Determinants of Moonlighting Rate in Iranian Labour Market

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[First Draft]

Abstract

This paper examines the main determinants of moonlighting rate in Iranian labour market using data from statistical surveys conducted by Statistics Centre of Iran. We found that (1) moonlighting rate increases with age, years of experience, university education degree, marital status, living in rural areas, and family size, (2) hours worked on main job negatively affect the probability of moonlighting, which supports the hypothesis that a constraint on hours worked on the first job can be considered as one of the main motives to get a second job, and (3) the coefficients for hourly wage and non-labour income show that higher wage rate and extra non-labour income tend to decrease the probability of multiple job holding; the results are consistent with theoretical implications and the findings of other empirical studies and indicate that leisure is a normal good for the individuals.

JEL classification: J2; J6
Keywords: Moonlighting, Multiple job holding, Iran's Labour Supply,

1. Introduction

One of the fundamental changes that have occurred in Iranian labour market is concerned with moonlighting rates. In November 1994, 0.624 million wage and salary workers held two jobs (i.e., 4.5 percent moonlighting rate) where as in 2002 the figure increased to 1.477 million (i.e., 8.9 percent moonlighting rate).[2] As can be seen, dual-job holding is an important factor in the working lives of many Iranians. Understanding who moonlights and why is particularly important for policy makers especially in a situation where unemployment rate is relatively high.

Economists typically explain moonlighting as a response to an employer who does not, for some reason, offer enough hours to the employee on the primary job. Therefore, individuals take a second job in addition to their primary job. This explanation is considered as hours constraints model of moonlighting.[3]

More recent research has recognized that moonlighting may occur even among those individuals who do not face a constraint on the number of hours that they

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[2] Two other surveys, that is Iran Newspaper (1996) and Gal-e-dari (1996), found higher multiple job holding rates.

[3] Among others, the following studies examine hours constraints model of moonlighting:

Averett, S. L. (2001), Burks, R. (1997), Kimmel, J. and L. Powell, M. (1999), Kimmel, J. and K. S. Conway (1995), Krishnan, P. (1990), Paxson, C. H. and N. Sicherman (1994), Renna, F. (2002), Shishki, R. and B. Rostker (1976), and Stinson, J. F. (1990).

can work at their main job. Therefore, an alternative motivation for moonlighting may be that having two jobs enables individuals to engage in activities of particular interest for them. For example, a university professor may wish to use his/her expertise to perform consulting work, or a comedian may have a 'day' job and perform comedy on knights and weekends. For women, moonlighting may be a way to maintain a flexible work schedule. Therefore, the alternative motivation to take a second job refers to heterogeneous jobs and different non-pecuniary benefits attributable to the second job.[4]

Despite the fundamental changes in moonlighting rates that occurred in the 1990s in Iranian labour market, little is known about the composition and the different factors that affect and motivate individuals to hold more than one job or how these factors may vary across gender and regions in the labour market. There is no study that investigates the determinants of moonlighting rates in Iran.[5] This study aims to contribute to the understanding of moonlighting behaviour in Iranian labour market by focusing on the motives behind and gender differences in this behaviour. To understand who moonlights a logistic model of the decision to take more than one job is specified and estimated. The main focus of the study is "head" of households and data drawn from two separate surveys (i.e., the 2000 survey of Employment and Unemployment Characteristics of Household and the 2001 survey of Social and Economic Characteristics of Household) conducted by Statistics Center of Iran,[6] are used for the purpose of empirical estimates. Since 1994 the Statistics Centre of Iran has conducted annual survey of Employment and Unemployment Characteristics of Family through which data on the characteristics of a random sample of 100000 families have been collected. In the survey, the sampled families are randomly and systematically drawn through which families are grouped within clusters, clusters within regional areas (i.e., rural and urban) and regional areas within provinces. It is expected that the probability of being a multiple job holder varies across clusters, geographical areas and provinces. To deal with the variation and to incorporate the

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[4] See, for example, Conway, K. S. and J. Kimmel (1998) and Ligja, R., (1991).

[5] Naderi (2000) highlights the importance of multiple job holding as a main issue for the case Iran's labour market that might significantly affect unemployment rate. The findings of Naderi's (2002) study show that there is a strong correlation between multiple job holding and unemployment rate for the case Iran (using data on 1995-2002 period).

