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Second job-holding in an emerging economy: the role of household shocks*

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Abstract

Moonlighting is a strategy adopted by workers to generate sufficient income to cover their needs. Studies have been conducted mainly in advanced economies, although this is a feature of emerging economies. This paper, first, proposes a formal model of second job choice, which extends the theoretical literature on multiple jobs by endogenously modelling second job choice in the context of search models. Second, this paper assesses the role of income and working hours in the main job, but unlike previous literature, the effects of household shocks on the second job choice are assessed. The results show that household shocks are important in the second job choice, the history of household shocks matters, the household shock impact is greater in workers that have an informal main job, there is no difference in the household shock impact by gender, and household demand shock seems to be more important than household supply shock.

JEL Classification: C23, J64, O54.

Keywords: Second job; household shock; Peru.

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1 Introduction

Workers use various strategies to generate sufficient income to cover their needs. The use of multiple jobs or moonlighting is a strategy that has been widely documented in various advanced economies. International evidence suggests that moonlighting has a low incidence; in the U.S., approximately 5% of workers have more than one job; while in the European Union (EU), according to the EU Labor Force Survey, 4% of workers held two jobs in 2018 with high variability across countries, where moonlighting account for 1.5% or less of employment in Bulgaria, Croatia, Hungary, Italy, Romania and Slovakia; while this indicator exceeds 5% of workers in Denmark, Estonia, Finland, the Netherlands and Sweden ([Eurofound, 2020](#)). In Mexico, 6.3% of workers are moonlighting, according to the National Institute of Statistics. despite this scant evidence, moonlighting occurs more frequently in emerging economies ([Foley, 1997](#)); however, theoretical and empirical efforts emphasizing its importance have been mainly in advanced economies.

From a theoretical perspective, several models seek to rationalize the choice of multiple jobs. The seminal work of [Shishko \(1976\)](#) states that the decision to have a second job arises from the hourly restriction of the main job in a static model. Subsequently, [Renna and Oaxaca \(2006\)](#) put forward a formal model based on portfolio theory, suggesting that the choice of a secondary job is also explained by the worker's choice to allocate her available time among various jobs; similarly, [Conway and Kimmel \(1998\)](#) argue that workers may moonlight due to main job hours constraints or because jobs are heterogeneous. On the other hand, [Lalé \(2022\)](#) proposes that the choice of a second job in a search model context, where an exogenous shock to the number of hours worked in the primary job is the main variable guiding the choice of a secondary job. For a review of theory and evidence, see [Conway and Kimmel \(1992\)](#).

Further developments explain moonlighting by hours restriction (or also income constraints) or by the so-called multiple-job portfolio theory ([Hirsch et al., 2016](#)). The former is more frequent probably among formal workers with a full-time contract. On the other hand, portfolio theory considers moonlighting as a choice made by workers for jobs according to the availability of their time and preferences. A first proposal suggests that moonlighting allows exercising a preference for a diversity of tasks ([Renna and Oaxaca, 2006](#)). A second reason may be the insurance motive provided by having multiple jobs, where the portfolio of jobs protects workers against income uncertainty or volatility in the main job. An additional reason for having multiple jobs is the possibility of job mobility; that is, the second job can be seen as a position in which more experience and training are gained, which facilitates labor transitions to better jobs ([Panos et al., 2014](#)).

On the empirical front, [Renna \(2006\)](#) finds that decreasing the standard hours of

work increases the probability of moonlighting. Regarding the heterogeneity of workers, [Foley \(1997\)](#) shows that women are not only less likely to hold additional jobs in Russia but that those who do so receive significantly lower second-job wages, and also shows that marriage and young children are associated with lower rates of multiple jobs for women; likewise, [Allen \(1998\)](#) obtained similar results; conversely, [Averett \(2001\)](#) finds that moonlighting is similar among men and women in the USA. In other respects, [Wu et al. \(2009\)](#) examine which characteristics of the main job and which personal or family characteristics increase the probability of holding a second job in the United Kingdom; and [Livanos and Zangelidis \(2012\)](#) examine its determinants in Greece. For its part, [Hirsch et al. \(2016\)](#) investigated the determinants and geographic patterns of multiple jobs and found substantial heterogeneity across regions, states, and metropolitan areas in the USA.

Regarding the cyclical nature of multiple jobs, the literature is inconclusive. [Amuedo-Dorantes and Kimmel \(2009\)](#) show that the cyclical nature of multiple jobs in the USA varies by gender, being highly acyclical among men; whereas for women, moonlighting changed from countercyclical in the 1980s and early 1990s to procyclical between 2000 and 2002. In the same manner, [Hirsch et al. \(2016\)](#) find that USA moonlighting was strongly acyclical between 1998 and 2013, and suggests that the forces generating business cycles offset each other in their effects on multiple jobs. Likewise, [Partridge \(2002\)](#) shows that dual jobs are procyclical in the short run for the USA, while, in the UK, [Panos et al. \(2014\)](#) show that they are countercyclical; however, in the long run, second jobs are acyclical in both studies. In addition, [Livanos and Zangelidis \(2012\)](#) show that multiple jobs in Greece are procyclical. In this connection, economic factors may play a role (see [Conen and Stein, 2021](#)).

