THE ECONOMICS OF DUAL JOB HOLDING

by

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A Dissertation Submitted to the Faculty of the

DEPARTMENT OF ECONOMICS

In Partial Fulfillment of the Requirements
For the Degree of

DOCTOR OF PHILOSOPHY

In the Graduate College

THE UNIVERSITY OF ARIZONA

2002

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entitled The Economics of Dual Job Holding

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Final approval and acceptance of this dissertation is contingent upon the candidate's submission of the final copy of the dissertation to the Graduate College.

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STATEMENT BY THE AUTHOR

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ACKNOWLEDGEMENTS

I would like to sincerely thank my advisor, Ronald L. Oacaxa, for his valid support as an economist as well as a mentor. Part of the work included in this project is the result of a joint cooperation effort with him.

I would also like to remember, here, Daniel Houser for his valuable insights about some issues presented in this dissertation.

Finally, my last thank goes to my friends Bill, Fatin, Zeynep and Supriya, for sharing their friendship with me through the difficult times of graduate school.

DEDICATION

Ai Chiarissimi Professori Andrea Villani e Gian Carlo Mazzocchi, che hanno creduto in me e senza il cui supporto tutto questo non sarebbe stato possibile.

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ABSTRACT

This dissertation aims at enhancing the knowledge about dual job holding. While most studies in labor economics assume that each person holds only one job, a significant part of the work force holds two jobs simultaneously.

The first part of the dissertation empirically analyzes the determinants of wages for dual jobholders, with an emphasis on the contribution of the "on the job" human capital accumulation. In order to increase the number of observations, data from 1990 to 1994 have been pulled together, thus resulting in a panel. The usual problem associated with panel data, together with the need to control for the selection bias, makes the full information maximum likelihood estimation very challenging. New econometric techniques developed by Wooldridge (*Journal of Econometrics,* 1995) and Vella and Verbeek (*Journal of Econometrics,* 1999) are used to overcome this problem. We found some evidence that the motivation behind the decision to hold two jobs may play and important role in determining the market return of moonlighting.

Given the results of the first study, I explore the motivations that induce workers to hold two jobs and I explicitly design a labor supply function that includes these different motivations. I identify two major motivations: I call the first motivation the "hours constraint model". The hours constraint model says that workers underemployed will seek a second job in order to fulfill the gap in their work schedule. Yet, some workers may decide to hold two job simply because each job has some peculiar characteristics that makes it appealing to the worker. I call this motivation the "job portfolio model".

The last part of the dissertation looks at the impact of hours regulation on the decision to hold two jobs. The understanding of this relationship is important in order to address the real impact of time-sharing policies on reducing unemployment. By enforcing stricter working week standards, labor policies aim at creating new jobs by inducing employers to shift from an intensive to and extensive use of workers. However I found that reducing the working week causes some workers to be underemployed, thus increasing the number of moonlighters.

1. AN OVERVIEW

The phenomenon of dual job holding has still many uncovered facets, making this subject an interesting topic for a dissertation project. In fact, given the modest literature already existent, there is a need for more research to advance our understanding of this phenomenon.

While the major literature in labor economics focuses mainly on the assumption that workers work only on one job, lately several fellows have developed various models that account for the decision of holding two jobs. The increasing attention devolved to the study of dual job holding mimics the growth of moonlighting in the economy. Since the '80s, the rate of moonlighting has been increasing in US, going from 4.62 percent of the working population in US in 1981 to 5.9 in 1995[1]. These rates refer to the Current Population Survey for US (CPS), which portrays the working situation of the specific country during a reference week. The increase in the rate of moonlighting could be explained primarily by an increase of moonlighting among women together with the raise in the female labor participation. In US, for example, the female multiple job rate tripled from 2.2 in 1970 to 5.9 in 1991[2], while the male moonlighting rate stayed almost unchanged throughout the same period.

Interesting insides can be drawn by comparing these rates with the rates calculated from datasets using the calendar year as reference. Using the Panel Survey of Income Dynamics (PSID), Paxon and Sicherman (1996) calculated that on average each

[1] Kimmel and Powell (1999), Table 1, page 210.
[2] Stinson J. F. (1997), Table 1, page 4.

year between 1976 and 1991 more that 20 percent of the workers in the sample held two jobs. Comparing the weekly with the annual rate one can conclude that the decision to hold two jobs involves a large part of the working population and that people move frequently in and out of the secondary job market. This does not necessarily mean that every moonlighting episode is confined to only short spells. In fact, Paxon and Sicherman found that twenty five percent of their sample reported between 94 and 104 weeks of continuous moonlighting.

An important question relates to the connection between the main and the secondary job. In particular, we are interested in possible human capital spillover between the two jobs held by a worker. If these spillovers exist and are positive, we would observe higher wages for people holding two jobs. I proceed in the empirical analysis of the wage determinations for dual jobholders in Chapter 2. I extend the classical Mincer wage equation by including the experience gain in the secondary job market alongside with the standard market experience. Some preliminary but incomplete evidence of these spillovers can are found in Amirault (1997). He found that in 7 out of 12 occupational groups, the secondary job was most often in the same occupational group as the first[3], thus concluding that workers are able to use their primary job skills in their secondary occupation. Moreover the connection between first and second job is stronger for occupations that require more specific skills.

A fundamental feature of dual job holding, that completely shapes and complicates the analysis of dual job holding, is the identification of the motivations that

[3] See Amirault (1997), Table 7, page 12.

drive the decision to hold two jobs. In 1997 the CPS gathered this information. Six specific reasons and one residual entry are specified in the questionnaire. Four of these possible answers (*"Meet regular household expenses"*, *"Pay off debts"*, *"Buy something special"*, *"Save for the future"*) are related to some form of financial constraint. These motivations are strictly related to the common perception of moonlighting and account for 58.4 percent of dual jobholders[4]. Of the remaining 41.6 percent, 14.5 declared that they help two jobs simply because they enjoyed the second job, 7.7 percent because they wanted to built a new business and 19.8 percent for other reasons. I call this second group of motivation the "job portfolio model", since the decision of holding two jobs is not a consequence of a constraint placed on the main occupation, but it is the result of a deliberate decision of holding not just one job but two jobs simultaneously. For a correct estimation of the labor supply for dual jobholders, we have to specify a labor supply that can account for both motivations. In Chapter 3 we use the Stone Geary utility function to derive the specification of the labor supply for dual jobholders.

Finally, the Chapter 4 looks at the relationship between working week regulation and moonlighting as a possible response to the hours constraint when overtime is not available. This research topic aims at evaluating the effectiveness of "time sharing" policies in generating new employment. Recently, time sharing policies have been receiving growing attention in a variety of European countries. They are believed to increase occupation by reducing the working week or making overtime very costly for the employers. However, supporters of these policies usually fail to recognize that

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[4] See Kimmel and Powell (1999) Table 7, page 224.

underemployed workers may seek a second job in order to compensate for the gap between target earnings and actual income. In Chapter 4, I estimate the responsiveness of moonlighting to the tightening of the hours regulation. Chapter 5 reviews some of the main findings of this dissertation.

2. AN EMPIRICAL ANALYSIS OF WAGE DETERMINATION FOR DUAL JOBHOLDERS

2.1 Introduction

The forces driving the decision to accumulate human capital and their effect on the determination of wages has been widely investigated in Labor Economics. Yet, only few studies have explored the implications involved in the decision to hold two jobs. Indeed, despite the fairly large incidence of moonlighting within the American economy[5], only recently has this topic captured scholars' attention. In this chapter, I look at the effect of human capital accumulation on the determination of wages for dual jobholders by using new econometric techniques that can account simultaneously for the panel nature of the data available and the sample selection process of being a worker holding two jobs. This investigation has important policy implications. Previous research[6] has shown that experience in one occupation often has positive spillover effect on wages available to an individual in other occupations. It might be the case, therefore, depending on the nature of the spillover effects, that the human capital investment value of working on two jobs exceeds that of working the same amount of time but on only one job. If so, then the argument for government policies that make dual job holding easier would be strengthened.

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[5] Paxon and Sisheman [1996] report that nearly 17% of the global hours worked in a year comes from the secondary job market) . Furthermore, the decision to moonlight seems to be a phenomenon that involves a large part of the population since more than half of the workers hold a second job at least once during their working life

[6] See Keane and Wolpin, 1997.

To our knowledge, only three studies have dealt with estimation of wage equations for dual jobholders. Krishnan (1990) looked at the substitutability between the decision to moonlight for the husband and the decision to enter the labor market for his wife. She estimated only the second-job wage equation, in which she included a proxy for the human capital accumulated on the main job. Following Becker (1962), she differentiated between specific and general training. Surprisingly, she found evidence that only the main job specific training was significant in increasing the wage of the secondary job. The second empirical study looking at the determinants of wages for dual jobholders is Conway and Kimmel (1998). The goal of their paper was the analysis of the motivation behind the decision to hold two jobs, in the light of the fact that the standard argument of the hours constraint on the main job (also called "moonlighting") may not have been the only explanation. In their model, they allowed for both primary job hours constraints and the heterogeneity of the jobs as possible reasons for working on more than one job. The latter reason can be thought of as a portfolio allocation decision, in which a utility maximizing worker has to decide how to allocate his time between two (or more) jobs. By defining jobs as heterogeneous, Conway and Kimmel wanted to emphasize that occupations are not perfect substitutes for each other. Occupations can be heterogeneous for different reasons. For example, people may hold more than one job because one occupation provides a credential for another occupation (such as a university professor who engages in consulting) or because it provides satisfaction regardless of the pay (such as a musician who has a regular day job and performs at night). Conway and Kimmel estimated a wage equation for both the primary and secondary job, but in their specification the human capital appears only in the form of education. Lastly, Averett [2001] looks at the wage differential on the secondary job between men and woman. Using data from the 1991 Current Population Survey, the author concludes that almost 93 percent of the wage differential is not explained by the characteristics of the individuals. Furthermore, she finds little connection between human capital and moonlighting wages, but it should be pointed out that even this study neglects to include market experience among the human capital variables. Hence, no study offers a satisfactory analysis of the structure of wages for dual jobholders, either because of a failure to consider the importance of the experience accumulated in the job market or because the estimation of the wage equation on the main occupation is completely disregarded.

This study aims at untangling the effects of human capital accumulation in the wage equations for a dual jobholder using the experience earned on both job markets as a proxy for human capital. In fact, ever since Mincer's (1979) seminal paper, researchers have constantly found that market experience is a significant and economically important determinant of wages. In view of the fact that workers spend a relevant part of their working life in the secondary job market, it is notable to investigate how this work experience affects the wage for the main job. At the same time, I explore the possibility of spillovers from the human capital acquired in the main occupation to the secondary job. If these cross effect are positive, then a worker would be better off by allocating his working time between two jobs rather than working on just one job. I also estimate a separate regression for workers that hold two jobs for reasons different from the hours constraint, and I speculate on the different results.

2.2 Model and Data

This study presents a model of wage determination for dual-job holders. Theoretically, a worker could hold any number of jobs. In practice, however, rarely do individuals hold more than two jobs. Hence, focusing only on dual-job holders is not a serious restriction, especially because the model can be easily generalized to allow for multiple job holding. The structure of the wage equation for each job is identical and is based on the standard Mincer formulation, with the exception that here the main (secondary) wage is not only a function of the main (secondary) job market experience, but also of the secondary (main) job market experience. By including these variables, the model captures the cross experience effect between the two jobs:

$$\begin{aligned} LogW1_{it} &= a_{1,i} + \gamma_{1,1}Exp1_{it} + \gamma_{1,2}(Exp1_{it})^2 + \gamma_{1,3}Exp2_{it} + \gamma_{1,4}(Exp2_{it})^2 + \overline{\gamma}_1'\mathbf{G}_{it} + \eta_{1,it} \\ LogW2_{it} &= a_{2,i} + \gamma_{2,1}Exp1_{it} + \gamma_{2,2}(Exp1_{it})^2 + \gamma_{2,3}Exp2_{it} + \gamma_{2,4}(Exp2_{it})^2 + \overline{\gamma}_2'\mathbf{G}_{it} + \eta_{2,it} \end{aligned} \quad (1)$$

where $LogW1_{it}$ is the log of the wage for the main job, $LogW2_{it}$ is the log of the wage for the second job, $\mathbf{G}_{it}$ is a vector of control variables, $Exp1_{it}$ is the market experience for the main job and $Exp2_{it}$ is the experience as a dual job-holder, $a_{1,i}$ and $a_{2,i}$ are the individual specific effects, and $\eta_{1,it}$ and $\eta_{2,it}$ are the error components, respectively, for the main and secondary wage equation, which are allowed to be contemporaneously correlated and heteroskedastic. Both experience variables are measured as the number of years working, respectively, on the main and secondary job.

In order to obtain unbiased estimates of the γ's in (1), we have to take into account possible selection processes due to the fact that the sample is not a random draw from the entire population but from a systematically selected portion of it. Strictly speaking, one should control for two sources of selection: the first, the decision to enter into the labor market, and the second, the decision to hold two jobs. However, since the data used in this study refer to prime age males, one can safely assume that the first source of selection is not binding[7]. One cannot make the same assumption about the second type of sample selection, i.e. the decision to hold a second job. In particular, this becomes a problem when the error term in the sample selection equation is correlated with the error term in the equation under study. In the present framework, I define the sample selection equation as:

$$H2_{it} = b_i + \boldsymbol{\delta}'\mathbf{Z}_{it} + v_{it} \tag{2}$$

where $H2_{it}$ is the number of hours worked on the second job, $\mathbf{Z}_{it}$ is a set of strictly exogenous variables, b_i is the individual-specific effect (which may be either random or fixed) and ν_{it} is the error component assumed to be distributed normally with a zero mean and variance of σ_v[8]. However, $H2_{it}$ is observable only if a worker actually holds two jobs. Hence, what one really observe is

$$\begin{aligned} H2^*_{it} &= 0 \qquad && \text{if } v_{it} \le -(b_i + \boldsymbol{\delta}'\mathbf{Z}_{it}) \\ H2^*_{it} &= H2_{it} && \text{if } v_{it} > -(b_i + \boldsymbol{\delta}'\mathbf{Z}_{it}) \end{aligned} \tag{3}$$

From (3) it follows that

$$LogW2^*_{it} = \begin{cases} LogW2_{it} & \text{for } H2^*_{it} > 0 \\ 0 & \text{for } H2^*_{it} = 0 \end{cases} \tag{4}$$

[7] Less than 1% of the people in the sample reported they were unemployed.
[8] This assumption excludes any form of autocorrelation in the structure of ν. This strong assumption is relaxed in Wooldridge (1995) for the fixed effect only.

