THE INCIDENCE OF WAGE
ARREARS IN UKRAINE:
EVIDENCE FROM ENTERPRISE
AND HOUSEHOLD LEVEL
DATA

by

Olena Gryshyna

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Abstract

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Chairperson of the Supervisory Committee: Professor Serhiy Korablin
Institute of Economic Forecasting at the Academy of Science of Ukraine

In Ukraine, employers adjusted to slowdown of economic activities and to the consequent fall in revenues not through labour force lay-offs, but through wages paid in barter form and through wage arrears. Applying Probit estimation techniques, I develop an empirical study of the determinants of wage arrears in Ukraine and compare them with those in the Russian Federation. My analysis draws upon nationally representative household-level data together with firm-level data to show that wage arrears are spread in both private and state sectors throughout the economy. It is shown that individual characteristics of workers (such as age and gender) are less contributive to the incidence of wage arrears than the characteristics of the enterprises. My analysis also suggests that for firms, among the most significant determinants of wage arrears are regional location, industrial affiliation and type of ownership. My results are comparable to the results estimated for the Russian Federation by Lehmann et al. (1999) and Earle and Sabirianova (2000). I also show that economic factors, such as changes in net profits, bartered sales, and unpaid leaves determine the incidence of wage arrears. For both, firms and individuals, I attempt to investigate factors that influence the length of wage arrears.

TABLE OF CONTENTS

List of TABLES

LIST OF FIGURES

ACKNOWLEDGMENTS

GLOSSARY

KIIS. The Kyiv International Institute of Sociology.

Marginal Effects Probit Model. The model that shows how the derivative of the probability of a dichotomous dependent variable from corresponding probit model with respect to x varies with the level of x and other variable in the model.

Oblast. Subnational administrative unit in Ukraine. There are 24 oblasts in Ukraine.

Ordered Probit Model. Multinomial choice model in which dependent variable has several alternatives (1, 2, 3, …) that are logically ordered.

Probit Model. Type of the binary choice models in which dichotomous dependent variable y_i takes on values of 1 or 0. The model states that probability of having $y_i = 1$ depends on the vector x_i containing individual characteristics. To explain the behavior of a dichotomous dependent variable, standard normal distribution function is used in the model.

RLFS. Russian Labour Force Survey.

"smt" or "selysche miskogo typu". In Ukraine, settlement of size up to 10,000 residents.

UELFS. Ukrainian Enterprise Labour Flexibility Survey.

INTRODUCTION

Wage arrears are one of the most controversial phenomena that have come out in the transition economies. Wage non-payments can be found in different industries from different regions. The workers with various individual and social characteristics are found to be subject to wage arrears of different size. In other words, wage arrears are like a dangerous disease that penetrates the whole economy and damages its fundamentals.

The countrywide and industry-wide patterns of the delays in wage payments differ from those in the countries with developed market economies, where only small start-up firms or firms-bankrupts may occasionally be liable to wage arrears. [Earle and Sabirianova (1999)]. In contrast, in the Commonwealth of Independent States' ("CIS") economies, such as Russia and Ukraine, wage arrears have persisted and grown over time [Earle and Sabirianova (1999), Lehmann *et al.* (1999)]. In these countries, employers adjusted to slowdown of economic activities and to fall in revenues not through increasing labour force lay-offs, but through wages paid in barter form and through wage arrears.

In Ukraine, the growth of the delays in wage payments began after the initial financial stabilization in the end of 1994. Since that time, wage arrears have grown from UAH 575 million in the fourth quarter of 1995 to UAH 5,827 million as of October 1, 2000 [UEPLAC (2000)]. The workers from various industries and from different regions are affected across the whole country. Some spheres, such as health, education, mining, agriculture, are more likely to be subject to wage non-payments than others. Among the Ukrainian regions ("oblasts") that are characterised by the highest levels of the wage arrears are such

Eastern oblasts as Luhansk (UAH 528.2 million) and Dnipropetrovsk (UAH 506.4 million) regions [UEPLAC (2000)].

The investigation of wage arrears in the countries of Former Soviet Union has begun in the middle nineties. The analysis was primarily carried out for the Russian Federation and was done on the basis of the longitudinal survey of the Russian households. Lehmann, Wadsworth, and Acquisti (1999) determined the motives the firms had to not just sporadically, but regularly withhold wage payments from their workers. They also tried to explain why wage arrears persisted, i.e. why did the employed who suffer wage arrears not quit these firms. Earle and Sabirianova (2000) presented the model of managerial choice of wage delays that implied a possibility of multiple equilibria in the levels of arrears. Econometric analysis showed that workers' responses to wage delays are attenuated by local labor market arrears.

While in Ukraine wage arrears seem to be more widespread than in any other republic of the Former Soviet Union, little studies of this problem have been made on the micro level so far. In this paper, I make an attempt to find the answers to the following questions: what are the determinants of incidence of wage arrears by industry? what workers are mostly affected by non-payments? why do workers tolerate wage arrears? what influences the duration of wage arrears? For doing that, I try to investigate the determinants of the incidence of wage arrears in Ukraine and compare them with those in the Russian Federation. Also, I try to find out which categories among workers are most affected by delays in wage payments. For this, I consider the workers with various individual (age, gender) characteristics.

Exploring regional differences in the state of the labour market among the employed, I also attempt to explain why people agree to be unpaid for such a long period. Using the fact that demand and supply for labour differ among the

regions of the country, I try to explain why workers tolerate wage non-payments and do not quit the jobs for which they do not receive any payments. According to Lehmann, Wadsworth, and Acquisti (1999), employed individuals who face wage arrears move to new jobs actively only in the largest cities of the Russian Federation. In this case, workers face a dynamic labour market with many outside options that allow them to move. In the provinces the workers simply do not have jobs to move to. In Ukraine, this is particularly true for the industrial towns of Donetsk-Dnipropetrovsk region, where the mining and heavy industries constitute significant part of the industrial output and which were badly hurt by the prolonged decline in economic activity. Wage arrears are also widespread in some Western regions, such as Lviv and Ivan-Frankivsk. I test the hypothesis stated above using the data of the survey "Ukraine Small and Medium Enterprises Survey," conducted by the Kyiv International Institute of Sociology in February-July of 1999.

One of the hypotheses that can be explored is that enterprise performance (changes in net profits) determines the probability of wage arrears for a certain firm. If net profits of the firm increase, firm is less likely to be subject to wage arrears. And vice versa, if net profits decrease, the firm has more incentives to increase wage arrears. Another hypothesis is that value of the sales of the firm made in barter form also determine the incidence of wage arrears within a firm: the higher the percentage of sales were paid in barter form, the higher is the probability of wage arrears for this firm. In this case, the firm faces liquidity problems and simply does not have cash to pay its workers.

The paper is organized as follows. Chapter 2 presents a short overview of the literature on the problem concerned and offers empirical and theoretical evidence with a view to justifying the hypotheses. In Chapter 3, the description of the data sets as well as the analysis of the social, regional and industrial allocation of wage

non-payments in Ukraine in dynamic perspective is given. The hypotheses are formulated taking into account limitations imposed by data set and described earlier in this chapter. Chapter 4 contains econometric specifications and findings, comparing the latter with the results obtained by Lehmann, Wadsworth, and Acquisti (1999) for the Russian Federation. Also, results of Ordered Probit estimation are presented. Chapter 5 concludes with the discussion of the results and examines possible policy implications of the analysis. By using complementary data sets – firms and individuals, it becomes possible to present the picture of the incidence of wage arrears on the micro level in Ukraine for the first time.

WAGE ARREARS IN THE CIS

The transition process in the republics of the Former Soviet Union, such as Russian Federation, has been accompanied by the rise of many distinguishing economic phenomena, the most peculiar of which seems to be an increase in the non-payment of wages. In such countries, wage arrears are spread over the whole economy, covering all the industries in all the regions. A significant share of the labour force has suffered from delays in wage payments for several months. In some firms, the managers use very inefficient form of payment for the job performed by workers, i.e., wages paid in kind.

Against the background of economy-wide recession, wage arrears seem to be like an incurable disease that undermines the health of the whole economy. On the one hand, wage arrears create disincentives for the workforce to work efficiently. The workers do not care to increase the productivity of the labour, for which they are non-paid. According to Lehmann *et al.* (1999), the firms use wage delays as a measure to adjust their cost schedules. On the one hand, wage arrears keep employment up, but, on the other, they do not allow the economy to utilize the factors of production efficiently. Meanwhile, wage arrears cause the spreading of poverty across the country and throughout numerous social groups.

In this chapter I first review the contributions of the existing literature, then I present short overview of the dynamics of wage arrears in Ukraine, and finally I describe the major participants on the Ukrainian labour market and show the relationships between them, which then allow me to formulate hypotheses on the determinants of wage arrears in Ukraine.

2.1. Previous research

In economic literature, the most interesting investigations of the problem of wage arrears in transition economies have been made during the period of 1996-2000. During this time, wage arrears emerged and expand throughout the post-Soviet economies, in particular, in the Russian Federation and Ukraine. One common feature of all the researches is that the analysis has been primarily made for the Russian Federation and was done on the basis of the longitudinal survey of the Russian households. In my case, the data available for analysis are of the cross-sectional type: thus, there is no possibility to investigate the dynamics of wage withholding process in Ukraine. Nevertheless, the findings of the following researches are very useful both in terms of formulating possible hypothesis for testing as well as in terms of econometric methods to be applied.

Investigation of the labour market in Russia has treated wage arrears as a special form of the cost adjustment mechanism for the firms. The firms, facing the liquidity constraints, adjusted to new conditions by increasing the delays in wage payments.

Alfandari and Schaffer (1996) present an analysis of payment arrears in the Russian enterprise sector, focusing on trade credit arrears, tax arrears, and wage arrears. It is found that contrary to the standard view of an ongoing "inter-enterprise arrears crisis" in Russia, levels of arrears in Russia are comparable to those found both in other transition economies and in Western market economies. Another conclusion is that trade credit arrears and inflation are closely inversely correlated, probably because when macro policy is being tightened, firms try to create liquidity by extending payment periods. I can explore a similar hypothesis in my analysis of incidence of wage arrears in Ukraine by using multivariate regression analysis.

Earle and Sabirianova (2000) present the model of managerial choice of wage delays that implies a possibility of multiple equilibria in the levels of arrears. They study three equilibria, distinguishing two that are stable – the punctual payment equilibrium" and the "late payment equilibrium" – and one unstable "critical mass equilibrium", a threshold of arrears in the local labour market beyond which even profitable firms may adopt in practice.

The most interesting from this paper for my study is the stylized model of managerial decisions suggested by the authors. The assumptions of the model are the following. The authors consider a firm with a single manager who maximizes his or her private net benefits by choosing the level of back wages owed to a particular employee. This level can be thought as the loan from the worker to the firm and can vary according to certain characteristics of the firm such as liquidity needs of the firm, the effective interest rate it faces in borrowing from other sources etc. The manager faces the costs of wage arrears as well. The model permits worker response to arrears leading to several types of costs: reduced effort, increased labour turnover, more protests and lawsuits. These are the costs generated by wage arrears. Thus the model is that the manager chooses the level of back wages to maximize the expected net return to wage arrears (which is marginal return of wage arrears minus marginal costs of wage arrears). The authors derive the reaction function for wage arrears and solve for Nash equilibria.

Results of this investigation can be summarized as follows. Econometric analysis shows that workers' responses to wage delays are attenuated by local labor market arrears. Furthermore, it is shown that the behavior of the neighboring firms influences the managerial choice of the wage arrears of the certain enterprise.

This paper can be useful for my research in terms of the development of theoretical background for hypotheses formulation. It is also of great usefulness

due to the broad spectrum of econometric techniques for measuring of wage arrears. In particular, the authors of the paper suggest the proxies for the different types of costs of arrears.

