGURES

Figure 2.1: Firm Equilibrium

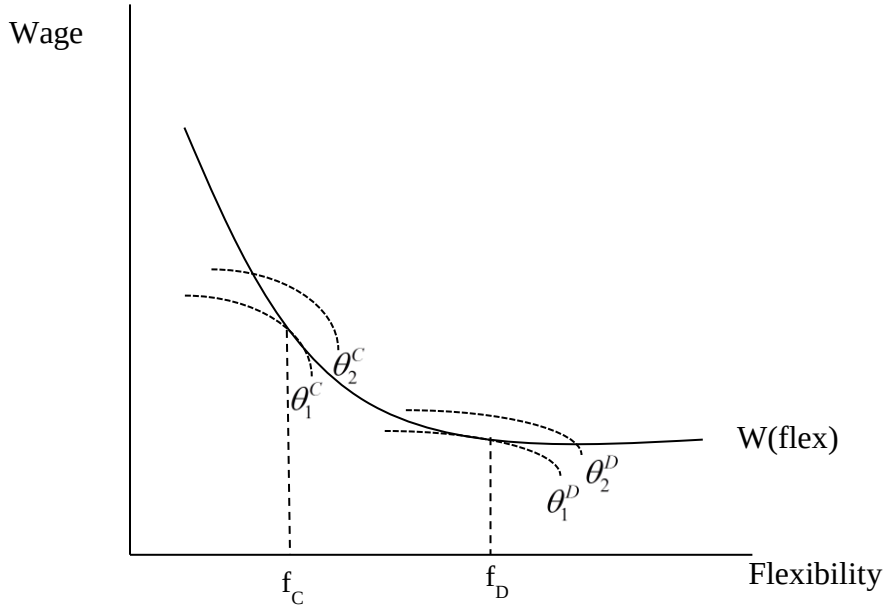


Figure 2.2: Worker Equilibrium

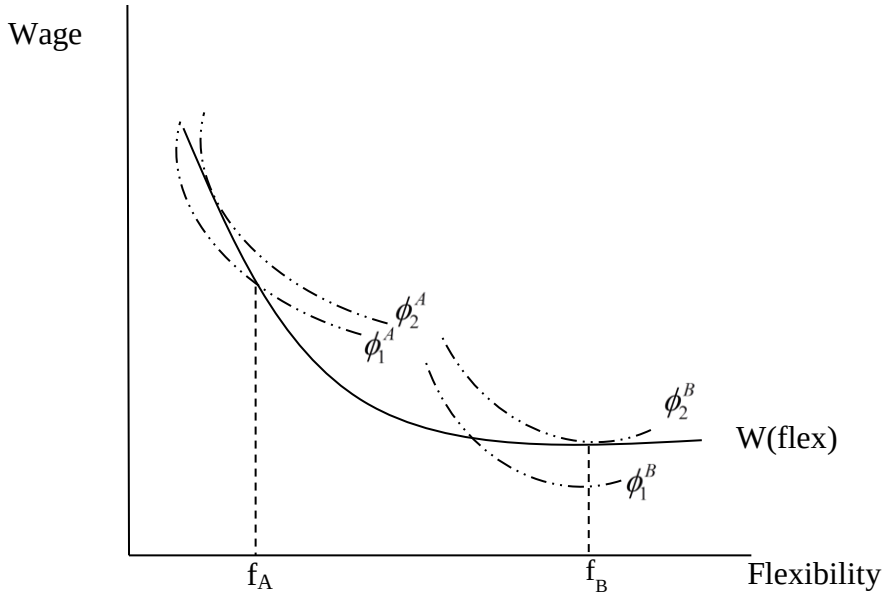
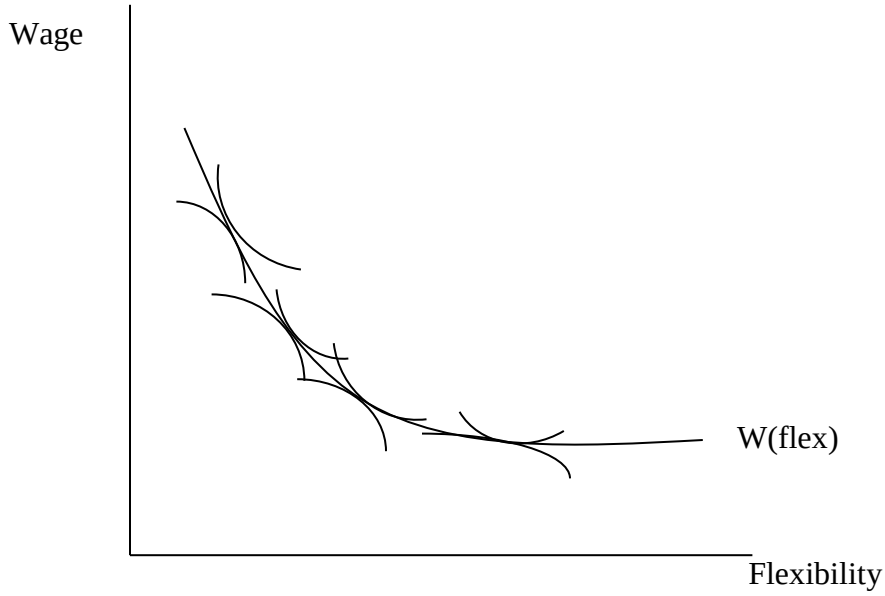


Figure 2.3: Hedonic Labor Market Equilibrium



CHAPTER THREE

WORKING SPOUSES AND FLEXIBILITY

3.1 INTRODUCTION

In previous chapters I found that men have a stronger demand for schedule flexibility than women. One mechanism that may have led to the increase demand for flexible schedules is the increase in female labor force participation. The increase in demand for flexible schedules for women is over 20% and for men approximately 35% between 1980 and 2000. It may be the case that men who's wives work are more likely to choose a flexible job in order to better share the at-home responsibilities. Flexible schedules are a mechanism in which individuals can adjust their work schedules in order to meet personal needs. If both spouses are working the need to adjust work schedules becomes relatively more important.