Consequently, onee should be concerned about selection bias only if $\eta_{2,it}$ and ν_{it} are correlated. It should be mentioned that (3) is not the only possible specification of the selection equation. One could specify (3) as a probit, which takes the value 1 if a worker holds two jobs, 0 otherwise. While this would be a more common specification for the selection equation, it has the disadvantage of being less informative.

The estimation of equations (3) conditional on (4) is not straightforward. If the wage equation and the selection process were set in a cross section framework (i.e. if there were no subscript "*t*" on the variables in the equations), one could consistently estimate this model by using the two-step Heckit procedure. Such a procedure would still yield consistent estimators, even in a time-series and cross-section environment like this, under the assumption that there are no unobservable idiosyncratic characteristics. Unfortunately, such an assumption is unreasonable in labor economics. Hence, in order to correctly estimate (4) one should control for these individual-specific characteristics. However, such estimation can be very complex to compute, particularly in the case of the fixed effect since the individual effects cannot be identified in the Tobit specification. Theoretically, we could estimate (4) by using full information maximum likelihood estimators, but even allowing for a simple form of serial correlation would make this parametric approach almost prohibitively difficult. Because of these difficulties, studies that wanted to control for the sample selection bias usually would confine their analysis to cross section data only. This could be a serious limitation for studies that look at phenomena which, by nature, have few realizations per year. In cases like these, a panel data set would be the usual choice in order to increase the number of observation. Our topic definitively falls in this category.

Recently, the complexities involved in the estimation of selection problems inside a panel data framework have been lessened by the development of new econometric techniques. Using an approach that resembles the two-step Heckit procedure, Wooldrige (1995) and Vella and Verbeek (1999) offer two methods of dealing with the sample selection problem in a panel framework. In this study the procedure proposed by Wooldridge (1995) is used to control for sample selection under the hypothesis of fixed effects, and the procedure proposed by Vella and Verbeek (1999) to estimate the model under the hypothesis of random effects. Like the two-step Heckit procedure, these procedures are not efficient, but they have the nice properties of being computationally feasible.

As already mentioned, the difficulties in the correct estimation of fixed effect in (4) arise from the fact that the individual effects in (3), i.e. b_i cannot be identified. In order to overcome this problem, I specified a functional form for these unobserved time-invariant individual effects as proposed by Chamberlain (1980) and Verbeek and Nijman (1992):

$$b_i = \beta_0 + \boldsymbol{\beta}_1 \mathbf{Z}_{i1} + \boldsymbol{\beta}_2 \mathbf{Z}_{i2} \ldots + \boldsymbol{\beta}_T \mathbf{Z}_{iT} + \mu_i \tag{5}$$

where μ_i is a random variable independent from $\mathbf{Z}_{it}$ with a zero mean distribution. While equation (5) is still a random effects formulation, it allows for possible correlations between the b_i and present, past, and future values of the observable time variant characteristics. Usually one would assume that under the random effects model the individual idiosyncratic components are independent from the exogenous variables, but this formulation was motivated by the fact that the we need to condition on a variable which may be correlated with the exogenous variables. Substitute (5) into (3) and define the new error component as

$$\omega_{it} = \mu_i + \nu_{it} \tag{6}$$

Furthermore define ϕ_i a zero-mean random variable, such that

$$E\{\eta_{2,it} \mid \phi_i, \mathbf{Z}_i, \omega_{it}, a_{2,i}\} = \phi_i + \tau_1 \omega_{it} \tag{7}$$

where $\mathbf{Z}_i=[Z_{i1}, Z_{i2}, \ldots, Z_{iT}]$, $\phi_i=\tau_1\mu_i$, $\tau_1=\sigma_{\eta\nu}/\sigma_\eta^2$, σ_η^2 is the variance of $\eta_{2,it}$, and $\sigma_{\eta\nu}$ is the covariance between $\eta_{2,it}$ and ν_{it}. Given formulation (7) for the conditional expectation of the error term in (1) it follows that

$$E\{\log W2_{it} \mid \phi_i, \mathbf{Z}_i, \omega_{it}, a_{2,i}\} = \xi_i + \tilde{\gamma}'\mathbf{X}_{it} + \tau_1 \omega_{it} \tag{8}$$

where $\xi_i = a_{2,i} + \phi_i$, $\tilde{\gamma}'=[\gamma_{2,1}, \gamma_{2,2}, \gamma_{2,3}, \gamma_{2,4}, \bar{\gamma}'_2]$, and $\mathbf{X}_{it} = [Exp1_{it}, (Exp1_{it})^2, Exp2_{it}, (Exp2_{it})^2, \mathbf{G}_{it}]$.The procedure to implement (8) can be found in Wooldridge (1995)[9].

Conversely, Vella and Verbeek (1999) offer a two-step procedure to estimate the model under the assumption that the individual effect (b_i) and the observable characteristics $\mathbf{Z}_{it}$ are orthogonal to each other. Under this hypothesis the random effect would be a more efficient estimator of this model, and equation (5) reduces to

$$b_i = \beta_0 + \mu_i \tag{9}$$

while $a_{2,i}$ in (1) can now be specified as:

$$a_{2,i} = \alpha_0 + \varepsilon_i \tag{10}$$

We can substitute (10) in (1) and redefine the new error term as:

$$e_{it} = \varepsilon_i + \eta_{2,it} \tag{11}$$

Assuming that the conditional expectation of this error term is

$$E\{e_{it} \mid Z_{it}, \omega_{it}\} = \tau_1 \omega_{it} + \tau_2 \overline{\omega}_i \tag{12}$$

it follows that

$$E\{LogW2_{it} \mid Z_{it}, \omega_{it}\} = \alpha_0 + \tilde{\gamma}'\mathbf{X}_{it} + \tau_1 \omega_{it} + \tau_2 \overline{\omega}_i \tag{13}$$

where $\overline{\omega}_i = T^{-1}\sum_{t=1}^{T} \omega_{it}$, $\tau_2 = T(\sigma_{\varepsilon\mu} - \sigma_{\eta\nu}\sigma_\mu^2/\sigma_\eta^2) \div (\sigma_\nu^2 + T\sigma_\mu^2)$, $\sigma_{\varepsilon\mu}$ denotes the covariance between ε_i and μ_i, and σ_μ^2 and σ_ν^2 are the variances respectively of μ_i and ν_{it}. The procedure to implement (13) can be found in Vella and Verbeek (1999)[10].

The data used in this paper are from the 1979 youth cohort of the National Longitudinal Survey of Labor Market Experience (NLSY79). The NLSY79 consists of 12,686 individuals, about half of whom are men, aged 14-21 years as of January 1, 1979. The sample consists of a core random sample and an over-sample of blacks, Hispanics, poor white, and the military. Following previous conventions[11], the estimation is restricted to white males who were 16 or younger in 1978. This reduces the number of subjects to 1,880. Here, each individual in the sample is followed from 1990 to 1993. The sample mean of the variables included in the model are reported in Table 2.1.

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[9] Wooldridge [1995] estimation is based on a very general formulation of the variance covariance matrix, consistent to non spherical disturbances as autocorrelation and heteroskedasticity.

[10] The conditions for the estimation of the covariance matrix are also given in Vella and Verbeek [1999].

[11] See Keane M. and Wolpin K., [1997].

Table 2. 1- Descriptive statistics

VARIABLE	DEFINITION	MEAN
LogWage1	Log of the Wage for the main job	1.9965
LogWage2	Log of the Wage for the second job	1.8126
Hours2	Annual hours worked on the second job	58.002
ExpMain	Experience (years) in the labor market	6.6748
ExpXtra	Experience (years) as dual job holder	0.5472
1991	Dummy variable, 1 = year 1991	0.2426
1992	Dummy variable, 1 = year 1992	0.2392
1993	Dummy variable, 1 = year 1993	0.2236
EDUC	Years of education	13.13
North-East	Location dummy variable, 1 = North-East	0.1773
Central	Location dummy variable, 1 = Central	0.2966
West	Location dummy variable, 1 = West	0.2259
City	Dummy variable, 1 = living in a city	0.7778
NLY	Non Labor Income	3652.7
Age	Age	27.98
Married	Dummy variable, 1 = married	0.5461
Kids	Number of children	0.7241

The variable NLY has being calculated as total family income minus the sum of labor income for the worker and his spouse.

Dealing with dual-job holding raises the issue of how to identify which occupation is the "main" job and which one is the "secondary" job. This classification is not easy because there is no straightforward and unique definition of main job. The difficulty arises because on wants to find a method that could closely identify what an individual perceive as main rather than second job. If two jobs are perfect substitutes for each other, the only difference between the two is the wage rate. In this case, the theory unambiguously defines as the main job the occupation that pays the higher rate because workers would work only on this job if they could increase the number of hours on it. On the other hand, if two jobs are different for reasons other than the wage rate, then the theory has no a priori criteria to identify the main job. We can identify at least three alternative criteria: 1) the job with the highest wage rate. This definition is always consistent with the implication of the "hour constraint" theory[12]. However, it is almost trivial to find an example that would question the validity of this classification. According to this definition, a university professor working occasionally as a consultant at a much higher pay rate should be classified as being a consultant that moonlights as a university professor. Some people would be unsatisfied with this classification. 2) The job with the most hours worked. Even this definition has no straightforward interpretation and may lead to counterintuitive results. In the previous example, the teaching position would be considered as the main occupation for the university professor, and the consulting job as the secondary occupation. However, considering an artist who performs irregularly at night or during the weekend yet works daily elsewhere, this definition may become problematic. 3) The job with the highest earnings. This definition has the advantage of combining the previous two. However, there is no guarantee that even this definition would completely dissipate every problem of classification. In fact, if the performing remuneration rate is not high enough to offset the hours effect it would still not be possible to classify an artist in the way presumably he would like to be considered. On the other hand, if the length of time spent teaching is not high enough to compensate for the lower wage rate compared to the consulting fee, the university professor would still be classified as in (1). Depending on the definition adopted, the assignment of a

[12] See Shishko R. and Roster B., 1976.

given observation to the primary or secondary wage equation may vary. This chapter follows the convention adopted in the National Longitudinal Survey of Youth (NLSY79) which views the main job as the one corresponding to the definition used by the Current Population Survey (CPS). In the CPS a worker is defined as a "multiple jobholder" if he declared he worked on more than one job during a given survey week. The primary job is defined as the one at which the greatest number of hours was worked. If he worked the same number of hours on both jobs, then the job on which he had worked the longest is considered the main job[13].

A total of 1,221 moonlighting episodes have been recorded during the period 1990-1993 (see Table 2.2).

Table 2. 2 - Annual weeks worked on the second job

Weeks	Cases	Percentage
1	355	0.29
2 - 4	83	0.07
5 -12	140	0.11
13 - 25	205	0.17
26 - 52	438	0.36
Total	1221	1.00

About 30 percent of these observations regard moonlighting episodes of only one week, but more than 50 percent of all moonlighters continuously held a second job for 13 weeks (3 months) or longer. Information about the number of hours worked on the second job is available for only 876 moonlighting episodes. On average, people held a second job for 408 hours per year. The data seem to suggest that although the number of people holding

[13] Results for the other two possible classification of the main and secondary job can be found in the appendix A.

two jobs was higher during the first two years surveyed, on average people worked more in the last two years (Table 2.3).

Table 2. 3 - Hours worked on job 2 from 1990 to 1994

Year	Cases	Average	Total
1990	266	374.29	99561
1991	211	384.19	81064
1992	208	458.86	95442
1993	191	427.76	81702

Information about the wage on the second job is available in 843 cases. The average hourly wage for the second occupation (in 1980 dollars) was \$8.13, which is \$0.62 less than the average of the wage on the main job over the same period. The histogram of the wage distribution for both the main and secondary job is shown in Figure 1.

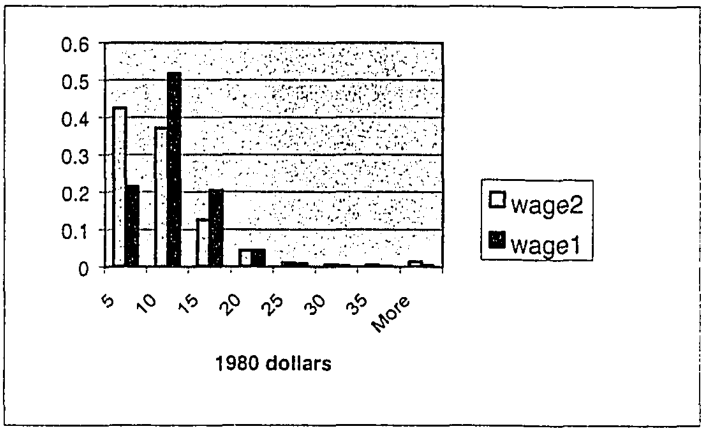

Figure 2. 1 Histograms of the distribution of wage 1 and wage 2

2.3 Empirical results

The following section reports the results for the fixed and random effects estimation of the wage equation on the main and secondary jobs. An unfortunate feature of the fixed effects model is that the time invariant variables are perfectly collinear with the individual specific constant term. For this reason we had to exclude these variables from the estimation. Similarly the variable "AGE" had to be excluded because it was collinear with the year dummy variables. It should also be pointed out that the estimation of the wage for the second job does not control for the industry and occupation, either in the fixed effects or in the random effects model. The reason for these exclusions is that the NLSY79 recorded information about industry and occupation only for those workers who held a second job either for more than 9 weeks in a year or for more than 10 hours per week. Restricting the estimation to workers for which this information was available would have meant a reduction in the sample size of almost 40 percent. Finally, it should be mentioned that the variation in the sample size is a consequence of either the number of variables included or the structure of the model. In particular, the fixed effects model for the wage for the second job requires a balanced panel because it is necessary to regress the number of hours worked on the second job on past, present, and future values of independent variables.