Earle and Sabirianova (1999) test the hypothesis that the patterns and persistence of wage arrears reflect an institutional equilibrium arising from peculiar factors that create incentives for firms to pay late and for workers to tolerate late payments. Controlling for the positive relationships of arrears with state ownership, monopsony power, and declining enterprise and regional performance, they find a strongly positive impact of the extent to which the practice is common in the firms' local labour market. Arrears reduce job quits, but increase transition to self- and non-employment. In their analysis, Earl and Sabirianova use Multinomial Logit specification. Taking into account the peculiarities of the data sets available, I am not able to test the same hypotheses. Nevertheless, the paper is very contributive to my research in the sense that it develops theoretical background for my hypotheses formulation.

Empirical analysis of wage arrears in Russia was made to investigate variation of delays in wage payments across different groups of work force and various types of firms. In the papers by Lehmann, Wadsworth, and Acquisti (1999), the following questions are investigated. They determine the motives the firms have to not only sporadically, but regularly withhold wage payments from their workers. They find that incidence of wage arrears in the Russian Federation depend on the type of ownership of the enterprise. They also show that individual characteristics contribute toward the incidence of wage arrears, and that some group of workers (older, less educated, with long tenure) are discriminated in terms of wage non-payments.

To test these hypothesis the authors apply such methods as cross tabs giving incidence of wage arrears and their temporal distribution (persistence of wage

arrears) by region, sector, industry and ownership type of firm; Multivariate Regression Analysis; Estimation of Probit and Random Effects Probit Models. This research is very important to my investigation, since I will try to check most of the hypotheses similar to those of Lehmann, Wadsworth, and Acquisti.

Desai and Idson (1998) use a longitudinal survey of Russian households for analyzing the impact of wage arrears on the incidence of poverty among families and their survival strategies. Using the multivariate analysis, the authors show that wage arrears are associated with a higher incidence of poverty. As a result, the unpaid households are more likely to take second jobs, increase home production for own consumption and sale, reduce their rate of saving, sell family assets, and receive transfers of goods and money from relatives (which reduce the effect of wage arrears on poverty). Wage arrears also contribute to a rise in barter between workers and firms. This research is useful for my investigation in terms of defining the types of survival strategies of unpaid Ukrainian workers.

Desai and Idson (1998), using a longitudinal survey of households, identify a pattern of wage arrears across regions and industries: managers allocated nonpayment across workers so as to minimize the real wage declines experienced by higher productivity workers. Their findings suggest that managers were responding more strongly to market incentives than to equity considerations in their wage withholding allocation decisions.

In this research, the authors applied Maximum Likelihood Probit estimation. The results they receive are the following. The incidence of wage withholding is greater, its duration is longer, and its cumulative amount is proportionally higher among relatively low paid workers. Incidence of wage arrears is higher among lower wage workers in lower wage regions and industries, reflecting the influence of market pressures in managerial strategies in distributing wage arrears. Workers

with weaker labour market prospects are more likely to experience wage withholding, in greater amounts and for a longer period.

This paper is of my interest primarily because of the econometric techniques applied. Unfortunately, on the basis of the data available, I am not able to check the hypothesis of the duration and persistence of wage arrears among the workers with different level of wage payments.

Friebel and Guriev (1999), on the basis of. RLMS, applied Probit ML Estimation of Mincerian wage equation enhanced by some controls and regional dummies. The researches try to answer the question on why the workers are not migrating between regions.

They argue that the phenomena of slow labour reallocation and wage arrears emerge as a consequence of firms' strategies to attach wealth-constrained workers to the firm. In Russia, search costs in finding new job is extremely high because labour exchanges are inefficient and housing markets are poorly developed.

The authors find that incidence of wage arrears depends on the structure of regional labour markets and is not constrained to the case of monopsonistic regional labour market. Even if there is a competition in the regional labour market, the employers can attach workers through fringe benefits and payments in-kind. This research is useful for me because it considers such variable as barter payments among the factors that influence incidence of wage arrears in the region.

2.2. Investigating Wage Arrears

Although the crisis of wage payments has drawn much public attention, there has been little research on the determinants of wage arrears in Ukraine so far. I begin with description of the relationships between GDP dynamic and unemployment

rate in the period of 1995-2000. I show that Ukrainian firms, just like Russian enterprises, adjusted to significant decline in output production not through extended unemployment rates, but through adjustment in prices – part of the wage is just not paid. I continue with analyzing conceptual background of wage non-payments in the CIS and describe the hypotheses about the determinants of wage arrears in the Russian Federation.

2.2.1. Macroeconomic Level

Since the beginning of the transition to the market economy, Ukraine has suffered from serious decline in output. It decreased from 33.71 billion rubles in 1991 to 13.65 billion rubles in the end of 2000 (1990=100) [UEPLAC, 2000]. Despite the slowdown in production, the levels of registered unemployment remained relatively stable, i.e. unemployment rates increased only from 0.1 percent in 1991 to 4.3 in the end of 1998 [UEPLAC, 1999]. As can be seen from figure 1, only since third quarter of 1996 one can observe increasing rates of the firms' adjustment through increasing layoffs.

Figure 1 Real GDP and Unemployment rates in Ukraine, 1992-2000

Real GDP and Unemployment rates, 1992-2000
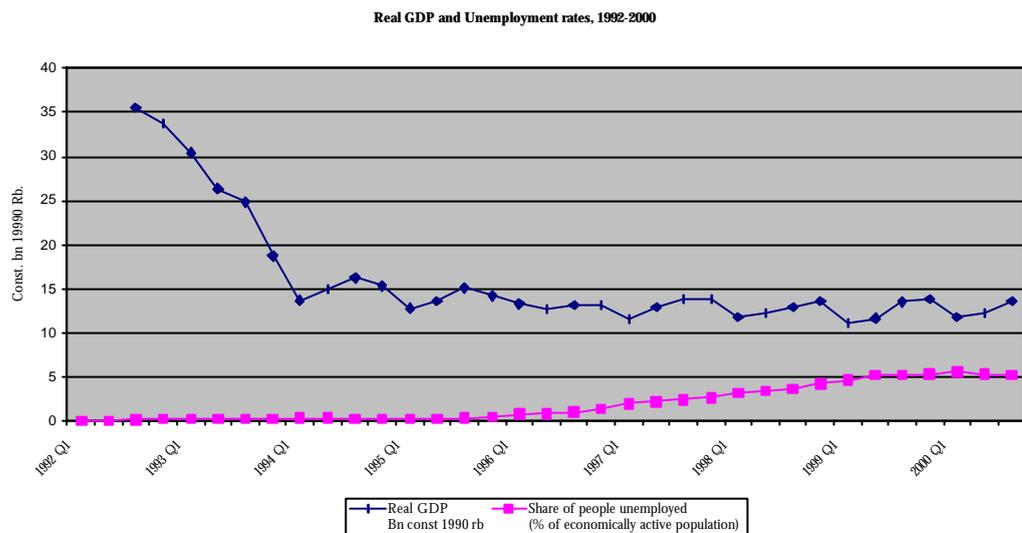
Source: UEPLAC estimates

There can be several possible explanations of the slight increasing of unemployment rates against the background of the diminished GDP. First, shadow economy constitutes significant part of the output production in Ukraine (see, for example, Kauffman and Kaliberda (1996)). It implies that GDP decline was not so disastrous as it was reported; and, therefore, unemployment rates did not increase sharply.

Another explanation I can draw from the similar findings for Russia. As Lehmann *et al*. (1999) suggest, the firms may adjusted to negative output shocks and liquidity constraints through many other ways which turned to be peculiar to the CIS countries. In addition to rapid decline in real wages (from 64.2 rubles per

month in 1992 to 33 rubles in the end of 1999 (1990=100)), firms have widely practiced unpaid leaves of absence, reduced hours worked (sometimes from 40 to 20 hours a week (KIIS, 1999)). All these factors pushed labour demand curve down decreasing real wages further while having relatively unchanged level of employment.

Finally, Lehmann *et al.* (1999) argue that such phenomenon as wage non-payments allowed managers to sustain high employment rates. In Ukraine, wage arrears started to rise in the end of 1994, when the initial financial stabilization was achieved after a prolonged period of hyperinflation. As can be seen from figure 2, there was a constant increase in wage arrears during the period under consideration. Since that time, wage non-payments increased fourfold from UAH 575 million in the fourth quarter of 1995 (or 1.3% of real GDP) to UAH 6,462 million in the end of 1999 (or 2% of real GDP) and then slightly fall to UAH 5,827 million as of October 1, 2000 (1.6% of real GDP)[UEPLAC (2000)]. According to the results of the Ukrainian Enterprise Labour Flexibility Survey, carried out in 1999 [Standing and Zsoldos (2000)], more than 80 per cent of all factories had reported that they have difficulties with paying wages in time in 1999. In all the regions, the most affected industries were building materials, energy, engineering, and light industries. In Dnipropetrovsk, Chernihiv, Luhansk, and Ivano-Frankivsk regions wage delays were most widespread [Figure D1 in Appendix 1 gives good presentation of locations of oblasts.].

Figure 2. Wage arrears in Ukraine, 1995-2000 *(UEPLAC estimates)*
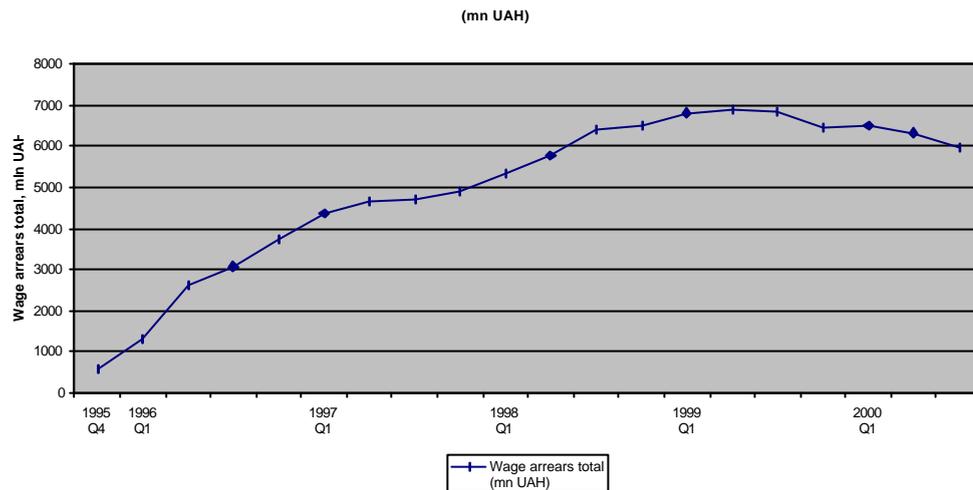
Source: UEPLAC estimates

I try to find out the motives of the firms to not pay for the work performed by their employees as well as motives of the workers to tolerate wage arrears and not to move to another firm. Previous research as well as investigation of the relationships between the agents of the labour market helps me to indicate possible "candidates" for the determinants of incidence of wage arrears in Ukraine.

2.2.2. Conceptual framework

The conceptual framework for understanding the motives behind wage non-payments in the CIS countries is limited. The reasons for limitation are rather obvious. This phenomenon has appeared only about six years ago. Thus, data available for the fundamental analysis, which may fully explain the reasons and consequences of wage arrears, have not been generated yet. In Ukraine the situation with data even worse since the problem of wage arrears has not been

14

examined on the micro level at all. Data set employed in my analysis is unique and have many limitations. Therefore, while formulating hypotheses to be tested I rely on the investigations made for the Russian Federation and assume their assumptions are acceptable for Ukraine. I also take into account limitations posed by the data set available.