I find that having a working spouse increase the likelihood of working men choosing a flexible job. Depending on the specification of the model the effect is an increase between 1 percentage point and 12 percentage points on the probability of choosing a flexible job. The two stage least squares specification estimates the effect to be a fifty percentage point increase in choosing a flexible job. Because the endogeneity of a binary variable leads to non-classical errors alternative methods should be used.

In the next section I discuss the binary choice model. In section 3 I discuss the endogeneity issue and the difficulties that are associated with estimating the model. In section 4 I discuss several methods that deal with the endogeneity issue. In section 5 I

construct the sample used to analyze the results and in section 6 I compare the various results. And I finally conclude in section 7.

3.2 BINARY CHOICE FRAMEWORK

Let *D* be the observed binary dependent variable which in this case is flexible schedules, *X* be a vector of observed regressor including the treatment variable *T*, working spouse. *T* is also binary and an element of *X*. The binary choice model to be estimated is

$$D = I(X'\beta + \varepsilon \geq 0), \tag{3.1}$$

where *I* is an indicator function which equals one if the expression is true and zero otherwise and ε is an error term.

Families jointly maximize utility where they simultaneously face the tradeoffs between women's home production and higher family income and the flexibility in men's jobs at the cost of higher wages. The probability that *D* equals one given *X* is *E(D|X)* when ignoring endogeneity; which is the probability that $X'\beta \geq 0$. When *T* is endogenous the probability that *D=1* will depend on the conditional distribution of ε given *X* rather than the marginal distribution of ε but the marginal distribution is often used to measure the choice probability (Blundell and Powell 2004).

3.3 ENDOGENEITY PROBLEM

It is reasonable to assume that married couples make joint labor market decisions regarding both the choice to work and the choice of flexibility in order to maximize family utility. Because these decisions are simultaneously determined the endogeneity must be accounted for in the model.

If the endogeneity is unaccounted for the estimates could be biased. This occurs because the error terms are correlated with the regressors. Typically endogeneity is accounted for by using instrumental variables. For an instrument to be valid two conditions must be met: the instrument must be correlated with the endogenous variable conditional on the other control variables and it must be uncorrelated with the error term. However since the dependent variable is binary is the error terms will be remain correlated with the regressors and it remains difficult to obtained unbiased estimates of the endogenous variables.

In order to address the endogeneity when the dependent variable is binary alternative methods must be explored.

3.4 METHODS

In this section I discuss several methods that attempt to solve the endogeneity problem. I first will discuss the linear probability model. The LPM does not address the endogeneity issue but will serve as a baseline for comparison to the other models. I will also estimate traditional two stage models despite their shortcomings. I will finally consider alternative specifications that adequately deal with binary dependent variables and endogeneity.

Econometricians disagree on the efficacy of proposed solutions in dealing with endogeneity of a limited dependent variable. I discuss several alternatives methods and how the methods deal with the endogeneity problem and also the complications that arise from the method. The complications may include restrictive assumptions or may create different econometric problems such as bias.

I also provide a baseline estimates using ordinary least squares and probit estimation. These methods ignore the endogeneity problem but are useful for comparing effects across regressions.

A. Linear Probability Model

Consider the classical model

$$y = x\beta + u, \tag{3.2}$$

where y is the dependent variable in this case flexible schedules, β is a vector of parameters to be estimated, x is a series of explanatory variables and u is the residual. For now assume that the residual is uncorrelated with the regressors; this allows me to estimate the parameters using OLS. This assumption will be relaxed and the endogeneity issue will addressed.

The expected value of y given x is the probability that individuals choose a flexible job

$$\Pr(y = 1 \mid x) = E(y \mid x : \beta) = x\beta. \tag{3.3}$$

The probability that I observe a man in an inflexible job is

$$\Pr(y = 0 \mid x) = 1 - x\beta, \tag{3.4}$$

since the probabilities must sum to 1.

While the linear probability model can be easily estimated it is not without its shortcomings. By definition probabilities must fall between zero and one, but predicted probabilities can be greater than one or negative. Further consider that if a continuous covariate increases the probability of choosing a flexible job and because the model is

linear as this covariate continues to increase the probability of choosing a flexible job increases by more than one.

Another problem with the LPM is that residuals are not independent of the regressors. In particular, the residuals, $\hat{\varepsilon}$ is equal to 1 – xβ or –xβ, and these are functions of the regressors. This does not satisfy the assumption of no correlation between the regressors and the error term as the conditional expected mean of the residuals must be zero. Horrace and Oaxaca (2006) among others show that OLS estimates of the LPM are both inconsistent and asymptotically biased.

Despite these shortcomings OLS remains a popular method to estimate binary choice models. I estimate the LPM to use as a baseline of comparison for other methods.