I start the presentation of the results from the analysis of the main job wage equation. The results pertaining to the fixed effects estimation suggest that the experience earned on the secondary job has no market value in determining the wage on the main job (Table 2.4).

Table 2. 4 - Fixed Effect on Log Wage1

	COEFFICIENT	T-VALUES
ExpMain	0.0631	2.975
$ExpMain^2$	-0.0027	-3.308
ExpXtra	-0.0343	-1.208
$ExpXtra^2$	0.0048	1.249
1991	-0.0254	-1.318

Table2.4 - Continued

1992	-0.0235	-0.703
1993	-0.0122	-0.257
nobs	4352	

The results from the random effects model seem to support a different story. In fact, as Table 2.5 suggests, holding a second job has a negative impact for the determination of the wage on the main job, but only for workers that have been in the secondary job market for less than 4 years. Beyond that threshold, holding a second job has a positive impact on the determination of the wage rate on the main job.

Table 2. 5 - Random Effect on LogWage1*

	COEFFICIENT	T-VALUES
Constant	0.3025	2.741
ExpMain	0.0768	7.098
$ExpMain^2$	-0.0017	-2.200
ExpXtra	-0.0533	-2.892
$ExpXtra^2$	0.0062	1.915
1991	-0.0389	-2.775
1992	-0.0720	-4.429
1993	-0.0874	-4.470
EDUC	0.0928	16.143
North-East	0.1544	4.855
Central	0.0393	1.446
West	0.0756	2.576
City	0.0681	2.861
nobs	3395	

* Dummy variables for industry and occupation are included but not shown in the regression

However, the value of the Hausman test (38.55) indicates that the random effects model should be rejected in favor of fixed effects.

The estimation of the second job wage equation requires first the estimation of the selection equation that in our case is the hour equation. For the fixed effects model I run 4 Tobit regressions (one for each year in the sample) from which we saved the residuals needed to create ω_{it}, i.e. the additional variable used to purges the estimates of the second job wage equation from sample selection bias (Table 2.6). Since in each Tobit equation every variable appears not only in its current value, but also for every year in the sample, only time variant variables can be included in the estimation. A natural choice was a measure of non-labor income. I also thought that experience as dual jobholder would capture some of the dynamics of movements into and out of the secondary job market. The non-labor income variables are never statistically significant, while the coefficients on the dual job holding experience variables are almost always statistically significant, although they do not show any systematic pattern.

Table 2. 6 - First stage of the Wooldridge procedure

	Hours2 in 1993		*Hours2 in 1992*		*Hours2 in 1991*		*Hours2 in 1990*	
	t-values	Coefficient	t-values	Coefficient	t-values	Coefficient	t-values	Coefficient
Costant	-7.351	-973.133	-7.859	-660.62	-7.494	-554.50	-8.793	-753.00
NLY90	-0.371	-0.0044	0.039	0.0004	0.011	0.0001	0.446	0.0037
NLY91	2.569	0.0187	-0.5045	-0.0038	1.479	0.0061	-0.892	-0.0072
NLY92	-0.386	-0.0046	1.521	0.0092	0.191	0.0012	1.580	0.0090
NIY93	0.262	0.0031	-1.144	-0.0122	-0.932	-0.0070	0.169	0.0013
ExpXtra90	-0.0354	-155.972	2.599	786.44	0.531	97.21	-5.099	-1562.66
$ExpXtra90^2$	1.014	135.576	-1.749	-151.99	-1.563	-91.53	-1.094	-100.67
ExpXtra91	0.393	338.669	-3.567	-1948.05	-5.295	1899.76	3.039	1989.14
$ExpXtra91^2$	-0.961	-229.416	1.927	286.68	2.630	272.79	1.239	215.71
ExpXtra92	-2.649	1956.131	-1.090	-410.69	5.596	1971.42	1.406	662.04
$ExpXtra92^2$	0.919	149.336	-0.799	-84.00	-3.084	-233.90	-2.960	-321.96
ExpXtra93	5.189	1764.979	8.498	1685.65	-0.641	-118.99	2.210	-738.79
$ExpXtra93^2$	-0.660	-42.647	-1.555	-65.21	1.596	48.91	3.239	142.69
obs	466		465		463		463	

Table 2.7 shows the results of the second stage of the Wooldridge's procedure, where the coefficients of the fixed effects are corrected for selection bias through the inclusion of the variable ω_{it}. This procedure does not allow the retrieval of the individual effects, but it still yields consistent within-estimators.

Table 2. 7 - Fixed Effect on LogWage2

	COEFFICIENT	T-VALUES
ExpMain	0.0023	0.4786
ExpMain^2	-1.22E-06	-0.3172
ExpXtra	-0.1678	-1.8764
ExpXtra^2	0.0105	0.6429
1991	-0.0342	-0.1946
1992	-0.0353	-1.2959
1993	-0.0799	-0.1793
ω	0.0003	-2.0095
Nobs	165	

Before turning to the analysis of the results, I conducted a test to check for the presence of sample selection biases. Wooldridge offers a simple t-test based on the coefficient of the variable ω_{it} with the standard error constructed under the null hypothesis that the coefficient on ω_{it} is zero. The generated t-value is -2.008814, which rejects the null hypothesis of no sample selection. Table 2.7 reports the coefficients and the autocorrelation and heteroskedasticity consistent t-values. From those results one can conclude that there is no spillover effect from the human capital accumulated on the main job to the secondary job since the coefficient on the variables that represent the experience on the main job are insignificant. Even more surprising is the finding that the experience in the secondary job market has a negative effect on the determination of the wage for the secondary job.

The results of the random effects estimation do not appear to reveal additional insights about the determinants of the second job wage. In the selection equation (Table 2.8) non-labor income is still insignificant, while the coefficients on the experience in the secondary job market reveal a certain continuity to stay in the second job market once entered.

Table 2. 8 - Selection equation with Random Effect

	COEFFICIENT	T-VALUES
Constant	1681.797	5.547
NLY	0.0005	0.176
Age	-54.820	-2.892
Educ	-148.877	-2.239
$Educ^2$	5.244	2.165
Married	-79.965	-1.723
Kids	11.238	0.471
ExpXtra	467.177	12.902
$ExpXtra^2$	-42.661	-6.978
1991	-37.059	-0.658
1992	2.326	0.036
1993	-7.932	-0.099
North-East	15.377	0.243
Central	12.296	0.239
West	50.886	0.902
City	-89.240	-1.813
nobs	3197	

The results pertaining to the regression of the wage on the second occupation using the Vella and Verbeek's procedure are reported in Table 2.9.

Table 2. 9 - Random Effect on LogWage2

	COEFFICIENT	T-VALUES
Constant	0.8471	2.9537
ExpMain	-0.0028	-0.0600
ExpMain^2	0.0012	0.3833
ExpXtra	0.0245	0.4093
ExpXtra^2	-0.0015	-0.1540
1991	0.0032	0.0480
1992	-0.0591	-0.8368
1993	0.0659	0.7376
EDUC	0.0606	3.9875
North-East	0.2053	1.9352
Central	-0.1067	-1.3232
West	0.0920	0.9231
City	0.1474	1.9497
ω	-0.0001	-0.9918
$\overline{\omega}$	4.79E-05	0.2395
nobs	462	

In this model the human capital appears under the forms of both market experience and education. None of the variables representing market experience has a statistically significant coefficient. However, the random effects results highlight how education is an important factor that shapes the characteristics of the secondary job market. First of all, education affects the hours supplied to the second job: workers with very low or very high levels of education supply more hours. Moreover, by comparing Table 2.5 and Table 2.9, it appears that the return on education on the secondary job is 3 log points lower than the return on the main job. Finally, the t-statistics on the correction terms ω_{it} and $\overline{\omega}_{it}$ provide the tests for the compound hypothesis of sample selection bias and exogeneity of the individual effects. Neither coefficients on these two variables is significant, hence even for the estimation of the wage on the second job the random effect model is rejected in favor of the fixed effects model.

These results are counter to the initial expectations. For example, with the university professor who conducts private consulting, one would expect to observe some form of spillover between the two jobs. Indeed, I decided to further investigate the phenomenon of the dual jobholders. As pointed out by Kimmel and Conway, people can hold two job for two different reasons: they can moonlight because of an hours constraint on the main job or because they maximize their utility function by holding two jobs (portfolio model). While one would expect some positive spillover in the case of the portfolio model, there is no reason to expect the same when people hold two jobs because of an hours constraint. Constrained workers would moonlight even in sector of the economy that are unrelated to their main job, as long as the second job pays more than the reservation wage and it can help to fulfill their optimal number of hours. Hence, I thought that aggregating dual jobholders who have different motivations for having two jobs added noise to the model. Therefore, I decided to run a set of regressions only for people holding two jobs under the portfolio hypothesis. Unfortunately, the NLSY79 does not provide the information necessary to sort the sample according to motivations. Thus, I had to devise a rule to identify these motivations and I decided to use education attainment as an indicator of the motivation behind the decision to hold two jobs. From the selection equation I know that people with either very low or very high levels of education are more likely to be in the secondary job market. One can made the reasonable assumption that workers with low education moonlight due to an hours constraint because they face a higher probability of working in less flexible occupations. On the other side, people with higher level of education would most likely work on a job that offers more flexible hours. Table 2.10 reports the results of the sample restricted to only individuals who have completed a college degree or have a higher level of education. Only the random effects results are reported since for the main wage equation the Hausman test (12.55) is in favor of the random effects at 5 percent critical value. Moreover, the strong significance of the two additional variables in the Vella-Verbeek procedure support the hypothesis of selection bias and exogeneity of the individual effects, thus making the random effect a more efficient estimator even for the wage on the second job.

Table 2. 10 - Random effect restricted to 16 or more years of education

	*LogWage1**		*LogWage2*	
	Coefficient	t-values	Coefficient	t-values
Constant	1.6836	4.125	1.3730	1.0111
ExpMain	0.0887	3.807	-0.2330	-1.6776
$ExpMain^2$	-0.0030	-1.390	0.0283	1.6130
ExpXtra	-0.1332	-3.246	0.1687	1.3738
$ExpXtra^2$	0.0221	2.817	-0.0390	-1.7741
1991	-0.0423	-1.591	-0.0161	-0.1158
1992	-0.0409	-1.199	-0.2246	-1.3953
1993	-0.0392	-0.888	0.0271	0.1318
EDUC	0.0175	0.818	0.0675	0.9187
North-East	0.1106	1.904	-0.1023	-0.4901
Central	0.0214	0.418	-0.3290	-1.8032
West	-0.0131	-0.213	-0.5522	-2.4117
City	0.0056	0.105	0.2442	1.4888
ω	-		0.0005	-2.6095
$\overline{\omega}$	-		0.0009	1.8443
nobs	914		108	

* Dummy variables for industry and occupation are included but not shown in the regression

Interestingly, both regressions in Table 2.10 show a U-shaped relationship between the wage and the cross market experience. Several factors can be hypothesized for this particular cross effect. Possibly the initial negative effect might due to the fact the some work time has being diverted from the main job to the secondary job, thus decreasing the growth of experience on the main job. However, when a certain stock of experience on the second job as being reached (4 years), then we observe some spillover effects from the second to the main job. This quite lengthy period of apprenticeship before a worker can observe benefits on the main job from the experience accumulated on the second job can be explained by the fact that usually people work part time on the second job, which slows down the process of human capital accumulation. The results for the second job wage equation show exactly the same pattern as for the main job wage equation, supporting the idea that in the portfolio model one should not be talking about main job and secondary job, but rather job 1 and job 2, because there is no hierarchical relationship between the two jobs. The low precision in the estimation of the coefficients of the wage equation on job 2 may be due to the reduction in the sample size (108 observations).

2.4 Conclusion

In this study I examined the human capital implications of holding two jobs. In particular, this chapter's contribution to the existing literature is the analysis of how the market evaluates the experience accumulated on the main and secondary job, as reflected in the wage rates. This analysis has been conducted using new econometric techniques, which allowed consistent estimation of the panel model controlling, at the same time, for sample selection. Notwithstanding their broad applications, only very few studies have so far used such techniques. Using an extended version of the Mincer equation, I found no evidence of a positive return from the experience accumulated on the second job. Moreover, the hypothesized cross occupation spillover effect has been rejected by the results. However, the results are different when we confine the estimation to only individuals who possess at least a college degree. I argue that these workers hold two jobs for reasons different from the hours constraint. The new results say that experience on the other job market has an initial negative impact in the determination wages, but after 3 or 4 years, the experience on the other job shows positive returns. In conclusion these findings highlight the need for further studies of dual job holding in the direction of a more rigorous analysis of the motivation behind the decision to hold two jobs to integrate the limited existing literature.

3. THE LABOR SUPPLY FUNCTION FOR DUAL JOB HOLDERS

3.1 Introduction

In the past decades, researchers have progressively expanded the classical specification of labor supply to derive models that can account for more detailed features[14]. However, not much space has been devoted to the exploration of labor supply for dual jobholders. In this chapter the Stone-Geary Utility function is used to estimate a labor supply function in a static framework.