The determinants of wage arrears may be explained by the macroeconomic situation in the country as well as by special reasons inherited by wage non-payments itself. On the one hand, liquidity problems in the Ukrainian economy together with lack of credits to the real sector from the Ukrainian banks may explain the diffusion of wage arrears to some extent. But as Earle and Sabirianova (1999, p.4) argue, wage arrears "have a somewhat independent dynamics". Enterprises (and this is also true for Ukraine) that do not face severe liquidity constraints use wage arrears. Moreover, as Alfandari and Schaffer (1996) show for Russia in 1994, there is a little evidence of a weak relationship between the stock of wage arrears and performance of the firm expressed in terms of changes in employment and output and dummies for state of profitability of the enterprise.

How the incentives for wage arrears are generated from the firm side? In the studies of Lehmann *et al* (1999) wage arrears are considered as price adjustment mechanism. Alfandari and Schaffer (1996) argue that firms consider wage arrears as a measure to extract tax concessions from the government. Earle and Sabirianova (1999) also agree that wage arrears may be used for avoiding taxation and extracting subsidies from national as well as local governments. High tax rates on wages and profits together with tax payments priority over wage payments push the firms to look for possible ways to hide cash and to escape from the mandatory payments.

Another possible explanation of the countrywide diffusion of wage arrears comes from the underdeveloped system of legal infrastructure. In accordance with Article 115 of the Law of Ukraine on Remuneration of Labour as of March 24, 1995 " wage should be paid to the workers twice a month on a regular basis". The management of the firms is supposed to be conducted in accordance with current labour legislation. All workers sign hire contracts with the firms, which stipulate their rights for salaries and wages. Unfortunately, poor development of legal infrastructure and law enforcement allow the managers to "postpone" wage bill payments.

I can also argue that trade unions turn out not to be that force that may make the managers to pay the wage bills in Ukraine. Most of the trade unions of the state-owned or newly privatized companies (which are extremely badly hurt by wage arrears) were established during the Soviet period. They have historically remained loyal to the company management and do not really contribute to the improvement of the performance of wages.

Another factor that allows the firms to shrink away from paying wages is poor monitoring of managers, as Earle and Sabirianova note (1999). This is particularly true for state-owned enterprises and large *de novo* privatized firms where the system of supervision does not work properly and where Soviet-type management does not create sufficient incentives to seek for improvement of the firm performance. It can be suggested that such incentives are much higher in newly created private firms as well as in joint venture companies and, as result, wage arrears are lower.

Earle and Sabirianova (1999) also argue that the possibilities for tax evasion and subsidy-seeking activities may be determined by the position of the firm on the local labour market. If the firm is large and if it is a monopsonist, it is have greater bargaining power with local authorities. It reduces the job-quit

opportunities for the workers in the region. Possibilities for such actions may also depend on the industrial affiliation of the firm and its regional location.

If the firms does not pay workers, why do the latter just not leave their jobs and look for better ones? Theoretical and empirical findings suggest following possible explanation.

Lehmann *et al* show that lack of outside opportunities on the labour market together with high migration costs allow the managers of the firm to exploit the workers' low bargaining power. Thus, the peculiarities of local labour market, i.e. the regional unemployment rate and the level of wage arrears in the region, are likely to have impact on the probability of wage non-payments in the firm. For example, it is argued that if the firm acquires monopsonostic position on the local labour market it does not care about possible employment losses. It *knows* that the employers have incentives to stay *longer* (!) in the firm (Earle and Sabirianova (1999)). It is so because the costs of leaving even non-paid job are too high: the worker is not able to get back full amount of wages owed, even through the court. In such a way, inflation rates and spending on the court are "eating up" significant part of the recovered wage.

Lehmann *et al* also view wage arrears as loans from workers with few outside opportunities to firms on the margin of bankruptcy. If the worker leaves the firm and sues it, the firm will be bankrupt. Since the worker has no opportunities to find another, well-paid job, it is less costly to him or her to stay on the firm. In such a way a form of implicit contract arise – " the worker trades wage arrears for continued employment" (Lehmann *et al* (1999, p.597)).

Another ways through which the firms attach the non-paid workers to the firm are fringe benefits and the production facilities as well as pilferage (Earle and Sabirianova (1999) and Lehmann *et al* (1999)). On the state-owned enterprises,

17

where the system of monitoring the workers' performance is rather poor, pilferage and access to the social system of the firm (such as recreation facilities or kindergartens which are subsidized by the firm)"ties" the workers to the enterprise. The influence of these factors also depends on the type of ownership of the firm, its industrial affiliation, and may be correlated with its regional location.

Now let us investigate possible explanations of the persistence of wage arrears that have already been worked out for the Russian Federation and may be true for Ukraine.

Earle and Sabirianova (2000) introduce the notion of network externalities while investigating the persistence of wage arrears in Russia. They show that regional environment is crucial factor that influences the behavior of both firms and workers. If the workers are unsure about the possibility to find new job where they would be paid, it is less costly for them to stay on the firm with the hope to get their wage back. Besides, Earle and Sabirianova (2000) argue that there is strong evidence of positive correlation between the manager's choice of wage arrears and behavior of other firms in the region. As Earle and Sabirianova (1999, p. 8) suggest, " the more general the practice of delaying wages, the easier it may be to persuade workers that it is somehow legitimate, or at least not the management's fault…Wage arrears become a new social norm and accepted routine".

The labour market in Ukraine has regional differences in terms of job-quitting opportunities. According to Lehmann *et al* (1999), employed individuals who face wage arrears move to new jobs actively only in regions where the labor market offers outside options. This statement is supported by the UELFS research [see Standing and Zlodos (2000)]. In Kyiv, there is the lowest number of firms that claimed to have difficulties with paying wages in time in 1999. In the provinces

the workers simply do not have jobs to move to. The worst situation is in the industrial (Eastern) regions of Ukraine, where the mining and heavy industries are located. They constitute a significant part of industrial output and were badly hurt by prolonged decline in economic activity. In theses regions, the accumulated amount of wage non-payments varies from UAH 528.2 million in Luhansk region and to UAH 506.4 million in Dnipropetrovsk region [UEPLAC (2000)].

Furthermore, it can be suggested that the workers of different characteristics may be liable to wage arrears of different levels. The employed individuals may be distinguished by gender; age; level of education (years of education); experience (number of years of work experience); tenure of employment (number of years). Lehmann *et al* (1999) argue that managers may discriminate against some groups of workers, such as women, less educated workers, and the older. One may point out that the managers might pursue an efficiency – wage strategy (Yellen, (1984)) of the extreme kind when the least-efficient workers are not paid wages at all or are paid only irregularly. It has not been shown either theoretically or empirically so far. At the same time, Lehmann *et al* (1999) argue that real wage cuts and extended layoffs may not be considered as the strategies that allow for receiving the same level of commitment from the employers as wage non-payments. As a result of those strategies, the most productive and efficient workers would leave the firm; thus, the firm finds it more efficient not to pay rather than to layoff.

According to Lehmann *et al* (1999), the workers with ownership of the stake of the enterprise have their own interest in the prolonged existence of the enterprise. Therefore, they are more ready to be bear wage non-payments.

Besides, there are the workers that have close family relationships with the owners or managers (who maintain the rights of the owners of the firm). That allows them to obtain privileged position within the firm. Nepotism may occur eventually.

It can be concluded that workers as well as firms of different characteristics may be liable to wage arrears. Such factors as development of legal infrastructure, regional environment and many others may determine the incidence of wage arrears.

Up to this point, I have investigated theoretical background of the incidence and persistence of wage arrears. It helps me to choose and define the factors for analysis that I should include into my empirical part of the paper. It is also helpful in determining the hypotheses to be tested.

In the next chapter I describe the data sets available for analysis. I also formulate hypotheses to be tested n the paper.

DATA AND HYPOTHESES

Despite the fact that wage non-payments have been rather widespread for the last five years in Ukraine, the information on wage arrears turns out to be limited solely to aggregate time series of the cumulative amounts of reported wage non-payments as well as amounts of wage arrears throughout the oblasts. Unfortunately, one can infer little about the determinants of the incidence of wage arrears in the different industries from these data. The examination of the differences of non-payments in respect of various social characteristics of the workers and different features (regional, industrial) of the firms on the basis of the aggregate data sets appears to be impossible. Thus, analysis of wage arrears at the micro level requires direct surveys of firms and individuals. In this section, I describe the source of the data employed in the research along with short description of the raw data sets.

While investigating the determinants of wage arrears in Ukraine, I can suggest that the limitations of the data sets available for investigation determine the extent to which the survey is possible. Therefore, in the concluding section of this chapter I present the hypotheses to be tested taking into consideration the possibilities that that the available survey data open up for me.

3.1. Data

In this section the sources and the characteristics of the data sets available for my analysis are presented.

3.1.1. Official Statistics

Despite the fact that diffusion of wage arrears is huge on the countrywide level, official information on wage non-payments is rather limited. UEPLAC (on the basis of information from Ministry of Labour and Social Policy and Ministry of Economy) publishes only aggregate time series of the reported cumulative wage debts for the whole economy and for the regions as well as cumulative wage debts in the budget sphere.

It is obvious that this data does not allow us to investigate the determinants of wage arrears. From these data, it is not possible to determine which sector of the economy are most badly hurt as well as what kind of workers are mostly affected. I cannot trace out any changes of the volume of wage arrears by region, industrial affiliation of the firm or by occupation of the worker.

In spite of the fact that one can evaluate the growth of magnitude of wage arrears in Ukraine, it is not possible to identify whether the increase in wage non-payments affects additional workers or it is just the evidence that the situation of the previously affected workers worsened. The same is true for the firms.

It can be concluded that using official statistics does not allow one to investigate the determinants of wage arrears in Ukraine. Thus, one should look at micro level data, i.e. on the surveys of the enterprises and workers. It should be noted, however, that such samples are also limited. In Ukraine, in the period from 1995 – 2000 there is only one country-wide survey that investigates the activities of the Ukrainian enterprises at the micro level and contains information about incidence of wage arrears. My analysis is based on this survey. So in the next section I describe the survey and the sample employed in the analysis.

3.1.2. Samples for Analysis

The analysis of incidence of wage arrears in Ukraine is based on the data sets of the surveys "Ukraine Small and Medium Enterprises Survey", conducted by the Kyiv International Institute of Sociology in February-July of 1999 (KIIS, 1999).

The survey included three major steps:

1) Survey of 5,000 officially recorded enterprises in 24 regions (so-called "oblasts") and in the Autonomous republic of Crimea.

2) Survey of all employed members of 4,000 households aged between 15 and older.

3) Street survey of all "visible" enterprises (i.e., micro enterprises that are operating on the streets, such as kiosks etc.)

The questionnaire for the enterprises covered five major topics. The topics of my interest are:

Topic A – general information on the enterprise: regional location, type of ownership and industrial affiliation, number of shareholders etc.

Topic B – general information on the employees: headcount, type of employment (which is full-time job or part-time job), labour turnover for the last six months as well as information on the accrued salaries and the arrears in wages.

Questionnaire "Employment of Households" for the employed members of households provides demographic characteristics of all the members of the household aged 15 and older. It also contains information on the type of employment of the workers (employed or self-employed). For the employed workers the condensed version of the questionnaire for the enterprises was used.

The street survey employed "Flow Process Chart of Businesses" which contained additional information on randomly selected firms, such as the name of the firm and the firm's headcount.

Final Data File includes 3,904 interviews of recorded enterprises, 3,267 interviews of employed members of households and 646 interviews of self-employed households' members as well as 996 interviews of "visible" firms under street survey.

The random sample was worked out by the Kyiv International Institute and is representative for all 24 oblasts of Ukraine, Kyiv City, and for the Autonomous Republic of Crimea.