Against this backdrop, the study of second job choice in emerging economies is relevant because the institutional aspects differ from advanced economies; for instance, the importance of informality and micro shocks faced by households are prominent in emerging economies. Of particular relevant interest, we studied the case of Peru, where approximately 18.8% of workers have two jobs, which far exceeds international evidence, and has a high labor informality of around 75% according to different indicators (see [Céspedes-Reynaga and Ramírez-Rondán, 2021](#)). The large database of second jobs allows us to make an accurate characterization of moonlighting according to various categories, and at the same time estimate the models with high levels of confidence. In addition, a representative panel sample of the Peruvian labor market between 2007 and 2021 is used, which allows for adequate control of moonlighting based on the prior characteristics of both the household and the workers.

The paper has several contributions; on the theoretical side, we propose a formal model of second job choice, which extends the theoretical literature on multiple jobs by endogenously modeling second job choice in the context of a search model, where the model incorporates hour restrictions and heterogeneity in the supply of the second job, whereby workers choose the first and second jobs extensively (having jobs) and also intensively (hours worked). From the empirical side, similar to the previous literature, we assess the role of income and working hours in the main job, but unlike it, we assess the effects of an aggregate household shock composed of six categories: loss of employment of a household member; bankruptcy of the family business; natural disasters; serious illness or accident of a household member; abandonment of the head of household; and the criminal act of a household member. This shock is also evaluated by differentiating by geographical area, main formal-informal job, and gender. In addition, we evaluate the effects of the history of shocks and the effect of supply and demand household shocks on moonlighting.

The remainder of this paper is organized as follows. In Section 2, we propose a theoretical model in the context of search models. In Section 3, we discuss the dataset and methodology we use in this study. In Section 4, we assess the empirical results of the impact of household shocks on a second job choice according to geographical areas, history of shocks, informality in the main job, gender, and supply and demand shocks. Finally, in Section 5, we conclude with a summary of our findings.

2 A theoretical model of second job choice

The decision to take a second job is framed in the context of job search models. The worker can be in three possible states: unemployed, employed with one job, and employed with two jobs. In general terms, the main decision that the worker makes is whether to have one or two jobs, with the second job being an offer that occurs while she is working in her main occupation (sequentially). In this sense, the decision to have a second job is conditional on having an active job. This decision is based on the supply of the second job, the type of supply measured by a productivity shock of the second job, and on the household's level of savings that defines its level of wealth.

In the proposed model, all variables with apostrophes symbolize variables in the next period, where the decision variables according to the state are: hours in the first job (L_1), hours in the second job (L_2), consumption (c), and wealth (a). Thus, the following recursive representation of the model illustrates the decisions that the individual makes in the context of the problem.

Unemployment. Workers are characterized by their level of wealth a . The present value of their unemployment status is denoted by U . If the person is unemployed, the worker has income associated with household production or with unemployment insurance, which is denoted by b . The decision in this state concerns consumption c and saving a , and whether to accept the offer of a job (main job) next period. The labor supply of the first (main) job, w_1 , is characterized by its level of productivity, which comes from a known distribution $w_1 \sim F_1(w_1)$ and could be called the hourly wage of the main job. Job search effort, while the worker is unemployed, is captured by the probability λ_0 of receiving an offer. If the offer is not received, the worker remains unemployed.

Thus, the individual maximizes the objective function given by

$$U = u(c) + \beta\{\lambda_0 U' + (1 - \lambda_0)E \max[U', V_1(w'_1)]\} \quad (1)$$

subject to

$$c + a' = (1 + r)a + b, \quad (2)$$

where β is the discount factor, $u()$ is the utility function, r the market interest rate and $V_1(w'_1)$ is the value function of labor supply (main job) in the next period.

Employed with one job. In this case, the worker receives his labor income corresponding to the first job and decides on consumption c , working hours L_1 , and savings a' . In addition, she decides whether she will have two jobs in the next period or not conditional on whether she keeps her first job. Otherwise, in the next period, she will be unemployed because the job is destroyed according to the separation rate s_1 . The supply of the second job w_2 comes up at an average rate $\lambda = \lambda(a)$, which depends negatively on the worker's wealth $\lambda'(a) < 0$. This supply comes from a known distribution $w_2 \sim F_2(w_2)$. Note that this parameter captures the search effort of the second job. In this formulation, the productivity of the first job follows an autoregressive process of order 1. In addition, it is considered that there is a threshold on the total hours available to the worker, which is standardized to 1 ($L_1 + L_2 \leq 1$), and a threshold referring to the hours that the worker allocates to the first job from which the second job can be activated ($L_1 < \bar{L}$). That is, the worker decides to allocate L_2 hours to the second job if she works a few hours in the first job ($L_1 < \bar{L}$); otherwise, she does not work in the second job. Note that w_1 and w_2 are independent.

Thus, the individual maximizes the following objective function

$$V_1(w_1) = u(c, L_1) + \beta\{s_1 U + (1 - s_1)[\lambda E \max[V_1(w'_1), V_2(w'_1, w'_2)] + (1 - \lambda)V_1(w'_1)]\} \quad (3)$$

subject to

$$\begin{aligned} c + a' &= (1 + r)a + w_1 L_1 \\ L_1 &\leq 1 \\ w_1 &\sim AR(1), \end{aligned} \quad (4)$$

where $V_2(w'_1, w'_2)$ is the value function of labor supply in the first job and labor supply in the second job in the next period; and $AR(1)$ is an autoregressive process of order 1.