The evidence of different motivations behind the decision to hold two jobs[15] calls for the need to formalize a model that allows and distinguishes between at least two different motivations: moonlighting due to an hours constraint on the first job and moonlighting because people prefer to hold multiple jobs. Firms often offer a fixed package of hours-wage combination. If the number of hours required by a firm is less than the optimal number of hours that a utility maximizing worker would choose, a rational individual will take a second job under the condition that it pays more than his reservation wage on the second job. We will call this motivation the "hours constraint model". Sometime, however, people may prefer to allocate their working time between two or more jobs: we will call this motivation the "job portfolio model". In the job portfolio model people hold multiple jobs not because there is market constraint on their first occupation, but because they have a personal preference for job differentiation deriving from a wide range of motivations like side benefits, prestige, building

[14] See Heckman (1993) and Pencavel (1986) for a complete survey of the status of knowledge in labor economics about labor supply.

reputation, job security, creating credentials, and so on. Under this scenario, the individual has to decide how to allocate his working time among two alternative activities. In this paper we model this double motivation for holding two jobs inside the Stone Geary Utility function.

3.2 Literature Review

Early empirical work on labor supply for dual jobholders date back to Shishko and Rostker (1976), who model the decision of an individual to moonlight as a reaction to an hours constraint on the primary job. In the same line of research, but emphasizing more the role of a liquidity constraint, Abdukdir (1990) found evidence that the decision to buy a house or a new car increases the probability of taking a second job. However, data from the 1997 US Current Population Survey reveal that only 59 percent of the population moonlights because of a constraint on working more on their first job (see Kimmel and Powell, Table 7). This finding highlights the need for a more accurate model that can account for the motivation of dual jobholding beyond the hour constraint.

Using data for the Survey of Income and Program participation (SIPP), Kimmel and Conway (1998) estimated a labor supply function for prime-age male moonlighters, incorporating in their model the job portfolio as an alternative to the hours constraints hypothesis. In particular, they emphasize that the hours supplied on the first job are endogenous in the job portfolio hypothesis but exogenous in hours constraint. Since the SIPP does not identify if a moonlighter is constrained, they proceed to use a

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[15] See Kimmel and Conway (1996).

disequilibrium model to estimate the probability that a moonlighter faces an hour constraint on the main occupation. Subsequently they use this probability to run a switching regression model. In their 2001 paper, Kimmel and Conway use a different procedure to separate out the moonlighters facing hours constraints from the rest of the dual jobholders. Still using the SIPP, they assume that people with short spells of moonlighting would be most likely constrained. Even if this would be a reasonable assumption, it raises the question of how to define a short spell. The fact that the authors use in their 1998 paper a completely different criterion to identify the constrained people with respect to their 2001 paper points to the difficulties when the data set does not provide such information.

To avoid the difficulty of having to identify the constrained moonlighters, Allen (1998) uses the Panel Study of Income Dynamic data set, which collected information about the hour constraint until 1986. The author concentrated only on unmarried men and women, and he found that unconstrained workers are more likely to have two jobs than constrained workers are. Similarly, Averett (2001) uses data from the Current Population Survey, which in 1991 collected information the motivation for holding two jobs. She runs a probit which specifies the probability of being a constrained moonlighter, highlighting the difference between men and women. However, even if both studies have access to data that reported information about the motivation for holding multiple jobs, they neglected to estimate the labor supply for moonlighters.

Krishnan (1990) estimates the labor supply for dual job holder, but without specifying the dual nature of the decision, focusing only on the substitution between the decision for the husband to hold a second job and the decision for the wife to enter in the job market. Finally Paxon and Sicherman [1996] model the decision to hold two jobs in a dynamic setting, still failing to recognize the dual nature of this decision.

This chapter presents a more comprehensive study of the labor supply for dual jobholders, which includes the job portfolio and the hours constraint as possible reasons for holding multiple jobs. By using the PSID data for 1986 we avoid the problem of having to identify which motivation drives the decision of each individual.

3.3 Model

Let us assume that a representative individual maximizes his utility, which is a function of the hours supplied on the first job, h_1, the hours supplied on the second job, h_2, and his consumption level. Assume, furthermore, that no saving decisions are made in this environment and that our hypothetical individual's consumption (y) equals his income, which is the sum of the earnings from both jobs plus non labor income. We can then specify the maximization problem for this individual as:

$$\begin{aligned} &\max_{h_1,h_2,y} U = f(h_1, h_2, y; Z) \\ &s.t.\ y = w_1 h_1 + w_2 h_2 + I, \\ &\quad h_1 + h_2 \leq T, \end{aligned} \tag{1}$$

where Z is a set of individual characteristics, w_1 is the hourly wage on job 1, w_2 is the hourly wage on job 2 and I is non labor income. T is the total amount of time available to the individual, but we assume that this constraint is never binding. The first order conditions for this maximization problem together with the Kuhn-Tucker slackness conditions are the followings:

$$\frac{\partial L}{\partial h_1} = \frac{\partial f(h_1, h_2, y, Z)}{\partial h_1} + \lambda w_1 \leq 0 \qquad h_1 \frac{\partial L}{\partial h_1} = 0$$
$$\frac{\partial L}{\partial h_2} = \frac{\partial f(h_1, h_2, y, Z)}{\partial h_2} + \lambda w_2 \leq 0 \qquad h_2 \frac{\partial L}{\partial h_2} = 0 \tag{2}$$

Since we will only look at prime age male head of households we can safely assume that h_1 is always positive, which implies that $\partial L/\partial h_1=0$. However, we cannot make the same assumption about h_2, since only a fraction of the sample holds two jobs. We will have, hence, a double regime according to whether h_2 is greater or equal to zero. If $h_2=0$ then

$$y=w_1 h_1 + I \tag{3}$$

and substituting (3) in $\partial L/\partial h_1=0$ we obtain

$$\frac{\partial L}{\partial h_1} = \frac{\partial f(h_1, w_1 h_1 + I, Z)}{\partial h_1} + \lambda w_1 = 0 \tag{4}$$

from which, by means of the envelop theorem, one can derive the labor supply for an individual that works only on one job:

$$h1=g(w_1, I, Z) \tag{5}$$

Let's now consider the case for the hours supplied to the main job for a dual jobholder. Since $h_2>0$, it must be that

$$\frac{\partial L}{\partial h_1} = \frac{\partial f(h_1, h_2, w_1 h_1 + w_2 h_2 + I, Z)}{\partial h_1} + \lambda w_1 = 0 \tag{6}$$

which will yield the reduced form labor supply on the first job for dual jobholders:

$$h_1=g(w_1, w_2, I, Z). \tag{7}$$

The specification of the labor supply for the second job also has a dual regime, with the difference that now the separating factor is the motivation for holding two jobs.

If an individual seeks a second job because he would have liked to work more hours on the main job, then h_1 is not a decision variable since h_1 for this worker is not what he would have chosen if he had been free to pick up the optimal hours on the main job. In this case we can consider h_1 an exogenous variable and the hours supplied on the second job will be also a function of this variable:

$$h_2=g(w_1, w_2, h_1, I, Z). \tag{8}$$

On the other hand, if the people prefer to hold two jobs because jobs are heterogeneous, then both h_1 and h_2 are endogenous, i.e. workers have to decide how to split their total work time between two activities. If this is the case, then h_1 cannot appear in the labor supply function for h_2 and

$$h_2=g(w_1, w_2, I, Z). \tag{9}$$

Imposing a functional form on the general supply function specified above places strong restriction on the estimation, but at the same time has the property of being more informative, because we can shape the utility function that generates the supply curve. We decided to use the Stone-Geary (SG) utility function to model the decision to hold two jobs. The SG has the appealing properties of being an extended version of the Cobb Douglas:

$$U=(\gamma_1-h_1)^{\alpha_1}(\gamma_2-h_2)^{\alpha_2}(y-\gamma_3)^{1-\alpha_1-\alpha_2}, \tag{10}$$

where α_1, α_2, γ_1, γ_2, $\gamma_3>0$, h_j represents the time allocated to activity j, and y is income. The parameters γ_1 and γ_2 represent the upper bound on the time that can be spent on activities 1 and 2 respectively for the utility function to be defined. They satisfy the following restriction:

$$\gamma_1 + \gamma_2 = T, \tag{11}$$

where T is the total time available for work and leisure. The parameter γ_3 represents the lower bound on the amount of income necessary in order to have the utility function defined. The general economic problem can be stated as:

$$\begin{aligned}
&\max_{h_1,h_2,y} U = (\gamma_1 - h_1)^{\alpha_1}(\gamma_2 - h_2)^{\alpha_2}(y-\gamma_3)^{1-\alpha_1-\alpha_2} \\
&s.t.\ y = w_1 h_1 + w_2 h_2 + I, \\
&\quad h_1 + h_2 \le T, \\
&\quad 0 \le h_j < \gamma_j,\ j = 1, 2 \\
&\quad \gamma_3 \le y
\end{aligned} \tag{12}$$

where w_1 and w_2 are wages to activities 1 and 2 and I is exogenous, non labor income. After making the reasonable assumption that the second constraint is never binding (i.e. $h_1 + h_2 < T$), the first order conditions for the portfolio model yield:

$$\begin{aligned}
h_1 &= (1-\alpha_1)\gamma_1 - \alpha_1\gamma_2\left(\frac{w_2}{w_1}\right) + \alpha_1\gamma_3\left(\frac{1}{w_1}\right) - \alpha_1\left(\frac{I}{w_1}\right) \\
h_2 &= (1-\alpha_2)\gamma_2 - \alpha_2\gamma_1\left(\frac{w_1}{w_2}\right) + \alpha_2\gamma_3\left(\frac{1}{w_2}\right) - \alpha_2\left(\frac{I}{w_2}\right)
\end{aligned} \tag{13}$$

It can be shown that, for a constrained worker, since h1 is not a decision variable, i.e. $h_1 = H_1$, the labor supply on the second job becomes:

$$h_2 = \frac{1-\alpha_1-\alpha_2}{1-\alpha_1}\gamma_2 - \frac{\alpha_2}{1-\alpha_1}\left(\frac{w_1}{w_2}\right)H_1 + \frac{\alpha_2}{1-\alpha_2}\gamma_3\left(\frac{1}{w_2}\right) - \frac{\alpha_2}{1-\alpha_1}\left(\frac{I}{w_2}\right) \tag{14}$$

As we see by comparing (13) and (14), the specification of the labor supplies is different under the two regimes, since H_1 appears in the labor supply equation for a constrained moonlighter, but not for a job portfolio holder.

The uncompensated own wage effect on occupation i for (13) is given by

$$\frac{\partial h_i}{\partial w_i} = \frac{\alpha_i}{(w_i)^2}\left(\gamma_j w_j + I - \gamma_3\right) \qquad i,j = 1,2 \tag{15}$$

which can be greater, equal, or less than zero. If this uncompensated own wage effect is negative, it means that an increase in its return leads to a reduction of the time spent on that occupation and some combination of increases in leisure and time spent on the second occupation. The pure income effect for the occupation i is given by

$$\frac{\partial h_i}{\partial I} = -\frac{\alpha_i}{w_i} < 0, \qquad i=1,2 \tag{16}$$

which implies that leisure is a normal good since an increase in non-labor income will reduce the time spent on activities 1 and 2, hence increasing leisure time. The uncompensated cross wage effect 1 is as follow:

$$\frac{\partial h_i}{\partial w_j} = -\frac{\alpha_i \gamma_j}{w_i} < 0, \qquad i,j = 1,2 \tag{17}$$

Since the Slutsky equation decomposition is given by

$$\frac{\partial h_i}{\partial w_i} = S_{ii} + h_i \frac{\partial h_i}{\partial I}, \qquad i = 1,2 \tag{18}$$

it follows that the compensated own substitution effect for occupation i is

$$S_{ii} = \frac{\alpha_i}{(w_i)^2}\left(w_i h_i + \gamma_j w_j + I - \gamma_3\right), \quad i,j = 1,2 \tag{19}$$

which can be shown to be always greater than zero given the restrictions placed on the γ's, in accordance with the theory's prediction. Likewise, we can compute the compensated cross substitution effect for occupation i

$$S_{ij} = \frac{\alpha_i}{w_i}\left(h_j - \gamma_j\right) < 0, \qquad i,j = 1,2. \tag{20}$$

Neoclassical theory implies that $S_{21}=S_{12}$, i.e a compensated change in the wage of occupation 1 has the same effect on labor supply to occupation 2 as a compensated change in the wage of occupation 2 has on labor supply to occupation 1.

Naturally, the above results change when the compensated and uncompensated own and cross price effect are derived for (14). In particular, the uncompensated own wage effect on occupation 2 is given by

$$\frac{\partial h_2}{\partial w_2} = \frac{1}{\left(w_2\right)^2}\frac{\alpha_2}{1-\alpha_1}\left(H_1 w_1 + I - \gamma_3\right) \quad , \tag{21}$$

while the pure income effect can be written as

$$\frac{\partial h_2}{\partial I} = -\frac{1}{w_2}\frac{\alpha_2}{1-\alpha_1}, \tag{22}$$

and the uncompensated cross wage effect as

$$\frac{\partial h_2}{\partial w_1} = -\frac{\alpha_2}{1-\alpha_1}\frac{H_1}{w2}. \tag{22}$$

Using (21) and (22), we can calculate the compensated own wage effect:

$$S_{22} = \frac{1}{\left(w_i\right)^2}\frac{\alpha_2}{1-\alpha_1}\left(H_1 w_1 + h_2 w_2 + I - \gamma_3\right), \tag{23}$$

Finally, $S_{21}=0$, since the hours supplied on the main job cannot be changed and any increase in the wage on the occupation 1 affects the labor supply to occupation 2 only through the income effect.