The survey includes several questions dealing with wage non-payments directly. The questions are complementary across the surveys of the enterprises and the households. For the enterprises, the questions were asked in the form: "For how many months the workers on your enterprise have been in arrears?" The households, in turn, were asked: " For how many months have you been unpaid?" Besides, to both households and firms, there are the questions concerning the amounts of wages paid in kind (in percentage of monthly wages).

The firms' data set as well as the data set for households contains questions about the persistence of the wage arrears for a certain individual. In particular, the respondents were asked about the duration of wage non-payments (in months) in a certain firm or for a certain individual. These numbers show us the cumulative amount of wage arrears as of the date of the interview. In particular, persistence of wage arrears is measured in months (from zero months, i.e. no wage arrears, to 1 – 3 months, 4 – 6 months, 6 –12 months, and more than 12 months). Ordered feature of the responses allows me to investigate how sensitive the incidence of wage arrears is to their persistence in a certain firm and a certain region.

Finally, the firms were asked about changes in their net profits and the volumes of sales during the last 6 months. It could be a good proxy of the performance of the enterprise. In addition, there also was question about the percentage by which the firm receives its gross receipts in barter form. This information can also be used for identifying possible factors that can influence the incidence of wage arrears.

The data sets can be very useful in determining those categories of labour force that are hurt by wage delays at most. First, for the purpose of examining the determinants of incidence of wage arrears from the households' level, I matched the data set with individual characteristics with the characteristics of the firms, on which the individuals are employed. Using this data set I am able to test the hypotheses about possible correlation between individual characteristics and probability of wage arrears to occur. Second, data set for the firms contains information about various characteristics of the firms, i.e. size, type of ownership and industrial affiliation. I can test the influence of these factors on the incidence of wage arrears for different firms. Taking into consideration the fact that data sets contain information about regional location of the firm and living place of the individual, I can test some hypotheses about the influence of the local labour market on the behavior of the firm. Thus, available data sets are of great usefulness, because they help to make a survey of incidence of wage arrears in Ukraine on the micro level for the first time.

It should be noted, however, that analysis is made separately for each data set. First, I investigate the determinants of wage arrears for the households. Then I do the same for the firm level data. Finally, I compare the results of my analysis with the results of Lehmann *et al.* (1999) for Russia. It is necessary to mention, however, that both data sets have some disadvantages. First of all, the survey of Ukrainian enterprises is a cross-section, i.e., it was not done in the years before

1999 and was not repeated in 2000. Therefore, I am not able to study the incidence of wage arrears in dynamic perspective. Secondly, the questionnaire does not provide information on the types of wage arrears (however, it contains information on the amount of wages paid in barter form). It has information only on the amount of wage arrears and the duration of being un-paid up to the date of the survey. Besides, information on firm-specific and households-specific characteristics is rather limited. In addition to the facts about the ownership, size and industrial affiliation of the firm, there is very restricted information about the performance of the firm. There are only some measures of the percentage changes in the net profits as well as changes in sales volumes of the firms during the last 6 months as of the date of the interview.

Information about individuals available is also rather limited. In addition to information about the firm where the individual works, there are only data on the age and gender of the individual. Unfortunately, there is no information about educational level of the individual as well as experience of the worker.

3.1.3. Description of the data
Now I describe information from the data sets in more details.

First, I exclude all the observations for self-employed individuals from both data sets. I support the point of view that when self-employed individuals do not get paid, it means that they just are not able to generate profits to do so. In other words, their profits are not considered as wages and their losses – as wage arrears.

Second, as I have already mentioned, the firms and individuals from all the 25 oblasts of Ukraine were interviewed (regional distributions of the individuals and firms interviewed are given in tables A1 and B1 in Appendix A and Appendix B respectively).

Since for some regions there are too few observations (less than 20), I combined them into groups of two or three oblasts. In general, there is one group of firms from Ivano-Frankivsk, Ternopil and Chernivtsi regions; another group is from Kyiv and Chernihiv regions; the last group is from Kirovograd and Cherkassy regions. These groups are created on the geographical basis, i.e., these regions are neighboring. All the other firms and individuals are investigated at each region separately.

Workers

According to the analysis of the data set for workers, 64.4 percent of employees claimed that they have had wage arrears as of the date of the interview (see table A2 in Appendix A). In the tablesA1 – A14 from Appendix A, more detailed information for the incidence of wage arrears among the workers is presented. Unfortunately, information about personal characteristics of workers is limited to the data about age of the individual as well as gender. No information about length of employment or educational level is available. That is why my analysis is primarily focused on the information about the firms on which workers perform jobs.

On the basis of the data set available, I estimated the median levels of wage arrears among workers from different industries. As can be seen from table A14 in Appendix A, workers in agricultural sector face wage arrears of 7 to 12 months. This is the largest duration of wage non-payments compared with that for the workers from other industries. Such a huge length of wage non-payments in agricultural sector can be explained by the fact that the workers who perform their jobs in agriculture face smaller amount of possibilities to quit their jobs and to move to another regions. They usually work on former state-owned agricultural enterprises which turn out to be monopsonistic on the local labour market. Moreover, it is possible to assume that workers in rural areas (where

agriculture is actually developed) have no incentive to move because their relatively lower educational level as well as their skills do not allow them to compete for jobs in urban market.

For such industries as construction, manufacturing, public utilities and scientific services the median level of duration of wage arrears is about 4 to 6 months. For transport, trade, health and education and finance, the median level of wage non-payments is about 1 to 3 months.

In table A13 in Appendix A, information about the median level of wage non-payments in different regions is presented. According to my estimation, in most regions the median level of the duration of wage arrears is accounted to about 4 to 6 months. However, in Kyiv City as well as in some regions such as Kyiv oblast, Sumy, Zakarpattia, Kharkiv, it is amounted to smaller length, i.e., to 1 to 3 months. Kyiv City and Kharkiv regions are large industrial centers of the country. In these regions, the mobility in labour market is higher. In particular, according to UEPLAC estimates (see table C1), in these regions, the workers face more opportunities to move: unemployment rates in Kyiv City and Kharkiv region are accounted to only 0.2 and 3.8 percent respectively. In Chernihiv oblast, the median level of wage arrears is the highest – 7 to 12 months.

Firms

Inspection of the firm data suggests that approximately 49.5 per cent of all the firms claimed that they have no wage arrears as of the date of the interview. At the same time, 36.2 per cent of the firms had wage arrears from 1 to 6 months, and 14.2 per cent had wage arrears for more than six months. More detailed information about firms is presented in Appendix B, in tables B1 – B19.

According to table B2 in Appendix B, long-term wage arrears (more than 12 months) prevailed in Donetsk (11% of the firms), Sumy (10% of the firms), and Cherkassy (9.5% of the firms) regions. Wage arrears of 6 to 12 months were most widespread in Kyiv oblast (13% of the firms), Dnipropetrovsk (11.6%) and Zaporizhzhia (10.6%) regions. Almost 30% of the firms in Kyiv oblast, 25.3 % of the firms in Sumy region and 23% of the firms in Ivano-Frankivsk region claimed that they had cumulated wage arrears of 4 to 6 months. Most of the firms interviewed from all the regions, however, stated that their wage arrears were for 1 to 3 months. In Kyiv City and Odesa region, there was the highest percentage of the firms that claimed they had no wage arrears as of the date of the interview (63.5% and 68.9% respectively).

Industrial affiliation of the firms interviewed is presented in table B4 Most of the firms were from the services industries (trade, hotel and recreation businesses). The smallest amount of the firms (less than 2 percent) was from finance sector. As can be seen from table B5, long-term wage non-payments (more than 12 months) are very widespread in manufacturing and construction (33% and 22% of all the firms claimed about prolonged wage arrears respectively). Wage arrears of 1 to 3 months prevailed in services sector.

As can be seen from table B6 in Appendix B, most of the firms interviewed were of the small size (almost 55% of all the firms) and employed up to 50 employees. According to table B7, small firms were less subject to wage arrears: they constituted almost 69% of all the firms with no wage arrears. At the same time, large and medium enterprises have wage arrears of more than 6 months.

From table B8 (Appendix B), one can see that firms interviewed were of different types of ownership: state, private, joint-stock (most of the firms), joint-venture, and other types of ownership. In table B9 distribution of wage arrears among different ownership types is presented.

According to table B10 (Appendix B), almost 42% of all the firms interviewed had fired employees for the last 6 months as of the date of the interview. As can be seen from table 11, among those firms that had prolonged wage arrears (more than 12 months), 63% of them had not fire employees. At the same time, according to table 12, 38% of the firms practiced unpaid layoffs. Among those firms that had more than 12 months of wage arrears, almost 67% practiced unpaid vacations.

According to table B14 in Appendix B, 40.6% of all the firms interviewed had their sales bartered to different extent. As can be seen from table 15, among those firms that had no wage arrears as of the date of the interview, 75% of the firms had zero percent of the sales bartered. For those firms with more than 12 months of wage non-payments, only 42% have zero percent of sales bartered.

According to table B16 in Appendix B, 58% of the firms claimed that their net profits had decreased during the last 6 months. Distribution of wage arrears among the firms with decreased and increased levels of net profits is presented in table B17 in Appendix B. It is not clear whether there is a clear pattern of net profit movements and the incidence of wage arrears. Further analysis aims at investigation of this problem.

For evaluating of the magnitude of wage arrears in Ukrainian industries, I present the information about median level of wage arrears for several industries in Ukraine (see table 19 in Appendix B). As can be seen from the table B19, for such industries as manufacturing, construction, agriculture, transport and communications, duration of wage arrears is equal to 1 to 3 months at the median level. For services, health and education, finance and other services, median level of duration of wage arrears is zero months.

Information about median level of wage arrears in different regions is presented in the table B18 in Appendix B. As can be seen from the table, in large cities such as Kyiv City, Odesa, Zaporizhzhia as well as in Crimea, Zakarpattia, Poltava, Kherson, Khmelnitski, median level of wage arrears are accounted to zero months. In these oblasts, the rate of unemployment is at the lower levels than in any other regions of Ukraine. In all other regions, except for Kyiv oblast, median wage arrears equal to 1 to 3 months. In Kyiv region, median level of wage arrears is amounted to 4 to 6 months, which is the largest number of the duration of wage non-payments.

3.2. Hypotheses

In this section, I describe the hypotheses to be tested in this paper. Also I explain which hypotheses cannot be tested due to the limitation of the data sets.

In this paper, I test some of the hypotheses about the determinants of wage arrears in Ukraine which have already been tested for the Russian Federation by Lehmann *et al* (1999) and Earle and Sabirianova (1999 and 2000). The limitations imposed by the data set available (cross sectional, little information about demographic factors of the employees) do not allow me to test any hypotheses about persistence of wage arrears. Hypotheses about discrimination of the workers on the age or gender basis as well as the existence of nepotism cannot be checked either.

Using the data set available, I test some of the hypotheses that Lehmann, Wadsworth, and Acquisiti (1999) tested for the Russian Federation.