[6] Since 1994 the Statistics Centre of Iran has conducted annual survey of Employment and Unemployment Characteristics of Household through which data on the characteristics of a random sample of 100000 families have been collected. Data drawn from the survey 2000 will be used as the first data set for the purpose of empirical estimates of this study. See also 10.

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heterogeneities across the groups into the models, multilevel modeling technique is used.[7]

2. Theoretical Framework

The so-called moonlighting, i.e. the supply of labour in more than one job is an issue that for long has not been on the top of labour economists' agendas. Recently, however, there has been an increasing literature on multiple jobholding. Initially, the primary explanation for second jobholding was the notion of a fixed amount of hours an individual is allowed to work on his main or first job. This situation might then be a labour supply constraint if this number of hours worked is below the one that the individual would like to work. The number of hours worked, however, can be adjusted by offering labour in a second job. Although the 'hours-constraints' explanation still holds, recent research has explored another motive for moonlighting. Multiple jobholding might occur, if jobs are not perfect substitutes, hence called the 'heterogeneous-jobs' motive. Typical examples here are the university professor who uses his expertise in consulting or the musician who cannot make a living on his performances and hence holds a regular job to keep up to his expenses.

We assume that a person's labor supply decisions on the first and second job result from utility-maximizing behavior. However, to allow for the possibility that labor supplied to different jobs may not be equivalent, hours of work on the first job, h_1, hours of work on the second job, h_2, and hours of leisure, L, enter the utility function separately. Total utility may mathematically be written as

$$Max\ u(c,\ h_1,\ h_2,\ l) \tag{1}$$
$$s.t.\ h_1+h_2=24-l\ ,\ \ PX=Y=C=W_1h_1+W_2h_2+A$$

where *c* denotes consumption. If working on either job provides no (dis)utility beyond that caused by foregoing leisure then (1) simplifies to the standard leisure/consumption utility function. The utility function written in (1) is maximized subject to both a budget and a time constraint, or

$$PX=Y=W_1h_1+W_2h_2+A \qquad and \qquad h_1+h_2=24-l$$

Substituting these constraints into the utility function for *C* and *L* yields the utility-maximizing problem,

$$Max\ u(W_1h_1+W_2h_2+A,\ h_1,\ h_2,\ 24-h_1-h_2) \tag{2}$$

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[7] For more detailed discussion on multilevel modeling, see: Naderi & Mace (2003) and Goldstein (1995).

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We can use the utility-maximizing problem written in (2) to describe both types of moonlighting behavior. In the following sections the theoretical underpinnings of these two motives of moonlighting are presented.

2.1. Hours constraints explanation of moonlighting

The standard theoretical framework that is usually employed in the analysis of moonlighting is based on the assumption of an hours constrained worker. The seminal contribution here is the work of Shishko and Rostker (1976). Extending the standard labour supply model, they argue that a worker who cannot spend as much time in his main job as he wants to in order to achieve the utility maximizing hours of work, might supply labour in a second job.

The decision of a constrained moonlighter can easily be illustrated with adoptions of the standard labour-leisure diagram. Consider Figure 1, where A is non-labour income, w_1 and w_2 are the wages paid in first and second job respectively, T denotes total time available, H_1 is the fixed hours of work in the first job, and h_2 is the time spent in a second job. The individual is assumed to maximise his utility that is determined by consumption and leisure. He would like to work **QT** hours on his first job in order to reach utility level **U^1**, but cannot work more than **h_1** hours. The decision to supply labour in a second job then depends on the wage offered in the second job. The second-job reservation wage is determined by the utility level (**$U^{1'}$**) given at the intersection of the first-job wage line and the allowable hours **h_1**. If the wage offered exceeds the reservation wage, the constrained worker will take a second job that makes him better off (i.e., **U^1** utility curve).