3.4 Data

A quick glance at the data may shed light on some basic characteristics of moonlighters. The descriptive statistics herein presented refers to the Panel Study of Income Dynamics database for the 1986. The analysis is based on prime age male heads of household. There are a total of 3263 individuals, 595 of whom reported working on two jobs[16] in 1985. The PSID has some interesting features that make this database an appealing choice. First, during the period between 1968 and 1986 it collects information about hours constraints by asking if the respondent would have liked to work more hours but he could not. Secondarily, the decision to identify the main job is left to the interviewee, without having to specify *a priori* an arbitrary rule to single out the main job. At least in one case, this is an advantage. In fact, for the hours constraint model, the main job is the only job on which a worker would work, if there were no constraint placed on it. However, there is no guarantee that using rules which identify the main job as the job with the higher wage rate, rather than the higher earnings or the most hours worked on will necessarily isolate the job that the worker considers the main job. On the other hand, when we talk about a job portfolio, it does not make sense to distinguish between the main job and the secondary job, since workers want to work on both of them simultaneously. We should rather be talking about job1 and job2, which might raise the question of how to classify the two jobs.

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[16] PSID definition of moonlighting from the 1995 interviewer manual: "Main vs. Extra job distinctions are not as difficult as they seem. Very simply, Head cannot have an extra job unless he\she has a main job during the same time period. The extra job must be held simultaneously with the main job. Heads who were temporarily laid off were still employed at the main job and, therefore, could not have an extra job during this time period. However, Heads who were unemployed and looking or not working and looking are

Practically, in 97.5 percent of the cases people reported as the main job the occupation on which they spend the most time working. Notice that this corresponds to the definition of main job used by the CPS. The self-identified main job is the occupation with the higher hourly pay only in the 51.6 percent of the cases. The idea of main job is also highly correlated with the earnings since in the 96.5 percent of the cases it is the job with the larger income.

In the PSID, only 24.3 percent of all moonlighters reported that they were constrained. Among these, some respondents reported a secondary wage higher than the primary, which seems inconsistent with the hours constraint model. In fact, as in Shisko and Rosker (1976) the theory predicts that in the hours constraint model, the wage on the main job is always higher than the wage on the second job. In fact, the theory assumes that jobs are homogeneous except for the wage rate. Naturally, in this environment, the main job is always the occupation that pays better, since that would be the only job that the worker would hold, if he could freely work any hours. However, in real life jobs are not homogeneous, hence there is no guarantee that for constrained workers, the occupation that pays better is the only one that they would like to hold in a world without constraints.

3.5 Empirical Results

Two models were estimated: the first is a linear supply model, while the second model is labor supply derived from the Stone Geary utility function.

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saying that they had no main job employer during the time in question. But if the Head was working for at

The complete list of the variables used in the regressions, together with their respective mean values, is reported in Table 3.1.

Table 3. 1 - Variables description

NAME	DEFINITION	MEAN
White	Dummy variable, 1 for white	0.6963
Age	Age	37.2694
Educ	Years of schooling	13.1149
DJ84	Dual jobholder in 1984	0.1848
NLY	Non-labor income	3842.59
Unempl	Hours of unemployment in 1984	44.0539
Union	Dummy variable, 1 for union member	0.2686
Constrained84	Constrained in 1984	0.2773
H2-84	Hours supplied on second job in 1984	68.0487
DJ	Dual jobholder	0.1592
UC	Unconstrained	0.7410
H1	Hours supplied on main job in 1985	2074.5
H2	Hours supplied on second job in 1985	380.65
W1	Wage rate on main job in 1985	11.29
W2	Wage rate on second job in 1985	16.59
Prof	Occupation Dummy variable, 1 for Professional	0.1897
Adm	Occupation Dummy variable, 1 for Administration	0.1474
Sales	Occupation Dummy variable, 1 for Sales	0.0237
Cler	Occupation Dummy variable, 1 for Clerk	0.0561
Craft	Occupation Dummy variable, 1 for Craftsmen	0.2597
Oper	Occupation Dummy variable, 1 for Operative	0.1198
Tran	Occupation Dummy variable, 1 for Transportation	0.0648
Labor	Occupation Dummy variable, 1 for Laborer	0.0573
Farm	Occupation Dummy variable, 1 for Farm worker	0.0120
Serv	Occupation Dummy variable, 1 for Service	0.0711

The mean values are calculated on the sample of 2530 complete observations, except for H2 and W2 means which are calculated on the sub sample of complete observations for dual job holders only (386). The occupation dummies refer to job 1.

In the linear model we exploit the dual regime presented in the previous section by running a switching regime regression with an endogenous switching equation. For

all during these times, this work is not an extra job. It is considered main job."

the estimation of labor supply on the main job, the switching equation identifies whether a worker is a dual jobholder. This estimation has been performed using a sample that includes only workers that reported no constraint[17] (1814 out of 2530 complete observations). Because of this necessary restriction, a sample selection equation has been estimated to calculate the Inverse Mill's Ratio used to correct the results of the switching regime from possible selection biases. Figure 3.1 outlines the steps of estimation.

First stage:

1) Estimate the unconstrained equation using Probit:
UC = f(white, unempl, age, educ, union, c84, h2-84) + e

2) Calculate the Inverse Mill's Ration: LambdaUC

Second stage:

3) Run a switching regression model
DJ = f(white, age, educ, dj84, NLY) + u

$H1^1$ = f(w1, NLY, LambdaUC, occupation dummies) + ε_1

$H1^0$ = f(w1, w2, NLY, LambdaUC, occupation dummies) + ε_0

H1= $H1^1$ if DJ=1; H1= $H1^0$ if DJ=0

Corr[u, ε_1] = ρ_1

Corr[u, ε_0] = ρ_0

Figure 3. 1 Outline of the estimation of H1 for the lineal supply model

Table 3.2 shows the results for the selection equation specified as a probit equation, which takes the value 1 for unconstrained workers.

Table 3. 2 - Probit equation: UC =1

VARIABLE	COEFFICIENT	p-VALUE
constant	-0.9618	*0.0000*
white	0.2109	*0.0007*
unempl	-0.0008	*0.0000*
age	0.0185	*0.0000*

[17] This could have happened either because the constraint does not exist or because it exists but it is not binding.

Table 3.2 – continued

educ	0.0877	*0.0000*
union	-0.0987	*0.1260*
c84	-0.8548	*0.0000*
h2-84	0.0005	*0.0024*
obs	2530	

White workers have a lower probability of being constrained, and losing some hours of employment in the previous year increases the chances of facing an hours constraint. A higher level of education decreases the probability of being constrained. The probability of being constrained decreases also with age. Working on an occupation covered by union contract increases the probability of being constrained, but this coefficient is significant only at a critical value of 12.6 percent. Constraints are not easy to eliminate since most people constrained in 1984 are also constrained in 1985. Finally, people with more hours worked on the second job have a higher probability of being unconstrained, thus confirming what is already found in the literature.

From this probit equation we calculated the Inverse Mill's Ratio (LambdaUC) and we proceed to estimate the labor supply for the main job only for unconstrained workers. Among the 1814 unconstrained workers, almost 15 percent held two jobs. To estimate labor supply to job 1, we run a switching regime regression where the specification of the hours supply changes according to whether the worker holds one job or two. In the switching equation (Table 3.3), only the variable that identifies whether or not the individual held two jobs in 1984 (DJ-84) is statistically significant. As expected, this variable is positive, indicating that the decision to hold two jobs under the job portfolio model extends beyond the one-year period.

Table 3. 3 - Switching equation: dual job holder =1

VARIABLE	COEFFICIENT	p-VALUE
constant	-2.2008	*0.0000*
white	-0.0246	*0.8055*
age	0.0068	*0.2068*
educ	0.0227	*0.2347*
dj84	1.8008	*0.0000*
NLY	3.8E-06	*0.5102*
obs	1814	

The labor supply for workers with only one job (Table 3.4) has the usual backward bending shape. In accord with what was predicted by the theory, higher levels of non-labor income reduce the amount of hours supplied.

Table 3. 4 - Labor Supply for single job holders

VARIABLE	COEFFICIENT	p-VALUE
constant	2317.71	*0.0000*
w1	-6.29	*0.0002*
NLY	-0.0048	*0.0026*
lambdaUC	-314.02	*0.0000*
adm	244.21	*0.0000*
sales	81.89	*0.2991*
cler	-105.92	*0.1589*
craft	60.00	*0.1098*
oper	-41.81	*0.4444*
tran	63.53	*0.3100*
labor	-32.93	*0.6501*
farm	-25.80	*0.7082*
serv	-132.53	*0.0138*
σ	452.8431	*0.0000*
ρ_1	0.1657	*0.1529*
obs	1549	

When we look at hours supplied on job 1 for a dual jobholder (Table 3.5) we find that the coefficients on both own wage and non-labor income are statistically insignificant. Furthermore, the coefficient on the wage on the second job is positive and statistically significant, while theory predicts a negative sign.

Table 3. 5 - Labor supply to main job for dual jobholders

VARIABLE	COEFFICIENT	p-VALUE
constant	1903.76	*0.0000*
w1	4.29	*0.3306*
w2	6.04	*0.0031*
NLY	0.0007	*0.8724*
lambdaUC	-407.03	*0.0489*
adm	196.41	*0.0324*
sales	217.09	*0.2810*
cler	126.83	*0.4767*
craft	229.78	*0.0489*
oper	8.97	*0.9627*
tran	61.60	*0.7639*
labor	36.83	*0.8779*
farm	208.65	*0.3885*
serv	187.68	*0.2118*
σ	482.5520	*0.0000*
ρ_0	-0.0185	*0.8895*
obs	265	

Finally, the additional variable "lambdaUC" is significant in both regimes, confirming that the selection is a real concern in this setting. Since the coefficients on this variable are negative in either case, we conclude that unconstrained workers supply fewer hours to job 1. As expected this coefficient is bigger, in absolute value, for dual jobholders since they allocates some of their work time to job 2.

The estimation of the hours supplied on the second job proceeds in the following way: first estimate a selection equation as a probit that takes the value 1 for dual jobholders. From these results retrieve the Inverse Mill's Ratio (LambdaDJ), and then exclude those who do not hold two jobs. For the dual jobholders a switching regime regression is estimated, where regime 1 corresponds to the hours supplied to job 2 under the job portfolio model, and regime 2 corresponds to the hours supplied to job 2 under the hours constraint model. Figure 3.2 outlines the steps involved with the estimation of this model.

First stage:

1) Estimate the dual jobholding equation using Probit:
   DJ = f(white, age, educ, dj84, NLY) + e

2) Calculate the Inverse Mill's Ration: LambdaDJ

Second stage:

3) Run a switching regression model
   UC = f(white, unempl, age, educ, union, c84, h2-84) + u

   $H2^1$ = f(w1, w2, NLY, LambdaDJ, occupation dummies) + ε_1

   $H2^0$ = f(w1, w2, H1, NLY, LambdaDJ, occupation dummies) + ε_0

   H2= $H2^1$ if UC=1; H2= $H2^0$ if UC=0

   Corr[u, ε_1] = ρ_1

   Corr[u, ε_0] = ρ_0

Figure 3. 2 Outline of the estimation of H2 for the lineal supply model

In the selection equation (Table 3.6) the lag variable DJ-84 is still significant and of the same magnitude as in Table 3.3. In addition, education is significant and positive.

Table 3. 6 - Probit equation: DJ =1

VARIABLE	COEFFICIENT	p-VALUE
constant	-2.1088	*0.0000*
white	0.0641	*0.4217*
age	-0.0016	*0.7010*
educ	0.0442	*0.0022*
dj84	1.7039	*0.0000*
NLY	3.6E-05	*0.4528*
obs	2528	

From the 2528 complete observations in the sample, 337 are related to dual jobholders, with 262 cases following under the job portfolio model and only 75 under the hours constraint model. The switching equation in Table 3.7 reports many similarities with Table 3.2 In fact except for the constant term, the variable "white" and the variable "union", the results are mostly unchanged.

Table 3. 7 - Switching equation: unconstrained =1

VARIABLE	COEFFICIENT	p-VALUE
constant	-0.7557	*0.2653*
white	0.0872	*0.7028*
unemp	-0.0010	*0.1182*
age	0.0205	*0.0603*
educ	0.0722	*0.0994*
union	0.0494	*0.8308*
c84	-0.9561	*0.0000*
h2-84	0.0005	*0.0837*
obs	337	

Table 3.8 shows the results of the labor supply on the second job under the job portfolio model.

Table 3. 8 - Labor supply to job 2 for unconstrained dual jobholders

VARIABLE	COEFFICIENT	p-VALUE
constant	533.51	*0.0000*
w1	-1.92	*0.7504*
w2	-5.77	*0.0108*
NLY	0.0029	*0.4617*
lambdaDJ	-147.70	*0.0052*
adm	164.48	*0.0527*
cler	-35.44	*0.8422*
sales	132.99	*0.2182*
craft	136.69	*0.1032*
farm	245.04	*0.1092*
army	-21.85	*0.9395*
oper	197.76	*0.2735*
labor	-17.37	*0.8954*
serv	251.92	*0.0011*
σ	365.7156	*0.0000*
ρ_1	0.0996	*0.7744*
obs	262	

This labor supply curve is backward bending, but it does not exhibit any cross wage effect. Also, non-labor income does not have a significant coefficient.

Possibly because of the small number of observations, it was not possible to obtain very precise estimates of labor supply equation for the second job for constrained workers (see Table 3.9). Except for the constant term and the additional variable introduced to correct for the selectivity, lambdaDJ, nothing else is significant.