For workers, it is possible to check whether firms' characteristics are more important determinants of wage arrears than demographic characteristics of the individual. Also I investigate hypothesis whether individuals are less likely to be subject to wage arrears if they work fewer hours a week (say, less than 20 hours a week). It can be

argued that as firm reduces hours worked a week for its workers, it decreases the necessity to cumulate wage arrears. *Thus, the smaller the amount of hours worked, the lower the probability of wage arrears.*

Since data set for individuals is rather limited (I have little information about personal characteristics of workers) that does not allow me to explore more hypotheses and to broaden the scope of my conclusions, my analysis is concentrated on the investigation of the incidence of wage arrears for the firms. To start with, I check the hypothesis that regional location, industrial affiliation, and ownership type of the enterprise are the factors that influence the incidence of wage arrears of the firms. I also test the hypothesis that is shown to held for Russia (Earle and Sabirianova (1999)): *the firms from the regions where there is high level of unemployment are more subject to wage arrears than workers from oblasts with lower level of employment where workers have more opportunities to move.*

Despite the limitations described above, the available data set for the firms allow me to investigate unique hypotheses that have been checked neither for the Russian Federation nor for Ukraine before. As Earle and Sabirianova (2000) emphasized, economic performance of the firm can be a significant determinant of the incidence of wage arrears. Since I have information about changes of net profits of the firm and about share of the sales of the firm that were bartered, I can test another important hypothesis.

One of the hypotheses that can be investigated is that enterprise performance (changes in net profits) determines the probability of wage arrears for a certain firm. *If net profits of the firm increase, firm is less likely to be subject to wage arrears and vice versa.* Another hypothesis is that value of the sales of the firm made in barter form also determine the incidence of wage arrears within a firm: *the higher the percentage of sales were paid in barter form, the higher is the probability of wage arrears for this firm.* In this

case, the firm faces liquidity problems and simply do not have cash to pay its workers.

I also investigate other possible determinants not tested by Lehmann *et al.* (1999), but that seem to be reasonable candidates for the factors that can influence the probability of wage arrears.

First, if the firm practices unpaid leaves heavily, it can be suggested that it has lower probability of wage arrears. Since the firm reduces paid working hours for its workers, and, consequently, the burden of wage bill, the firm has fewer incentives to cumulate wage arrears. At the same time, it cannot be concluded that unpaid vacations and wage arrears are substitutes. It is a usual practice when the firm both does not pay workers for their jobs and follows unpaid leaves practices. Thus, my hypothesis is that presence of *unpaid vacations influences the incidence of wage arrears with negative sign.* It should be noted that in this case, the problem of endogeneity may occur. Due to limitations of data, it is not possible to find instrument for unpaid leaves so to treat the problem properly.

Second, if the firm that has constrains on paying wage bills starts firing the employees, the incidence of wage arrears is likely to decrease. In this case, the firm adjusts to decrease in output production or decrease in profits not through growing wage arrears but through layoffs, as practiced in developed economies. Thus, I investigate the *hypothesis that presence of layoffs decreases probability of wage arrears for a certain firm.*

Since I have five alternative answers by firms to the question about persistence of wage arrears – whether the firm has zero months, 1 – 3 months, 4- 6 months, 6 – 12 months, or more than 12 months of wage arrears, ordered response model can be used. In particular, I use ordered probit estimation technique to evaluate the factors that can increase persistence of wage arrears for a certain firm or for a

certain worker for a period of 1 year. Certainly, it is not long enough period to make any conclusions about persistence, but I can still use ordered probits to look at the persistence within one-year period.

For workers, my hypothesis are as follows: *regional location of the firm where the worker works, its industrial affiliation, settlement, and type of ownership determine different levels of persistence of wage arrears*.

For firms, my hypotheses are that *firms from the regions with higher unemployment rates have more prolonged wage arrears*. Also, *industrial affiliation* of the firm influence persistence of wage arrears. Another hypothesis is that *type of ownership matters* for persistence of wage arrears: private firms have shorter terms of non-payments compared to state enterprises. Hypotheses about regional location, industrial affiliation as well as ownership type of the firm are of *most* interest for me.

Finally, I explore some hypotheses about the influence of the activities of the firm on the persistence of wage arrears. Namely, I test whether *higher percentage of sales bartered positively influences the increasing of the persistence of wage arrears*. I also investigate the hypothesis that *unpaid vacations reduce persistence of wage arrears*. I test whether *increase in profits leads to decreasing of the persistence of wage arrears*. It should be noted that neither of these hypotheses were tested for Russia or Ukraine before.

It is rather difficult, due to the lack of previous research for Ukraine, to determine the hypotheses about the most important determinants of wage arrears. That is why, I test numerous hypotheses concerning firms' and workers' activities. On the one hand, in this paper, I investigate only some of the hypotheses that were explored by Lehmann *et al* (1999). It is determined by limitations imposed by the data. On the other hand, I am able to test hypotheses that are new for both Ukraine and Russia cases. They deal with economic performance of the firm and with some unusual practices of the Ukrainian firms

such as unpaid leaves and bartered sales. Also, I explore some hypotheses about the influence of the factors mentioned above on the persistence of wage arrears.

Chapter 4

RESULTS AND DISCUSSION

In this chapter I first present model specification and estimation results for the incidence of wage arrears for the individuals. Then I check hypotheses described in the previous chapter for the firms' level data. I also describe estimation results.

4.1. Individuals-Level Data

4.1.1. Model Specification: Probit

In this section, I estimate the determinants of the incidence of wage arrears for individuals.

First, I construct dependent variable. The workers were asked: "Does the firm owe you any money?" On the basis of the answers to this question, I construct dummies of 1 if an individual has wage arrears and 0 otherwise.

Since dependent variable is of binary type, i.e., it takes the values 1 or 0, I cannot apply OLS estimation. Using linear regression, I get biased and inefficient estimates (Verbeek (2000)). Thus, I use binary choice model – probit model – to investigate the incidence of wage arrears. A probit model is defined as

$$\Pr(y_i \neq 0 \mid x_j) = \Phi(x_j b),$$

where Φ is the standard cumulative normal distribution ; x_j is a vector of factors that may determine the probability of y_i to not be equal to zero; b - vector of the coefficients that shows the change in probit index $(x_j b)$ by b

standard deviations. According to Johnston and DiNardo (1997), it is not useful and transparent to report coefficients from a probit "unless only the sign and significance of the coefficients are of interest" (p. 422). Therefore, I look for the change in probability for a change in x_j $(\partial \Phi / \partial x_j)$. It is the marginal effects of the Probit model that are of interest here:

$$\partial \Phi / \partial x_j = \boldsymbol{f}(xb)b_j.$$

These marginal effects of the probit model give us the change in the probability of the incidence of wage arrears with respect to different factors. So, after estimation of probit models, I calculate marginal effects to make conclusions about the probabilities of being subject to wage arrears for different workers.

Therefore, estimation of Marginal Effects Probit allows me to determine change in probability of the incidence of wage arrears with respect to different factors.

4.1.2. Description of Variables

Vector x_j includes following characteristics. Detailed description of variables is presented in table C2 in Appendix C**.**

As personal characteristics of the individual, I consider gender and age of the workers. Another dummy is introduced for the region where the worker works. Also I include characteristics of the place (settlement) where the worker performs their job: urban or rural.

There are several characteristics of the firm where the individual works: the size of the enterprise, type of ownership, and industrial affiliation of the firm. Size of the firm varies from small (of less than 50 workers) to medium (less than 250 workers) and large (of more than 250 employees). Ownership type of enterprise is corresponded to several types: private, state firms, joint-stock companies with

different amount of shares owned by the state (from 25% to more than 50%), joint-ventures with both private and state ownership. The workers are taken from different industries (construction, manufacturing, agriculture, trade, hotel business, catering, finance, health ad education, science, and other services).

Also I include such characteristics as payments in kind the worker might receive (which vary from zero to more than 70 percent of the salary) as well as hours worked on the enterprise (from less than 20 hours to more than 50 hours a week).

4.1.3. Determinants of the Incidence of Wage Arrears: Workers' Side
After estimating the probit model and deriving the marginal effects, I get the results presented in the C4 in Appendix C. Firm characteristics are found to be more important determinants of wage arrears for the individuals compared to the personal characteristics of the worker. Age and gender of the worker do not show any influence on the incidence of wage arrears of workers.

At the same time, I find that *type of settlement* and regional location of the place where the worker works affect the incidence of wage arrears. The marginal effects show that there is some negative urban effect on arrears of around 6 percentage points. In Ukraine, the sign of the estimator of urban settlements coincide with that predicted by the literature: for workers from small villages and settlements where there are less opportunities to find paid jobs, the probability of wage arrears is higher than in large cities. The results are also comparable with estimations by Lehmann *et al* (1999) for Russia. It was shown that in Russia, residents of rural arrears face 19 percentage points higher probability of being subject to wage arrears. Such discrepancy between my results and estimations for Russia results could be explained by the fact that in the Russian Federation, differences between regions are more important than in Ukraine. Russian oblasts are more dispersed, and it can be a factor that positively affects the probability of

wage arrears in rural areas. It can be suggested that in Ukraine the workers living far away from large cities find it easier to move to paid jobs than in Russia.

Regional location of the firm where the worker performs job also has impact on the probability for worker to be subject to wage arrears. Probability is higher for some western oblasts. For workers from Rivne and Zhytomyr oblasts, probabilities of being subject to wage arrears are 31.3 and 24.3 percentage points (respectively) higher than for the employees from Donetsk region. Workers from other Western regions, Ivano-Frankivsk, Ternopil, Chernivtsi as well as employees from Northern region – Sumy, have higher probabilities of experiencing wage arrears compared to workers from Donetsk by approximately 13 percentage points.

It can be explained by the fact that in these regions, the level of registered unemployment was the highest in Ukraine in 1999 (Rivne – 7.2%, Zhytomyr – 7.2%, Ivano-Frankivsk – 6.2%, Ternopil – 6.5%, Chernivtsi – 4.3%, Sumy –6.9% (see table C1)). Since the workers have fewer opportunities to move in these regions, the firms chose to increase wage arrears rather than to lay off employees. These results are in line with predictions got by theory. Paradoxically, the probability of the wage arrears is higher by 15.7 percentage points in Luhansk region too, which is located in the eastern part of Ukraine. Here the registered unemployment rate was "only" 3.7% in 1999 (table C1). The rise in wage arrears in this region can be explained by the fact that in this oblast most of the collieries are located. Such workers also have no opportunities to change job easily due to low mobility of the local labour market.

On the other hand, the marginal effects indicate that there is almost a 14 percentage points spread between Kyiv city and Donetsk region. Probability of being subject to wage arrears is also 12.1 percentage points lower in Zaporizhzhia It can be explained by the fact that in the capital of Ukraine as well in the eastern

region, the workers have much more opportunities to move and to switch jobs. In particular, in Kyiv city, registered unemployment was at 0.9% level in 1999 whereas in Zaporizhzhia – 3.2% (table C1). The results of estimation are comparable to those for Russia by Lehmann *et al*. (1999, 607): for example, spread between the largest cities, Moscow and St. Petersburg, is estimated to be 25 percentage points.

Industrial affiliation of the firm also influences the probability of workers to be subject to wage arrears. Compared to agriculture, the probability of workers to be subject to wage arrears is 46.5 percentage points lower for finance; 34.5 percentage points for trade and 26.3 - for catering; 17.3 – for transport, 15.1 – for health and education. These results are comparable to the Russian estimates (Lehmann *et al*, 606). However, one should take into account that there are significant differences between the magnitudes of the calculated marginal effects for Ukraine compared to those for Russia. In particular, according to Lehmann *et al* (1999, 606), probability of being subject to wage non-payments in finance sector in Russia is some 28 percentage points lower than in agriculture. In Ukraine, as it has already been mentioned, this estimate is almost twice as large. The same is true for trade estimators. It can be concluded that differences between sectoral performances of different industries compared to agriculture are much larger in Ukraine than in Russia. This is maybe due to the poorly developed agricultural sector compared to other industries. Another conclusion that can be made is that in Ukraine, there is an obvious and significant difference in the probabilities of experiencing wage arrears for workers of different industries. Agriculture seems to be hurt at most. This conclusion is consistent with estimation that in rural areas (mostly agricultural), the probability of being subject to wage arrears is higher than in urban areas, where services industries mostly operate.