Employed with two jobs. A worker in this situation receives income from both jobs and decides on the consumption, savings, and working hours that she will allocate to each job. This decision is conditional on the restrictions on the number of hours she can allocate to each job, as mentioned above. In this state, it is also considered that separation from each job can occur. However, this separation is considered to occur only in the second job; that is, the worker with two jobs can lose in any period the second job at an exogenous separation rate s_2 . One aspect that needs to be clarified is the dynamics of productivity shocks in each job. This issue is relevant because it can be argued that wages in the first and second jobs are correlated and that they occur simultaneously. With this consideration, it is assumed that the productivity shocks of the two jobs follow a VAR process of order 1, such that $[w_1, w_2] \sim VAR(1)$. An additional aspect that is incorporated is that the utility function is separable between the hours spent in the first and second jobs. This procedure incorporates the assumption that an hour of work in the second job has a higher disutility than an hour of work in the first (main) job.

Thus, the individual maximizes the following objective function

$$V_2(w_1, w_2) = u(c, L_1, L_2) + \beta\{s_2 V_1(w'_1) + (1 - s_2)V_2(w'_1, w'_2)\} \quad (5)$$

subject to

$$\begin{aligned} c + a' &= (1 + r)a + w_1 L_1 + w_2 L_2 \\ L_1 + L_2 &\leq 1 \\ [w_1, w_2] &\sim VAR(1), \end{aligned} \quad (6)$$

where $VAR(1)$ is a vector autoregressive process of order 1.

Some implications of the model that explain the decision to accept a second job are as follows:

- The supply of the second job is higher in workers with low financial wealth, who are also the workers who work longer hours. This feature of the model is captured in the second job supply arrival rate $\lambda = \lambda(a)$, which is negatively correlated with wealth. This makes low-income workers the ones who opt more frequently for a second job.
- The decision also depends on the quality of the second job offers. In this case, the productivity shock of the second job is relevant for accepting a second job.
- Workers who work long hours will accept a second job less frequently (i.e., the hours threshold matters). This is because, although a second job may generate higher income, the welfare loss that this implies due to less leisure consumed would be greater. That is, having a second job generates more utility due to the higher income generated, but it also generates disutility due to less leisure consumed. This trade-off is relevant in the decision to take a second job in the model, as it incorporates a "biological" threshold on the maximum number of hours that can be allocated to both jobs.

Although the model does not incorporate policy variables, it is possible to argue that taxes affect only the first job, since the second job is mostly informal in emerging economies, thus including an additional element for taking a secondary job. This extended model could have direct policy implications. However, the model in its current description would be capturing the exogenous shocks affecting the household through the separation rate and the second job supply arrival rate. In this context, the model could be useful to evaluate the effect of these shocks on the main household decision variables (welfare, consumption, savings, employment).

However, solving the model requires the identification of some relevant parameters such as the productivity shocks of the second job, which must be estimated jointly with the productivity of the first job through a VAR model; the separation rate of the second job; the labor supply of the second job conditional to the first job; and the threshold of hours at which the decision to work in the second job is triggered. Since the contribution of the paper is mainly empirical, where some of the aforementioned parameters are estimated in an emerging economy, the calibration of the model is proposed as a research agenda.

3 An empirical investigation

3.1 Data

The data used in this study come from the National Household Survey (ENAHO from its acronym in Spanish). This survey is conducted annually by the National Institute of Statistics and Informatics (INEI from its acronym in Spanish). The survey only identifies workers with primary and secondary employment. Since it is not possible to identify additional jobs, moonlighting in the Peruvian case corresponds only to workers with two jobs.

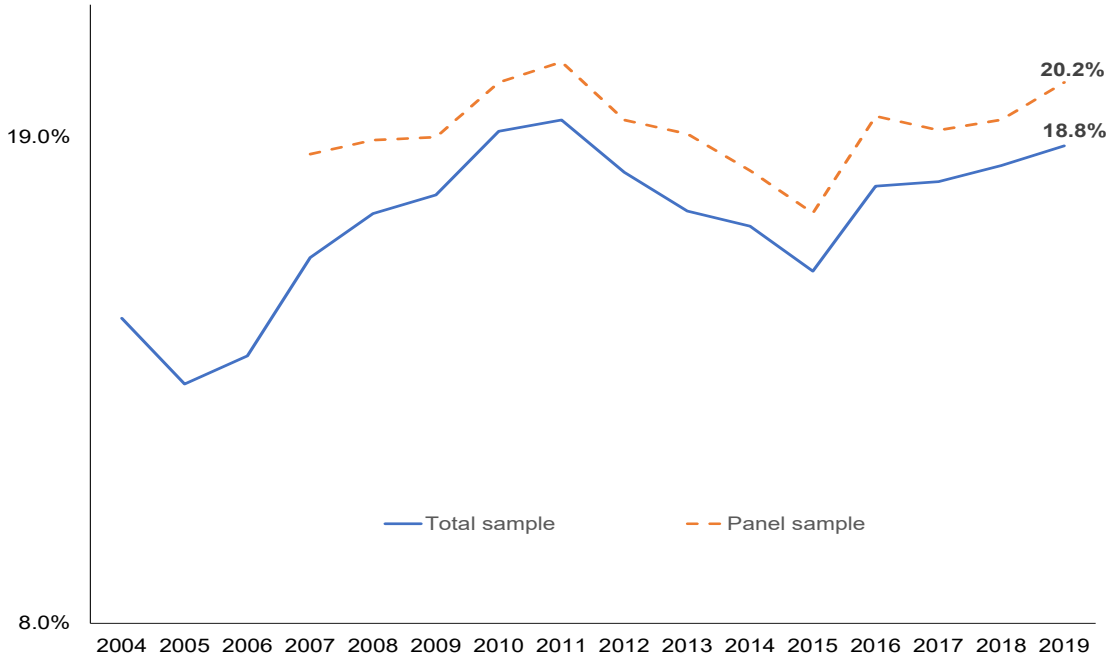
The panel module is used to identify workers who obtain a second job conditional on having an active job. The ENAHO has a panel data module that allows tracking the same workers for up to 5 consecutive years. Having information between 2007 and 2019,¹ an unbalanced panel database is constructed for this period with individuals who are observed at least twice and up to a maximum of 5 times. The resulting panel database corresponds to 31.8% of the total sample of employed persons in the ENAHO for the 2007-2019 period. This panel sample is considered to be representative of the total sample. In the particular case of the proportion of workers with two jobs, it is argued that the estimator of this indicator obtained using the panel sample is statistically similar to the estimator computed with the total sample, as presented in Figure 1.

