Labor Supply Responses in the Face of Income Uncertainties. A Panel Data Analysis of Moonlighting and Time Allocation Decisions of Ukrainian Workers

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-- Draft version: February, 25th 2008 --
-- Do not cite --

Abstract

This paper investigates coping strategies as a response to labor market uncertainty using unique individual level data from the Ukrainian Longitudinal Monitoring Survey (ULMS). Based on a dual job holding model it introduces a theoretical distinction between two different forms of coping reactions: subsidiary farming activities and second job holdings. Participation and working hours equations are econometrically estimated in a cross-sectional and panel data setting. We find that uncertainty indeed fosters moonlighting activities but activity specific characteristics like response time to shock, skill transferability from main job and coping of other household members also matter significantly.

Keywords: Labor supply, moonlighting, subsidiary farming, wage arrears, panel data, Ukraine

JEL classification: J22, O17, Q12

1. Introduction

An immanent feature of the transition process in the countries of the Former Soviet Union was the restructuring of industries, firms and labor market institutions that lay the ground for a shift from a centrally planned to market based allocation of labor. However, this transformation has been accompanied by diverse forms of labor market disruptions leading to irregular income flows of individuals and households. Among these are wage arrears, forced unpaid leaves and in-kind payments as well as unemployment with increasing importance in recent years. While a large body of literature has focused on worker turnover, unemployment and informality, the question of individual labor allocation decisions in response to income uncertainty has attracted much less attention.

This paper uses unique individual level data from the Ukrainian Longitudinal Monitoring Survey (ULMS) to investigate how workers cope with wage income uncertainty and how much labor they allocate to different moonlighting activities. Next to second job holdings, special attention is paid to subsidiary farming activities, a widespread phenomenon in many transition countries, even among workers. Introducing individual small-scale agricultural production as a potential coping activity in the analysis requires a longitudinal setting, as planning horizons are relatively long and immediate reaction may not be feasible.

This paper adds a couple of novelties to the literature: First, we apply a work response model to income uncertainties in a transition setting. To the best of our knowledge, no attempts have been made to investigate empirically the labor supply reactions of workers after shocks in a panel setting. Second, we distinguish theoretically and empirically between two coping strategies which differ with respect to e.g. accessibility (urban - rural divide), reaction time (short - long run response) and motivation (income generation - consumption production): second job holding and subsidiary farming activities. Most studies on moonlighting have either ignored subsidiary agriculture in the analysis or not adequately distinguished between both coping strategies. However, as will be shown, there are theoretical and empirical reasons to analyze them separately. As a third contribution, the paper is the first to provide empirical evidence for Ukraine on both, individual level coping activities and time allocation. While studies on plot farming activities were conducted for other transition countries than Ukraine, their focus was more on descriptive, household level analysis.

Applying a dual job holding model under labor market uncertainties in the main job, we find that the most widely used time reallocation strategy is through adjustment of hours on a

household plot or – to a much lesser extent – in a second job. However, this result holds only for workers already practicing farming. When controlling for the time the shock occurred it turns out that off-farm second job holdings are better coping instruments in the short run due to the more flexible reaction horizon. Furthermore, we disentangle important differences between coping strategies: While plot farming is more often practiced by women as well as older and less educated workers, second jobs are performed by workers with higher human capital endowment or those employed in sectors with generally higher salaries. The importance of geographic determinants indicates the crucial role played by the access to coping options for the labor allocation response.

We also want to stress what our paper does not aim at: We incorporate the response behaviour of other household members in the model, however to keep the model simple, we refrain from jointly modelling the labor allocation of different household members, despite the interdependence of hour's decisions inside the household. Furthermore, we do neither consider labor response at various points of the income distribution to allow for differences in the impact of labor market uncertainty nor do we investigate welfare effects of different coping strategies. We plan to turn to these important issues in future research.

The remainder of the paper is as follows: Section 2 motivates the study of labour responses of workers to economic shocks. Section 3 reviews important theoretical considerations for the understanding of dual job holding and the labour allocation decision under uncertainty and deducts the research questions of the paper. Section 4 provides relevant information on Ukraine, the country under consideration. However, we expect that some results generally hold for other transition countries as well. Section 5 introduces the data set. Section 6 describes the methodology and econometric approach employed. The results are reported in section 7 before we conclude with some relevant policy implications.

2. Motivation

The transition process following the break down of the Soviet Union was characterized by a re-building of economic institutions which strongly impacted on individuals' life. In the economic sphere, many people had to face two major challenges in their daily life: How to earn money and how to deal with economic shocks or increased irregularities in the payment of these earnings?

The serious economic crisis throughout all transition economies has been well documented at the macro-level. On the micro-level however, one strand of literature investigated the transition and restructuring processes taking place in the sphere of employment and the labor market (Lehmann, Wadsworth et al. 1999; Earle and Sabirianova 2002), while another was concerned with poverty and welfare implications of these transitions. Some analyses have been dedicated to households' response mechanisms in the context of general deterioration of living conditions. Another focus has been on the rise in economic uncertainty and its implications for economic behaviour. It is important to keep in mind that the planned economies of the Soviet Union exhibited rather low individual choice options and individual risks in many spheres of life in general and in the labor market specifically.

Surprisingly, many authors note the link between the labor market, uncertainty and welfare implications but not many attempts have been made to link these bodies of literature. This paper aims at providing some empirical evidence for the economic behavioural consequences to wage income uncertainty. The measurement of this uncertainty is a demanding task; however, we believe that providing good proxies should shed some light on the coping response of workers.

Despite increased levels of flexibility and worker turnover in some transition countries (Brown, Earle et al. 2006), the threat of labor market shocks is especially serious since contracts have mostly remained inflexible in terms of working hours. As we will show later, the dominating prevalence of full-time contracts even complicates coping *inside* the labor market, i.e. through adapting working hours or taking on a second job. As a consequence, workers may try to cope *outside* the labor market, e.g. through subsidiary farming activities. This, in turn, strongly impacts on the labor supply and makes an understanding of the uncertainty–coping nexus crucial. At the same time, subsidiary farming is a widespread phenomenon in many transition countries and seems to be fairly stable over time, with first investigations on the topic dating back to the 1920s (Chayanov 1925/1986).

In this paper, we analyze the coping response to wage income uncertainties present in the main employment and disentangle the differences between coping activities on and off the labor market. In allowing for individual fixed effects such as household subsidiary farming tradition we expect to contribute to the understanding of the link between uncertainty and labor allocation.

3. Review of theoretical considerations

The paper fits in the large body of literature on time allocation responses to labour market uncertainties. In their important contribution Block and Heineke (1973) showed that the effect of uncertainty in wages on labor supply is ambiguous and potentially leads to increased working efforts if the substitution effect towards leisure is dominated by an income effect. However, this incentive effect relies on the assumption of a single job model and free time adaptability in the main job. In this paper, we do not consider labor adaptation in the first job, but rather investigate the potential reallocation to coping activities. Entering a second job or subsidiary farming activities or changing the time allocation between main job and coping activity can be analyzed in the framework of dual job holdings. Both kinds of coping will be referred to as dual job holdings. Paxson and Sicherman (1996) describe different motivations to hold more than one job. One reason might be the wish to create a portfolio of jobs with different functions of distinct employments: One job might bring stable and secure income or fringe benefits, while the other does not. Another reason may be located in constraints on the main job[1]. If workers wished to increase working hours, but this adaptation is excessively costly or not possible in the main job, a second employment might be plausible[2]. Fluctuation of desired working hours over time may then be reflected in changes in dual job participation and the time allocation in the second job. These fluctuations of desired working hours, which are unobservable to the researcher, may have different reasons. Beside life cycle events it seems plausible that workers adapt their desired working hours according to risk exposure. This link is especially strong in the presence of imperfect credit and insurance markets, as is true for economies in transition.

A labor allocation models for second job holdings that can consistently estimate second job participation under non-observable second job "wages" – a problem that holds for the case of agricultural production, was proposed and applied in a development setting by Theisen (2005). In the following we will resume to presenting the subsidiary farming model only as it is empirically more relevant – as will be shown below. The model underlying our analysis belongs to the group of neoclassical agricultural household models (Singh, Squire et al. 1986) and is

[1] The authors also consider that one job brings main income, while the other is more prestigious.
[2] The asymmetry of the model lies in the impossibility to reduce hours in the main job. However, in the presence of wage income uncertainty, we assume away desired reduction of working hours beyond those explained by life cycle effects captured in the demographic characteristics. As some authors have pointed out for Western European countries, wishing to work fewer hours might be realistic (Bryan 2007).

similar to the one proposed by Kurkalova and Jensen (1999). It accounts for the non-separability of a farmer's decision[3]: the production and the consumption decision.

Assume a utility maximizing risk avers agent who derives utility from either consuming consumption goods X or leisure L both of which are considered normal goods:

$Max\ U = U(X, L)$

- under the goods constraint $X = WN + ZF(H)$ and
- the time constraint $L = T - H - N$.

It should be noted that we take into account the corner solution of quitting subsidiary farming ($H \geq 0$). We assume away the possibility to hire in labor from outside (which is empirically irrelevant for the context under consideration). Consumption goods can either be produced in home production or bought on the market at price 1. An important assumption for implementing subsidiary farming into the utility framework is the perfect substitutability between market goods and home produced goods (Gronau 1977; Gronau and Hamermesh 2006). Home production follows a production function $ZF(H)$ with $f' > 0$ and $f'' < 0$, where H are the hours devoted to subsidiary farming, while Z is an exogenous productivity index which comprises other unobserved production factors that affect output. Buying goods in the market requires income, which is earned at an hourly rate of W for N hours employed in the main job[4]. Main job working hours are assumed to be fixed, $N = \check{N}$. This assumption is important, as it impacts on the potential for hours substitution between jobs; it is quite realistic in transition countries as evidenced in empirical applications (Saget 1999). Since T could be transformed into H, the price of labor affects the production decision on the plot. And since L could be transformed into H as well, the wage level affects the leisure-consumption decision. A drop in income under fixed N would thus, ceteris paribus, set free a substitution towards subsidiary farming.