The workers from the same sectors where found to be more liable to wage arrears in Russia as in Ukraine. However, construction and manufacturing have positive signs in the Russian Federation while in Ukraine they are negative. It can be explained by the fact that agricultural sector in Ukraine is more extended and underdeveloped even in comparison with Russia. For example, collective ownership was abandoned only in 2000, which is two years later than in Russia.

Ownership type of the firm is found to be a determinant of the incidence of wage arrears. For workers from private firms, the probability of being subject to wage arrears is 30 percentage points lower than for workers from state firms. For joint stock companies with less than 50 percent shares owned by state, this estimator is lower – probability of wage arrears is lower by 11.8 percentage points. Employees on the joint-venture companies have probability of being liable to wage arrears by 14.8 percentage points lower than state enterprises. It should be noted, that such a significant difference between probabilities gives us some hints about enterprise performance in Ukraine. State enterprises, which are used to depend extensively on the subsidies from the government, suffer at most from wage arrears. I can suggest hypothesis that probability of wage arrears increases for workers from the state enterprises also because managers of such enterprises find it much easier to find justification for avoidance of wage payments under inter-enterprises arrears and under reduction of governmental subsidies.

According to estimation results, if the *worker works less than 20 hours a week*, the probability to be subject to wage arrears for him or her is 5.8 percentage points higher than for the worker who works hard (40-50 hours a week). If we assume that smaller amount of working hours a week indicate that the firm use unpaid leaves practices, one may conclude that unpaid vacations and wage arrears exist together on the firm. They seem to be "complements". Here, as I have already mentioned, the problem of endogeneity may appear. Unfortunately, it is not

possible to treat the problem properly due to the fact that the data available does not allow me to find instrumental variables for unpaid leaves.

Another interesting finding of the estimation concerns with the *percentage of wages paid in kind.* I find that the higher the share of wage paid in kind, the lower the probability for the worker to be subject to wage arrears. In particular, if the worker receives more than 70 per cent of his or her salary in kind, the probability to be subject to wage arrears reduces by 47 percentage points. For comparison, if the firm does not practice reduced working week, probability of being subject to wage arrears fro its workers is 28.9 percentage lower. It can be concluded that the employers substitute wages for payments in kinds for reasons that are not investigated in this paper.

4.1.4. Ordered Probit Estimation: Workers' Side

In the following sections, I investigate factors that may determine the duration of wage arrears for the workers. First, I present econometrical model to be estimated. Second, I describe the results of the ordered binary choice model and compare them with those for binary choice model.

Since the workers were asked about the length of the firm's wage bill subject to wage arrears (zero months, 1 - 3 months, 4 - 6 months, 6 – 12 months, and over 12 month), their answers can be considered to be ordered as longer duration of arrears is worse than shorter. Thus, we can apply the ordered probit model.

According to Green (2000, p. 876), ordered probit model is defined as follows. One starts with

$$y* = \boldsymbol{b}'x + \boldsymbol{e} \, .$$

Since $y*$ is unobserved, one can have only:

$y = 0$ if $y* \leq 0$

$y = 1$ if $0 \leq y* \leq m_1$

$y = 2$ if $m_1 \leq y* \leq m_2$

...

$y = J$ if $m_{j-1} \leq y*$

In this case, m is a vector of unknown parameters to be estimated jointly with b. Estimation of the model is based on maximum likelihood method.

Dependent variable is constructed as follows. I introduce 1 if the worker faces no wage arrears,, 2 – for the wage arrears of 1 to 3 months, 3 – for 4 to 6 months, 4 – for 7 to 12 months, and 5 – for the wage arrears of more than 12 months.

Vector x includes the same factors as those for the probit estimation for workers described earlier. The dependent variable is constructed as follows. I introduce 1 if the worker faces no wage arrears,, 2 – for the wage arrears of 1 to 3 months, 3 – for 4 to 6 months, 4 – for 7 to 12 months, and 5 – for the wage arrears of more than 12 months. The interpretation of b coefficients in the ordered probit model requires special care. If the coefficient is positive, then the probability of the category with y=0, P (y=0) must decline; in other words, the derivative of P (y=0) has the opposite sign from b. By the same logic, the derivative of P (y= J) has the same sign as b. What happens to the middle categories is ambiguous (Greene, p. 877).

4.1.5. Determinants of the Duration of Wage Arrears: Workers' Side

The results of the ordered probit estimation are presented in table C4 in Appendix C. As can be seen from the table, the ordered probit results, although similar to those of simple binary choice model, allow me to make some interesting conclusions.

Holding all other factors constant, women are found to be subject to wage arrears of shorter duration (the estimate of the dummy for female has a negative sign). We have no good explanation for this finding. Perhaps, management has a bias in favor of women, all else equal. Aged people (older than 55 years) are found to be subject to wage arrears of shorter duration than people of 25 – 44 year age group (the benchmark category). It seems reasonable to assume that more experienced worker may be valued by the managers more highly than the young and the less experienced ones.

Regional location is estimated to have certain impact on the duration of wage arrears for the workers. In particular, compared with the workers from Donetsk region, the workers from Luhansk, Kherson, and Khmelnitsk regions are found to be subject to wage non-payments of longer duration (the coefficients have positive signs). Moreover, if we compare the results of the ordered binary choice model with those for binary choice model, we see that the workers from Luhansk not only have higher probability of being subject to wage arrears, but they are also found to be subject to wage non-payments of longer duration in comparison with Donetsk workers. It can be explained by the fact that in Luhansk region, the mobility of workers is possibly much lower than in any other oblast because most of the collieries are located there. At the same time, workers from Zakarpattia, a small Western region, are shown to be subject to wage arrears of shorter duration than workers of Donetsk firms.

Interesting conclusion can be made about the impact of the *type of settlement* for a certain worker. It is estimated that urban residents face wage arrears of shorter duration than workers from rural regions. As discussed above, this may be explained by higher demand and more job opportunities in the urban sector.

It is shown that the workers from all non-agrarian sectors (with the exception of workers from Hotels and Recreation and the Scientific Service sectors, coefficients for which are insignificant) face *shorter* duration of wage non-payments compared with workers in the agricultural sector. It should be added that workers from transport, trade, public catering, health and education as well as those from finance are also found to have *lower* probability of being subject to wage arrears. It can be explained by the fact that these industries are more dynamic in terms of labour market.

Some forms of ownership of the firm turn out to have significant impact on the duration of wage non-payments. In particular, workers from private firms and from the joint-stock enterprises with less than 50% of shares owned by the state not only have a lower probability of being subject to wage arrears but also are shown to have shorter duration of wage non-payments.

On the basis of ordered binary choice model, it is possible to suggest that the workers who have shorter working week, face longer duration of wage arrears. Maybe, the managers of such firms employ a simple strategy. They are unable to pay for job which was done before and do not find it possible to pay to the employees currently. So it is a reasonable solution for managers to put the workers on involuntary leaves so to avoid of accumulation of wage arrears. Wage non-payments that have already been accumulated remain to be paid. Their length, therefore, extends. It should be noted, however, that the problem of endogeneity may occur here. Due to limitations of data set, it is not possible to treat this problem.

It is also shown that for workers who receive from 1 to 10 percent of their salary in kind, the duration of wage arrears is longer than for those who receive up to 40 percent of the salary in barter form. It can be concluded that duration of wage non-payments may be shorter the higher the percentage of payments received in kind. In other words, such payments "compensate" workers for not being paid in time. In other words, such payments are a substitute for cash payments.

Thus, ordered binary choice model for workers allows me to make several important conclusions. First, for the workers from Luhansk, the duration of wage arrears is longer and the probability of being subject to wage non-payments is higher. Besides, workers from the non-agrarian sectors have not only a lower probability of not being paid in time, but also face a shorter duration of wage non-payments compared with agriculture. Percentage of salary received in kind as well as duration of working week also influences the duration of wage non-payments.

After comparison of the results of my estimation with those for Russian Federation by Lehmann *et al*. (1999), it can be concluded that the impact of the industrial affiliation of the firms in Ukraine is almost the same as for Russia. In particular, such sectors as transport, trade, finance, health and education are found to have lower duration of wage arrears compared with agriculture in both Ukraine and Russia. At the same time, in Russia, workers from manufacturing and construction sectors have longer periods of wage non-payments, whereas in Ukraine workers from these sectors face shorter periods of non-payments as opposed to the workers from agricultural sector.

Therefore, I show that firm characteristics are very important determinants of wage arrears in Ukraine. Taking all the estimators into consideration at once, one can infer that fema.le employee on the small private firm in Kyiv city from finance industry has the lowest probability of being subject to wage arrears. What

is more is that this worker faces the shortest duration of wage non-payments compared to other employees. The worst situation faces the worker from Western region from agricultural sector on the state enterprise (likely, collective agricultural firm): the probability of being subject to wage arrears is the highest and the duration is the longest.. At the same time, I cannot make other important conclusions about the influence of the personal characteristics of the individual on the probability of wage arrears, since I have only two of them (age and gender) in my regression. That is why I focus on the firms' determinants of wage arrears.

4.2. Firms-Level Data

4.2.1. Model Specification: Probit

In this section, I estimate the determinants of the incidence of wage arrears for the firms.

Dependent variable for the firms is constructed as follows. The managers were asked about the length of the firm's wage bill that is subject to wage arrears. If the debt on the wage bill is zero months, then the firm has no wage arrears. In this case, dummy is zero; otherwise, it is one.

Again I face the problems with OLS estimation of the incidence of wage arrears for the firms (biased and inefficient estimates). Thus, I apply probit model to investigate the incidence of wage arrears for the firms level data. Since I am especially interested in the change in probability of wage arrears for a change in vector of determinants x_j $(\partial \Phi / \partial x_j)$, I derive the marginal effects of the probit model.

4.2.2. Description of Variables

Analysis is based on the investigation of 1,128 firms. Vector x_j for the firms includes several important factors, all of which are presented in detail in table C3 in Appendix C. I consider firms' characteristics. There are dummies for different types of ownership of the firm: private, joint stock, joint venture and other types of ownership that include non-profit companies and collective enterprises.

Also I introduce dummies for the size of the firm: large (more than 250 employees), medium (from 50 to 250 employees), and small firms (up to 50 employees). It should be noted that I exclude self-employed individuals from the analysis for the reasons I have mentioned in the previous chapter.

According to the literature, regional location of the firm has an impact on the behavior of the firm due to wage arrears. So I include regional dummies for oblasts of Ukraine. In addition, I introduce dummies for urban as well as rural settlements of Ukraine since, according to literature I analyzed earlier, in rural areas, labour market is less dynamic, and, thus, workers have les opportunities to move from there. Thus, it may have impact on different levels of probability of wage arrears in rural versus urban arrears.

Another group of variables is concerned with economic characteristics of the firm such as industrial affiliation of the firm, changes in net profits of the firm, changes in employment, presence of unpaid vacations, and share of sales bartered.

Industrial affiliation of the firm can be characterized by such industries as construction, agriculture, transport, services, health and education, finance, and other services.

Changes in net profits are represented as increasing in net profits of the firm during the last 6 months, decreasing or staying at the same level.

Changes in employment of the firm are indicated as the dummies for existence of firing workers and absence. Analogically, dummies for the presence in unpaid leaves introduced.

Shares of sales bartered are represented with several dummies: one for the zero percent sales bartered; second – for 1-10 percent sales bartered; third – for 10-70 percent of sales bartered; finally, the fourth – for more than 70 percent of the sales made in barter form.

4.2.3. Determinants of the Incidence of Wage Arrears: Firms' Side
After estimating the probit model and deriving marginal effects, I get the results presented in table C5. Type of ownership of the firm, its industrial affiliation and regional location are shown to be significant determinants of wage arrears. Economic performance of the firm and its different practices such as unpaid leaves or bartered sales also appear to have impact on the probability of wage arrears.