Figure 1: Utility maximizing hours-constrained double job-holder

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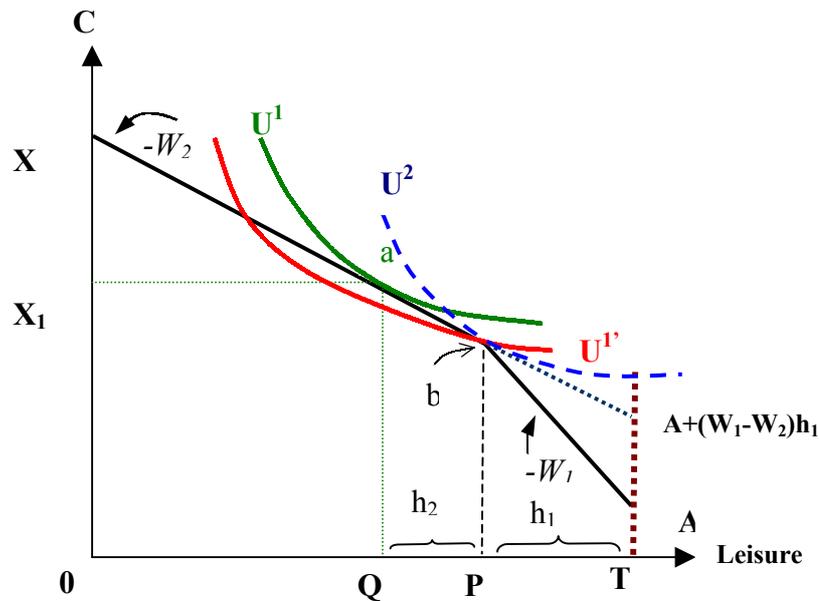
If the worker is constrained on the primary job, then h_1 is no longer a choice variable (i.e., $h_1 = \overline{h}_1$) and the only avenue for working more hours is to take a second job.[8] In other words, here the worker cannot work any more than h_1 hours on the primary job, and the decision to take a second job depends on whether the wage paid on the second job exceeds its marginal disutility, given that h_1 hours have already been committed to the first job.

Shishko and Rostker (1976) rigorously derive the testable implications for the resulting moonlighting equation and so we will not repeat them here. Substituting the constraint $h_1 = \overline{h}_1$ into the problem written in (2) yields

$$Max \ u(W_1\overline{h}_1 + W_2h_2 + A, \ \overline{h}_1, \ h_2, \ 24 - \overline{h}_1 - h_2) \tag{3}$$

and results in the optimizing relationship,

$$(U_2 - U_l)/U_c = -w_2 \tag{4}$$

where U_2 denotes the partial derivative of utility with respect to h_2. Recognizing $(U_2 - U_l)$ as the marginal disutility from an hour of work on the second job (any (dis)utility from working minus the utility lost from the foregone leisure) reveals that equation (4) is the familiar condition between the reservation wage and the market wage.

Solving for hours supplied on the second job leads to the moonlighting equation,

$$h_2 = h_2^c(w_2, \ A + (w_1 - w_2)\overline{H}_1, \ \overline{H}_1) \tag{5}$$

where $A + (w_1 - w_2)\overline{H}_1$ can be seen from Figure 1 to be the "linearized" intercept of the new segment of the budget line, akin to the concept of virtual income in the income tax literature (e.g. Killingsworth 1983). The superscript c identifies this function as the moonlighting function of workers who are constrained on their primary jobs.

Economic theory suggests that if leisure is a normal good then $\partial h_2^c / \partial V < 0$, where V is the virtual income measure, $\partial h_2^c / \partial \overline{H}_1 < 0$, and that $\partial h_2^c / \partial w_2$ has the usual ambiguous sign.

Shishko and Rostker (1976), O'Connell (1979) and Krishnan (1990) estimate Tobit (or probit) moonlighting functions similar to that written in (5) using data on all workers and including hours worked on the primary job as a regressor. Hours on the primary job is a valid regressor only if it is truly fixed and

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[8] This situation is considered by Shishko and Rostker (1976), O'Connell (1979), Krishnan (1990), Daxson & Sicherman (1994), and Averett (2001).

exogenous for all observations, which suggests that all workers are constrained on their primary jobs. This is quite a heroic assumption and one that Shishko and Rostker (1976) acknowledge (see: Shishko and Rostker, 1976: 304; footnote 14). There is no reason to believe that all non-moonlighters are constrained on their primary jobs, and even moonlighters may not necessarily be constrained. To assume that hours supplied to the primary jobs exogenous is to question the importance of much labor supply research. In the following section a more theoretically consistent model is presented.