To introduce labor income uncertainty, W contains a stochastic component (or is stochastic itself). This leads economic agents to form expectations over their utility in case of uncertain wage income against the background of secure wage income[5]. A change in the expected wage rate sets free a substitution and an income effect and could potentially lead an individual to increase working hours in the main job to compensate for the increased uncertainty. However,

[3] Under certainty recursiveness can be assumed in the agricultural household model.
[4] For simplicity and to prevent from the introduction of simultaneity bias, non labor income is assumed away.
[5] Positive marginal utility over all possible consumption bundles ($U' > 0$) and $U'' < 0$ is assumed. The secure alternative is assumed to have the stochastic wage rate fixed at its mean.

if *N* is fixed and utility is gained from consumption rather than income, one observes a labor supply substitution towards subsidiary farming. In plugging the time and income constraints into the expected utility function, taking derivatives and resolving the equation system, one can show that $f'(H) < E[W]$ which implies that risk-avers agents shift their effort towards the certain source of income as they treat uncertainty as a negative wage income premium.

Research on worker response models considering uncertainty in a transition setting has been scarce. Except for the outlined model by Kurkalova and Jensen (1999), there exists a literature on time reallocation between sectors to understand the transition towards a private economy. Bouev (2001), for instance, theoretically analysed job-to-job flows in which workers reallocate their time to the informal sector over transition. His definition of informal second job holding includes subsidiary farming. This may partly explain why he predicted strong increase in informal job holding for Russia, while Clarke, Kabalina et al. (1998) who exclude subsidiary farming do not observe such growth. On the empirical side, Kolev (1998) used data from one wave of the RMLS panel to investigate labor allocation to the informal sector. He finds for 1995 that informal sector participation is strongly associated with unemployment and employer induced leaves, but not with shocks inside employment such as wage arrears. However, the study concentrated on all working age adults and not on workers only. Kim (2002) analysed the determinants of informal economy participation of couples in Romania, also in a cross section setting. His results give evidence for a joint allocation decision and point to the welfare enhancing effect of informal employment. Seeth et al. (1998) analyzed the role of household subsistence farming in three Russian regions on the consumption and poverty level and find that many Russian households had not been able to sustain the early transition period without relying on plot production.

To the best of our knowledge, there exists no empirical study investigating labor allocation decisions in transition over time using panel data. Furthermore, neither study analyses coping strategies of workers in a transition economy, which is of special interest, as hours adaptations are very uncommon and employment relations often exhibit a high degree of uncertainty and poorly developed worker protection institutions. The former aspect is associated with the inflexible nature of the labor market in many transition countries as a legacy of stable and homogenous labor relations in Soviet periods. Wage income uncertainty, however, has been documented to be substantial in many transition countries (a good list of references is included in Boyarchuk, Maliar et al. 2005). Guariglia and Kim (2003; 2004), for instance, relate wage income uncertainty in the form of wage arrears to precautionary savings in Russia

and find that working in a second job reduces precautionary savings. Especially during the long recession phase in transition countries, unemployment did not pay an important role as most workers remained formally employed even without supplying labour or receiving pay (for Ukraine compare Brück, Danzer et al. 2007). These labor market shocks can be considered rather exogenous to workers as they hurt workers randomly across personal characteristics (for job loss cp. Lehmann, Pignatti et al. 2006).

Despite focussing on the subsidiary farming model above, we consider the distinction between subsidiary farming activities and market-related activities for income generation an important feature of this paper. In several empirical applications, both activity choices are analysed without distinction (e.g. Bouev 2001). However, we believe that they reflect two different coping mechanisms with distinct motivations, characteristics, and requirements. Table 1 presents a theoretical profile of both coping activities:

		Farming activities	Second job holding
Motivation	"Remuneration"	Food production	Income generation
	Risk Exposure	Weather risks / maybe input/output price risks	Demand risks / maybe legal risks (for illegal jobs)
	Risk covariance with first job	Low	High
	Further motivations	Leisure	Qualification
Characteristics	Reaction time horizon	Medium run	Short run
	Market interaction	No / maybe	Yes
	Geography	Mostly rural	Mostly urban
Requirements	Input	Land	Skills
	Labor supply	Peak times	No peak times

The motivation to get engaged in a specific kind of coping mechanism is determined by access, preferences and risk exposure. If access is not an issue, workers may try to predominantly secure their consumption standard and trade food for income. This seems especially attractive if income generation is expected to be uncertain in second jobs highly risk covariant with the main occupation. Further motivations which are economically harder to qualify (e.g. the value from spending leisure time in the country side) are not at the centre of this analysis (cp. Smith Conway and Kimmel 1998).

Coping activities also differ in their characteristics. Geographical and market-related issues indirectly influence risk exposure and uncertainty. In the centre of interest, however, is the reaction time horizon of activities, i.e. the time required after the shock to start the coping activity. If a worker already is engaged in a coping activity, time adaptations are relatively easy, especially in subsidiary farming. However, if a worker is "unprepared" to the appearance of a shock, preparation times differ markedly. While second jobs can – if available – be taken on throughout the year, farming activities require favourable seasonal conditions.

Input requirements are crucial for performing a coping activity. Land access is virtually unrestricted in rural areas, but might comprise a serious barrier for urban households. The distance to land plots should be negatively associated with farming activities. The level of human capital is generally expected to be positively associated with second job holdings since education pays off in the labor market. As concerns skill transferability, we would expect that workers prefer second jobs closer to the occupation of their main job, as their skills will be rewarded additionally. In our sample, 37.6% of those workers holding a second job are employed in the same sector as the main job. This skill hypothesis implies that human capital will not be directed to subsidiary farming (cp. Rizov, Gavrilescu et al. 2001).

In the empirical analysis of the paper, we will investigate only few of the mentioned aspects explicitly. However, the following three points seem especially interesting to us and will thus be analyzed in turn: First, the participation decision and the time allocation decision are both dependent on the coping strategies chosen by other household members. This is relevant since labor supply decisions are taken interdependently (Becker 1965). The actions taken by other household members are important since we interpret subsidiary farming and second job holdings as coping strategies against labor market uncertainties. In reality, a person other than the one experiencing labor market problems could be chosen as the most efficient individual for coping[6]. However, since the labor supply requirements point to peak times in agricultural production, we predict that a second person on the subsidiary plot has a positive effect on own participation with ambiguous own time effort. Second job holdings should be decreased by the engagement of another household member as the activity is non-dependent on other household members and thus potentially indicates another coping person.

Second, the response time to arrears might be important for a workers coping response. Subsidiary farming requires time to prepare. Thus we expect that participation equations of

[6] The underlying rationale is that workers may maximize pooled household income instead of individual income.

subsidiary farming should not be affected in the short run, while second job holding participation might be. On the other hand, having already entered one of the both activities makes a coping activity available at relatively low cost.

Third, a worker's coping behaviour is likely to be influenced by the sector affiliation of the main job. Workers may find it easier to get engaged in similar professions as they are already equipped with the necessary skills and know-how. To make use of the high level of skill-transferability from main to second job, we expect individuals to select into similar sector activities. As concerns agriculture, there is even one more reason why worker should stay intra-sector. Many subsidiary farms were and still are highly cross-subsidised by large state-owned or private enterprises or collectives. Being a worker of an agricultural enterprise makes it relatively easy to receive inputs such as seeds, fertilizer and machinery.

Drawing on the theoretical considerations above, the questions to be answered in the empirical analysis of this paper are the following:

1. Which coping strategies do workers use to cope with wage income uncertainties?
2. What determines participation and time allocation to both coping activities under consideration?
3. Are there household, shock response timing or human capital transferability effects to these choices?

Besides the three aspects which differentiate between both coping strategies we will further investigate standard demographic, human capital and family context determinants of coping behaviour.

As subsidiary farming is a low-risk low-return activity we expect participation to be positively correlated with age. However, since the activities also require hard manual work, elderly workers my find it hard to engage in this activity; that's why the positive association should exhibit a negative squared effect. Second job holdings may be of diverse nature why we do not see any theoretical reasons to hypothesize on the sign of the effect. In empirical studies, the effect is ambiguous or insignificant (Reilly and Krstic 2003). The effect of gender on coping behaviour is not clear either: On the one hand, women have may have more difficulties in finding second jobs in the labor market, thus turning to subsidiary activities. Additionally, responsibilities for consumption management might in general be higher among women. On the other hand, hard manual work should make subsidiary farming among men

more likely. Consequently, the results from the empirical literature are inconclusive (Reilly and Krstic 2003; Guariglia and Kim 2006). Education is expected to be positively associated with labor market transactions, i.e. with second job holding, while it should negatively impact on manual non-market work like subsidiary farming. However, according to Guariglia and Kim's results (2006), second job holding is associated with lower education in Russia. This observation receives support from a time allocation study on moonlighting in Yugoslavia (Reilly and Krstic 2003). Finally, workers' coping responses may potentially depend on their welfare status (Khan 1995). Having a shock to individual income may hurt a poor person in a different way than a rich worker. To be poor despite employment may imply that an individual has already chosen time consuming coping strategies which do not leave much space for further adaptation. On the other side, earnings uncertainties may not hurt a rich person so much in principle. This would potentially lower the propensity and extent to cope. But earning much means being threatened by the loss of a high standard of living. As a result, an individual is likely to choose a coping strategy that generates income, such as second job holding. Overall, the expected impact of income on coping behaviour is ambiguous and open for empirical answers. Most studies of labor allocation in transition countries have found a negative time-wage elasticity of between -0.6% (Reilly and Krstic 2003) and -2.5% (Guariglia and Kim 2006).[7]

4. Ukraine

Ukraine experienced a transition shock of unprecedented severeness. GDP declined by 60% towards the 1989 level which only came to a halt in the year 1999. Recovery since then has failed to bring GDP back to pre-transition levels yet. However, Ukraine has experienced substantial growth with declining poverty. During the transition course the employment ratio dropped from 83% in 1989 to 65% in 1999 and rose slightly to 67% in 2003-4 (TransMONEE 2007). Labor market uncertainty rose steeply with the beginning of the restructuring process of enterprises. Mid of the 1990s, more than 60% of the labor force experienced labor market shocks such as delayed wage payments (wage arrears) with an estimated consumption loss between impressive 10-20% (Boyarchuk, Maliar et al. 2005). Still, in the period under consideration (2003 and 2004) 11 percent of workers suffered from wage arrears and 6 percent received all or part of their income in-kind.

[7] In Kolev (1998) the wage elasticity is insignificant.