The ENAHO survey includes variables such as employment, hours worked per week, and monthly labor income according to different observable categories of workers. The income per main job and secondary job is expressed in 2021 soles and at Metropolitan Lima prices. Table 1 shows the average characteristics of workers with two jobs in the period 2004-2019. The first aspect that stands out is that the proportion of workers with two jobs in Peru is high by international standards and reaches 18.8% of employed workers in 2019, which corresponds to 3.3 million workers.

On average in the 2004-2019 period, among the total number of workers with two jobs, 59.3% are men, with the percentage of male workers with two jobs out of the employed population being 18.1%, higher than that of women, which reaches 16.0%. By region, 61.7% of workers with two jobs are concentrated in urban areas in absolute terms; however, in relative terms, workers with two jobs represent 24.8% of the employed population in

¹The Covid-19 period is not included in the analysis as this caused disruptions in labor markets, specially in emerging economies, such as transitions to informality or inactivity – Calle (2024) finds that unemployed persons were in a more vulnerable situation than those who were inactive in Bolivia; job ladders destruction; workers were temporarily laid off; and workers reallocated across sectors – Garita et al. (2024) find that displaced workers were moving to more productive and higher-paying firms in Costa Rica.

Figure 1: Total and panel samples



Source ENAHO. Note: The panel sample corresponds to employed individuals who are registered in two consecutive periods.

rural areas and only 14.5% in urban areas.

Moonlighting has a marked difference according to income distribution, where workers in the low-income quintiles (quintiles 1 and 2) represent a higher proportion. A similar conclusion is observed according to poverty status. Moonlighting also has a differentiated incidence according to the life cycle of the workers, where young workers (under 25 years of age) and workers of retirement age (over 65 years of age) have the lowest proportion of workers with two jobs. An important feature of the survey is that workers with two jobs are, in absolute terms, mostly informal workers in their main job, where the percentage of informality is higher than the informality of workers with one job.

The important variable in this study is household shocks. Shocks are exogenous events that affect households, these are estimated at the household level, and the ENAHO allows us to distinguish up to six types of shocks: loss of employment of a household member; bankruptcy of the family business; natural disasters (drought, storm, plague, flood, etc.); serious illness or accident of a household member; abandonment of the head of household; and the criminal act of a household member (robbery, assault, etc.). This variable takes the value of one if the household has suffered one of these shocks, zero otherwise. Table 1 shows that a high proportion of workers have faced some of the household shocks, and these are more prevalent among workers in rural areas.

Table 1: Characterization of workers holding two jobs

	Urban		Rural		Total	
	Thousands	Percentage	Thousands	Percentage	Thousands	Percentage
Male	903	14.3	666	28.4	1569	18.1
Female	730	14.6	345	20.0	1075	16.0
Extreme poor	26	16.3	155	18.6	181	18.2
Non-extreme poor	267	14.2	335	24.0	602	18.4
Not poor	1340	14.5	521	28.3	1861	16.8
Q1 quintile	130	17.1	450	22.6	580	21.1
Q2 quintile	264	14.5	285	26.5	549	18.9
Q3 quintile	342	13.6	151	27.1	493	16.1
Q4 quintile	406	13.9	85	27.7	491	15.2
Q5 quintile	491	15.1	39	28.2	530	15.6
Age < 25 years	193	9.2	161	15.7	353	11.3
[25 - 34]	389	13.6	229	28.2	617	16.8
[35 - 44]	494	17.6	309	33.0	803	21.4
[45 - 54]	333	17.9	168	30.8	501	20.8
[55 - 64]	172	14.6	100	24.2	272	17.1
Age \geq 65 years	52	10.7	45	13.2	97	11.7
Household shock	1263	13.9	667	24.7	1931	16.4
No household shock	371	16.6	343	25.1	714	19.9
Firm size < 20 workers	1147	14.3	908	23.9	2055	17.3
From 21 to 50 workers	58	11.9	13	28.1	72	13.3
From 51 to 100 workers	33	10.3	6	26.8	38	11.3
From 101 to 500 workers	53	10.0	8	25.4	61	10.8
Firm size > 500 workers	320	17.8	75	42.8	395	20.0
Informal job	1249	15.1	1034	27.3	2282	18.9
Formal job	579	13.5	65	36.4	645	14.5
Total 2004-2019	1633	14.5	1010	24.8	26.44	17.2

Note: The percentages represent the number of workers with two jobs out of the total employed population in each category. In the case of informality in the first job, the average corresponds to 2012-2019, as the survey does not have data for this category for previous years.