B. Probit Model

The probit model addresses the shortcomings of the linear probability model. The probit model restricts predicted values to be between zero and one and because the model is nonlinear the partial effects will increase quickly when $x\beta=0$ and decline to zero at large values of $x\beta$.

The probit estimator can be derived from the binary choice frame above; however OLS must now be abandoned. The probit maximum likelihood estimator is

$$\ln L(y \mid x;\beta) = \sum_{i=1}^{N} \{ y_i \ln \Phi(x_i\beta) + (1-y_i) \ln[1-\Phi(x_i\beta)] \}. \qquad (3.5)$$

Since there is endogeneity in the regressors the probit estimates will be biased. In order to account for this an instrument must be used. These methods will be discussed next in the next subsection.

C. Two Stage Least Squares

When the regressors are correlated with the error terms the assumptions of the classical model are violated and the parameter estimators will be inconsistent if estimated by OLS. However employing an instrumental variable and estimating the model through two-stage least squares can remedy this problem. In order for an instrument to be valid it must meet two criteria, the instrument must be correlated with the endogenous regressor and uncorrelated with the residuals.

I use state-year female labor force participation as an instrumental variable in the two stage model. As more women enter the workplace men are more likely feeling more pressure to be involved at home and share greater responsibility in home production. This measure is correlated with individual spouses to enter the labor force and can be thought to be predetermined when spouse make their decision to work or not. The individual decision to work or not as a negligible effect on the state's labor force participation and can be considered exogenous.

The estimates although not efficient are consistent and so this two-stage model is often the preferred method for this reason. However, the endogenous variable is binary a nonlinear estimator may be appropriate in the first stage for the reasons discussed in the subsection above.[28]

D. Bivariate Probit

The bivariate probit model, models both the decision to decision for the wife to work and the decision of a flexible job for the husband. The model allows for there to be

[28] If the model is specified incorrectly the estimates will be inconsistent (Angrist 2001).

correlation be the decisions and for the errors to be correlated. This is an appealing feature of the model since it is likely that those decisions are made simultaneously by families.

Greene (2003) formalizes the bivariate probit model. The model can be expressed as

$$\begin{aligned} y_1 &= x_1'\beta_1 + y_2\gamma + \varepsilon_1 \\ y_2 &= x_2'\beta_2 + \varepsilon_2, \end{aligned} \tag{3.6}$$

where y_1 is the variable of interest, flexible work schedules, y_2, here working spouse, enters endogenously in the first equation, x_1 and x_2 are vectors of control variables in each of the two regression equations and is estimated using maximum likelihood. The residuals are assumed to be independent, identically distributed following the bivariate standard normal distribution with correlation parameter ρ:

$$\phi(\varepsilon_1, \varepsilon_2, \rho) = \frac{1}{2\pi\sqrt{1-\rho^2}} \exp\left[\frac{-1}{2(1-\rho^2)}(\varepsilon_1^2 + \varepsilon_2^2 - 2\rho\varepsilon_1\varepsilon_2)\right]. \tag{3.7}$$

If the error terms are uncorrelated it is appropriate to estimate the equations in (3.5) separately.

The bivariate probit is similar to two stage least squares in which it corrects for the endogeneity of the regressor by regressing the endogenous variable on the control variables in the first stage and correcting for it in the second stage. However the model yields inconsistent estimates if the first stage regression is not specified correctly (Angrist 2001).

E. Sample Correct Probit- Causal IV

The endogeneity problem is typically solved by using an instrumental variable in order to identify the causal effect of the endogenous treatment variable. In this section I discuss several methods that have used to address the endogeneity issue. Most of the methods fail to take into account the effects of an endogenous dummy variable and do not adequately address the identification issue. Angrist (2001) outlines the Causal IV method developed by Abadie (2000).

The methodology developed be Abadie and discussed by Angrist can be used to estimate nonlinear models with endogenous binary regressors without making distribution assumptions. A two-stage least squares model is estimated for the equation:

$$Y_i = X_i'\beta + \alpha D_i + \varepsilon_i, \tag{3.8}$$

where Y_i is the outcome of interest, here observing person i in a flexible job, X_i is a vector of covariates including demographic controls, D_i is the endogenous dummy variable and ε_i is a stochastic error term. But if the assumptions of additive and constant effect are invalid, the 2SLS estimates do not provide the best linear predictor (Angrist 2001). Since D_i is binary it seems reasonable to estimate a non-linear model in the first stage such as logit or probit but the second-stage estimates will be inconsistent unless the first stage regression is specified correctly; using a linear probability model in the first stage will yield consistent estimates in second stage (Angrist 2001). However a LPM may yield negative probabilities or probabilities greater than one.

The Causal IV estimator provides the best linear predictor and is based on assumptions used by Imbens and Angrist (1994) to estimate average treatment effects.

These assumptions are: independence of the instrument, exclusion of the instrument, the instrument is correlated with D in the first stage, and monotonicity. The first assumption can be interpreted to mean the instrument is "as good as randomly assigned." Assumption 2 imposes the condition that variation in the instrument does not change potential outcomes other than through *D*. Assumption 3 ensures that the instrument and endogenous regressor are correlated. Assumption 4 ignores the possibility of defiers in the data.