It is found that *regional location* may determine incidence of wage arrears for a specific firm. In Sumy, the firms have 28.8 percentage points higher probability of being liable to wage arrears compared to the firms from Donetsk region. In Zakarpattia, the firms face 27.1 percentage higher probability of experiencing wage arrears. Firms from Ivano-Frankivsk, Chernivtsi, Ternopil have 15.7 percentage points higher probability while the firms from Lviv – 15.4 percentage points higher compared to the firms from Donetsk. In Dnipropetrovsk region, the firms have 10.3 percentage points higher probability of being subject to wage non-payments. On the contrary, in Kyiv city, probability of being subject to wage arrears is 11.2 percentage points lower than in Donetsk region. These findings

support the hypothesis that in the regions with high unemployment rates where the ability for workers to find jobs is limited, the probability of wage arrears is higher than in other regions (For unemployment rates in the regions, see table C1).

Industrial affiliation of the firm also influences the probability of wage arrears for the firm. Construction sector have 8.7 percentage points higher probability of wage arrears than manufacturing. At the same time, firms from services and finance face 11 and 55.4 percentage points respectively, lower probability of being subject to wage arrears. As one can infer, there is a huge difference between the incidence of wage arrears in finance sector compared to other sectors of the economy. These results are comparable to those for Russia by Lehmann *et al* (1999, 606).

It is also shown that compared to *state firms*, private firms have 18.3 percentage points lower probability of having wage arrears. The same is true for joint stock and joint venture enterprises: the probability to be subject to wage arrears is 7 percentage points lower for them rather than for state enterprises. These findings are supported by the evidence from the Russian Federation where state enterprises had a higher probability of not paying wages.

It also turned out that economic practices of the firm have impact on the probability of wage arrears. If most of the firm's *sales are made in barter form* (more than 70 percent of the sales), the probability of wage arrears increases by 14.5 percentage points. At the same time, if the firm makes no sales in bartered form, it has 8.5 percentage points lower probability of being subject to wage arrears compared to the firms that have 10 to 70 percent of sales in kind. It can be concluded that liquidity problems connected with bartered sales have positive strong impact on the incidence of wage arrears.

It is shown that if *net profits of the firm increase*, the probability of being subject to wage non-payments for the firms is 8.7 percentage points lower than for the firms that have net profits unchanged. If the profits decreases , the coefficient has positive sign (i.e., it is found that changes I net profits influence probability probability of wage arrears increases), although the estimated coefficient is insignificant.

It is estimated that if *firm fires employees extensively*, the probability of wage arrears becomes lower by 6.5 percentage points compared to firms that do not fire the employees. It can be an indicator that firms may cumulate wage arrears together with practices of unpaid vacancies. This result is consistent with findings for workers. When, on the other hand, the firm practices unpaid leaves, probability of wage arrears is 8.5 percentage points higher compared with those firms that do not value such practices, other things equal.

It can be concluded that economic performance of the firm as well as industrial affiliation of the firm and its regional location are important determinants of wage arrears.

4.2.4. Ordered Probit Estimation: Firms' Side

This section is devoted to the analysis of the duration of wage non-payments for the firm level data. First, I describe the model I estimate and present the results of estimation of ordered probit for the firms. Then I compare my results with binary choice model results and also draw conclusions comparing my results with those for Russia by Lehmann *et al*. (1999).

Since the managers were asked about the length of the firm's wage bill (zero months, 1 - 3 months, 4 - 6 months, 6 – 12 months, and over 12 month) that is subject to wage arrears, their answers can be used in ordered probit model. I

employ the same approach as in the section with estimation of determinants of duration of wage arrears for workers.

Dependent variable is constructed as follows. I introduce 1 if the debt on the wage bill is zero months, 2 – for debt of 1 to 3 months, 3 – for 4 to 6 months, 4 – for 7 to 12 months, and 5 – for the wage arrears of more than 12 months.

Vector x includes the same factors as those for the binary choice model for the firms.

4.2.5. Determinants of the Duration of Wage Arrears: Firms' Side
Ordered probit estimation results are presented in table C5 in Appendix C. It is found that regional location of the firm as well as its industrial affiliation have impact on the duration of wage arrears in a certain firm. Such economic characteristics of the firms' activities as changes in net profits, employment policy, presence of unpaid vacations and percentage of the sales bartered are shown to be factors that determine the duration of wage arrears as well.

It is shown that in some *regions* the firms have wage arrears of smaller duration. Negative estimated coefficients for Kyiv City, Odesa, Crimea, Kherson, Khmelnitsk, Cherkassy and Kirovograd, Zaporizhzhia and Volyn allow to conclude that firms operating in these regions have shorther period when the wages are non-paid to workers compared to those from Donetsk. It is worthwhile to mention that in Kyiv City, according to probit estimation results described earlier, the firms not only face the smaller probability of being subject to wage arrears but also they have wage non-payments of shorter duration. This finding can be explained by the fact that Kyiv City as the capital of Ukraine has a more dynamic labour market than any other place in the provinces. As a result, workers can quit jobs for which they are not paid comparatively easily and move to another job.

Industrial affiliation of the firm is also found to be significant determinant of the duration of wage arrears. In particular, compared to manufacturing, firms from construction industries have longer periods of wage non-payments, whereas firms from services, health and education, and finance industries have shorter periods of wage arrears. Having in mind results from probit estimation, it can be concluded that firms from construction industry experience not only higher probability of wage arrears, but the duration of wage non-payments is also higher. On the contrary, firms from finance business, have both lower probability of having wage arrears and smaller duration of non-payments. At the same time, in services industry, the probability of wage arrears is higher whereas the duration is found to be shorter. It can be explained by the fact that services may have more dynamic labour market, although with high probability of wage arrears. So if the workers from this sector are not paid, they just quit their jobs.

It is estimated that *private and joint-stock firms* have shorther duration of wage arrears compared to state enterprises. Such firms also have lower probability of being subject to wage arrears.

It is also turned out that economic activities of the firm influence the duration of wage non-payments. First, it can be concluded that *increasing in percentage of sales bartered* increases the duration of wage arrears for a certain firm. If the firm does not receive any barter payment for its sales, the duration of wage arrears is shorter compared with those firms that made from 10 to 70 percent of sales in barter form. The probability of having wage arrears for such firms is also lower. At the same time, if the firm makes more than 70 percent of sales in barter form, the duration of wage arrears becomes larger and probability of having wage arrears also increases. It makes sense because the firm does not receive cash for its sales and, as a result, faces liquidity problems which are accompanied with increasing incidence of wage arrears.

Increasing of net profits of the firm has positive impact on the duration of wage arrears: it becomes shorter compared to those firms that face no changes in net profits. It should be added that, according to Probit estimation, increasing net profits also imply lower probability of wage arrears in general.

In firms, where the management fire employees, the duration of wage arrears is shorter than in those that do not. The probability of wage arrears also decreases. At the same time, firms that practice unpaid vacations, have significantly longer wage non-payments (the probability is also higher). It can be explained by the fact that the workers that are pushed on unpaid vacations have too low a bargaining power to force the management to pay them for work they performed earlier. Thus, wage arrears accumulate and there is no reduction in their duration.

Summarizing all the estimation results, I may suggest that private firms from finance sector that have increased profits during the last 6 months as of the date of the interview and are located in Kyiv city has the lowest chances to be subject to wage non-payments. Moreover, these wage arrears are probably of comparatively short duration. If the firm makes no sales in barter form, practices layoffs and do not respect unpaid vacations, probability of wage arrears for such a firm becomes lower.

Therefore, almost the same factors that determine the probability of wage arrears for the firms turn out to be the determinants of the length of wage arrears. Comparing the results with the estimations for Russia by Lehmann *et al* (1999), it can be concluded that finance, services, health and education industries have shorter duration of wage arrears in both Russia and Ukraine. For Russia, it turned out that size of the firm determines the duration of wage non-payments. It is shown not to be the case for Ukraine. At the same time, in contrast to Russia, for Ukraine I get that type of ownership of the firm matters. . So, in spite of the fact that direct comparisons between the present study and Lehmann *et al* (1999)

cannot be made, the comparisons, wherever possible, remain useful, because they allow us to better understand the factors behind wage arrears.

If we compare the binary and the ordered probit estimates, we can conclude that ordered probit models for both firms and workers catch the influence of the different factors on the incidence of wage arrears better than the binary choice models. This conclusion comes from comparison of the estimation statistic for both regressions. Ordered probit models may be considered to be "non-resricetd" in the sense that they not collapse the multiple answers of the respondents to just two categories.

* * *

If we compare probit and ordered probit estimation, we can conclude that ordered probit models for both firms and workers catch the influence of the different factors on the incidence of wage arrears better than probit models. This conclusion comes from comparison of the estimation statistic for both regressions. As Greene (2000, 875) states, " ... although the outcome is discrete, the multinomial logit or probit models would fail to account for the ordinal value of the dependent variable." Ordered probit models are turned to be "non-resriceted" because they do not restrict the answers of the respondents to just 0 and 1 replys. Such models allow to observe differences in people's attitudes toward the problem under consideration.

CONCLUSIONS

5.1. Policy Implications

Widespread wage arrears turn out to be phenomenon that extensively appeared in the CIS countries. Significant fall in output and consumption in Ukraine beginning from 1994 resulted in specific firms' adjustment to the demand shocks. Instead of reducing employment, firms found it possible to not pay to its workers. Practices of non-payments turned out to be very widespread throughout the whole Ukraine. It is shown that wage arrears seem to be major problem for certain industries of the economy as well as for certain regions. In Kyiv City and Odesa –large and developed cities of Ukraine, wage arrears occur not very often. Moreover, they are usually of shorter terms. At the same time, in small underdeveloped Western oblasts such as Zakarpattia and Ternopil, wage arrears have significantly longer terms and are more widespread.

Data sets available do not allow me to check many hypotheses checked by Lehmann *et al.* (1999) and Earle and Sabirianova (2000) about the determinants of wage arrears in Ukraine. It should be noted, however, that I check some new hypotheses about the influence of the economic activities of the firms on the incidence of wage arrears. I present evidence that allows me to make some important conclusions.

First, I found that individual characteristics of the individuals (ages and gender) do not have significant impact on the incidence of wage arrears. Firms' characteristics are determined as a major factor that influences the incidence of wage arrears for workers. These findings are comparable to those made for the

Russian Federation. However, the problem here is that in model has to leave out many important factors (such as tenure and educational level) due to lack of data. That is why my analysis is primary focused on the firms' characteristics.

Firms and workers from the regions where there are high unemployment rates and low dynamic opportunities suffer more from wage arrears. Industrial affiliation also determines the probability of wage arrears for the firms and workers. Agriculture, manufacturing, and construction are more badly affected by wage arrears than services and finance. Firms and workers from large cities have lower probability to be subject to wage arrears.

My analysis gives the evidence that the determinants of wage arrears in Ukraine are similar to those for the Russian Federation. Moreover, it also shed some light upon the influence of economic activities Now I can try to answer the question why do the firms choose not to pay its workers. First, as I have already mentioned, local labour market situation matters: the higher the unemployment within region, the higher the probability of wage arrears. Besides, existence of unpaid leaves contributes positively to the incidence of wage arrears. At the same time, if the firm fires employees while experiencing decreasing in profits, the probability of wage arrears decreases. Moreover, it is shown that increase in the share of sales bartered increases the probability of wage arrears for a certain firm. In other words, liquidity problems matter. Finally, changes in net profits also determine the probability of wage arrears. If the firm experience decrease in net profits, probability of wage arrears goes up.