Second jobs have a notable contribution in terms of the distribution of working hours, where workers with two jobs work, on average, 19% more hours compared to workers with one job. Likewise, in the second job, an average of 17 hours per week are worked, which represents 34% of the total hours that a worker with two jobs works in a week. For its part, Workers with two jobs have a monthly income 23% higher than the income of workers with only one job, where income from secondary work represents 38% of the total income for households with two jobs.

3.2 Methodology

The empirical model used is a probit model. As the theoretical model suggests, the probabilistic model is conditional on having a main job previously. In other words, the dependent variable $E_{2,t}$ takes the value of 1 ($E_{2,t} = 1$) if the employee has two jobs in the current period and had one job in the previous period ($E_{1,t-1} = 1$); and takes the value of 0 ($E_{2,t} = 0$) if the employee has only one job in the current period and also in the previous period ($E_{1,t-1} = 1$). Workers who have two jobs in both periods are excluded as there is no employment decision. That being said, the dependent variable represents the transition of a worker with a job in period $t - 1$ towards a two-job situation in period t and therefore captures the worker's choice to take on a second job in period t . This indicator corresponds to a new second jobs in the dataset.

The empirical model for a representative individual is given by

$$Prob[E_{2,t} = 1 | E_{1,t-1} = 1] = \phi(\beta X_{t-1} + \theta L_{1t-1} + \delta S_t + \epsilon_t), \quad (7)$$

where ϕ denotes the normal distribution. X_{t-1} is a set of variables that characterize the main employment during period $t - 1$ such as income, gender, etc. These are incorporated to control for the observable heterogeneity of workers in the main job. L_{1t-1} denotes the hours worked in the main job for period $t - 1$ and S_t denotes the shocks that affect households in the period t . The coefficients of interest in this model are those associated with hours worked, income in the main job, and especially shocks received by households.

The inclusion of variables lagged one period in the empirical model is to reduce the possible endogeneity of the independent variables due to simultaneity. Likewise, the variables considered as controls represent the characteristics of the workers in their first job, which is why the simultaneity in the choice of a second job and the first job is reduced (variables that characterize the second job are not considered in the model).

4 Empirical results

4.1 Baseline estimation

The sample corresponds to the period 2007-2019. Although the survey has been available since 2004, the panel sample has only been available since 2007, while the estimate uses data up to 2019 so that the results are not influenced by the COVID-19 pandemic. The results in Table 2 show the expected coefficient signs, with the effect of income and working hours of the main job being negative. Since these variables are included lagged

and correspond to the main job, the decision to accept a second job is based on decisions made in the past, which reduces potential endogeneity problems.

Table 2: Probit estimation of second job choice

	Urban		Rural		Total	
	Coefficient	Mar. effects	Coefficient	Mar. effects	Coefficient	Mar. effects
Income from the main job (Lagged log)	-.0595*** (0.007)	-.0123*** (0.001)	-.0156* (0.009)	-.0004** (0.002)	-.0736*** (0.005)	-.0177*** (0.001)
Working hours in the main job (Lagged log)	-.1001*** (0.010)	-.0206*** (0.001)	-.0602*** (0.0137)	-.0181*** (0.004)	-.0829*** (0.008)	-.0199*** (0.001)
Household shocks (shock=1, otherwise=0)	.0776*** (0.016)	.0164*** (0.003)	.0319* (0.017)	.0096* (0.005)	.0895*** (0.011)	.0220*** (0.002)
Controls						
Year Fixed Effects	✓	✓	✓	✓	✓	✓
Firm size in the main job	✓	✓	✓	✓	✓	✓
Gender	✓	✓	✓	✓	✓	✓
Informality of the main job	✓	✓	✓	✓	✓	✓
Observations	61842		30229		92071	
Period	2004-2019		2004-2019		2004-2019	
$LR \chi^2$ -Statistic	61842		61842		61842	
Probability > $LR \chi^2$	0		0		0	

Notes: Robust standard errors are in parentheses. *, **, and *** denote statistical significance at the 10, 5, and 1 percent level, respectively, for the null hypothesis of the coefficient estimate equal to zero. The probability shows the value of the null hypothesis that all regression coefficients are simultaneously equal to zero.

The above procedure may not completely isolate unobservable heterogeneity components of main income that may be correlated with the probability of accepting a second job. This would be the case, for example, of the unobservable skill of workers. Thus, it can be argued that people with high skills are highly productive and tend to work in one job; while low-skill workers, generating little income, tend to take a second job to compensate for the low income of their first job. Some components of the skill are unobservable in the data and may not change over time, so the use of lags does not fully isolate the potential inconsistency bias that could be generated. To overcome this problem, the change in the logarithm of income is included instead of income from the main job as shown in Table 3.