I provide an overview of the model, for technical details see Angrist (2001) and Abadie (2000). Estimate the effects on the endogenous variable, working spouse, of the control variables using probit. Predict the observed outcomes and calculate the weights κ that will be used in the second stage. The weights are

$$\kappa_i = 1 - \{D_i(1 - Z_i) / (1 - E[Z_i \mid X_i])\} - (1 - D_i). \tag{3.9}$$

Next estimate the effects of having a working spouse on the probability of a married working man choosing a flexible job using weighted least squares; some of the weights may be negative be construction. Angrist shows that the resulting estimates are consistent and can be used to identify the effects of endogenous regressors on a binary dependent variable.

3.5 DATA

Like in chapter 2, I use individual level data from the Current Population Survey: Work Supplement Survey.[29] The data include information on demographic variables including age, marital status, and parent status, occupational data, and schedule flexibility

[29] The survey is available for the years 1985, 1991, 1997, 2001 and 2004.

data. I restrict the sample to married men age 25-65 working year round. Only married men are analyzed in the sample in order to estimate the role of working spouses on probability that men enter a flexible job.

Summary statistics can be found in Table 3.1. Workers in jobs with schedule flexibility tend to be more educated and earn approximately $90 more per week than workers in jobs without schedule flexibility. Men in flexible jobs are also more likely to be married to women with college degrees relative to men in non-flexible jobs.

The CPS interviews each member in the household making it possible to match husbands and wives to one another. The variable is of interest is an indicator variable for wife's working status. The percentage of working wives in the sample has increase from 41 percent in 1985 to 47 percent in 1997 before falling to 38 percent in 2004. This is displayed along with the percent of men in flexible jobs in Figure 3.1. The percentage of working wives decreased while the percentage of men in flexible jobs increased from 14 percent in 1985 to 39 percent in 1997 where it has since leveled off.

3.6 RESULTS

I estimate the various model and individually discuss the implications of each model. In order to compare results across models the marginal effect must be calculated for each of the models.

A. Regression Results

I first estimate two baseline models, a linear probability model and probit model, in which assumes there is no endogeneity. The linear probability model is estimated using ordinary least squares. The results for both regressions can be found it Table 3.2. In both

the LPM and probit there is positive correlation between men employed in jobs with schedule flexibility and working spouses.

The interpretation of the linear probability model is straightforward. On average, having a working spouse increases the probability of choosing a job with schedule flexibility by 1.5 percentage points. However the probit regression cannot be interpreted in this way, it can only be said that working spouses are positively correlated with men choose job with schedule flexibility.

The linear probability model and probit model are frequently used to estimate the effects on a binary outcome variable but they do not take into account endogeneity of the simultaneous decision and other methods should be used. Two stage least squares takes into account endogeneity. The estimated regression results can be found in Table 3.3. In the first stage I estimate the likelihood that a working spouse in present in the household. I use state-year female labor force participation rates as an instrumental variable. Working spouses is positively associated with college graduates, age, and female labor force participation.

In the second stage this information is used to correct for the correlation between working spouses and flexible schedules. Having a working spouse increases the probability of choosing a job with a flexible schedule by 54 percentage points. Schedule flexibility is a limited dependent variable and can only take the values zero and one. This causes the estimated residuals to not be independent with the dependent variable. Specifically, they take the values $-x\beta$ and $1-x\beta$. This leads to biased estimates and the

effect of working spouses on the probability of choosing jobs with schedule flexibility maybe overstated.

In Table 3.4 I report the estimates of the bivariate probit model. The bivariate probit model is the non-linear equivalent of the two stage least squares model. In the first stage the decision to have a working spouse is estimated using a probit model. Working spouses are positively associated with state-year female labor force participation and college graduates. These results are then taken into account in the second stage and state-year specific female labor force participation is once again used as the excluded variable in the second stage.

In the second stage a probit model is used to estimate the likelihood men choose a job with scheduling flexibility. Men choosing a job with schedule flexibility are once again positively correlated working spouses. Jobs with schedule flexibility are more likely to be chosen when individuals are college graduates, are older, and when there is a more highly educated work force. Marginal effects must be calculated in order to compare the model to the baseline linear probability model.

Lastly, in Table 3.5 I report the results from the causal instrumental variable approach. The causal IV method is variation of two stage least squares where specific weights are calculated from the first stage probit regression and utilized in the second stage. Once again the instrument used is state-year specific female labor force participation. In the first stage working spouses are positively correlated with state-year specific labor force participation.

In the second stage having a working spouse decreases the probability of choosing a job with schedule flexibility by .7 percentage points. However the null hypothesis that this is significantly different zero cannot be rejected. Choosing a job with schedule flexibility is more likely when individuals are college graduates and when workers are older.

B. Marginal Effects

In order to compare the results across models the marginal effects must be calculated. These effects are reported in Table 3.6. The OLS results are found in column 1 and provide a baseline of comparison to the other methods. Under this specification working married man is 1.5 percentage points more likely to choose a flexible job if their spouse is working.

Other characteristics have the expected effect on the probability that working men choose a flexible job. Being a college graduate increases the probability of choosing a flexible job by 15 percentage points and a 5 year increase in age leads to a 1 percentage point increase. Age roughly correlates to experience and experience leads to more flexible jobs. However, the higher percentage of women whom are college graduates an 11.5 percentage point decrease in the probability of choosing a flexible job. As more individuals complete college it is more difficult to obtain a job with desirable attributes.

The probit model is column 2 has similarly sized effects of the flexible jobs. The notable difference between the two models is that the effect of female college graduates is positive but statistically insignificant from zero.