At the same time, labor contract schemes have not become very flexible. Recall the important assumption of inflexible working hours in main jobs in our theoretical model. In Ukraine, as in many other transition countries, the largest share of working contracts is fixed at full-time 40 hours (Figure 2a). Thus, many workers can actually be expected to have problems in adjusting their working hours (cp. Saget 1999).

Subsidiary farming can be considered a traditional activity of many households in Ukraine and other post-Soviet countries. At Soviet times Ukraine was considered the "bread basket" of the Soviet Union since it covered a major share of agricultural production due to its extremely fertile soils. With many state-owned agricultural enterprises closing down during the first years of transition, food shortages aggravated falling household incomes. To combat increasing levels of poverty (Brück, Danzer et al. 2007), household plots functioned as a buffer against the agricultural output decline with quite stable production output, as indicated in Figure 1. Present-day agriculture in Ukraine is characterized by a bimodal structure made of many – often subsidiary – small-scale farmers and a small number of large enterprises[8]. The significance of household production can be appraised by the fact that the largest share of potatoes' and vegetables' gross agricultural output stems from household plots (e.g. 98% of potatoes) (OECD and World Bank 2004).

5. Data

To answer the research questions above, we use data from the nationally representative Ukrainian Longitudinal Monitoring Survey (ULMS) for the years 2003-2004, a time period exhibiting quite stable consumer prices. The panel offers data of about 7,200 individuals aged 15 up to 72 years and their corresponding 3,400 households, respectively. Since our interest lies in the analysis of workers' responses, we exclude all persons in the pension age (for men: 60 years, for women: 55 years) and those individuals who did not work at all or did not work at least one hour in their main job during the last week.

The various variables employed in our empirical analysis will be discussed below. An overview of basic statistics can be found in Table 1.

[8] Commercial farming is well documented for Ukraine in Johnson and Bouzaher (1994).

Dependent variables

For the coping participation choice, binary variables are used, taking the value of unity if a worker was engaged in subsidiary farming or second job holding during last week, and zero otherwise.

Time allocation to second job holding and subsidiary farming is measured in hours spent on the coping activity during last week. As typical for agricultural activities, the time volume heavily depends on seasonality. In 2003, the ULMS was collected between April and July, while in 2004 the large majority of interviews were taken in June and July[9]. To control for seasonality effects we will introduce interview month dummies in the regression analysis. Several workers reported unrealistic numbers of hours for either the time spent on the plot, the time spent in the main job or the time spent in second jobs. Since it is impossible to distinguish reporting errors from coding errors, we remove these individuals from the sample. Also, we control for the sum of hours dedicated to all activities and chose a cut-off point at 99 hours work per week which implies a maximum of 14 hours work for seven days in a week. In Figure 2a-c we present the distribution of hours worked in subsidiary farming, along with hours in the main and second jobs. As becomes evident, the hour's distribution for farming activities is right skewed and thus requires a log transformation to satisfy the normality assumption in the estimation[10]. The same holds for hours worked in second jobs, but one should note the much lower overall level of second job employment. Only 102 workers out of the sample of 5,625 have second jobs and observable working hours.

Independent variables

The explanatory variables used in the analysis comprise socio-demographic and job specific determinants as well as geographic and inter-temporal controls.

The set of socio-demographic variables consists of a female dummy, a marital status dummy indicating whether the respondent is married or living in cohabitation, age and squared age divided by 100 (to account for non-linearities). Our ethnic dummy "Ukrainian" indicates whether a respondent prefers to speak Ukrainian instead of Russian in daily life. Another variable especially important for labor market analyses is the level of human capital. As a proxy we use adjusted years of schooling in the econometric specification. The welfare of an individual will not be captured by the own wage of the worker as often done in the literature,

[9] The interviews taken between August and October comprise 6.8% of the 2004 sample.
[10] To preserve a larger sample we took the natural logarithm of (hours+1). However, the results were very robust to different transformations.

but by household income (exclusive of income from subsidiary activities and second jobs, respectively) as the household income is supposed to be the relevant measure for coping decisions.

One job related information used in the econometric analysis is time spent in the main job as one important determining factor in the moonlighting decision is time availability. As noted before, the largest share of work contracts in Ukraine are fulltime positions with part-time or other modes of employment being still rare (Figure 2a). However, to control for deviations and to be able to estimate the substitution rate between hours worked in the main job and hours spent on coping, we make use of a variable indication main job hours. As the elasticity of labor substitution requires a loglog format, we transform main job hours in logarithm for estimation purposes. Wage income uncertainty in the main job is measured with two dummies: “Wage arrear” takes on the value of one if the worker experienced non-payment of the salary during last year, and zero otherwise. The “in-kind”-dummy is one if the worker was paid with goods produced by the enterprise instead of money.

Geographic controls include the type of settlement as measured with dummy variables for village, town, and city larger than 100,000 inhabitants as well as macro-regions. As the Ukraine is a sizeable country with diverse relief and climatic regions, the analysis of farming activities makes the use of regional fixed effects a necessity. For second job holding, these regional dummies capture different levels of second job demand. For farming activities, the distance to farm plots is a variable of importance as it reflects the cost to transport the output to the place of residence. Unfortunately, the exact distance was not recorded in the survey, so we are left with constructing a proxy index out of a detailed list of settlement sizes. In all regressions, a time dummy is included to catch the time trend between both years under consideration.

Three aspects of coping activities are especially emphasized: The impact of other household members’ coping activities is capture by a dummy indicating whether a second person in the household is working on the subsidiary plot or holding a second job. For all estimations, the results to this effect will be shown in column (2). The response time to wage arrears was said to potentially have differentiating effects on the two coping activities. To disentangle timing effects, we construct interaction effects, indicating the presence of arrears 12 month or six month ago. The results to this investigation will be shown in column (3). Lastly, we want to find out, whether workers of some sectors are more likely to engage in specific coping strategies than others. We construct ten dummy variables (see Table 1) for different sector

affiliations in the main job. The impact of sector affiliations can be studied from column (4) of the regression tables in comparison to the agricultural sector (base category).

6. Methodology

As noted in the outline above, this study investigates coping activities under both, a cross-sectional and a panel setting. Besides conducting a nice robustness exercise, the reason to do so lies in the motivation to not only distinguish between coping activities but to relate their differences to some of the dimensions outlined in Table 1. By comparing pooled cross-section and panel results we can draw conclusions for the reaction time dimension of both activities.

For the first part of the econometric analysis we use pooled regressions to estimate the participation and hours equations of coping activities. To secure homoscedastic standard errors we compute standard errors clustered by individuals. The coping participation equation shall reveal the propensity of a worker to engage in the specific coping activity. We assume a probabilistic distribution and estimate the equations by simple Probit:

$$\Pr(y_i = 1) = \alpha_t + x'_i \beta + \varepsilon_i, \qquad i = 1,\ldots, N, \qquad t = 1, 2 \tag{1}$$

Time allocation to a specific coping activity consists of a two-stage decision and thus requires a model with a joint decision, whether to participate in coping and how much time to dedicate to the activity. Before turning to the Heckman selection model which we employ for the subsidiary farming time allocation, we consider a more general type of selection model. For hours employed in second jobs, the sample size is too small as to provide us with robust results for the Heckman model. Therefore we chose the distributional extremely restrictive Tobit model to investigate second job hours. The model for the unobserved true value of hours y^*

$$y^* = x' \beta + \varepsilon,$$

can be identified with observed values $y = \begin{cases} y^* & if \quad y^* > 0 \\ . & if \quad y^* \leq 0, \end{cases}$ (2)

where . means zero hours of second job holding or no value observed at all. Since the Tobit model relies restrictively on the distributional assumptions of normally distributed and homoskedastic errors, we compute individual clustered standard errors in an auxiliary interval regression. A major draw back of the Tobit model is that it incorporates the selection into

second job holdings implicitly. Consequently, we have to assume that the determinants for second job holdings equal the determinants of the time choice. Furthermore, if the number of uncensored observations is small (as in our case) the Tobit results become relatively similar to Probit estimations.

These determinants are allowed to differ if we model both, a selection equation, whether to participate in coping and a supply equation on the number of hours engaged. The latter follows a quite similar setup as in equation (3) above. Hence, after having selected individuals into subsidiary farming in the first decision, we observe zeros instead of dots. Heckman has proposed a model with sample selection for linear outcome variables in the "second stage". Supplied hours might most often be reported as discrete numbers, in reality they will most likely be supplied in continuous format. Since reporting errors are likely to be random we assume a linear relationship.

We apply a Heckman selection model, which makes use of maximum likelihood to estimate both, selection and time allocation equation with normal errors:

$$L = \sum_{i \in M}^{y_i=1} \ln\left[\Phi_2\left(\beta X_i, \delta Z_i, \rho\right)\right] + \sum_{i \in M}^{y_i=0} \ln\left[\Phi_2\left(-\beta X_i, \delta Z_i, \rho\right)\right] + \sum_{i \notin M} \ln\left[1 - \Phi_1\left(\delta Z_i\right)\right] \qquad (3)$$

where Z is an individual specific vector of variables predicting the time allocated to subsidiary farming activities and X is associated with the choice to work on the land plot. β and δ are the respective coefficients to be estimated. M describes the part of the sample with individuals working in subsidiary agriculture. Φ_1 is a normal distribution and Φ_2 a joint normal distribution necessary for the simultaneous estimation of both equations. Rho (ρ) is the correlation coefficient between the error terms of both equations. If a likelihood ratio test rejects the hypothesis of rho=0, i.e. rejects both equations to be independent, simple OLS would lead to biased results and we have to make use of the presented selection procedure. A crucial issue in the Heckman selection model is the validity of the exclusion restriction. For it to hold, one variable has to have good predictive power for the selection equation but not for the estimation equation (see discussion in the results section).

The advantage of applying the time allocation equation to panel data lies in the consistent estimation of individual specific effects. As will be discussed in a moment, we can choose from two models with different assumptions and different explanatory coverage of the equation under consideration. Let us consider the following model to investigate time allocation y_{it} to either subsidiary farming or second job holdings for individual i at point t:

$$y_{it} = \alpha_i + x'_{it}\,\beta + \varepsilon_{it}, \qquad i = 1,\ldots, N, \quad t = 1, 2 \qquad (4)$$

with observable explanatory variables x_{it} and the error term ε_{it} being iid over *i* and *t*. The choice of either the random or fixed effects model depends on our assumption about the unobservable heterogeneity across individuals which is captured by the random variables α_i.