In Table 3, the model predicts a significant effect of working hours in the main job on the probability of having a second job. That is, a 1% increase in working hours in the main job (0.32 hours) reduces, on average, the probability of having a second job by 0.04 percentage points. If standardized to an increase of 1 working hour, the predicted probability would be reduced by 0.12%. Note that, the effect of other covariates on the probability of having a second job increases concerning the previous formulation, which indicates that the effect of observable and unobservable heterogeneity that does not change over time could be important.

An important feature of the survey is that it includes six different exogenous house-

Table 3: Probit estimation of second job choice

	Urban		Rural		Total	
	Coefficient	Mar. effects	Coefficient	Mar. effects	Coefficient	Mar. effects
Income change from the main job (Log difference)	-.0738*** (0.007)	-.0152*** (0.001)	-.0625*** (0.008)	-.0188*** (0.002)	-.0697*** (0.005)	-.0167*** (0.001)
Working hours in the main job (Lagged in logs)	-.01574*** (0.009)	-.0324*** (0.002)	-.0877*** (0.012)	-.0264*** (0.003)	-.1501*** (0.007)	-.0361*** (0.001)
Household shocks (shock=1, otherwise=0)	.0817*** (0.016)	.0173*** (0.003)	.0336** (0.017)	.0101** (0.005)	.0980*** (0.011)	.0241*** (0.002)
Controls						
Year Fixed Effects	✓	✓	✓	✓	✓	✓
Firm size in the main job	✓	✓	✓	✓	✓	✓
Gender	✓	✓	✓	✓	✓	✓
Informality of the main job	✓	✓	✓	✓	✓	✓
Observations	61842		30229		92071	
Period	2004-2019		2004-2019		2004-2019	
$LR \chi^2$ -Statistic	61842		61842		61842	
Probability > $LR \chi^2$	0.000		0.000		0.000	

Notes: Robust standard errors are in parentheses. *, **, and *** denote statistical significance at the 10, 5, and 1 percent level, respectively, for the null hypothesis of the coefficient estimate equal to zero. The probability shows the value of the null hypothesis that all regression coefficients are simultaneously equal to zero.

hold shocks as mentioned earlier, from which an exogenous household shock variable is constructed. The shocks faced by households also significantly affect the probability of having a second job (see Table 3). On average, the probability of having a second job for workers who face at least one shock out of the 6 shocks identified in the survey is 2.4% higher compared to households that do not receive shocks, with this effect being greater in urban than in rural areas.

4.2 Does the history of household shocks matter?

The panel database allows us to identify a history of shocks faced by households with a length of up to 5 years, although the sample of households with two jobs is significantly smaller for panels longer than 3 years. Does household shock history influence the likelihood of having a second job? To this end, we use the panel sample of individuals whose households report having received shocks for consecutive periods. Due to sample limitations, we consider a panel of no more than three consecutive periods in which shocks are observed (or not) sequentially. The empirical model is reformulated to measure the effect of the household shock that occurs in the current period when controlling for the history of shocks.

The main results in Table 4 highlight that the effect of a household shock occurring in the current period is larger when households did not receive any shock in the past. That is, the marginal effect of a household shock on a worker whose household did not receive a

shock in the previous period is 0.03. This effect reduces to 0.02 for workers who received a household shock in the previous period and becomes non-significant (zero) when received household shocks for two consecutive periods. Likewise, the marginal effect of having a household shock in the current period is zero when workers receive household shocks for three consecutive periods.

Table 4: Probit estimation of second job choice according to the history of shocks
(Marginal effects)

	Total sample	No shocks in $t-1$	With shocks in $t-1$	No shocks in $t-1$ and $t-2$	With shocks in $t-1$ and $t-2$	No shocks in $t-1$, $t-2$ and $t-3$	With shocks in $t-1$, $t-2$ and $t-3$
Income change from the main job (Log difference)	-.0164*** (0.001)	-.0148*** (0.001)	-.0214*** (0.002)	-.0155*** (0.002)	-.0248*** (0.006)	-.0170*** (0.003)	-.0425*** (0.014)
Working hours in the main job (Lagged in logs)	-.0363*** (0.002)	-.0352*** (0.002)	-.0379*** (0.003)	-.0368*** (0.003)	-.0371*** (0.009)	-.356*** (0.005)	-.0300 (0.020)
Household shocks (shock=1, otherwise=0)	.00298*** (0.003)	.0302*** (0.003)	.0184*** (0.005)	.0269*** (0.006)	.0051 (0.012)	.0410*** (0.010)	-.0202 (0.025)
Controls							
Year Fixed Effects	✓	✓	✓	✓	✓	✓	✓
Firm size in the main job	✓	✓	✓	✓	✓	✓	✓
Gender	✓	✓	✓	✓	✓	✓	✓
Informality of the main job	✓	✓	✓	✓	✓	✓	✓
Observations	92071	70366	21705	30342	4353	11830	998
Period	2004-2019	2004-2019	2004-2019	2004-2019	2004-2019	2004-2019	2004-2019
$LR \chi^2$ -Statistic	1319.9	1004.4	263.6	494.6	48.4	215.6	27.5
Probability > $LR \chi^2$	0.000	0.000	0.000	0.000	0.000	0.002	0.070

Notes: Robust standard errors are in parentheses. *, **, and *** denote statistical significance at the 10, 5, and 1 percent level, respectively, for the null hypothesis of the coefficient estimate equal to zero. The probability shows the value of the null hypothesis that all regression coefficients are simultaneously equal to zero.