Table 3. 9 – Hours supplied on job 2 for constrained workers

VARIABLE	COEFFICIENT	p-VALUE
Constant	686.56	*0.0197*
w1	14.15	*0.3731*
w2	-15.97	*0.1600*
H1	0.12	*0.3860*

Table 3.9 - continued

NLY	0.0087	*0.6235*
LambdaDJ	-214.74	*0.0725*
Adm	-195.97	*0.3843*
Sales	123.02	*0.6667*
Craft	-150.79	*0.2566*
Army	-150.99	*0.7098*
Oper	46.94	*0.7506*
Labor	-273.68	*0.2004*
Serv	-28.68	*0.9135*
σ	378.5545	*0.0000*
ρ_0	0.2944	*0.5102*
obs	75	

After this first set of regressions, labor supply for dual jobholders is estimated using the Stone-Geary utility function. The main advantage of using this approach is that it allows for the derivation of a functional form. A theoretical limitation of the Stone Geary model is that there are no means to include those variables that have been proven to have an effect on labor supply, but that do not enter in the functional form. The first set of results indicate the presence of sample selections in this setting. Therefore, two correction terms are included in the regressions: one to accommodate the selection for being a dual jobholder (LambdaDJ), and the second for facing an hour constraint on the main job (LambdaUC). For the estimation of the job portfolio model a Non Linear Seemingly Unrelated procedure is used. In fact, since both jobs are held by the same individual, we might expect a correlation between the error terms of the two hours equations. For the estimation of the hours constraint model a Non Linear Least Squares procedure is used.

The α's estimated in the job portfolio model (Table 3.10) are negative and statistically significant, which is inconsistent with the theory. Positive and statistically significant are, instead, the γ's.

Table 3. 10 - Stone Geary estimation for unconstrained dual jobholder

VARIABLE	COEFFICIENT	p-VALUE
α_1	-0.0802	0.0000
α_2	-0.0148	0.0000
γ_1	1959.55	0.0000
γ_2	472.00	0.0000
γ_3	6486.86	0.0000
$LambdaDJ_1$	-10.2733	0.0000
$LambdaDJ_2$	-171.4068	0.0000
$LambdaUC_1$	-331.314	0.0000
$LambdaUC_2$	196.1633	0.0000
obs	264	

LambdaUC1 and LambdaDJ1 are the correction terms in the hours supply equation for job 1 and LambdaUC2 and LambdaDJ2 are the correction terms in the hours supply equation for job 2. The upper bound for hours worked on job 1 is 1960 and 472 for job 2. The minimum sustainable income is about \$6500. While values are reasonable, they would still leave the utility function undefined for a large fraction of individuals. In fact, 60 percent of all individual in the sample worked more than 1960 hours on job 1, while 30 percent worked more than 472 hours on job 2. To address this issue, the upper bounds on the hours worked on job 1 and job 2 are set equal to the highest values recorded in the sample. Hence $\gamma 1$ is set at 4704 and $\gamma 2$ is set at 2100. For the same reason $\gamma 3$ is restricted to equal the lowest reported income in the sample, i.e. \$3730. Table 3.11 reports the results of the estimation using these constraints. As shown in Table 3.11 the α's are now positive.

Table 3. 11 - Restricted Non Linear SUR for Job Portfolio model

Variable	Coefficient	p-value
$\alpha 1$	0.1359	0.0000
$\alpha 2$	0.0375	0.0000
$\gamma 1$	4704	-
$\gamma 2$	2100	-
$\gamma 3$	3730	-
$LambdaDJ_1$	-733.7181	0.0000
$LambdaDJ_2$	-767.7571	0.0000
$LambdaUC_1$	-1631.9079	0.0000
$LambdaUC_2$	-1024.1900	0.0000

Since $\alpha 1$ is greater than $\alpha 2$ one can conclude that increasing leisure time by working less on job 1 has a bigger increase in the utility than by working less on job 2.

The Non Linear Least Squares estimation for the hours constraint model is not very precise (see Table 3.12). The fact that only 79 observations are available for this model could explain the poor performance of the estimation.

Table 3. 12 - Non Linear Least Squeres for Hours Constraint Model

VARIABLE	COEFFICIENT	p-VALUE
$\alpha 1$	-0.2763	1.0000
$\alpha 2$	-0.0289	1.0000
$\gamma 2$	325.16	0.0933
$\gamma 3$	-26205.09	0.4426
$LambdaDJ_2$	-96.9109	0.1954
$LambdaUC_2$	-4.9691	0.9652
obs	79	

Likewise for the job portfolio model, a restricted regression is run for the hours constraint model using the same constraints as in Table 3.11. However, even after imposing these restrictions, the estimation still yields insignificant α's. Finally one more restriction is imposed on the estimation. If one believes that there is a unique utility function that represents the preferences of every individual in the sample, then the values for the α's and γ's should be the same for the job portfolio model and the hours constraint model. Thus, Non Linear Least Squares estimation is performed imposing the same values of the α's to be the same as in Table3.4. Table 3.13 reports the results for this regression.

Table 3. 13 - Restricted Non Linear Least Squares using values from SUR

Variable	Coefficient	p-value
$\alpha 1$	0.1359	-
$\alpha 2$	0.0375	-
$\gamma 1$	4704	-
$\gamma 2$	2100	-
$\gamma 3$	3730	-
$LambdaUC_2$	-96.9109	0.0000
$LambdaDJ_2$	-4.9690	0.0000

The likelihood ratio test under the null hypothesis that the α's in the hours constraint model are the same as in the job portfolio model is 1.1582. Hence, one cannot reject the null hypothesis that they are the same under the conventional critical values. Using the results from Table 3.11 and 3.13 one can compute the own and cross wage effects. Table 3.14 summarizes these results computed at the mean value of w_1, w_2, and I.

Table 3. 14 - Components of the Slutsky decomposition and elasticities

	Job Portfolio Model		Hours Constraint Model
	Job 1	Job 2	Job2
$\partial h_i / \partial w_i$	33.96	8.78	8.12
$\partial h_i / \partial I$	-0.01	-0.002	-0.004
$\partial h_i / \partial w_j$	-24.79	-11.51	-8.71
S_{ii}	77.33	13.40	7.42
S_{ij}	-2.52	-2.52	-
ε	0.24	0.11	0.09

Contrary to the labor supply estimates for worker with only one job (Table 3.4), the uncompensated own wage effect on job is positive, which says that the labor supply for this class of workers is upward sloping. Conway and Kimmel (1998) found similar results, with the difference that they calculated an uncompensated wage elasticity of +1.07 while in the current model it is +0.11. Keeping in mind the limitation of a static model, the compensates wage elasticity for job 1 for dual jobholder is calculated. Its value of +0.24 is in the upper end of the range of estimates found in the literature for the classical labor supply[18]. The results reveal also an upward sloping supply curve for job 2, both for constrained and unconstrained workers. Moreover, both classes of workers have a very similar compensated own wage elasticity (0.11 for job portfolio and 0.09 for hours constraint). The labor supply to the second job appear, hence, less sensitive to changes in the own wage respect to the labor supply to the main job.

3.6 Conclusion

Classical labor supply assumes that individuals face a wage offer and they accordingly decide how many hours to work at that wage rate. However, worker often cannot freely choose the number of hours to supply. If the number of hours that they are allowed to work is less than the optimal hours of work, a situation of underemployment will arise. Under these circumstances a worker might turn to a second job to fill the gap between the desired and the actual hours worked. This study maintains very clearly, however, that not every dual jobholder faces an hours constraint, since some workers prefer to hold

[18] See table 1.19 in Pencavel (1986).

multiple job simply because the two jobs have unique characteristics which make both of them appealing. This situation is termed the "portfolio model". This study improves on the existing literature by explicitly extending the formulation of labor supply such that dual job holding is a possible choice for workers. The conditions for the hours constraint and the job portfolio model are derived from the maximization process of an hypothetical worker with a utility function whose arguments are hours worked in each job. Estimation proceeds to of two different models: a linear supply function and a functional form supply function derived from a Stone Geary. Labor supply to occupation 1 for dual jobholders is found to be more responsive to changes in the own wage than the labor supply to occupation 2.

4. WORK WEEK REGULATION AND MOONLIGHTING IN SELECED OECD COUNTRIES

4.1 Introduction

A century ago, the average work week was significantly longer than it is today[19]. This fact can partly be explained by new equilibria in the labor market brought on by an increase in the general wealth of the workers: assuming that leisure is a normal good, one would expect a decrease in the number of hours supplied in response to an increase in wealth. However, the regulation of working time has undoubtedly contributed to this trend[20]. Regulation of work time can happen either at the government level or through labor contracts between unions and employers, and it aims at imposing a upper limit on the weekly work hours beyond which employers have to pay a premium (overtime premium). The current work week averages around 40 hours among most OECD countries, while the overtime-premium ranges from 25 to 100 percent (see Table 4.1).

Table 4. 1- Working hour regulation in selected countries, 1996.

	Statutory weekly hours	Premium wage for overtime (in excess of normal hours)	Normal weekly hours set by collective agreements
Australia	38-40	50% the first 4 hours, then 100%	35-40
Austria	40	50%	36-40
Belgium	40	50% (100% during the weekend)	38
Canada	40-48	50%	35-40
Czech Rep.	40.5	25%	37
Denmark	37	50 % the first hour, then increasing	37.5-40
Finland	40	50 % for 2 hour, then 100%	39
France	39	25 % for 8 hour, then 50%	35-39

[19] Conternsou and Vranceanu [2000].
[20] See Table 5.13 in *"Employment Outlook, 1998"* for a complete summery of current OECD countries measures designed to regulate working time.

Table 4.1 - Continued

Germany	48	25%	40
Greece	40	25% the first 60 hours per year, then 50%	
Hungary	40	50%	38-40
Ireland	48	25%	36-44
Italy	48	25%	40-44
Japan	40	25%	40
Korea	44	50%	36-40
Luxemburg	40	25% blue collars, 50% white collars	40
Mexico	48	100	
Netherlands	45	Collectively bargained	36-40
New Zealand	40	Collectively bargained	40
Norway	40	40%	37.5
Portugal	40	50 % the first hour, then 75%	35-44
Spain	40	Collectively bargained	38-40
Sweden	40	Collectively bargained	40
Switzerland	45 (50)	25%	40-42
Turkey	45	50%	
UK	none	Collectively bargained	34-40
US	40	50%	35-40

Source: OECD, *Employment Outlook*, 1998

Lately, the issue of working time has received more attention for policy maker, especially in Europe, where the decade-long high level of unemployment has led governments toward "time-sharing policies." Time-sharing policies are aimed at stimulating employment through a reorganization of working time. Usually, employers have the option to allocate their demand for labor between numbers of workers and hours per worker. By imposing stricter legal weekly hours or a higher overtime premium, a time-sharing policy gives the employer the incentive to opt for more workers with fewer hours per capita. Both Germany and France are moving in this direction. On May 1998, the French government enacted a legislation that decreased the statutory work week from 39 to 35 hours as January 1, 2000 (Aubry law). Italy is seriously thinking about adopting a similar policy. Germany experienced the same level of reduction in weekly hours, but through the unions' active negotiation of labor contracts. According to a report of the French Ministry for Employment and Solidarity[21] by March 2000 about 175,000 jobs were created or saved by the Aubry law. Still the effectiveness of these policies has not been proven [see OECD (1999) and Hunt (1999)]. In fact, imposing a shorter work week does not guarantee that the employer would opt for more employees versus more hours per employee. If the fixed costs of hiring a new employee are high enough, a profit maximizing employer would still prefer to pay the overtime premium and reduce his demand for labor. Theory predicts that the lower the fixed costs of a new hire or the higher the overtime premium the more an employer would shift from an intensive to an extensive use of labor.

In order to conduct a complete evaluation of the effectiveness of any time-sharing policy, one should look also at its implication for labor supply. Reducing the legal work week could lead some workers to a situation of underemployment. The evidence emerging from several surveys about a general dissatisfaction of the workers with their actual working hours confirms that at least part of the decrease in the hours supplied derives from some form of regulation rather than from individual rational choice. In 1997 the International Social Security Program conducted a survey about the labor market situation in selected countries. Table 4.2 reports the results from that survey that pertain to the satisfaction with hour of work.

[21] http://www.35h.travail.gouv.fr/actualite/communique/index_communique.htm

Table 4. 2 - Preferred working time and income, 1997.

	more hours more income	same hours same income	less hours less income
Germany	21.89%	69.08%	9.03%
UK	22.81%	70.91%	6.27%
US	30.99%	59.35%	9.66%
Hungary	38.14%	56.72%	5.14%
Italy	33.33%	59.74%	6.93%
Netherlands	19.16%	69.33%	11.51%
Norway	11.62%	73.47%	14.90%
Sweden	17.25%	66.28%	16.47%
Czech Republic	37.62%	56.92%	5.46%
Slovenia	36.09%	60.75%	3.16%
Poland	55.93%	41.58%	2.49%
Bulgaria	67.69%	31.22%	1.09%
Russia	76.49%	22.72%	0.79%
New Zealand	30.42%	62.61%	6.97%
Canada	28.93%	61.37%	9.70%
Philippines	48.54%	44.08%	7.38%
Japan	23.65%	60.27%	16.08%
Spain	29.85%	63.43%	6.72%
France	20.03%	65.06%	14.91%
Portugal	45.09%	50.68%	4.22%
Denmark	10.76%	75.58%	13.66%
Switzerland	13.41%	69.79%	16.80%
AVERAGE	32.71%	58.68%	8.61%

Source: http://www.za.uni-koeln.de/data/en/issp/codebooks/s3090cdb.pdf

As seen in Table 4.2, almost one third of all workers would like to work more hours. A closer look at the European countries reveals more interesting insights. The European Commission periodically runs a labor market survey to address the situation in the member states. As shown in Table 4.3, the '90s experienced a dramatic increase in the percentage of workers that would have liked to work more hours at their present working wage, possibly as a consequence of the tightening of the hours regulation in some countries.

Table 4. 3 - Preferred working time in EU.