2.2. Non hours-constrained model of moonlighting

The decision of a non-constrained moonlighter can be depicted for the case of a higher paying second job, like, for example, the professor who is engaged in consulting. Figure 2 shows this situation. The individual that is non-constrained in his main job can work any amount of hours (h_1) that fall in the given standard working time span **PT**. Work in a second job might nevertheless be supplied, if the wage paid at least upholds the individual's utility level (**U$^{1'}$**). This wage, however, has to be higher than the one paid in the first job.

Assuming that hours of work on the second job (h_2) is a choice variable, it can   be argued that the individual facing this situation would aim at working more hours in his moonlighting job. However, due to the possible heterogeneous character of the two jobs, there quite likely are other reasons that drive the individual to supply labour in both occupations.

Figure 2: Utility maximizing non hours-constrained double job-holder
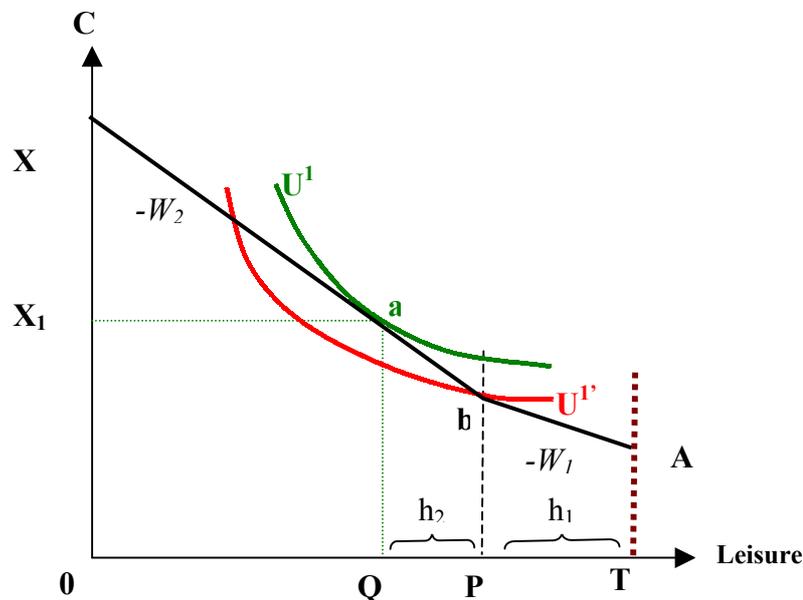
In other words, if the first and second jobs have different non-pecuniary benefits or costs, we may observe moonlighting among workers who are not

constrained on their primary jobs. Rather, utility-maximizing behavior leads them to supply their labour to two different jobs. The consumer's problem written in (2) once again yields the optimizing conditions,

$$(U_i - U_l)/U_c = -w_i , \quad for \ i=1, \ 2 \tag{6}$$

(6) suggests that the individual will supply hours on job i until the marginal disutility of working another hour divided by the marginal utility of income is just equal to the negative wage paid on the job. Clearly, rational behavior will lead to moonlighting only if there are non-pecuniary benefits or costs to working on job i, represented by U above. For instance, if the two jobs are identical and i impose no additional costs or benefits beyond the utility lost to the foregone leisure, (6) simplifies to

$$-U_l/U_c = -w_i , \quad for \ i=1, \ 2 \tag{7}$$

and the worker should supply all of his or her labour to the job paying the highest hourly wage.

If jobs are indeed heterogeneous, then we observe two labor supply equations of the form

$$h_i = h_i^u(w_1, \ w_2, \ A) , \quad for \ i=1, \ 2 \tag{8}$$

where h_i^u denotes an unconstrained labor supply (and moonlighting, for $i = 2$) function. Comparative statics for such a model, given standard assumptions about the utility function, suggest that $\partial h_i / \partial w_j < 0$ for $i \neq j$, with the usual ambiguous sign when $i = j$. Assuming that leisure is a normal good suggests $\partial h_i / \partial A < 0$. The reader may recognize this problem as being similar to the one facing the individual who can supply labour to either household or market production activities; therefore, the same theoretical results apply (see: Gronau, 1973).