The two-stage least squares predict the largest effect of a working spouse on choosing a flexible job. The effect of having a working spouse increases the probability of choosing a flexible job by 54 percentage points. This effect is over four times larger than the next largest effect from the bivariate probit model. Because the errors are correlated with the regressors the will yield biased estimates (Lewbel, Dong, and Yang 2012). The effect of being a college graduate on choosing a flexible job is in line with the other models. However the effect of age is now negative and a 10 year increase in age leads to a one percentage point decrease in the probability of choosing a flexible job for working men.

The bivariate probit (column 4) is similar to the two-stage least squares model discussed above. In the first stage the probability of having a working spouse is estimated using the female labor force participation rate by state and year as an instrument. Both the first and second stage regressions are nonlinear. Having a working spouse increases the probability of selecting a flexible job by six percentage points. The effect of being a college graduate is smaller than the other models and increases the probability of choosing a job with scheduling flexibility by three percentage points.

Finally in column 5 are the results of the causal IV are displayed. The effect of working spouses on men choosing flexible jobs is negative (less than one percentage point change) and statistically insignificant. The effect is roughly half the size in magnitude compared to the baseline models. The effect of college graduates increases the probability of choosing a flexible job by 17 percentage points. The effect of female college graduates is positive but statistically insignificant.

3.7. CONCLUSIONS

The effects of working spouse on the probability of choosing a flexible job for married working men range from a decrease in the probability of 1 percentage point to an increase of over 50 percentage points. These estimates form an upper and lower bound of the effect on flexible jobs. My preferred specification is the Causal IV as it corrects for the endogeneity of working spouse and provides consistent estimates. However this model estimates the effect of working spouse to be in opposite direction of the expected sign and the remaining specifications. However this effect cannot be not be distinguished from zero. The true effect of a working spouse on the probability of choosing a flexible job may actually be positive as suggested by the remaining specifications.

On an intuitive level it makes sense that men with working spouses would be more likely to choose jobs with flexible schedules. Families may wish to be able to coordinate their schedules in order to better balance their work and personal lives. It also provides an opportunity for individuals to take off from work if something unexpected arises. Family structure is an important determinant in the occupational choice model and how individuals value flexible schedules. These results are consistent with the results from this paper which show that individuals' whose spouse works has a greater need for flexible schedules. I find in the occupational choice model that married men value flexibility in greater amounts. Married men whose spouses are working are more likely to choose a flexible job in order to balance the needs between their job and their family.

3.8 TABLES

Table 3.1: Sample Means

	Full Sample	Flex	Non-Flex
Schedule Flexibility	0.164		
	(0.370)		
Working Spouse	0.274	0.289	0.271
	(0.446)	(0.454)	(0.444)
Wife College Grad.	0.147	0.197	0.138
	(0.355)	(0.398)	(0.345)
College Grad.	0.392	0.523	0.366
	(0.488)	(0.500)	(0.482)
Age	40.355	40.278	40.370
	(10.461)	(10.214)	(10.509)
Weekly Earnings	545.273	619.375	530.762
	(307.023)	(367.352)	(291.582)
Hours Worked per Week	41.740	41.610	41.765
	(8.014)	(9.500)	(7.689)
Married	0.709	0.683	0.714
	(0.454)	(0.466)	(0.452)
Parent	0.537	0.537	0.537
	(0.499)	(0.499)	(0.499)
Year	1992.108	1993.003	1991.933
	(6.854)	(6.963)	(6.819)
Num. Obs.	15126	2477	12649

Table 3.2: Baseline Regressions

The dependent variable is the binary outcome, jobs with schedule flexibility.

	OLS	Probit
Working Spouse	0.015	0.042
	(0.003)	(0.009)
Pct. Women College Grads	-0.115	0.134
	(0.048)	(0.161)
College Graduate	0.153	0.480
	(0.003)	(0.008)
Age	0.002	0.005
	(0.000)	(0.000)
1985	-0.024	
	(0.006)	
1991		0.058
		(0.021)
1997	0.205	0.894
	(0.017)	(0.043)
2001	0.201	0.883
	(0.017)	(0.043)
2004	0.196	0.868
	(0.017)	(0.043)
State Fixed Effects	Yes	Yes

Note: Standard errors are in parenthesis. Pct. Women College Graduate varies by state and year.

Table 3.3: Two Stage Least Squares	
First Stage Regression: Dependent variable Working Spouse, IV State Year Female LFP	
College Graduate	0.037
	(0.003)
Age	0.004
	(0.000)
Pct. Women College Grads	0.133
	(0.048)
State Year Female LFP	0.638
	(0.065)
1991	0.722
	(0.028)
1997	0.765
	(0.028)
2001	0.658
	(0.028)
2004	0.664
	(0.028)
Second Stage Regression: Dependent Variable Schedule Flexibility	
Working Spouse	0.544
	(0.115)
College Graduate	0.133
	(0.005)
Age	-0.001
	(0.000)
Pct. Women College Grads	-0.197
	(0.057)
1991	-0.217
	(0.053)
1997	-0.047
	(0.061)
2001	0.004
	(0.050)
2004	-0.003
	(0.050)
State Fixed Effects	Yes