The non-significance of household shocks for workers who consecutively received shocks in the past and the significance of current household shocks for workers who did not receive shocks in three (or two) consecutive periods suggests that the history of household shocks is relevant for taking a second job (this would vary if we condition on not having a second job at $t-1$ and $t-2$). This result indicates that the choice of a second job may be motivated by recent household shocks and, therefore, is a short-term adjustment mechanism for workers. Moreover, it is reasonable to assume that, if workers face household shocks very frequently, they are likely to use strategies other than taking a second job.

4.3 Household shock impact by labor informality

Labor informality is a structural characteristic of the Peruvian economy and a question that naturally arises is the importance of this feature in the decision to take a second job. Indeed, 20.2% of workers with informal main jobs have two jobs in 2019, while if the main job is formal, the proportion drops to 15.1%. It is worth noting that most of the workers with two jobs have both primary and secondary informal jobs. That is, the informality rate for the primary job among workers with two jobs is 83%, and this rate increases to 93.7% for the secondary job. The probit model is rescaled according to the informality

status of the main job to measure the importance of informality of the main job in the decision to take a second job.

The results in Table 5 indicate that the household shock impact is greater when the worker has an informal main job and occurs mainly in urban areas. For instance, when an urban worker receives a household shock, the probability of having a second job increases by 0.02 percentage points. if the main job is informal, while this probability increases by only 0.01 percentage points when the worker's main job is formal. Given the higher incidence of household shocks in recent years, the increase in workers with two jobs could be related to the greater contribution of informal workers who opt more frequently to take a second job. This interpretation would be consistent with the insurance mechanisms available to formal workers who, in the presence of shocks, resort to formal insurance mechanisms.

Table 5: Probit estimation of second job choice by labor informality
(Marginal effects)

	Urban		Rural		Total	
	Informal	Formal	Informal	Formal	Informal	Formal
Income from the main job (Log difference)	-.0182*** (0.001)	-.0077** (0.002)	-.0206*** (0.002)	-.0159 (0.013)	-.0199*** (0.001)	-.0043** (0.002)
Working hours in the main job (Lagged log)	-.0319*** (0.002)	-.0359*** (0.004)	-.0246*** (0.003)	-.0773*** (0.018)	-.0367*** (0.002)	-.0398*** (0.004)
Household shocks (shock=1, otherwise=0)	.0241*** (0.004)	.0127** (0.006)	.0146*** (0.005)	.0380 (0.024)	.0328*** (0.003)	.0206*** (0.006)
Controls						
Year Fixed Effects	✓	✓	✓	✓	✓	✓
Firm size in the main job	✓	✓	✓	✓	✓	✓
Gender	✓	✓	✓	✓	✓	✓
Observations	38987	22855	28316	1913	67303	24768
Period	2004-2019	2004-2019	2004-2019	2004-2019	2004-2019	2004-2019
$LR \chi^2$ -Statistic	483.5	206.7	239.4	64.5	680.2	252.7
Probability > $LR \chi^2$	0.000	0.000	0.000	0.000	0.000	0.000

Notes: Robust standard errors are in parentheses. *, **, and *** denote statistical significance at the 10, 5, and 1 percent level, respectively, for the null hypothesis of the coefficient estimate equal to zero. The probability shows the value of the null hypothesis that all regression coefficients are simultaneously equal to zero.

4.4 Household shock impact by gender

What is the impact of household shocks according to the worker's gender? To answer this question, we estimate the model for each population group and present the marginal effects in Table 6. Women seems to show a greater response compared to men. This is because the marginal effect of men is 1.6% and in the case of women it is 1.9% (both in

urban areas). Considering that the incidence of shocks affecting households has increased during the study period, the results suggest that the adjustment for taking a second job due to household shocks would have occurred more among women. However, when looking at the standard errors of the marginal effects, the effect of household shocks would not be different between men and women in the urban area.

Table 6: Probit estimation of second job choice by gender
(Marginal effects)

	Urban		Rural		Total	
	Male	Female	Male	Female	Male	Female
Income from the main job (Log difference)	-.0194*** (0.002)	-.0103*** (0.002)	-.0214*** (0.002)	-.0124*** (0.004)	-.0205*** (0.001)	-.0112*** (0.002)
Working hours in the main job (Lagged log)	-.0307*** (0.002)	-.0327*** (0.002)	-.0312*** (0.004)	-.0189*** (0.006)	-.0390*** (0.002)	-.0324*** (0.002)
Household shocks (shock=1, otherwise=0)	.0162*** (0.004)	.0191*** (0.005)	.0085 (0.006)	.0137 (0.010)	.0246*** (0.003)	.0238*** (0.004)
Controls						
Year Fixed Effects	✓	✓	✓	✓	✓	✓
Firm size in the main job	✓	✓	✓	✓	✓	✓
Informality of the main job	✓	✓	✓	✓	✓	✓
Observations	35968	25874	22105	8124	58073	33998
Period	2004-2019	2004-2019	2004-2019	2004-2019	2004-2019	2004-2019
$LR \chi^2$ -Statistic	340.4	397.2	195.0	91.6	807.8	553.1
Probability > $LR \chi^2$	0.000	0.000	0.000	0.000	0.000	0.000

Notes: Robust standard errors are in parentheses. *, **, and *** denote statistical significance at the 10, 5, and 1 percent level, respectively, for the null hypothesis of the coefficient estimate equal to zero. The probability shows the value of the null hypothesis that all regression coefficients are simultaneously equal to zero.