If the random variable α_i is correlated with the observed explanatory variables x_{it} of the model, the appropriate specification to estimate the coefficients consistently is the fixed effects model (FE). The FE estimator makes use of the individual deviation of both, dependent and explanatory variables from their respective time-averaged values over *t* and measures the association between those deviations. However, constructing these deviations leads to the removal of time-invariant regressors from the model. As follows from this, the non-identification of variables such as gender or ethnicity is the major limitation of the FE model.

If the distribution of the individual effects is assumed to be random, i.e. uncorrelated to the regressors ($E[\alpha_i \mid x_{it}] = \alpha$ with $\alpha_i \sim [\alpha, \sigma_\alpha^2]$), the random effects estimator (RE) is preferred on the basis of efficiency. In opposition to the FE estimator, an estimation of time-variant explanatory variables is feasible. However, if the fixed effects model is the correct specification, the random effects model is inconsistent. To resolve the question, which model to employ, Hausman (1978) developed a test of whether the differences between the FE and RE estimator are significantly different from zero. If this was true, the random effects model yields inconsistent results and the fixed effects model has to be employed.

As already discussed in the theoretical section both coping activities exhibit very different characteristics. As we believe, this also holds for the assumptions about α_i. Second job holdings take place in the labor market – may they be formal or informal. As discussed above, second jobs are quite similar to main jobs with respect to skill requirements and so forth and mainly differ from them with respect to time allocation. Therefore the determinants for second jobs and their time allocation decision are similar to the one for main jobs. In the empirical literature, consent has evolved on the important role of unobservable ability on performance and choices in the labor market. Since this unobservable individual characteristic is likely to be correlated with other explanatory variables, we assume that the fixed effects model is the true model.

However, the situation for subsidiary farming choices is somewhat different. We believe that one of the variables omitted from the model is time-invariant but differs across individuals (family tradition) while another is time-variant but does not differ much across individuals in a specific region (weather conditions). Key to our decision for the choice of a random effects

model is that we consider family tradition to not structurally impact on our explanatory variables.

The panel robust version of the Hausman test does support our specification choice for the subsidiary farming time equation (for an application of the random effects model for working hours of pensioners in Russia see Kolev and Pascal 2002). However, we cannot draw a clear decision for the second job time equation and therefore report both, RE and FE together. However, we feel more comfortable in concentrating on the fixed effects results and report the RE results merely for illustration.

7. Empirical results

The following section reports descriptive and multivariate results on the question how workers respond to wage income uncertainty in the main job. We present econometric results of pooled cross section and panel analysis[11].

Descriptive results

As could already be seen from Table 1, subsidiary farming activities are an extremely common phenomenon with almost 60 percent of employed workers (in the working age and with positive working hours in the main job) in Ukraine being at least casually active on a farming plot. In support of the magnitude of the phenomenon, the average amount of time dedicated to farming activities was at almost 16 hours per week. Second job holdings, on the other hand, are surprisingly uncommon in Ukraine with only 2 percent of workers reporting to hold such a job. The average second job holder is employed in the additional employment for 4.9 hours. It should become clear from this comparison, that subsidiary farming activities are quantitatively more important.

Table 2 draws worker profiles without any coping, with subsidiary farming activities and with second job activities. An interesting feature of both coping strategies is that being employed in a certain activity makes it significantly more likely for another worker in the household to be employed there as well. It becomes very clear, that workers who engage in farming do significantly differ in all characteristics but gender from those workers who do not farm. As concerns main job-related issues, farming workers are employed for less hours and are more likely to suffer from wage income uncertainty. From a demographic point of view, these

[11] We do not resume from presenting pooled cross-sectional results, since the available sample is larger than in the panel case.

workers are on average three years older, less educated and more likely to be married. Especially interesting is the fact that the share of ethnic Ukrainians among farming workers is by ten percentage points larger than in the average working population. Not very surprising, farming workers are more likely to reside in rural areas. In the West and Center region they are over represented, but significantly under represented in Kiev, East and South. Second job holders are not numerous and they do not have many characteristics significantly different from those workers not holding a second job. Second job holders seem to be significantly constrained in their prime job and work on average over 5 hours less. In connection with the average second job employment of five hours, this indicates that second job holdings are used to adapt working hours and to fill the gap in the main job. Second job holders are especially often women and they have higher educational attainments. Their human capital advantage is more than one year of education. This result stands in clear contrast to results from other studies on second job holdings in transition countries (Kim 2002; Reilly and Krstic 2003). In the econometric results, we will see, whether this effect can be considered robust for Ukraine. Geographically, second job holders dominate the Western region.

Table 3 shows results on the relationship between labor market uncertainties as measured by labor market shocks and hours employed in different activities. This relationship is of main interest in this paper. We find that hours worked in the main job are quite stable between workers experiencing wage arrears and those without such experience. Those workers receiving payments in-kind do, however, work more hours on the main job. Much clearer are the results concerning hours in second job holdings and in subsidiary farming: Workers with uncertainty experience dedicate significantly more hours to these activities. While the overall effect is small for second job holdings, workers in subsidiary farming have on average six to nine excess hours in comparison to workers without income shocks!

Figure 3 is a graphical illustration of the predicted time allocated to the main job in dependence of the coping intensity in one activity choice (holding the other one constant). The curves derive from simple fractional polynomial regression estimations. Figure 3a shows the expected downward sloping substitution curve between hours in subsidiary farming and main job. The curves of both years have relatively good fits and are not significantly different from each other. However, the curve for the second year is shifted outwards which might stem from a cohort effect of workers – if age is positively associated with hours on the plot. To investigate this issue, we present unconditional regression results in Figure 4a. As expected, the time spent on the plot increases from about eight hours per week at age of 20 to more than

13 hours at age of 46 but decreases sharply afterwards. This could be explained by women's pension income, which is received already between age of 55-60 and which might reduce plot farming efforts of their husbands (women older than 55 are excluded from the sample).

Figures 3b and 4b report results for the same investigation on hours spent in second jobs. Basically, we find similar results, but two issues should be noted: First, predicted hours worked in the main job 2004 increase after more than 15 hours of second job employment. Second, the predicted substitution curve for 2003 does not slope downward beyond 20 hours spent in the second job. However, the results of both estimations become very imprecise as the number of observations is too small at the far right tail. This illustration shall remind us that results have to be interpreted carefully in the case of second job holdings.

Results from multivariate regressions

In this subsection we report and discuss the results of the econometric analysis. The first part comprises pooled cross-sectional evidence on both, the participation and time allocation decision of workers. In the second part, we turn to the panel analysis. For all models we report three extended specifications along with the baseline model (I). The first extension deals with the role of coping behaviour of other household members (II), the second with the time response to wage arrears (III) and the third with the impact of sector affiliation (IV). For the latter, being employed in the agricultural sector is the omitted reference group.

Table 4 reports the results from the participation model for subsidiary farming. The regressions are highly significant and well fit. In the baseline model, three demographic determinants have a significant impact on the propensity to farm on the household plot. Women, married individuals and better educated are significantly more likely to farm. However, after including the dummy indicating whether a second household member works on the plot (specification II-IV), only gender remains significant. Obviously, if both partners of a couple work on the farming plot, the dummy picks up the marriage effect. Age impacts significantly positive on farming participation with an about 16% increase for growing ten years older from the age of 39 years. Contrary to what we expected, education does not exhibit any (negative) significant impact on subsidiary farming (Rizov, Gavrilescu et al. 2001). This result suggests that subsidiary farming is a phenomenon prevalent in all parts of society.

Geographic location has a strong impact on farming participation, as evidenced by the highly negative coefficient for distance from the farm plot. Living in the capital Kiev or the Southern region reduces the farming propensity as well. After the inclusion of interview month dummies, we find no evidence for a time trend over the years.

Labor market uncertainty seems to play no role for the propensity to participate. Even more support for this observation comes from the specification including time response to shocks (III). Similarly, sector of employment has no explanatory power after controlling for household per capita income. To give an example, it comes as a surprise that working in the industry or finance sector does not discourage subsidiary farm participation as compared to working in the agricultural sector. Both findings support somewhat the idea that subsidiary farming is a tradition of people. The only relevant and significantly negative labor market determinant is hours spent in the main job.

The natural logarithm of monthly per capita household income is negatively associated with subsidiary farming with a ten percent increase in income leading to a six percent reduction in participation. This result is highly comparable to the study by Reilly and Krstic (2003) for Yugoslavia and somewhat smaller than the result by Guariglia and Kim (2006) for Russia.

The determinants of second job participation exhibit a different pattern (Table 5). Demographic variables such as gender or marital status do not play a pronounced role. As hypothesized above, education plays a significant role and, as already noted in the descriptive analysis but in opposition to the literature, higher human capital fosters second job holding. Potentially, education coincides with general ambition or aspiration and the coefficient reflects those workers' time adaptation. Again, having another household member in a second job makes employment there much more likely. One potential explanation could be that second jobs are acquired through personal networks. In a study on informal sector participation in Romania, Kim (2005) found a similar mutual encouraging effect between husband's and wife's coping behaviour and argued that severe poverty might push more than one household member into informal work. Wage arrears encourage holding a second job. As can be seen from specification III, the time since shock has a significant impact on the participation response. Arrears which appeared a short period ago (3 months) have a significant positive impact, whereas earlier shocks do not show any significant effect. This supports our intuition, that the response horizon plays a crucial role in the coping reaction of individuals. Finally, sector employment plays an important role in the choice of second job holdings: Workers in the industry, administration and services sectors are significantly more

likely to hold a second job. Household income does not have any participation discouraging effect, quite similar to Kolev (1998); this points to the fact that second job holding is to a much lesser extent associated with poverty coping than subsidiary farming. The contrasting results between both coping strategies provide some affirmation for our approach of distinguishing between diverse activities.