Permitting two alternative motives suggests that there are two different moonlighting functions, one for those workers who moonlight in response to a labor supply constraint on the primary job written in (5) and another for those who moonlight because the two jobs have differences that go beyond the monetary wage paid written in (8). As mentioned earlier, Lilja 1991 is the first to explore explicitly both motives for moonlighting and to implement the resulting different functions, correcting for the simultaneity bias resulting when one includes hours worked on the primary job as a determinant of h^c.Conway & Kimmel (1998) build on Lilja's work by constructing a more consistent theoretical model and by modeling explicitly the behavior on the first job. They examine moonlighting behavior recognizing that workers may moonlight because of constraints on their primary jobs or because the two jobs are heterogeneous. Specifically, they devise a theoretical model that permits these different reasons for moonlighting and considers moonlighting in tandem with labour supply behavior on the primary job. For the case of Iranian labour market, however, there is no study that examines

moonlighting behavior. In the following section, we present a descriptive view on data used and provide a discussion on empirical estimates of the determinants of moonlighting rate.

3. Empirical Analysis

3.1. Data

The main focus of the study is to examine the determinants of moonlighting rate among "head" of households employed. For empirical estimates two sets of cross-section data are used: the first set is derived from Annual Survey of Employment and Unemployment Characteristics of Household (i.e., cross-section 2000)[9] and the other from Family Panel Survey (i.e., cross-section 2001)[10] conducted by the Statistics Centre of Iran. Variables means and standard deviations are presented in Table 1.[11] As can be seen, multiple job holders are more experienced and older than single job holders. (Figure 3 also shows this important point.) Multiple job holders spend fewer hours on their main job than the single job holders. These figures show that hours constraint can be an important reason to get a second job. Data also indicate that moonlighting rate is higher among rural workers than that of urban employees. Figures on the marital status of the employees show that the rate of moonlighting is slightly higher among the married workers.

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[9] See footnote 6.

[10] Since 1982 the Statistics Centre of Iran has conducted a longitudinal survey through which data

on the characteristics of 6000 sampled families (including population characteristics, age, educational background, employment situation, annual labour and non-labour income, living expenditures, number of jobs, hours of work, years of experience, etc.). The main advantage of the data set compared to the other data set is to access data on wage and income of the employees. Using information derived from the data set, we are able to evaluate the effects of wage on time allocation behaviour of the employees. Nevertheless, separate questions are not included into the questionnaire to collect data on wage rates of primary and secondary jobs.

[11] Moonlighting rates based on data derived from the data sets are different. The reason for these

differences is that the first data set sample derived from the population of all provinces where as the sample of the second data set belongs to the population of only one province. Variation of moonlighting rate among 28 provinces is one of the main issues to address in this regard. In addition, the population of the sets are not the same and therefore this can partially explain the difference.

Table 1: Variables means and standard deviations

Set 1(2000, all provinces)[1]

(i) Continues Variables	Single Job Holders		Multiple Job Holders		Full Sample	
	Means	**SD's**	**Means**	**SD's**	**Means**	**SD's**
Experience Years (first job)	15	12.8	21.1	14.9	15.7	13
Age	41.5	12.9	45.3	13.5	41.9	12.9
Hours Worked (1st Job)	51.5	16.9	44.9	17.7	50.7	16.9
Hours Worked (2nd Job)			28.8	15		
Household size	4.76	2.01	5.46	2.21	4.84	2.03

(ii) Discrete Variables	**Counts**	**%**	**Counts**	**%**	**Counts**	**%**
Number of Observations	**73646**	88.7	**9361**	11.3	**83007**	100
Urban Resident	45943	62.4	2339	25.0	48282	58.2
Married	70918	96.3	9118	97.4	80036	96.4
Gender_Male	72587	98.6	9281	99.1	81868	98.6
Higher Education Degree	6839	9.3	620	6.6	7459	9.0

Set 2 (2001, only one province) [2]

(i) Continuous Variable	Single Job Holders		Multiple Job Holders		Full Sample	
	Means	**SD's**	**Means**	**SD's**	**Means**	**SD's**
Age	42	11.4	41.4	8.73	41.9	11.3
Hours Worked (1st Job)	9.53	2.53	7.52	2.1	9.43	2.51
Hours Worked (2nd Job)			4.06	2.11		
Annual non-Labour Income	1.5E+06	5.2E+06	9.7E+05	3.3E+06	1.5E+06	5.2E+06
Annual Labour Income	1.9E+07	1.9E+07	2.8E+07	1.4E+07	2.0E+07	1.9E+07
Hourly Wage	7790	11000	9250	5530	7860	10800
Household size	4.13	1.52	4.27	1.36	4.13	1.51
Days Worked (during a week)	6.04	0.949	5.69	1.11	6.03	0.957