	1989	1994
Less	37%	29%
As long	51%	48%
Longer	8%	21%
No reply	4%	2%

Source: European Commission (1995)

Workers with a desire to work more hours than they are allowed have two options to overcome their constraint: either they can seek a second job or their spouse could decide to enter the labor market[22].

This study looks at the relationship between working hours regulation and the decision to hold two jobs. In particular, this study seeks to shed light on the effect of standard hours and overtime regulation on the probability of moonlighting. It is well established in the literature that a higher overtime premium decreases the amount of overtime worked, since it decreases the quantity of overtime demanded. If a higher overtime premium commands a lower level of overtime worked, one would expect higher levels of dual job holding in countries with lower standard hours. However no study presents any empirical evidence of the impact of hours regulation on dual job holding. This has important policy implications, since it could mean that any work-sharing policy is ineffective in raising employment, because it would actually cause more people to be looking for jobs, creating a situation in which workers seeking a second job are competing against the unemployed.

The first study to look at overtime and dual job holding dates back to Perlman (1966). Perlman spells out the theoretical condition for overtime and moonlighting to occur as possible responses to inflexibility in the work schedule. Paxon and Sicherman (1996) found some evidence in the US of dual job holding as a temporary solution to situations of underemployment, while looking for a job with the optimal hours of work. Friesen (2001) explicitly explores the effectiveness of working time regulation in terms of increasing employment in Canada. Standard hours and overtime pay vary across the Canadian provinces, thus creating the necessary conditions for the empirical evaluation of work-sharing policies. Her results do not support the idea that reductions in the work week can be used to promote employment. She finds, also, that moonlighting is higher in regions with stricter limits on weekly hours. Using international data, this study analyzes how moonlighting responds to variations in hours regulation. A bivariate probit model specifies the joint probability of either working overtime or holding a second job.

4.2 Data

This study uses data from the Luxembourg Employment Survey (LES). The LES is a project that aims at harmonizing the labor force surveys of 16 different countries. Here, a sample of 8 OECD countries for which information about the overtime premium was available has been chosen to analyze the effect of hours regulation on the probability of

[22] This option is available, of course, only to married people and it follows from Becker's idea of the time allocation inside the household. As a matter of fact, Krishnan (1990) has found evidence that the decision of the wife to enter the labor market is a substitute for the decision of the husband to get a second job.

holding two jobs for men[23]. Table 4.4 reports the list of the countries in this study, their original dataset and the reference year for the data available.

Table 4. 4 - Countries, years and survey data.

COUNTRY	YEAR	SURVEY NAME
Canada	1997	Labour Force Survey
Finland	1990	Tyoevoiman vuosihaastattelu sysky
France	1997	Enquête sur l'emploi
Luxembourg	1992	Enquête annuelle sur les forces de travail
Spain	1993	Encuesta de poblacion activa
Sweden	1990	Svenska arbetskraftsunders-ökningen (AKU)
Switzerland	1997	Enquête suisse sur la population active (ESPA)/ Schweizerische Arbeitskräfteerhebung (SAKE)
United Kingdom	1997	National labour force survey (NLF)[24]

In each survey, the respondents answered questions related to their employment condition during the reference week. Table 4.5 reports some descriptive statistics about the labor market characteristics in each country in this study.

Table 4. 5 - Summery statistics

COUNTRY	Number of Observation	Percentage moonlighting	Percentage overtime (p_{ov})	Average Overtime Hours (H_{ov})	$p_{ov}*H_{ov}$
United Kingdom	11670	3.41	63.32	10.35	6.55
Finland	11851	8.31	46.32	6.57	3.04
France	31588	2.67	9.04	7.89	0.71
Luxembourg	4287	0.91	7.58	9.08	0.69
Spain	38640	2.11	0.68	11.63	0.08
Sweden	23527	8.33	33.59	9.29	3.12
Switzerland	5178	4.44	40.87	8.19	3.35
Canada	30397	5.05	19.63	10.14	1.99

[23] The United States are excluded from the analysis because at the time of this study the data for this country has not been completely recorded jet by LES.

[24] Material from NLF is Crown Copyright; has been made available by the Office for National Statistics through the ESRC Data Archive; and has been used by permission. Neither the Office for National

The rate of moonlighting varies substantially across the 8 countries, from a low of about 1 percent for Luxembourg to a high of more than 8 percent for Finland and Sweden. Even more dramatic is the variability of the share of workers reporting some overtime during the reference week; Spain has the lowest rate (less than 0.7 percent) and UK the highest use of overtime (more than 60%). On average, workers that reported some overtime worked only 6.5 extra hours in Finland, but more than 10 hours in the UK and Canada. The last column of Table 4.5 reports the increase in the average work week due to overtime. In UK the average work week increases by more than 6 hours because of overtime. In Spain, instead, the impact on overtime on the average working week is negligible.

On average, people working on only one job work just above 40 hours per week (see Table 4.6). Except for Luxembourg[25], moonlighters work fewer hours on the main job. This may be due to either a constraint on the hours they can work on the main occupation or to a desire to shift some working time from the main to the secondary job. One has to bear in mind that individuals do not moonlight only to respond to an hours constraint. Even in a world without any hours constraint, one would still observe some individuals holding two jobs, simply because the second job has some non-pecuniary characteristics that are not available on the other job.

Statistics nor the ESRC Data Archive bear any responsibility for the analysis or the interpretation of the data reported here."

[25] Possibly the unusual results for Luxembourg are driven by the small numbers of moonlighters present in this dataset (only 39 observations).

Table 4. 6 - Average hours worked

COUNTRY	*hours on job 1 (non dual jobholders)*	*hours on job 1 (dual jobholders)*	*total hours for dual jobholders*	*Hours on job 2*
United Kingdom	43.95	41.30	53.35	12.05
Finland	41.63	38.62	53.37	14.75
France	41.35	38.08	51.62	13.54
Luxembourg	41.79	44.08	60.77	16.69
Spain	40.92	37.01	53.39	16.38
Sweden	41.17	38.92	51.07	12.15
Switzerland	43.00	36.57	48.6	12.03
Canada	41.00	37.26	52.09	14.83

On average, moonlighters work between 12 and 16 hours on the second job. Thus, even if they work less hours on the main job, they still work more hours per week than people working on just one job.

Table 4.7 breaks down the pool of moonlighters according to the occupation on their main job. Here the International Standard Classification of Occupations 1988 (ISCO-88) provided by the International Labour Organization has been used to define the different classes of occupations[26].

Table 4. 7- Moonlighting and Occupation on the First Job

	SWITZERLAND	FINLAND	FRANCE	LUXEMBOURG	SPAIN	SWEDEN
Officer	0.9%	0.6%	0.7%	0.0%	0.2%	3.6%
Manager	0.0%	8.6%	9.2%	17.9%	10.9%	7.1%
Professional	11.3%	7.1%	11.0%	5.1%	11.1%	5.5%
Teaching	4.5%	6.4%	10.0%	7.7%	5.2%	6.4%
Other Prof.	6.3%	4.3%	5.8%	2.5%	4.2%	5.5%
Technicians	19.4%	12.8%	15.6%	7.7%	6.0%	11.7%
Clerks	9.0%	5.0%	4.9%	17.9%	8.5%	6.9%

[26] UK and Canada used a country specific code for the occupation classification, thus they are not included in the table.

Table 4.7 - Continued

Service	6.8%	4.3%	2.4%	5.1%	6.7%	10.3%
Agriculture	10.4%	11.9%	14.4%	0.0%	14.4%	3.0%
Craftsmen	30.6%	21.1%	10.9%	12.8%	11.8%	23.2%
Operators	0.5%	10.2%	10.1%	12.8%	8.2%	8.4%
Laborers	0.5%	6.9%	4.2%	10.3%	12.3%	7.5%
observations	222	985	1144	39	1009	1965

On average across all countries, almost 1 dual jobholder out of 5 is a craftsman on his first job, thus making this occupation the main supplier of moonlighters. Interestingly, craftsmen appear to be the occupation with the heaviest use of overtime too (see Table 4.8), thus suggesting that the hours constraint is a serious concern for these workers.

Table 4. 8 - Percentage of workers using overtime by Occupation

	SWITZERLAND	FINLAND	FRANCE	LUXEMBOURG	SPAIN	SWEDEN
Officer	14.43%	0.52%	0.14%	0.02%	0.12%	3.60%
Manager	-	10.28%	6.77%	10.36%	8.17%	5.63%
Professional	7.39%	5.06%	5.55%	4.96%	2.91%	4.23%
Teaching	1.55%	2.77%	2.62%	3.39%	2.56%	3.75%
Other Prof.	3.40%	2.84%	2.11%	2.44%	1.60%	3.40%
Technicians	14.24%	13.64%	15.51%	8.69%	5.79%	13.28%
Clerks	11.50%	5.18%	6.55%	16.19%	8.53%	5.54%
Service	6.01%	4.81%	5.52%	5.33%	9.50%	11.55%
Agriculture	6.80%	8.65%	5.21%	2.21%	10.60%	2.36%
Craftsmen	43.80%	24.70%	25.05%	27.35%	25.03%	29.08%
Operators	2.95%	13.56%	17.37%	11.61%	13.68%	8.84%
Laborers	0.88%	7.24%	6.13%	7.27%	10.96%	7.72%
observations	4642	10978	29434	4015	36932	17539

Individuals working in a public establishment tend to have a higher participation rate in the secondary job market (Table 4.9). However, when we split people working in the private sector between employees and self-employed, we do not find a significant difference between the moonlighting rate for people in the public sector and self employed.

Table 4. 9 - Moonlighting and sector of the establishment on the main job

COUNTRY	PUBLIC	PRIVATE	SELF EMPLYED
United Kingdom	5.80%	3.46%	4.96%
Finland	11.98%	7.44%	8.92%
France	3.98%	2.70%	5.62%
Spain	3.51%	1.86%	3.06%
Sweden	15.14%	9.15%	11.83%
Canada	5.96%	4.89%	6.23%

Unfortunately we cannot have a comprehensive picture of the occupations on the second job, since only five countries reported this information, three of which use the standard ISCO-88 classification. Table 4.10 reports the composition of the occupations on the second job for the set of countries that use the ISCO-88 classification.

Table 4. 10 - Occupation on the second job

	SWITZERLAND	SWEDEN	SPAIN
Officer	8.55%	8.14%	13.45%
Manager	-	20.00%	10.76%
Professional	7.26%	4.02%	10.39%
Teaching	16.67%	5.29%	6.11%
Other Prof.	9.83%	8.65%	5.50%
Technicians	17.52%	5.14%	7.46%
Clerks	2.99%	6.36%	3.18%

Table 4.10 - Continued

Service	7.26%	15.27%	7.95%
Agriculture	8.55%	4.33%	33.13%
Craftsmen	6.84%	6.92%	3.91%
Operators	3.42%	5.70%	4.40%
Laborers	11.11%	9.06%	5.87%

No common trend can be extrapolated for these three countries. In Switzerland individuals end up moonlighting mainly as teachers or technicians. In Sweden they moonlight primarily in the service occupation, while in Spain an overwhelming portion of the dual jobholders (33.13%) moonlights in agriculture[27].

4.3 Results

An underemployed worker may either work overtime or seek a second job. These decisions are modeled as a bivariate probit, where one equation defines the probability of working overtime and the other defines the probability of holding two jobs. The set of variables appearing in the two probit equations are identical. Two variables are included in the model to capture the features of the country's work week regulations: the usual number of hours worked on the main job (H1), and the overtime premium (OP).

When the overtime premium is not regulated by law, but is left to collective contract agreements, the average overtime premium paid in that country[28] is used. Using one overtime premium rate for every worker in a given country is not the ideal way of

[27] Less overwhelming, but still relevant is the proportion of people moonlighting in agriculture for France : 15.53%

analyzing the impact of the overtime regulation on the decision to hold two jobs. In fact even in countries with a statutory overtime premium, parties can bargain for a higher premium. Moreover, unpaid overtime is not an unheard of phenomenon, especially for professional, managerial and self-employed workers who lack entitlements to overtime payments. Finally, collective contracts sometimes allow the employer to compensate overtime with paid vacations rather with an increase in the hourly wage. Thus, by using only one premium rate some information is lost. Unfortunately, this is the best one can do since information about the overtime premium is not available in the LES project. A total of four overtime regimes are identified: 25, 50, 88, and 100% more than the regular pay. Normally the effect of the overtime premium would be captured by means of dummy variables. However some of these dummies would be perfectly collinear with other variables, i.e. the year variables. For this reason a variable that takes one of the four values is been created.

The overtime premium can affect the probability of working overtime in two different directions. On the one hand, an increase in the premium should increase the probability of accepting overtime, but it also decreases the number of hours for overtime a firm will demand. Since it has been consistently found in the literature that higher levels of overtime premium command less overtime worked, we expect moonlighting is expected to increase with an increase in the overtime premium. Similarly, one should expect a negative correlation between H1 and moonlighting, i.e. shorter working week should increase the probability that workers are underemployed and need to integrate

[28] The average paid overtime premium is 25% in UK, 50% in Spain, and 88% in Sweden. Source:

their hours supplied on the main job with a second job to fulfill their target hours per week.

Previous studies[29] have found evidence that a large number of dual jobholders work on two jobs for reasons different than the hours constraint. For these people the decision to hold two jobs should be unaffected by the weekly hours regulation. Unfortunately the LES does not collect information about the motivation for holding two jobs. However, to correctly estimate the impact of the hours regulation on moonlighting one has to control for these different motivations that may induce dual job holding. Thus, the analysis proceeds at the following way. First, estimation pertains only to employees only, since self-employed can freely decide how many hours to work[30], hence making the hours constraint an unreasonable assumption for this class of workers. Furthermore, the overtime premium has no meaning for self-employed, since they are not remunerated according to a predetermined hourly wage. Hence, any overtime-premium regulation should leave the decision to moonlight unchanged for these individuals[31].