Table 3.4: Bivariate Probit	
First Stage: Working Spouse	
State Year Female LFP	2.154
	(0.100)
1985	-0.965
	(0.328)
1991	0.269
	(0.012)
1997	0.267
	(0.012)
2004	0.029
	(0.012)
College Graduate	0.101
	(0.009)
Constant	-1.613
	(0.060)
Second Stage: Flexible Schedule	
Working Spouse	0.698
	(0.126)
Pct. Female College Grads. By State	0.124
	(0.156)
College Graduate	0.436
	(0.016)
Age	0.005
	(0.000)
1991	-0.200
	(0.044)
1997	0.579
	(0.071)
2001	0.637
	(0.061)
2004	0.616
	(0.061)
Constant	-1.390
	(0.096)
State Fixed Effects	Yes

Table 3.5: Causal IV	
First Stage Probit: Probability of Working Spouse	
State Year Female LFP	1.071
	(0.927)
Log Real Weekly Wages	-0.014
	(0.019)
College Graduate	0.069
	(0.025)
1991	0.355
	(0.038)
1997	0.223
	(0.063)
2001	0.124
	(0.035)
2004	0.065
	(0.028)
State Year Fixed Effects	Yes
Second Stage Weighted Least Squares:	
Working Spouse	-0.007
	(0.008)
Pct. Female College Grads. By State	0.083
	(0.162)
College Graduate	0.171
	(0.008)
Age	0.000
	(0.000)
1991	-0.148
	(0.060)
1997	-0.059
	(0.016)
2001	0.075
	(0.021)
2004	0.048
	(0.021)
State Year Fixed Effects	Yes

Table 3.6: Marginal Effects on the Probability of Men Choosing Flexible Jobs					
	OLS	Probit	2SLS	Bivariate Probit	Causal IV
Working Spouse	0.015	0.014	0.544	0.063	-0.007
	(0.003)	(0.003)	(0.115)	(0.011)	(0.008)
Pct. Female College Grad. By State and Year	-0.115	0.044	-0.197	0.006	0.083
	(0.048)	(0.053)	(0.057)	(0.007)	(0.162)
College Graduate	0.153	0.163	0.133	0.030	0.171
	(0.003)	(0.003)	(0.005)	(0.010)	(0.008)
Age	0.002	0.002	-0.001	0.000	0.000
	(0.000)	(0.000)	(0.000)	(0.000)	(0.000)
State Dummies	Yes	Yes	Yes	Yes	Yes
Year Dummies	Yes	Yes	Yes	Yes	Yes
Note: The IV female LFP by state and year is included where appropriate.					

3.9 FIGURES

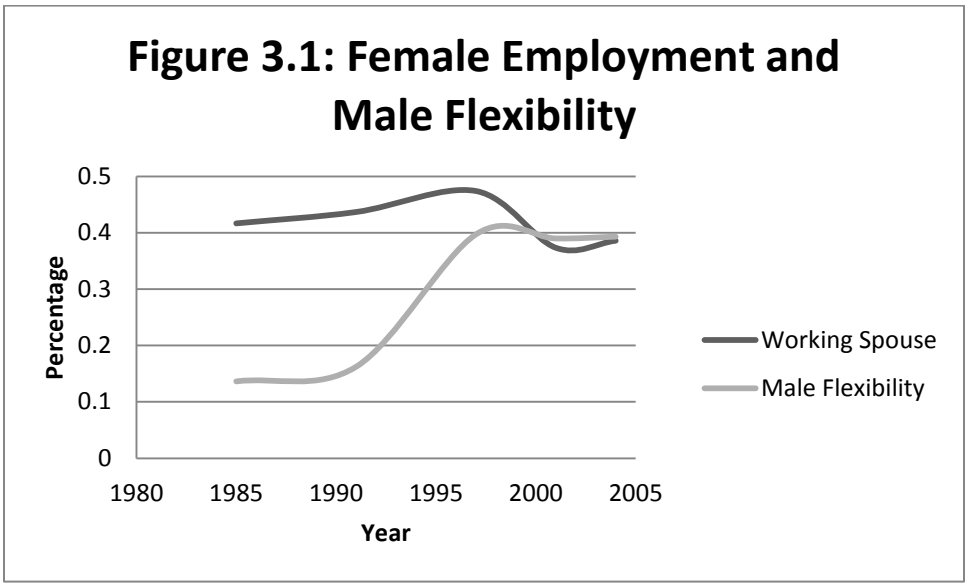


Figure 3.1: Female Employment and Male Flexibility
0.5
0.4
0.3
0.2
0.1
0
Percentage
1980
1985
1990
1995
2000
2005
Year
Working Spouse
Male Flexibility

APPENDICES

Appendix A

Data Appendix

In order to obtain a large sample of individuals I use the 1980-2000 Census data. While this sample provides a number of benefits, including precise estimates and the ability to use a large number of occupations it also creates difficulties in creating the data. Here I will describe in detail how I constructed the data. I first generate dummy variables for each of the demographic groups in the Census data. I then collapse the data by occupation-year to create count data of the number of individuals in each demographic group whom choose a particular occupation[30]. By doing this I am able to take advantage of the Poisson log likelihood function.

I then merge in working conditions from the Occupational Information Network (O*Net). O*Net uses the standard occupational classification system (SOC) which I am able to convert into occ1990 codes using a crosswalk available from IPUMS. SOC and occ1990 do not match one-to-one; several SOC codes will match into a single occ1990 code. This is problematic since each of the SOC occupations have different working conditions from O*Net. In order to obtain accurate estimates of the working conditions for each occupation a weighted average is needed[31]. To obtain the weights I download the 2001-2009 American Community Survey (ACS) and find the average proportion of people in each SOC that matches into a particular occ1990. Consider a simple example in

[30] I use the Census variable occ1990 to define the occupations since it is consistently used between the 3 Census years.