(ii) Discrete Variables	**Counts**	**%**	**Counts**	**%**	**Counts**	**%**
Number of Observations	**957**	95.2	**48**	4.8	**1005**	100
Urban Resident	812	95.6	37	4.4	849	100
Married	914	95.2	46	4.8	960	100
Gender_Male	941	95.3	46	4.7	987	100
Higher Education Degree	159	92.4	13	7.6	172	100

Note: [a] Hours worked during a week.
[b] Hours worked during a day.
[c] In Iranian Rials.
Source: [1] Statistics Centre of Iran (1380).
[2] Statistics Centre of Iran (1381).

Our second data set includes information on wages and income of employees (i.e., labour and non-labour income) that help to evaluate the effects of

wage rates on time allocation behaviour.[12] As the figures show, during 2001 hourly wage for the single job holders was 7790 rials[13] where as the figure for the moonlighters was 9250 rials.

[Figure 3 here]

3.2.   Empirical Estimates

The results of estimates of determinants of moonlighting rate are presented in Table   2. As can seen, the probability of being a moonlighter based on model 1 estimates increases with age but at a decreasing rate. Years of experience at the main job also affect moonlighting rate positively. In other words, moonlighting rate among older and more experienced   workers is higher than that of younger ones. Hours worked in the main job negatively affect moonlighting rate. That is, spending   more   time   on   the   first   job decreases the probability of being a moonlighter, which provides evidence on the fact that one of the main reason to get a second job has been hours constraints on the first job.

Based on the coefficients of gender, marital status, size of family and education variables, married male workers with more children and those who have higher educational qualifications are more likely to be a multiple job holder. However, the coefficient for geographical area shows that moonlighting rate is higher among the workers living in rural areas.

As   mentioned   earlier[14], the first data set does not include appropriate information on wage and income of employees and therefore we were not able to examine the effect of time allocation between work and leisure. To deal with this important issue, we used another data set (i.e., data set 2), which includes labour and non-labour income. Model 2 of Table 2 was estimated based on information derived from this data set. The main findings derived from the model provide the same pattern as that of Model 1. That is, the probability of moonlighting increases with age but at a decreasing rate. Higher education degree, marital status, living in rural areas, and family size tend to affect moonlighting rate positively, although in

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[12] As mentioned in footnote 10, data collected through the survey do not include information on wages paid on the first and the second job separately. Since the multiple job holding became an important phenomenon in Iranian labour market, it is recommended that the appropriate questions to be included into the questionnaire.

[13] Iranian Rials.

[14] See also footnote 11.

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some cases the statistical significance of the coefficients is not as strong as that in Model 1.

Table 2: Determinantes of Moonlighting Rates[1]

PARAMETER	Model 1[2]		Model 2[2]	
	ESTIMATE	S. ERROR	ESTIMATE	S. ERROR
Constant	-3.286	0.2203	-4.996	2.928
Hourly Earnings			-1.28E-05	1.72E-05
Non-Labour Income			-4.64E-08	4.46E-08
Age	0.04862	0.00655	0.2684	0.1364
Age Squared	-0.00052	6.73E-05	-0.00319	0.001551
Hours Worked (1st job)	-0.01659	0.000716	-0.3457	0.06958
Experience Years (1st job)	0.01561	0.00128		
Married_D[3]	0.1214	0.0833	0.7161	0.9241
Household Size	0.08774	0.006423	0.01397	0.1234
Urban_D[3]	-1.469	0.02823	-0.7031	0.4764
Gender_male_D[3]	0.6746	0.142	-0.5913	1.012
Higher Education_D[3]	0.3005	0.0481	0.697	0.3904

Note: [1] The figures presented in this table are the coefficients of logistic models. That is the logarithm of the odds ratio (i.e., the ratio of the probability of being a multiple job holder to the probability of not being a multiple job holder),

$$\textit{(i)} \ \log(\frac{\mathrm{Pr}\,ob(event)}{\mathrm{Pr}\,ob(no\ event)}) = X\beta \quad \text{or} \ \textit{(ii)} \ \frac{\mathrm{Pr}\,ob(event)}{\mathrm{Pr}\,ob(no\ event)} = e^{X\beta}$$

The logistic coefficients can be interpreted as the change in the log odds associated with one unit change in the independent variable. To evaluate the effects of the variables used on the probability of moonlighting one should use

$$\mathrm{Pr}\,ob(event) = e^{X\beta}/(1+e^{X\beta}) = [1+\exp(-X\beta)]^{-1}$$

[2] To estimating Model 1 we used information derived from data set 1 and for model 2 from data set 2. Number of observations are 83007 for data set 1 and 1005 for data set 2.