Table 6 and 7 report the results for the pooled time allocation models in subsidiary farming and second job holding, respectively. Both models actually imply a two-stage selection on whether to participate in a certain activity and on how much time to devote to this activity. However, our preferred modelling choice – the Heckman selection model – is not applicable for the hour's equation in second job holdings due to the small number of observations for working hours. The weaker alternative we chose – the Tobit model – assumes the selection and the hour's determination to be driven by the same process. However, due to data limitations we are not left with better alternatives. For the hours in the subsidiary farming equation we do have sufficient data to perform the Heckman selection model. The Wald test rejects the hypotheses of independence of both equations at conventional levels of significance thus making the use of the two-stage procedure necessary. We provide two options for the most crucial issue in this model, the exclusion restriction. The first variable to identify the selection equation is a dummy indicating whether a worker prefers to work more hours. We believe this is a good choice since a wish to work more hours does not impact on the real hours supplied. This variable catches the impossibility of preferred hour's adaptations in the main job and thus gives one important motivation for second job holdings. However, it has to be kept in mind that hours censoring is only one-sided which adds non-parallelity to the dual job holding model. Unfortunately, this variable is only observed for those individuals usually working less than 40 hours, leaving us with a sample of only 1,477 individuals (sample A). The dummy resembles an indicator for partial compulsory leave and hence should foster being engaged in an additional activity. For the full sample (sample B) we use alternative exclusion restrictions such as an indicator whether a member of the household is employed in an agricultural enterprise. The rationale behind this choice is that subsidiary farming activities were and still are highly cross-subsidized from agricultural enterprises. Such subsidies impact on the participation decision, but not on the hours supply for subsidiary farming.

The demographic determinants of farming hours correspond to the ones in the participation equation: Women work more than 10 percent more hours, married persons about 13 percent

more. As compared to the participation equation, the latter effect is robust to the inclusion of a second household member dummy. Age increases, while education decreases the effort on the plot. The fact that better educated workers work less agricultural hours is supportive for our expectation from the theoretical considerations that individuals try to search for ways to make use of their human capital also in their coping activity. The sector patterns of specification (IV) further underline this point. Almost all sectors strongly reduce the number of hours as compared to agriculture and the effect is strongest for well-pay sectors with relatively high skill-requirements such as finance. Wage income uncertainty has a significantly positive effect on farming working hours and increases hours by 14 to 16 percent. For shocks which happened very recently or long time ago, this hours' increasing impact is much stronger. This confirms our expectation that for subsidiary farming activities the reaction horizon and the adaptation to the planting/harvesting season is crucial. Sample A is characterized by a negative time trend. One reason for the decline in farming activities could be found in the drop in agricultural output due to strong Winter frost in 2003 (cp. Figure 1). A bad harvest of the preceding year may imply lack of seeds for the following year for subsistence farmers.

The results of the hours equation for second job holdings yields qualitatively similar results (Table 7). However, two differences stand out. First, education impacts positively on hours supplied to second jobs. Second, wage income uncertainty does not have any statistically significant effect in general, but taking into account the timing of related shocks yields the opposite picture as compared to subsidiary farming: Arrears experienced only half a year ago have a strong and significantly positive impact on hours supplied to the second job.

Exploiting the panel structure of the data, we can investigate the determinants of the hours equation more accurately. The random effects estimation confirms our results from the pooled regression to a large extent (Table 8). As concerns the impact of the main labor market, we estimate time substitution elasticities between main job and subsidiary farming of around minus 0.20 which implies that a 10% increase of main job hours, reduces subsidiary farming hours by only 2.0%. Hence farming activity responds quite inelastic to hours adaptations in the main job. Second job holdings, on the contrary, respond much more elastic with a 10% increase of main job working time resulting in a 15% decrease for coping (Table 7). These results suggest that subsidiary farming has a strong "traditional" persistence while second job holdings substitute for missing main job hours as hypothesized in the descriptive section.

Workers in households with another coping individual do not differ in their time allocation behaviour from workers without other household members in farming activities. This result

stands in contrast to estimates from the pooled regression and fits better to our expectation that time allocation should rather be negatively affected. Again, the response time to income shocks plays a crucial role for workers' reactions. Having suffered from wage arrears one year ago results in a highly significant 35% increase of farming working hours today while a shock six months ago impacts less strongly and less significant. In the panel application, the reallocation of hours is twice as strong as in the pooled regression. Sector affiliation displays a high degree of importance and an inverse "earnings related" pattern. Workers in the financial sector, for instance, work only half the time of agricultural workers, while individuals in the educational sector do not differ from their colleagues in agriculture at all.

Finally, the panel estimation of time allocation for second job holders is characterized by very low overall precision due to the limited number of positive hour's observations. Despite this and the generally lower efficiency of the FE estimator, we find that our main variables of interest *wagearrear*, *arrear6M_IA*, and *arrear12M_IA* show the expected positive sign and are significant (Table 9). However, the effect of wage income uncertainty on second job moonlighting is rather small.

Despite a similar time allocation pattern for individuals suffering from payments in-kind, this shock variable has proofed to exercise limited effect on coping behaviour. In-kind payments have a weakly significant negative effect on working hours for plot farming. Two explanations are at hand to approach this surprising result: First, in-kind payments are – despite their unfavourable form – payments. Exchanging or directly consuming these products may exempt a person from suffering too serious losses. Second, employment-related shocks occur in enterprises which are fighting economic troubles. Thus it is not unrealistic that enterprises should impose both, wage arrears and in-kind payments, on their workers. In our sample, 61.5% of workers receiving their salary in-kind also suffer from wage arrears.

The income elasticity of hours spent on the farming plot ranges between -0.075 and -0.157 and is thus larger than in the before mentioned Yugoslavian moonlighting study (Reilly and Krstic 2003) but smaller than in the Russian case (Guariglia and Kim 2006). The size of the income elasticity might be influenced by the share of individuals using subsidiary farming "predominantly as leisure activity" rather than "predominantly as poverty coping". Uncovering the true reason is open for future research, in which one may try to measure this elasticity at different points of the income distribution. As should also be noted, the negative income elasticity implies that leisure is a normal good and thus lends confidence to the respective assumption of our model (cp. Smith Conway and Kimmel 1998).

Robustness checks

Our results can be infected by two types of bias. First, we check whether the assumption of inflexible work hours is crucial for the results. To do so, we restrict the sample to workers with fixed 40 hours across years. Doing so removes the control variable of main job hours. Qualitatively, the results do not change (results not shown).

Second, some recent labor allocation studies of commercial farmers have pointed to the potential simultaneity bias deriving from a joint determination of land holding and off-farm employment decisions (Goodwin and Holt 2002). Since our focus was rather on the "labor market uncertainty – time allocation" link than on portfolio strategies of commercial farmers, we have ignored the role of land holdings altogether. However, we believe that the widespread access to farming land and the moratorium on land sales which is in effect in Ukraine since the restitution of plots, makes the role of land holdings sufficiently unimportant for our analysis.

8. Conclusion and policy implications

As a main finding of this paper we present evidence for the structural difference between two coping activities which are used by Ukrainian workers to respond to wage income uncertainties. Our findings indicate that workers respond to labor market uncertainty mainly by reshuffling their time portfolio. The time dedicated to low-risk subsidiary farming, which is widespread in Ukraine, increases by about 14-32% after an income shock. Second job holdings are quantitatively less important coping mechanisms. Nevertheless, due to the short reaction time horizon (as compared to farming), we observe that workers enter second jobs in response to shocks. While second job holdings allow for short- or medium-run reactions, agricultural response requires an adaptation to the agricultural business cycle. This result lends support to our hypothesis that the implementation time of coping strategies determines the activity choice of workers.

Other important determinants of labor supply decisions are the coping behaviour of other household members and the sector affiliation of workers. The former has a surprisingly positive impact on the moonlighting participation, a finding which is in line with the literature on other transition countries (Kim 2005). We explain these clustered coping activities with the specific structure of these jobs. Farming activities exhibit peak times in favour of joint work,

while second job holdings may be obtained through personal networks. Household income impacts negatively on the participation in farming and on the hours supplied.

The different impact of demographic characteristics on the propensity to engage in either of the activities supports our hypothesis, that human capital plays a distinct role for second job holdings while life cycle variables are more relevant for subsidiary farming. Education is the "dividing force" between activities: high skills discourage agricultural production and foster second job holding. As noted before, the latter result stands in contrast to the literature. Women engage more often in subsidiary farming. However, their over proportional share in second job holdings found in the descriptive statistics disappears after controlling for various other variables. In sum, our results support the expectation that treating coping strategies of diverse motivations and characteristics differently can substantially add to the analysis of moonlighting.

Our results have policy implications at the macro and the micro level. On the state level, three aspects prevail: First, labor markets in Ukraine are still not very flexible in terms of contracted working hours. The vast majority of contracts are full-time with little scope for adaptation. This leads to a surprising low level of second job holdings. Second, the low level of second job holdings and the simultaneous high prevalence of agricultural subsidiary production point to the potentially foregone tax revenues due to the contractual inflexibility. Third, since the food production of Ukraine is heavily dependent on subsidiary plots, workers contribute a substantial share to food security in the country.

For individual workers, employment in coping activities may involve serious skill depreciation, especially since the phenomenon is widespread also among younger workers. As a food securing coping strategy, engagement into these activities might be efficient, but workers are endangered of being locked into coping activities. Furthermore, informal coping activities in general and subsidiary farming specifically, do not contribute to pension funds. As a result coping with labor market income uncertainty may have adverse long-run consequences for individual welfare.

Acknowledgement

I thank the ESCIRRU consortium for making available the ULMS data and Natalia Weisshaar for helpful comments. The usual disclaimer applies.