[31] Of the 205 occupations in the Census that there is O*Net data available there are 153 unique matches between the SOC and occ1990 codes. For the remaining occupations I approximate the weights to use.

which 2 SOC codes match into a single occ1990 code. Suppose, the data in Table A4 is observed from the ACS, I first find the weights for each year. In 2001 SOC occupation 1 would have a weight equal to 0.4 (10/25) and SOC occupation 2 would have a weight equal to 0.6 (15/25). But in 2002 the weights change to 0.3 and 0.7 for occupations 1 and 2. I next average these weights over time to account for any extreme observations. The final weights become 0.35 and 0.65 for occupations 1 and 2.

These weights are then merged into the Census data and weighted averages of each O*Net characteristic is taken for each occ1990 occupation. Lastly, I merge in the auxiliary measures of flexibility from the Current Population Survey Work Schedule Supplement. The CPS follows the Census in their occupation classification scheme and these occupations matched one-to-one.

Appendix B

Table Appendix

Table A1: Occupational Choice Regressions Over Time

	Female			Male		
	1980	1990	2000	1980	1990	2000
Flexible Work Hours	0.326	0.480	0.409	0.281	0.368	0.407
	(0.023)	(0.013)	(0.012)	(0.017)	(0.011)	(0.010)
Exposure to Safe Conditions	0.928	0.801	0.967	0.703	0.684	0.642
	(0.010)	(0.007)	(0.007)	(0.004)	(0.004)	(0.004)
On the Job Training Required	0.252	0.242	0.133	0.360	0.028	0.077
	(0.008)	(0.006)	(0.005)	(0.004)	(0.004)	(0.004)
Unstructured Job	0.580	0.512	0.659	1.144	0.724	0.593
	(0.014)	(0.010)	(0.009)	(0.009)	(0.008)	(0.008)
Assisting or Caring for Others	-0.027	-0.043	-0.125	-0.160	-0.244	-0.319
	(0.005)	(0.004)	(0.003)	(0.003)	(0.003)	(0.003)
Level of Competition	-0.003	0.429	0.294	0.596	0.718	0.760
	(0.009)	(0.007)	(0.006)	(0.006)	(0.006)	(0.005)
Constant	4.987	4.388	4.869	1.805	3.648	4.085
	(0.057)	(0.041)	(0.039)	(0.036)	(0.033)	(0.033)
Log Likelihood	-32290	-56899	-63834	-118964	-106453	-103250

Note: Standard errors are in parenthesis.

Table A2: Pooled Poisson Regressions by Demographic Group

	Females				Males			
	Married Kids	Married No Kids	Single Kids	Single No Kids	Married Kids	Married No Kids	Single Kids	Single No Kids
Flexible Work Hours	0.364	0.496	0.150	0.419	0.532	0.498	0.252	0.246
	(0.023)	(0.024)	(0.053)	(0.019)	(0.017)	(0.020)	(0.094)	(0.016)
Exposure to Safe Conditions	1.037	0.976	0.841	0.929	0.597	0.662	0.461	0.678
	(0.014)	(0.014)	(0.030)	(0.011)	(0.007)	(0.009)	(0.037)	(0.007)
On the Job Training Required	0.170	0.122	0.135	0.115	0.153	0.066	0.071	0.005
	(0.008)	(0.009)	(0.021)	(0.007)	(0.006)	(0.007)	(0.035)	(0.006)
Unstructured Job	0.640	0.745	0.495	0.636	0.784	0.614	0.395	0.436
	(0.017)	(0.019)	(0.041)	(0.015)	(0.014)	(0.017)	(0.074)	(0.012)
Assisting or Caring for Others	-0.074	-0.160	-0.076	-0.147	-0.252	-0.348	-0.285	-0.371
	(0.006)	(0.007)	(0.014)	(0.005)	(0.005)	(0.007)	(0.029)	(0.005)
Level of Competition	0.222	0.383	0.163	0.303	0.773	0.801	0.722	0.730
	(0.011)	(0.012)	(0.027)	(0.010)	(0.009)	(0.011)	(0.053)	(0.009)
Constant	3.859	2.990	2.721	4.029	1.871	2.491	0.189	4.207
	(0.072)	(0.077)	(0.167)	(0.061)	(0.057)	(0.068)	(0.295)	(0.050)
Log Likelihood	-19863	-18052	-3407	-25524	-40355	-26417	-1299	-38349

Note: Standard errors are in parenthesis.

Table A3a: Occupational Choice Regressions by Demographic Group						
	Females			Males		
Married Kids	1980	1990	2000	1980	1990	2000
Flexible Work Hours	0.340	0.511	0.364	0.239	0.206	0.532
	(0.052)	(0.025)	(0.023)	(0.025)	(0.018)	(0.017)
Exposure to Safe Conditions	1.003	0.856	1.037	0.688	0.648	0.597
	(0.022)	(0.014)	(0.014)	(0.006)	(0.006)	(0.007)
On the Job Training Required	0.227	0.275	0.170	0.438	0.098	0.153
	(0.018)	(0.011)	(0.008)	(0.006)	(0.006)	(0.006)
Unstructured Job	0.520	0.454	0.640	1.419	1.016	0.784
	(0.029)	(0.019)	(0.017)	(0.013)	(0.013)	(0.014)
Assisting or Caring for Others	0.039	0.058	-0.074	-0.108	-0.170	-0.252
	(0.010)	(0.007)	(0.006)	(0.004)	(0.005)	(0.005)
Level of Competition	-0.265	0.257	0.222	0.601	0.685	0.773
	(0.019)	(0.013)	(0.011)	(0.008)	(0.009)	(0.009)
Constant	4.395	3.582	3.859	-0.323	1.399	1.871
	(0.120)	(0.078)	(0.072)	(0.057)	(0.056)	(0.057)
Log Likelihood	-7741	-16330	-19863	-60739	-48314	-40355
Note: Standard errors are in parenthesis.						