It can also be assumed that people with higher levels of education most likely will work in occupations not heavily controlled by union contracts and hence have more flexible hours. Adding a variable to measure the education level attained by the individual can control for this factor. Since each of the 8 countries in the study adopted a different education system, it was decided to simply create a dummy variable that takes

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www.itcilo.it/english/actrav/telearn/global/ilo/seura/eugap.htm.

[29] See Averett (2001) and Kimmel and Conway (2001).

[30] An exception to this rule is the regulation in some European countries on the time that shops can be open for business.

[31] A separate bivariate probit model is estimated for self employed workers. As expected the coefficient on OP is insignificant for this class of workers. See Appendix B.

the value of 1 if the individual has a certificate classifiable as "ISCED (International Standard Classification of Education) Level 3" or lower (NOCOLLEGE). Therefore, workers that earned a higher degree of ISCED level 3 are the reference group. ISCED Level 3 is equivalent to a High School Diploma and it corresponds to either 12 or 13 years of schooling, according to the country's education system. Moreover, the dummy variable "WHITE" identifies if the main occupation of the worker can be considered as white collar, because it can be assumed that white collar workers are less likely to face an hours constraint on their occupation.

Table 4.11 shows the results of the probit estimation. Pooling the 8 surveys together yields a total sample size of 96,505 observations; 4.29 percent of the individuals in the sample reported two jobs in the reference week, while 20.6 percent reported some overtime.

Table 4. 11- Results for the Bivariate Probit Regression*

VARIABLE	MOONLIGHTING	OVERTIME
Constant	-3.3918	-28.7422
	(0.000)	*(0.000)*
H1	-0.0256	-0.0045
	(0.000)	*(0.000)*
OP	0.0048	-0.0030
	(0.000)	*(0.000)*
NOCOLLEGE	-0.1414	-0.1793
	(0.000)	*(0.000)*
WHITE	0.1325	0. 2005
	(0.000)	*(0.000)*
YEAR	0.0315	0.3297
	(0.000)	*(0.000)*
UNEMPL	-0.7525	-3.6440
	(0.000)	*(0.000)*
AGE 30-34	0.0277	0.0322
	(0.311)	*(0.071)*
AGE 35-39	0.0648	0.0298
	(0.017)	*(0.098)*
AGE 40-44	0.1057	0.0002
	(0.000)	*(0.993)*
AGE 45-49	0.0746	-0.0603
	(0.009)	*(0.002)*
AGE 50-54	0.0540	-0.0688
	(0.080)	*(0.001)*
AGE 55-59	-0.0088	-0.1779
	(0.802)	*(0.000)*
MARRIED	0.0735	0.0178
	(0.000)	*(0.138)*
Rho	-0.0347	
	(0.0015)	

**P-value are reported in parenthesis*

The probability of holding two jobs increases with age but not in a linear fashion, peaking between the age of 40 and 44 and declining afterward, until there is no systematic difference with respect to the reference group (age 25-29). Overtime is more frequent for people between the age 30-34. Since the surveys used in this study refer to different years, a time trend variable (YEAR) is included to capture possible international economic conditions that affected the moonlighting market. The trend variable indicates an increase in the rate of moonlighting during the 90's. At the same time it is desirable to control for possible national macroeconomic conditions that may have influenced the local labor market. A possible solution to this problem would have been a regression that can condition out the country fixed effect. However, this procedure cannot be implemented in the probit regression[32]. Furthermore, even if a different procedure had been used to allow for the fixed effect, since some overtime premia are country specific, this variable should have been excluded from the estimation. Conversely, the intent of this paper is the estimation of the effect of the overtime premium on the decision to hold two jobs. Hence it was decided to use a different approach, by introducing a variable that would vary across the countries, but would be constant for a country and could catch any macroeconomic factor specific to a country. The national rate of unemployment is a natural choice for this variable (UNEMPL). This variable is constructed as to be the ratio between the current unemployment rate and the long run unemployment rate, in order to capture deviations of the economic situation from the long run equilibrium. The average

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[32] The fixed effect can be run only with the logit.

over the 1990-1997 period is used as a proxy for the long run unemployment rate. The coefficient on this variable is negative and strongly significant.

Finally, the two hours regulation variables have the predicted sign. Lower standard hours increase the probability of overtime or moonlighting. In particular, the model predicts that decreasing weekly hours from 39 to 35, as proposed by the French government, would increase the conditional probability of moonlighting by 1 percentage point[33]. Even if the model presented in this study is a static model, it is possible to make same comparison with the statistics released by the French government. Since the French working population stood at 26 million in 2000[34], the model would predict that because of the Aubry Law the labor supply of moonlighters would have increased by 260,000 individuals. The official statistics of French government claim that the Aubry law created 175,000 new jobs in that year. These two numbers cannot directly compared because the jobs created were full-time while, on average, a dual jobholder works only 15 hours on the second job. Moreover as of March 8, 2000 only 42 percent of the employees were covered by contracts with the new statutory hours, so a complete picture of the total effect of the Aubry law is lacking. On the other hand, one should also point out that the statistics released by the French government are inflated since they do not take into account the positive effect on employment due to an overall improvement in the French

[33] This result has been obtained by calculating the probability of observing a worker holding two job conditional on the probability of no overtime. This conditional probability is evaluated at the mean values of the dependent variables, excepted for UNEMPL for which we used 9.8% (i.e. the unemployment rate in France in 2000) is used, the overtime premium of 25%, and YEAR=2000. The difference between the estimated probability at H1=39 and the estimated probability at H1=35 is then calculated.

[34] http://www.france.diplomatie.fr/france/gb/geo/popu04.html

economy in that year. In conclusion, one can assert that the impact of the Aubry law was less effective than anticipated and publicized.

We also found that the overtime premium has a very influential effect on the decision to moonlight and on the probability of working overtime. As shown in Table 1.12, the estimated conditional probability of holding two jobs (evaluated at the means of the independent variables) more than doubles when the overtime premium increases from 25 to 100 percent. Hence, in light of these results one can conclude that an increase in the overtime premium decreases the amount of overtime being worked, thus inducing more people to seek for a second job.

Table 4. 12 - Impact of Overtime Premium on Dual Job Holding

Overtime premium	Estimated Conditional Probability
25	0.0267
50	0.0350
88	0.0514
100	0.0578

4.4 Conclusion

Concerned with the still high unemployment rates in most European countries, some governments have moved toward work sharing policies. Those policies aim at stimulating employment by shifting the demand for labor from an intensive to an extensive use of workers. By decreasing the working week, employers face an incentive to hire more workers, if the cost of a new hire is still lower than the cost of paying overtime. However, a reduction of the work week together with the lack of possible overtime may lead the individual to a situation of underemployment. In order to fill the gap between the desired and the actual hours worked, an individual may decide to hold a second job. In this study it is found that the degree of moonlighting is affected by the extent of the hours regulation. In particular it is shown that much of the alleged creation of new jobs in France from a stricter hours regulation is offset by an increase in the supply of moonlighters. This paper highlights that in order to make a correct assessment of a specific labor policy, both the effect on the demand and the supply side have to be addressed.

5. FINAL REMARKS

This dissertation examines some of the economic implications surrounding the decision of holding two jobs. In particular, I wanted to shed light on three specific aspects. First, we looked at the market return of moonlighting. I estimated the wage equation on both jobs, including two separate variables that capture the standard market experience and the market experience as dual jobholder. One would expected to found positive cross occupation spillover, but my results have to reject this hypothesis. However, when restricting the estimation to only workers with more than 12 year of education, the results indicate an initial negative impact associated with the activity of moonlighting, which becomes positive after 4 years of dual jobholding. I argue that this behavior is due to a the fact that holding two job decrease the rate of human capital accumulation on the first job because for work time has to be diverted from the main activity to the second job. However, after a certain amount of experience has been accumulated on the second job, one observe positive spillover between the two jobs.

The second study presented in this dissertation regards the estimation of the labor supply for dual jobholders. I run two set of regressions: one using a linear labor supply function and the other using a functional form derived from the Stone Geary utility function. I specify the labor supply for workers moonlighting because they face an hour constraint on the first job and for workers holding two jobs because they prefer to allocate their working time between two occupations (job portfolio model). I show that the numbers of hours supplied on the main job is an exogenous variable in the hours constraint model but endogenous in the job portfolio model. Hence this variable will appear in one regression equation, but not in the other. I found that the labor supply to job 1 is more responsive to wage changes than the labor supply to job 2.

The last study included in this dissertation investigates the relationship between hours regulation and moonlighting. Hours regulations play an important role in time-sharing policies. Time-sharing policies are aimed at boosting employment by reducing the working time per individual. But, if the hours regulation decreases the working week or make overtime more difficult, some workers would feel underemployed. An underemployed worker will seek a second job, hence one would expect to see more moonlighting as a response to stricter hours regulations. Using an international dataset for our estimation, one is able to obtain some variation in the degree of regulation, needed to measure the effects of regulation on moonlighting. The results suggest that moonlighting offsets most of the jobs created by time-sharing policies. Hence I conclude that time-sharing policies are not very effective in enhancing the level of employment.

APPENDIX A: OUTPUT FOR ALTERNATIVE DEFINITION OF MAIN JOB

Main job = job with higher wage

Fixed Effects

	LogWage1		*LogWage2*	
	Coefficient	t-values	Coefficient	t-values
ExpMain	0.0699	3.224	-0.0018	-0.5531
ExpMain^2	-0.0038	-4.328	-7.0E-09	-0.0020
ExpXtra	-0.2093	-0.665	0.0124	0.3032
ExpXtra^2	0.0007	0.169	-0.0065	-0.6301
1991	-0.0236	-1.189	0.0911	1.1397
1992	-0.0146	-0.436	0.1740	1.2671
1993	0.0138	0.300	0.3629	2.1487
ω	-		-0.0001	-1.7471
nobs	4410		161	

Random Effects

	LogWage1		*LogWage2*	
	Coefficient	t-values	Coefficient	t-values
Constant	0.3449	4.926	0.9406	3.167
ExpMain	0.0613	5.739	0.0128	0.328
ExpMain^2	-0.0007	-0.935	-0.0007	-0.249
ExpXtra	-0.0127	-0.842	0.0225	0.363
ExpXtra^2	0.0011	0.407	0.0038	0.366
1991	-0.0389	-1.886	-0.0518	-0.691
1992	-0.0709	-3.291	-0.0622	-0.794
1993	-0.0824	-3.542	0.0355	0.369
EDUC	0.0954	25.708	0.0341	1.981
North-East	0.1510	6.572	0.2010	1.787
Central	0.0261	1.373	-0.0917	-1.050
West	0.0515	2.442	0.1456	1.452
City	0.1092	5.820	0.1200	1.466
ω	-		0.0002	5.917
$\overline{\omega}$	-		0.0002	2.106
nobs	3397		451	

Main job = job with higher earning

Fixed Effects

	LogWage1		*LogWage2*	
	Coefficient	t-values	Coefficient	t-values
ExpMain	0.0864	3.727	0.0053	0.898
$ExpMain^2$	-0.0035	-3.976	-6.0E-06	-1.145
ExpXtra	0.0407	1.157	-0.0680	-0.799
$ExpXtra^2$	-0.0009	-0.189	0.0037	0.227
1991	-0.0287	-1.357	-0.1138	-0.561
1992	0.0466	-1.264	-0.4037	-1.143
1993	0.0480	-0.912	-0.1400	-0.288
ω	-		-0.0004	-2.196
nobs	4067		161	

Random Effects

	LogWage1		*LogWage2*	
	Coefficient	t-values	Coefficient	t-values
Constant	0.2983	2.876	0.8287	2.8794
ExpMain	0.0844	7.458	-0.0004	-0.0076
$ExpMain^2$	-0.0023	-3.046	0.0009	0.2559
ExpXtra	-0.0116	-0.544	0.0006	0.0096
$ExpXtra^2$	0.0015	0.386	0.0025	0.2569
1991	-0.0411	-2.932	-0.0200	-0.2920
1992	-0.0753	-4.469	-0.0721	-0.9908
1993	-0.0813	-3.907	0.0344	0.3730
EDUC	0.0950	16.000	0.0604	3.9227
North-East	0.1325	4.597	0.2035	1.9348
Central	0.0250	0.829	-0.1042	-1.2788
West	0.0460	1.41	0.1350	1.3171
City	0.0677	2.669	0.1316	1.7129
ω	-		-5.30E-05	-0.6576
$\overline{\omega}$	-		0.0003	1.4000
nobs	3165		451	

APPENDIX B: BIVARIATE PROBIT FOR SELF EMPLOYED

VARIABLE	MOONLIGHTING	OVERTIME
Constant	-4.9200	-26.0028
	(0.000)	(0.000)
H1	-0.0156	-0.0040
	(0.000)	(0.000)
OP	0.0005	0.0086
	(0.651)	(0.000)
NOCOLLEGE	-0.0791	-0.0881
	(0.022)	(0.002)
WHITE	0.0450	0.1080
	(0.158)	(0.000)
YEAR	0.0494	0.2794
	(0.000)	(0.000)
UNEMPL	-0.8441	-2.2776
	(0.000)	(0.000)
AGE 30-34	0.1723	0.1238
	(0.011)	(0.037)
AGE 35-39	0.1299	0.1267
	(0.051)	(0.027)
AGE 40-44	0.1077	0.0318
	(0.103)	(0.578)
AGE 45-49	0.1050	-0.0560
	(0.116)	(0.340)
AGE 50-54	0.0369	-0.0848
	(0.595)	(0.161)
AGE 55-59	0.0549	-0.1310
	(0.444)	(0. 042)
MARRIED	0.0817	-0.0299
	(0.037)	(0.373)

*P-value are reported in parenthesis

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