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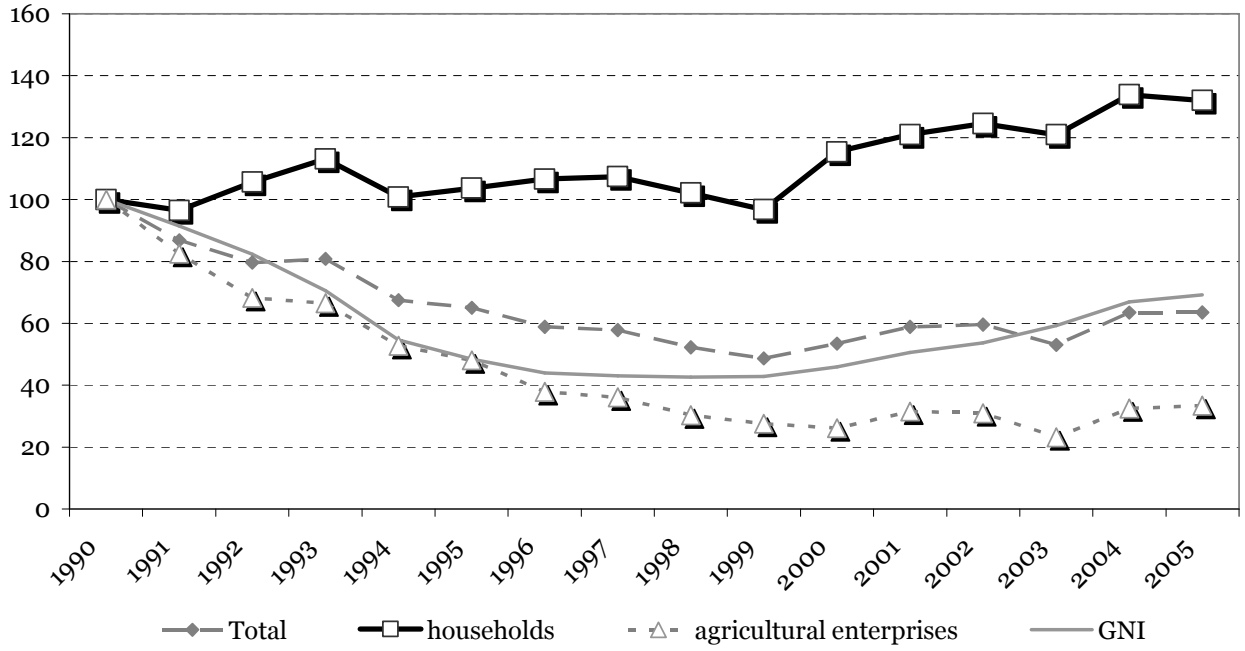
Appendix

Figure 1: Agricultural production in Ukraine



Source: State Statistics Commitee of Ukraine 2007; author's calculations;
the decline in production in 2003 is related to crop failure as a consequence of strong frost.

Table 1: Variable overview

variable		N	mean	sd	min	max
subsid	subsidiary farming	5,625	.594	.491	0	1
secjob	second job holding	5,625	.018	.133	0	1
hrssub	hours spent on the farm plot last week	3,036	15.6	14.6	0	99
hrsothJ	sum of hours spent in all other activities last week (excluding subsid)	5,625	.332	2.43	0	51.5
hrs2ndjob	sum of hours spent in all second jobs last week	5,625	.089	.848	0	24
othsubHH	other household member engaged in subsid	5,625	.578	.494	0	1
othsecjobHH	other household member engaged in second job	5,625	.011	.102	0	1
logincpc	log of (per capita HH income minus subsidiary and second job income + 1)	3,735	5.27	.724	-1.1	8.23
hrsLW	hours spent in main job last week	5,625	41.6	11.8	1	99
wagearrear	respondent suffered from wage arrears in the main job	5,625	.110	.313	0	1
inkind	respondent suffered from inkind payments in the main job	5,625	.060	.238	0	1
female	respondent is female	5,625	.512	.500	0	1
age	age of respondent	5,625	39.0	10.5	16	59
married	respondent is married or lives in cohabition	5,625	.712	.453	0	1
adyedu	adjusted years of schooling	5,625	11.9	2.18	4	15
ukrainian	respondent prefers to speak Ukrainian (ethnic proxy)	5,625	.418	.493	0	1
distance	distance to agricultural land index	5,625	3.54	2.01	1	6
village		5,625	.285	.452	0	1
town		5,625	.267	.442	0	1
city		5,625	.448	.497	0	1
Kiev		5,625	.064	.244	0	1
West		5,625	.203	.402	0	1
East		5,625	.246	.431	0	1
Center		5,625	.234	.423	0	1
South		5,625	.254	.435	0	1
arrear*M_IA	wage arrear (* = three, six, nine or twelve) months ago				0	1
sectors	agriculture, industry, electricity, construction, sale, transport, finance, administration, education, services				0	1

Source: ULMS 03-04; author's calculation

Table 2: Workers' profiles and coping activities

	Total	subsidiary farming yes	subsidiary farming no		second job yes	second job no	
other household member in activity		.855	.171	***	.324	.005	***
wage arrear	.110	.129	.082	***	.137	.11	
inkind payment	.060	.085	.024	***	.069	.060	
hours in main job	41.6	40.9	42.5	***	36.3	41.7	***
female	.512	.512	.512		.588	.511	*
age	39.0	40.2	37.3	***	39.1	39.0	
married	.712	.768	.629	***	.725	.712	
years of education	11.9	11.8	12.1	***	13.1	11.9	***
ukrainian	.418	.518	.272	***	.382	.419	
village	.285	.430	.073	***	.255	.286	
town	.267	.317	.193	***	.235	.267	
city	.448	.253	.734	***	.510	.447	
Kiev	.064	.015	.135	***	.088	.063	
West	.203	.246	.139	***	.304	.201	***
East	.246	.233	.264	***	.176	.247	*
Center	.234	.294	.147	***	.176	.235	*
South	.254	.211	.315	***	.255	.253	
N	5,625	3,342	2,283		102	5,523	

* significant at 10%; ** significant at 5%; *** significant at 1%
Source: ULMS 03-04; author's calculations.

Table 3: Working time allocation

type of wage income uncertainty			Total	no wage arrear	wage arrear	diff. sig
wage arrear	Hours main job	mean	41.6	41.6	41.4	
	Hours second jobs	mean	0.09	0.08	0.18	***
	Hours subsidiary farming	mean	15.6	14.8	20.7	***

			Total	no inkind pay	inkind pay	diff. sig
inkind pay	Hours main job	mean	41.6	41.4	43.4	***
	Hours second jobs	mean	0.09	0.08	0.22	***
	Hours subsidiary farming	mean	15.6	14.9	23.3	***

* significant at 10%; ** significant at 5%; *** significant at 1%
Source: ULMS 03-04; author's calculations.

Figure 2a: Hours worked in main job

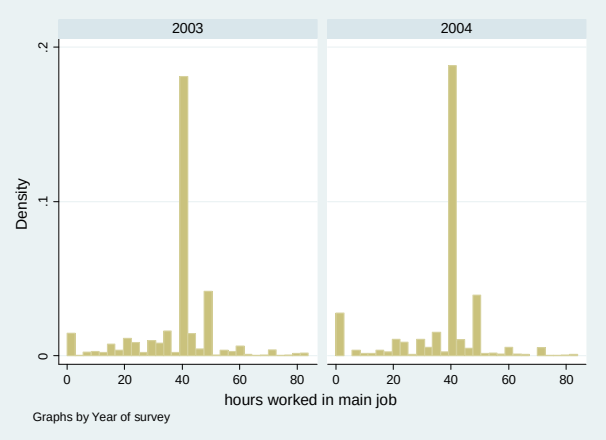


Figure 2b: Hours worked in subsidiary farming

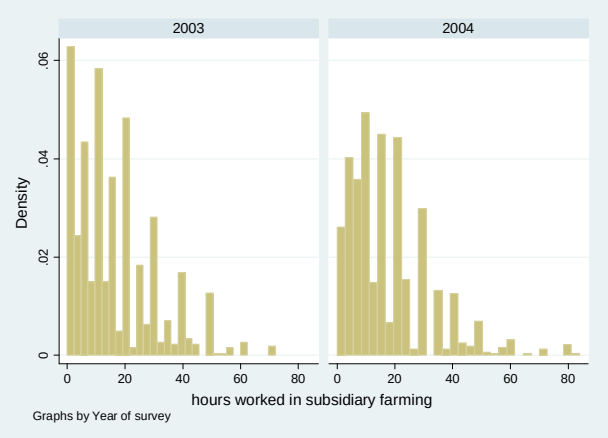


Figure 2c: Hours worked in second jobs (total)