Table A3b: Occupational Choice Regressions by Demographic Group						
	Females			Males		
Married No Kids						
Flexible Work Hours	0.359	0.500	0.496	0.290	0.445	0.498
	(0.042)	(0.025)	(0.024)	(0.035)	(0.023)	(0.020)
Exposure to Safe Conditions	0.918	0.793	0.976	0.733	0.707	0.662
	(0.018)	(0.013)	(0.014)	(0.009)	(0.008)	(0.009)
On the Job Training Required	0.249	0.241	0.122	0.335	0.002	0.066
	(0.014)	(0.010)	(0.009)	(0.008)	(0.008)	(0.007)
Unstructured Job	0.693	0.634	0.745	1.118	0.719	0.614
	(0.026)	(0.019)	(0.019)	(0.018)	(0.017)	(0.017)
Assisting or Caring for Others	-0.058	-0.104	-0.160	-0.189	-0.283	-0.348
	(0.009)	(0.007)	(0.007)	(0.006)	(0.006)	(0.007)
Level of Competition	0.030	0.525	0.383	0.665	0.799	0.801
	(0.016)	(0.012)	(0.012)	(0.012)	(0.012)	(0.011)
Constant	3.310	2.501	2.990	0.378	2.089	2.491
	(0.106)	(0.079)	(0.077)	(0.075)	(0.069)	(0.068)
Log Likelihood	-10177	-17823	-18052	-28229	-26065	-26417
Note: Standard errors are in parenthesis.						

Table A3c: Occupational Choice Regressions by Demographic Group						
	Females			Males		
Single Kids	1980	1990	2000	1980	1990	2000
Flexible Work Hours	0.299	0.212	0.150	0.186	-0.012	0.252
	(0.111)	(0.069)	(0.053)	(0.219)	(0.136)	(0.094)
Exposure to Safe Conditions	0.897	0.653	0.841	0.560	0.504	0.461
	(0.046)	(0.033)	(0.030)	(0.053)	(0.043)	(0.037)
On the Job Training Required	0.259	0.276	0.135	0.282	0.125	0.071
	(0.037)	(0.031)	(0.021)	(0.055)	(0.047)	(0.035)
Unstructured Job	0.378	0.417	0.495	0.870	0.553	0.395
	(0.064)	(0.050)	(0.041)	(0.108)	(0.097)	(0.074)
Assisting or Caring for Others	-0.054	0.016	-0.076	-0.234	-0.270	-0.285
	(0.023)	(0.017)	(0.014)	(0.042)	(0.038)	(0.029)
Level of Competition	0.051	0.261	0.163	0.664	0.698	0.722
	(0.043)	(0.034)	(0.027)	(0.077)	(0.070)	(0.053)
Constant	2.548	1.662	2.721	-2.430	-0.793	0.189
	(0.265)	(0.206)	(0.167)	(0.457)	(0.392)	(0.295)
Log Likelihood	-1752	-2401	-3407	-874	-897	-1299
Note: Standard errors are in parenthesis.						

Table A3d: Occupational Choice Regressions by Demographic Group						
	Females			Males		
Single No Kids						
Flexible Work Hours	0.286	0.466	0.419	0.347	0.494	0.246
	(0.036)	(0.021)	(0.019)	(0.029)	(0.018)	(0.016)
Exposure to Safe Conditions	0.897	0.780	0.929	0.710	0.714	0.678
	(0.015)	(0.011)	(0.011)	(0.008)	(0.007)	(0.007)
On the Job Training Required	0.260	0.213	0.115	0.266	-0.041	0.005
	(0.012)	(0.009)	(0.007)	(0.008)	(0.007)	(0.006)
Unstructured Job	0.555	0.478	0.636	0.816	0.454	0.436
	(0.021)	(0.016)	(0.015)	(0.015)	(0.013)	(0.012)
Assisting or Caring for Others	-0.042	-0.081	-0.147	-0.220	-0.309	-0.371
	(0.007)	(0.006)	(0.005)	(0.006)	(0.005)	(0.005)
Level of Competition	0.106	0.494	0.303	0.530	0.705	0.730
	(0.014)	(0.010)	(0.010)	(0.010)	(0.009)	(0.009)
Constant	3.927	3.527	4.029	2.371	3.976	4.207
	(0.087)	(0.064)	(0.061)	(0.061)	(0.052)	(0.050)
Log Likelihood	-14472	-23014	-25524	-31994	-34117	-38349
Note: Standard errors are in parenthesis.						

Table A4: Example Calculation of Weights

occ1990	SOC	Number of Individuals 2001	Number of Individuals 2002	2001 Weight	2002 Weight	Average Weight
1	1	10	15	0.4	0.3	0.35
1	2	15	35	0.6	0.7	0.65

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