For its part, In the rural area, the effect of household shock was not found in both men and women. When considering the total sample, the effect of household shock is observed in both groups, indicating that the significance comes mainly from urban areas, and this effect is quite similar in both groups. It is worth mentioning that the effect of the income from the first job on having a second job is greater for men in both urban and rural areas. While there seems to be no major difference with respect to the effect of working hours in the first job.

4.5 Household demand and supply shocks

We decompose the six types of exogenous household shocks into demand and supply shocks. The demand shock comprises loss of employment of a household member, and the bankruptcy of the family business; while the supply shock includes natural disasters, serious illness or accident of a household member, abandonment of the head of household,

and the criminal act of a household member. Both clashes are constructed as before, where each shock takes the value of one if the household has suffered one of its components, zero otherwise.

When the household shock is decomposed into supply and demand shocks, household demand shock appears to be more important than household supply shock in both urban and rural areas (see Table 7). The increase in the number of workers with two jobs could be related to the greater contribution of informal workers who opt more frequently to take a second job when faced with the incidence of household shocks (mostly demand shocks). This interpretation is consistent with the insurance mechanisms available to formal workers who, in the presence of economic shocks, use formal insurance mechanisms.

Table 7: Probit estimation of second job choice by household shock type

	Urban		Rural		Total	
	Coefficient	Mar. effects	Coefficient	Mar. effects	Coefficient	Mar. effects
Income change from the main job (Log difference)	-.0728*** (0.007)	-.0150*** (0.001)	-.0618*** (0.008)	-.0186*** (0.002)	-.0681*** (0.005)	-.0164*** (0.001)
Working hours in the main job (Lagged in logs)	-.1581*** (0.009)	-.0325*** (0.001)	-.0880*** (0.012)	-.0265*** (0.003)	-.1503*** (0.007)	-.0361*** (0.001)
Household supply shock (shock=1, otherwise=0)	.0390* (0.021)	.0081** (0.004)	.0210 (0.026)	.0063 (0.008)	.0353** (0.016)	.0086** (0.004)
Household demand shock (shock=1, otherwise=0)	.1276*** (0.023)	.0279*** (0.005)	.0568*** (0.019)	.00173*** (0.006)	.1593*** (0.014)	.0406*** (0.003)
Controls						
Year Fixed Effects	✓	✓	✓	✓	✓	✓
Firm size in the main job	✓	✓	✓	✓	✓	✓
Gender	✓	✓	✓	✓	✓	✓
Informality of the main job	✓	✓	✓	✓	✓	✓
Observations	61842		30229		92071	
Period	2004-2019		2004-2019		2004-2019	
$LR \chi^2$ -Statistic	708.5		250.0		1337.3	
Probability > $LR \chi^2$	0.000		0.000		0.000	

Notes: Robust standard errors are in parentheses. *, **, and *** denote statistical significance at the 10, 5, and 1 percent level, respectively, for the null hypothesis of the coefficient estimate equal to zero. The probability shows the value of the null hypothesis that all regression coefficients are simultaneously equal to zero.

5 Conclusion

The dynamics of multiple jobs in developing economies have been scarcely documented in the specialized literature. Multiple jobs are part of the various mechanisms used by workers and/or households to meet their needs. In the particular case of the Peruvian economy, they constitute a widely used option, with around 19% of workers having a second job in 2019. Thus, in this paper, we propose a formal model of second job choice, which extends the theoretical literature on multiple jobs by endogenously modelling second

job choice in the context of a search model, where the model incorporates hour restrictions and heterogeneity in the supply of the second job, whereby workers choose the first and second jobs extensively (having jobs) and also intensively (hours worked).

Afterwards, we conduct an empirical investigation on the role of household shocks in determining a second job choice in Peru. To do so, we use a probit panel data model for the period 2004-2019, the database comes from ENAHO. The main results indicate that household shocks are important in the second job choice in both urban and rural areas, the history of household shocks matters in the sense that the effect of a household shock occurring in the current period is larger when households did not receive any shock in the past, the household shock impact is greater in workers that have an informal main job, the household shock impact does not differ between men and women, and household demand shock seems to be more important than supply shock.

Several extensions would be interesting as a research agenda. A first extension concerns the hypothesized relationship between hours worked in the first job and its influence on the second job choice; that is, is there a threshold of working hours of the main job below which the choice of a second job becomes more likely? A second extension of relevance is to assess the effect of the Covid-19 pandemic on the dynamics of having two jobs; the Covid-19 pandemic has represented an exogenous shock that has undoubtedly affected the labor market in general and households in particular. Finally, it would be interesting to assess the effects of moonlighting on human capital due to the likely mismatch between first and second job activities.

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