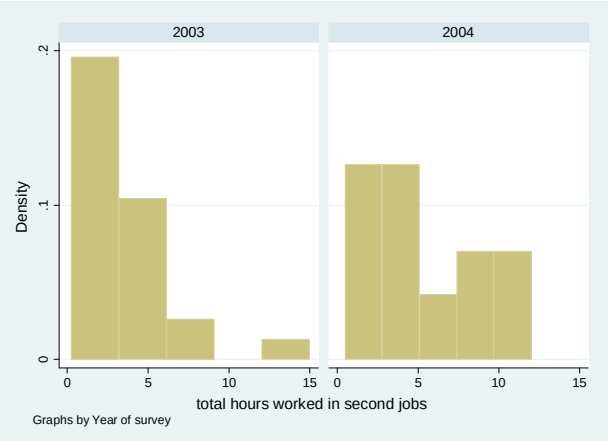


Figure 3a: Predicted time allocation between main job and subsidiary farming*

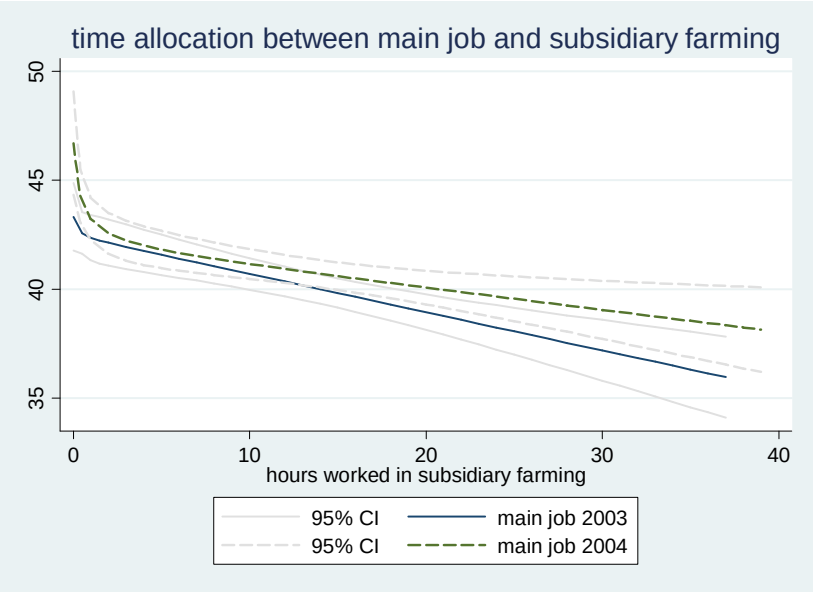


Figure 3b: Predicted time allocation between main job and other jobs*

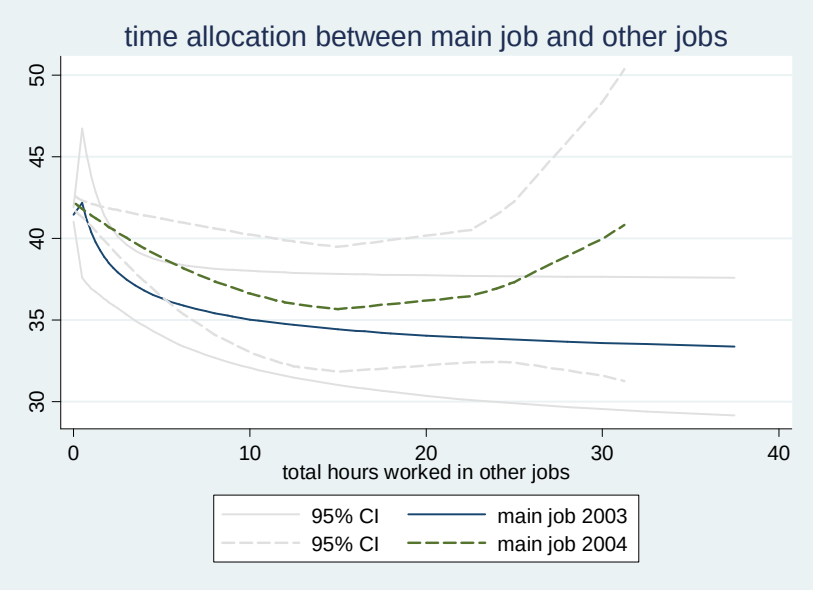


Figure 4a: Predicted time spent in subsidiary farming by age*

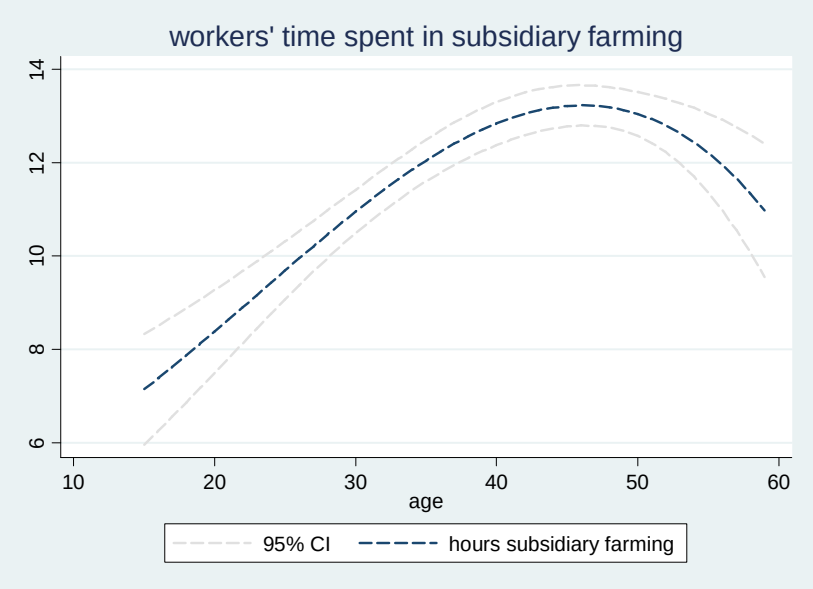


Figure 4b: Predicted time spent in other job activities by age*

* prediction from fractional polynomial estimation;
Source: ULMS 03-04; author's calculations

Table 4: Probit model: participation equation (marginal effects)

	participation in subsidiary farming			
	baseline model	other HH member	arrear timing	sectors
logincpc	-0.015	-0.060	-0.060	-0.058
	(1.00)	(3.52)***	(3.55)***	(3.34)***
inkind	0.037	0.008	0.010	-0.008
	(0.78)	(0.14)	(0.19)	(0.13)
wagearrear	0.008	-0.012	-0.004	-0.016
	(0.27)	(0.33)	(0.10)	(0.44)
loghrsMJ	-0.080	-0.057	-0.056	-0.054
	(2.74)***	(1.94)*	(1.90)*	(1.82)*
age	0.007	0.018	0.018	0.018
	(1.01)	(2.32)**	(2.30)**	(2.33)**
age2	-0.002	-0.017	-0.017	-0.018
	(0.20)	(1.73)*	(1.72)*	(1.76)*
female	0.054	0.064	0.064	0.059
	(2.67)***	(2.94)***	(2.96)***	(2.56)**
married	0.103	0.023	0.023	0.023
	(4.58)***	(1.00)	(0.99)	(0.98)
adyedu	0.008	0.007	0.007	0.006
	(1.79)*	(1.42)	(1.42)	(1.25)
ukrainian	0.015	0.013	0.013	0.014
	(0.54)	(0.42)	(0.44)	(0.44)
distance	-0.128	-0.077	-0.077	-0.076
	(21.99)***	(11.89)***	(11.87)***	(11.34)***
Kiev	-0.247	-0.170	-0.170	-0.165
	(4.66)***	(3.24)***	(3.25)***	(3.12)***
West	0.005	-0.007	-0.007	-0.006
	(0.15)	(0.20)	(0.22)	(0.17)
East	0.022	-0.016	-0.016	-0.014
	(0.67)	(0.48)	(0.47)	(0.40)
South	-0.105	-0.083	-0.083	-0.082
	(3.26)***	(2.51)**	(2.53)**	(2.48)**
time	0.047	-0.000	-0.001	0.001
	(0.51)	(0.00)	(0.01)	(0.01)
othsubHH		0.629	0.629	0.629
		(32.01)***	(32.00)***	(31.96)***
arrear timing			insignificant	
sectors				insignificant
Month FE			YES	
Observations	3735	3735	3735	3735
Pseudo R-squared	0.24	0.46	0.46	0.46
F-test	968.900	1641.811	1651.021	1651.335

Robust z statistics in parentheses
* significant at 10%; ** significant at 5%; *** significant at 1%
Base categories: June (month), Center (region), Agriculture (sector)
Source: ULMS 03-04; author's calculations

Table 5: Probit model: participation equation (marginal effects)

	participation in second job holding			
	baseline model	other HH member	arrear timing	sectors
logincpc	-0.002	-0.002	-0.002	-0.003
	(0.57)	(0.75)	(0.58)	(0.94)
inkind	-0.003	-0.005	-0.004	0.004
	(0.32)	(0.76)	(0.35)	(0.34)
wagearrear	0.015	0.008	0.013	0.014
	(2.06)**	(1.23)	(1.78)*	(2.13)**
loghrsMJ	-0.011	-0.009	-0.011	-0.011
	(2.34)**	(2.24)**	(2.34)**	(2.32)**
age	0.004	0.005	0.004	0.004
	(2.54)**	(2.69)***	(2.57)**	(2.46)**
age2	-0.006	-0.006	-0.006	-0.005
	(2.65)***	(2.83)***	(2.68)***	(2.57)**
female	0.000	-0.003	0.000	0.001
	(0.02)	(0.75)	(0.02)	(0.29)
married	0.001	0.001	0.002	0.001
	(0.35)	(0.29)	(0.37)	(0.33)
adyedu	0.004	0.003	0.004	0.004
	(4.46)***	(3.32)***	(4.45)***	(4.42)***
ukrainian	-0.007	-0.001	-0.007	-0.007
	(1.28)	(0.24)	(1.28)	(1.40)
Kiev	0.009	0.010	0.009	0.009
	(0.84)	(1.04)	(0.86)	(0.89)
West	0.017	0.008	0.017	0.016
	(2.14)**	(1.24)	(2.15)**	(2.13)**
East	-0.004	0.001	-0.004	-0.005
	(0.59)	(0.24)	(0.57)	(0.75)
South	0.005	0.007	0.005	0.004
	(0.71)	(1.10)	(0.72)	(0.68)
time	-0.003	-0.004	-0.003	-0.003
	(0.72)	(1.02)	(0.70)	(0.69)
othsecjobHH		0.455		
		(8.43)***		
arrear3M_IA			0.277	
			(1.64)*	
arrear6M_IA			0.282	
			(1.51)	
arrear9M_IA			0.246	
			(1.55)	
arrear12M_IA			0.249	
			(1.61)	
industry				0.023
				(2.29)**
administration				0.040
				(2.28)**
services				0.027
				(1.75)*
Observations	3747	3747	3747	3747
Pseudo R-squared	0.07	0.20	0.07	0.09

Robust z statistics in parentheses
* significant at 10%; ** significant at 5%; *** significant at 1%
Base categories: Center (region), Agriculture (sector)
Variables omitted from the Table: village, town, electricity, construction, sale, transport, finance, education (all insignificant)
Source: ULMS 03-04; author's calculations