[3] "D" stands for Discrete Variable takes one when the employee is married, an urban resident, and a male worker and has a higher education qualification. Therefore, the control group comprises the female employees with not having higher education qualification, living in rural areas, and those who were not married.

The coefficient for hourly wage shows that employees with higher wage rate tend to allocate their working time in their main job. Non-labour income also decreases the probability of multiple job holding, which indicates that the employees with higher non-labour income tend less likely to be a moonlighter. The results are consistent with theoretical implications and the findings of other

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empirical studies (e.g., Shisko & Rostker, 1976; Krishnan, 1990; and Conway & Kimmel, 1998)[15] and indicate that leisure is a normal good for the individuals.

4. Concluding Remarks

In this paper, we examine the main determinants of moonlighting rate in Iranian labour market using data from two surveys (i.e., Employment and Unemployment Characteristics of Household and Social and Economic Characteristics of Household conducted by Statistics Centre of Iran). We found that moonlighting rate increases with age and experience indicating that the probability of being a multiple job holder is higher among the older and more experienced workers. Our empirical findings also show that higher education degree, marital status, living in rural areas, and family size tend to affect moonlighting rate positively. In Contrast, hours worked on the main job as one of the main determinants of multiple job holding negatively affect the probability of moonlighting, which supports the hypothesis that a constraint on hours worked on the first job can be considered as one the main motives to get a second job.

The estimates of the coefficients for hourly wage and non-labour income show that higher wage rate and extra non-labour income decrease the probability of multiple job holding. The results, especially those of non-labour income, are consistent with theoretical implications and the findings of other empirical studies and indicate that leisure is a normal goods for the individuals.

Because of data limitation, we were not able to examine job-heterogeneity motive of moonlighting and to evaluate the effects of wage rates paid on the first and second job separately on time allocation behaviour of the employees. As mentioned earlier, multiple job holding became a dominating phenomenon in Iran's labour market. Careful examination of moonlighting behaviour and motives requires more detailed data. To collect the appropriate data the questionnaires used in the surveys need to be revised.

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[15] The significance of the coefficients is not very high and one reason for this can be the smallness of the sample size. After accessing the full sample of data on 28 provinces, we will able to check this point.

Figure 3: Moonlighting rates by age groups (%)
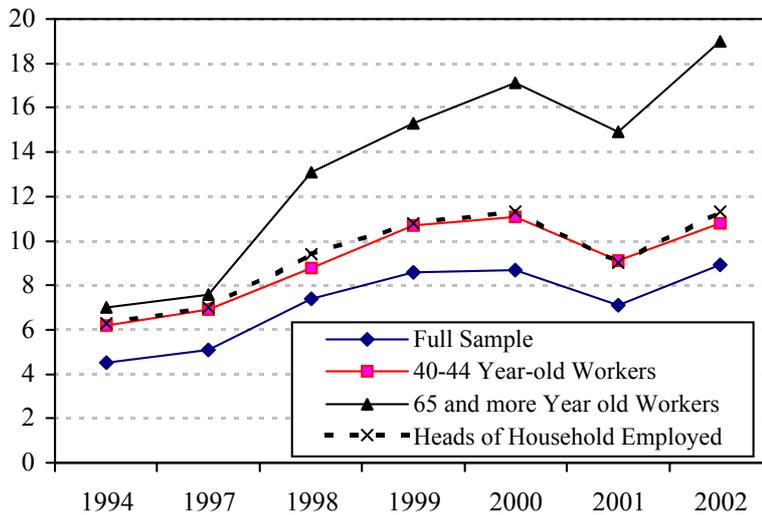
Source: Statistics Center of Iran (1994-2002).

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