Table 6: Heckman selection model: pooled hours equation

	(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)
	baseline model		other HH member		arrear timing		sectors	
	sample A	sample B	sample A	sample B	sample A	sample B	sample A	sample B
logincpc	-0.089	-0.075	-0.095	-0.084	-0.092	-0.092	-0.088	-0.091
	(2.65)***	(2.73)***	(2.84)***	(3.03)***	(2.72)***	(3.34)***	(2.65)***	(3.34)***
inkind	-0.057	-0.207	-0.097	-0.212	-0.102	-0.074	-0.186	-0.156
	(0.60)	(1.90)*	(1.00)	(2.02)**	(1.05)	(0.88)	(1.78)*	(1.72)*
wagearrear	0.154	0.150	0.139	0.141	0.138	0.152	0.135	0.161
	(2.15)**	(2.37)**	(1.94)*	(2.25)**	(1.87)*	(2.33)**	(1.91)*	(2.62)***
loghrsMJ	-0.212	-0.228	-0.212	-0.227	-0.216	-0.223	-0.217	-0.222
	(3.49)***	(4.40)***	(3.50)***	(4.39)***	(3.54)***	(4.34)***	(3.50)***	(4.27)***
age	0.055	0.052	0.057	0.053	0.058	0.049	0.056	0.052
	(3.38)***	(3.51)***	(3.48)***	(3.58)***	(3.57)***	(3.26)***	(3.42)***	(3.54)***
age2	-0.058	-0.053	-0.061	-0.054	-0.063	-0.052	-0.060	-0.055
	(2.79)***	(2.83)***	(2.95)***	(2.91)***	(3.05)***	(2.80)***	(2.93)***	(2.94)***
female	0.129	0.019	0.125	0.012	0.123	0.112	0.108	0.111
	(3.00)***	(0.30)	(2.89)***	(0.19)	(2.84)***	(2.87)***	(2.43)**	(2.77)***
married	0.132	-0.016	0.129	-0.029	0.129	0.131	0.130	0.129
	(2.48)**	(0.19)	(2.43)**	(0.35)	(2.43)**	(2.79)***	(2.48)**	(2.79)***
adyedu	-0.027	-0.013	-0.027	-0.014	-0.028	-0.017	-0.033	-0.020
	(2.62)***	(1.45)	(2.66)***	(1.53)	(2.73)***	(1.91)*	(3.17)***	(2.20)**
ukrainian	0.060	-0.098	0.039	-0.103	0.033	0.063	0.029	0.057
	(0.86)	(0.90)	(0.56)	(1.00)	(0.47)	(1.15)	(0.43)	(1.03)
distance	-0.098	-0.118	-0.082	-0.114	-0.080	-0.094	-0.079	-0.083
	(3.91)***	(8.48)***	(3.41)***	(8.14)***	(3.33)***	(5.34)***	(3.18)***	(4.45)***
time	-0.478	0.032	-0.419	0.034	-0.420	0.080	-0.332	0.034
	(4.71)***	(0.12)	(3.52)***	(0.13)	(3.53)***	(0.29)	(2.23)**	(0.13)
othsubHH			0.211	0.174	0.208	0.169	0.200	0.165
			(2.88)***	(2.99)***	(2.83)***	(2.86)***	(2.78)***	(2.84)***
arrear3M_IA					0.092	0.053		
					(2.75)***	(2.19)**		
arrear6M_IA					-0.098	-0.060		
					(1.12)	(1.82)*		
arrear9M_IA					-0.028	-0.025		
					(0.33)	(0.65)		
arrear12M_IA					0.013	0.036		
					(0.45)	(1.40)		
industry							-0.257	-0.250
							(3.02)***	(3.62)***
electricity							-0.170	-0.100
							(1.22)	(0.87)
construction							-0.510	-0.450
							(3.64)***	(3.52)***
sale							-0.358	-0.344
							(3.90)***	(4.18)***
transport							-0.091	-0.063
							(0.92)	(0.76)
finance							-0.519	-0.476
							(3.04)***	(2.95)***
administration							0.090	0.074
							(0.83)	(0.74)
education							-0.123	-0.162
							(1.50)	(2.36)**
services							-0.338	-0.284
							(3.07)***	(3.04)***
Constant	3.747	3.698	3.574	3.584	3.571	3.132	3.676	3.214
	(8.32)***	(6.65)***	(8.00)***	(6.58)***	(8.01)***	(6.45)***	(8.03)***	(6.73)***
Month FE					YES			
Region FE					YES			
Observations	2587	4151	2587	4151	2587	4151	2587	4151
Logpseudolikelihood	-3100.09	-4752.47	-3089.85	-4747.72	-3087.35	-4523.76	-3068.92	-4586.81
Wald test of indep equ	2.823	4.883	5.103	5.819	5.259	6.784	2.711	4.817
F-test	256.510	258.704	229.591	266.718	242.680	236.917	278.866	347.568

Robust z statistics in parentheses
* significant at 10%; ** significant at 5%; *** significant at 1%
Base categories: June (month), Center (region), Agriculture (sector)
Source: ULMS 03-04; author's calculations

Table 7: Tobit model: pooled hours equation second job holding

	(1) baseline model	(2) other HH member	(3) arrear timing	(4) sectors
wagearrear	0.535	0.102	0.267	0.648
	(1.12)	(0.23)	(0.53)	(1.35)
inkind	0.684	0.657	0.361	1.197
	(0.89)	(1.14)	(0.43)	(1.59)
loghrsMJ	-1.524	-1.114	-1.499	-1.503
	(4.49)***	(3.68)***	(4.41)***	(4.35)***
age	0.370	0.375	0.376	0.359
	(2.70)***	(2.96)***	(2.73)***	(2.61)***
age2	-0.493	-0.515	-0.503	-0.480
	(2.78)***	(3.13)***	(2.82)***	(2.71)***
female	-0.067	-0.275	-0.042	-0.012
	(0.19)	(0.91)	(0.12)	(0.03)
married	-0.105	-0.134	-0.114	-0.102
	(0.29)	(0.41)	(0.32)	(0.28)
adyedu	0.354	0.184	0.353	0.358
	(4.32)***	(2.58)***	(4.33)***	(4.26)***
ukrainian	-1.123	-0.391	-1.084	-1.082
	(2.33)**	(0.97)	(2.27)**	(2.29)**
Kiev	0.507	0.935	0.517	0.361
	(0.72)	(1.59)	(0.74)	(0.52)
West	1.152	0.664	1.177	1.111
	(2.10)**	(1.45)	(2.16)**	(2.05)**
East	-0.504	0.232	-0.531	-0.563
	(0.89)	(0.47)	(0.95)	(0.99)
South	0.068	0.511	0.095	0.058
	(0.13)	(1.09)	(0.18)	(0.11)
time	0.066	0.049	0.100	0.058
	(0.23)	(0.17)	(0.35)	(0.21)
othsecjobHH		6.479		
		(15.56)***		
arrear6M_IA			0.225	
			(2.09)**	
arrear12M_IA			-0.037	
			(0.33)	
transport				1.429
				(1.75)*
services				1.415
				(1.65)*
Constant	-13.133	-11.857	-13.199	-13.867
	(4.34)***	(4.16)***	(4.40)***	(4.54)***
Observations	5625	5625	5625	5625
uncensored observations	102	102	102	102
log likelihood	-619.206	-546.955	-614.710	-616.181
sigma	3.820	3.249	3.766	3.801

Robust z statistics in parentheses
Robust standard errors clustered by individual were computed through interval regressions.
* significant at 10%; ** significant at 5%; *** significant at 1%
Variables omitted from the Table: industry, electricity, construction, sale, finance, administration, education (all insignificant)
Source: ULMS 03-04; author's calculations

Table 8: Random effects model: Hours spent in subsidiary agriculture

	(1) RE baseline model	(2) other farmer in HH	(3) arrear timing	(4) sectors
logincpc	-0.156	-0.157	-0.148	-0.145
	(2.64)***	(2.66)***	(2.51)**	(2.48)**
wagearrear	0.294	0.294	0.322	0.312
	(2.84)***	(2.84)***	(2.96)***	(2.97)***
inkind	-0.271	-0.270	-0.274	-0.324
	(1.77)*	(1.76)*	(1.80)*	(2.01)**
loghrsMJ	-0.204	-0.204	-0.211	-0.201
	(2.17)**	(2.18)**	(2.20)**	(2.07)**
age	0.063	0.065	0.065	0.068
	(1.29)	(1.31)	(1.31)	(1.36)
age2	-0.061	-0.063	-0.063	-0.069
	(1.06)	(1.08)	(1.08)	(1.16)
married	0.025	0.025	0.025	0.018
	(0.30)	(0.29)	(0.29)	(0.21)
adyedu	-0.021	-0.020	-0.021	-0.024
	(1.20)	(1.19)	(1.25)	(1.36)
distance	-0.336	-0.335	-0.343	-0.309
	(7.87)***	(7.83)***	(7.94)***	(7.08)***
time	0.084	0.083	0.090	0.052
	(0.26)	(0.26)	(0.28)	(0.16)
othsubHH		-0.470		
		(3.45)***		
arrear3M_IA			0.310	
			(2.78)***	
arrear6M_IA			0.283	
			(2.46)**	
arrear9M_IA			0.344	
			(2.97)***	
arrear12M_IA			0.346	
			(3.22)***	
industry				-0.235
				(1.65)*
finance				-0.530
				(2.03)**
Constant	3.660	4.102	3.631	3.643
	(3.06)***	(3.56)***	(3.02)***	(3.01)***
Month FE		YES		
Region FE		YES		
Observations	740	740	740	740
Number of id	370	370	370	370
Rho	0.22	0.22	0.22	0.20
R2_overall	0.257	0.258	0.260	0.274
R2_between	0.319	0.320	0.321	0.346

Robust z statistics in parentheses
* significant at 10%; ** significant at 5%; *** significant at 1%
Base categories: June (month), Center (region), Agriculture (sector)
Variables omitted from the Table: electricity, construction, sale, transport, administration, education, services (all insignificant)
Source: ULMS 03-04; author's calculations

Table 9: Fixed and Random effects model: Hours spent in second job

	(1) FE baseline model	(2) RE baseline model	(3) FE arrear timing	(4) RE arrear timing
wagearrear	0.069	0.046	0.044	0.012
	(1.77)*	(2.05)**	(1.06)	(0.47)
inkind	0.005	0.029	-0.004	0.023
	(0.10)	(0.98)	(0.13)	(0.93)
loghrsMJ	-0.034	-0.043	-0.028	-0.039
	(1.19)	(1.68)*	(1.05)	(1.57)
adyedu	0.003	0.006	0.001	0.006
	(0.24)	(1.87)*	(0.08)	(1.84)*
Kiev		-0.009		-0.008
		(0.60)		(0.58)
West		0.029		0.035
		(2.03)**		(2.37)**
East		0.033		0.030
		(1.66)*		(1.69)*
South		0.039		0.041
		(1.98)**		(2.04)**
arrear6M_IA			0.015	0.014
			(1.73)*	(1.72)*
arrear12M_IA			0.019	0.020
			(1.85)*	(2.06)**
time	0.026	0.023	0.018	0.027
	(2.22)**	(2.13)**	(1.56)	(2.54)**
Constant	0.161	0.112	-1.840	0.032
	(0.62)	(1.15)	(1.32)	(0.27)
Observations	1814	1814	1814	1814
R-squared	0.01		0.08	
Rho	0.49	0.28	0.62	0.29
R2_overall	0.010	0.016	0.003	0.056
R2_between	0.009	0.020	0.001	0.046

Robust t statistics in parentheses
* significant at 10%; ** significant at 5%; *** significant at 1%
Sector regression omitted (all insignificant), other HH member regression omitted (dropped in FE)
Variables omitted from the Table: age, age2, married (all insignificant)
Source: ULMS 03-04; author's calculations