Ordered probit estimation gives me some ideas about the factors that influence the duration of wage arrears. Small private firms operating in finance sector have shorter duration of wage arrears, whereas large state-owned enterprises as well as agricultural enterprises are badly affected by prolonged wage non-payments.

It can be concluded that incidence of wage arrears in Ukraine are determined by both economic performance of the firms as well as factors connected with peculiarities of regional labour market.

What are the implications of the research results? I can conclude that soft budget constraints, poor legal infrastructure, small power of trade unions led to appearance of strange phenomenon – wage arrears. It turned out that in Ukraine, just like in the Russian Federation, what cannot be finance by the firm is just not paid. On the one hand, wage arrears deform the behavior of the firms: soft budget constraints slow down restructuring, do not give enough impulses for improving performance of the firm. One the other hand, wage non-payments distort the efficient allocation of labour force within economy due to the fact that productive labour force cannot move to the paid jobs. Moreover, workers do not receive enough incentives to perform their jobs better. On the contrary, shirking is "legalized" because workers do not feel responsibility for their job performance if they are not paid. One should also remember about such dangerous drawback of wage arrears as poverty spreading within economy.

I believe that if legal implementation of one of the most important issues of market economy – payment of wages – is violated, it is very hard to expect that economic transition in the country would be successful: population, which is not get paid for the jobs, would probably not grant credibility to the reforms in general.

5.2. Future research

Investigation of wage arrears in Ukraine is limited to the analysis of aggregate data sets, which cannot contribute a lot to the explanation of the determinants of wage arrears. This paper tries to add important information to the explaining wage arrears in Ukraine.

However, a lot of other analyses on micro level still need to be done. One major question is the discrimination of workers: what are the workers that tolerate wage arrears? This paper shades only little light on this problem. Further elaboration of data will allow researches to investigate the problem of wage arrears in Ukraine more deeply. In particular, the impact of other factors connected with legal environment, such as corruption and other rent-seeking activities, may be investigated.

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Description of Data Sets: Workers

Table A1. Regional Distribution of the Workers

Region (oblasts)	Frequency	Percent
Crimea	153	4.68
Kyiv City	206	6.31
Kyiv oblast	137	4.19
Vinnytsia	92	2.82
Volyn	72	2.20
Dnipropetrovsk	239	7.32
Donetsk	352	10.77
Zhytomyr	74	2.27
Zakarpattia	123	3.76
Zaporizhzhia	102	3.12
Ivano-Frankivsk	99	3.03
Kirovohrad	63	1.93
Luhansk	131	4.01
Lviv	234	7.16
Mykolaiv	61	1.87
Odesa	163	4.99
Poltava	163	4.99
Rivne	85	2.60
Sumy	91	2.79
Ternopil	97	2.97
Kharkiv	150	4.59
Kherson	82	2.51
Khmelnytskiy	77	2.36
Cherkassy	67	2.05
Chernivtsi	103	3.15
Chernihiv	51	1.56
Total	3,267	100

Table A2. Incidence of Wage Arrears in Ukraine: Households-Level Data

Does the enterprise owe you any money?	Frequency	Percent
Yes	2,105	64.43
No	1,149	35.17
No answer	13	0.40
Total	3,267	100.00

Table A3. Duration of Wage Arrears in Ukraine: Households-Level Data

How many months is the firm's payroll in arrears?	Frequency	Percent
Zero months	97	4.61
1 - 3 months	806	38.27
4 – 6 months	471	22.36
7 – 12 months	299	14.20
More than 12 months	396	18.80
Total	2,106	100.00

Table A4. Regional Distribution of Wage Arrears*

Regional location of the firm (oblasts)	How many months is the firm's payroll in arrears?						Total
	Zero months	1-3 months	4-6 months	7-12 months	More than 12 months	No answer	
Crimea	2 (2.06)	38 (39.18)	13 (13.40)	10 (10.31)	26 (26.80)	8 (8.25)	97 (100)
Kyiv City	5 (6.02)	41 (49.40)	18 (21.69)	13 (15.66)	6 (7.23)	0 (0.00)	83 (100)
Kyiv oblast	1 (1.35)	41 (55.41)	20 (27.03)	7 (9.46)	5 (6.76)	0 (0.00)	74 (100)
Vinnytsia	3 (4.62)	25 (38.46)	12 (18.46)	4 (6.15)	21 (32.31)	0 (0.00)	65 (100)
Volyn	1 (1.92)	21 (40.38)	10 (19.23)	11 (21.15)	6 (11.54)	3 (5.77)	52 (100)
Dnipropetrovsk	4 (2.88)	48 (34.53)	42 (30.22)	21 (15.11)	21 (15.11)	3 (2.16)	139 (100)
Donetsk	17 (7.49)	78 (34.36)	47 (20.70)	34 (14.98)	46 (20.26)	5 (2.20)	227 (100)
Zhytomyr	5 (8.47)	24 (40.68)	12 (20.34)	9 (15.25)	9 (15.25)	0 (0.00)	59 (100)
Zakarpattia	6 (8.11)	39 (52.70)	17 (22.97)	10 (13.51)	2 (2.70)	0 (0.00)	74 (100)
Zaporizhzhia	2 (4.08)	18 (36.78)	13 (26.53)	3 (6.12)	11 (22.45)	2 (4.08)	49 (100)
Ivano-Frankivsk	4 (5.41)	35 (47.30)	20 (27.03)	11 (14.86)	3 (4.05)	1 (1.35)	74 (100)
Kirovohrad	1 (2.33)	19 (44.19)	10 (23.26)	9 (20.93)	4 (9.30)	0 (0.00)	43 (100)
Luhansk	3 (2.86)	31 (29.52)	25 (23.81)	13 (12.38)	33 (31.43)	0 (0.00)	105 (100)
Lviv	3 (1.86)	66 (40.99)	38 (23.60)	26 (16.15)	25 (15.53)	3 (1.86)	161 (100)
Mykolaiv	1 (2.63)	16 (42.11)	13 (34.21)	7 (18.42)	1 (2.63)	0 (0.00)	38 (100)
Odesa	4 (4.55)	36 (40.91)	18 (20.45)	6 (6.82)	23 (26.14)	1 (1.14)	88 (100)
Poltava	11 (10.78)	29 (28.43)	20 (19.61)	14 (13.73)	25 (24.51)	3 (2.94)	102 (100)
Rivne	7 (9.59)	26 (35.62)	17 (23.29)	14 (19.18)	7 (9.59)	2 (2.74)	73 (100)
Sumy	2 (2.70)	40 (54.05)	11 (14.86)	5 (6.76)	14 (18.92)	2 (2.70)	74 (100)
Ternopil	5 (6.33)	18 (22.78)	24 (30.38)	20 (25.32)	12 (15.19)	0 (0.00)	79 (100)
Kharkiv	4 (4.26)	44 (46.81)	17 (18.09)	11 (11.70)	17 (18.09)	1 (1.06)	94 (100)
Kherson	1 (1.75)	20 (35.09)	10 (17.54)	5 (8.7)	21 (36.84)	0 (0.00)	57 (100)
Khmelnytskiy	0 (0.00)	17 (31.48)	11 (20.37)	5 (9.26)	20 (37.04)	1 (1.85)	54 (100)
Cherkassy	1 (2.56)	13 (33.33)	11 (28.21)	1 (2.56)	11 (28.21)	2 (5.13)	39 (100)
Chernivtsi	1 (1.45)	8 (21.62)	17 (24.64)	4 (10.81)	17 (45.95)	0 (0.00)	37 (100)
Chernihiv	3 (8.11)	15 (21.74)	5 (13.51)	26 (37.68)	10 (14.49)	0 (0.00)	69 (100)
Total	97 (4.61)	806 (38.27)	471 (22.36)	299 (14.20)	396 (18.80)	37 (1.76)	2,106 (100)

Note: In brackets, percentage amounts are given.

Table A5. Industrial affiliation of the firms

Industrial affiliation of the firm	Frequency	Percent
Construction	153	4.69
Manufacturing	682	20.89
Agriculture	446	13.66
Transportation and Communications	303	9.28
Trade	211	6.46
Public Catering	75	2.30
Public Utilities, Hotels	245	7.50
Health and Education	780	23.89
Finance	50	1.53
Scientific services	42	1.29
Other services	8	0.25
Other industries	270	8.27
Total	3,265	100.00

Table A6. Wage Arrears by Industry*

How many months is the firm's payroll in arrears?	Industrial Affiliation												
	Construction	Manufacturing	Agriculture	Transport	Trade	Public Cater	Public Utilities	Health, Educ	Finance	Scientific servic	Other Services	Other indus	Total
Zero month	7 (7.2)	16 (16.5)	9 (9.28)	12 (12.4)	8 (8.3)	0 (0.0)	6 (6.2)	29 (29.9)	5 (5.2)	0 (0.0)	1 (1.0)	4 (5.1)	94 (100)
1 – 3 month	31 (3.85)	145 (17.9)	82 (10.2)	93 (11.5)	25 (3.1)	11 (1.4)	67 (8.3)	258 (32)	4 (0.5)	13 (1.61)	0 (0.00)	77 (9.55)	806 (100)
4 – 6 month	24 (5.10)	138 (29.3)	51 (10.8)	38 (8.1)	10 (2.1)	9 (1.9)	36 (7.6)	114 (24.2)	1 (0.2)	8 (1.7)	0 (0.00)	21 (4.5)	471 (100)
7 – 12 month	24 (8.03)	84 (28.1)	50 (16.7)	17 (5.7)	5 (1.7)	3 (1.0)	24 (8.0)	62 (20.7)	0 (0.0)	6 (2.0)	0 (0.0)	7 (2.3)	299 (100)
More than 12 months	17 (4.3)	117 (29.6)	171 (43.2)	23 (5.81)	4 (1.0)	7 (1.8)	19 (4.8)	25 (6.3)	1 (0.3)	2 (0.5)	0 (0.0)	4 (3.46)	396 (100)
No answer	6 (16.2)	7 (18.9)	12 (32.4)	1 (2.7)	3 (8.1)	0 (0.0)	3 (8.1)	2 (5.4)	0 (0.0)	0 (0.0)	0 (0.0)	1 (0.05)	37 (100)
Total	109 (5.2)	507 (24.1)	375 (17.8)	184 (8.7)	5 (2.6)	30 (1.4)	155 (7.4)	490 (23.3)	11 (0.5)	29 (1.4)	1 (0.05)	81 (3.85)	2,106 (100)

Note: In brackets, percentage amounts are given.

Table A7. Size of the firms

Size of the firm	Frequency	Percent
Small firms (1-50 employees)	1,038	34.73
Medium firms (51-250 employees)	925	30.95
Large firms (more than 250 employees)	1,026	34.33
Total	2,989	100.00

Table A8. Distribution of Wage Arrears by Size of the Firms*

How many months is the firm's payroll in arrears?	Size of the firm			Total
	Small firms	Medium firms	Large firms	
Zero months	34 (41.46)	24 (29.27)	24 (29.27)	82 (100)
1 - 3 months	272 (36.86)	210 (28.46)	256 (34.69)	738 (100)
4 – 6 months	120 (27.84)	137 (31.79)	174 (40.37)	431 (100)
7 – 12 months	62 (22.38)	108 (38.99)	107 (38.63)	277 (100)
More than 12 months	72 (17.86)	117 (30.22)	199 (51.92)	388 (100)
Total	560 (29.23)	596 (31.11)	760 (39.67)	1,916 (100)

* *Note*: In brackets, percentage amounts are given.

Table A9. Ownership types of the enterprises.

Type of ownership of the firm	Frequency	Percent
Private	309	9.48
Joint-Stock (25%-50% of shares owned by the state)	203	6.23
Joint-Stock (50% and more of shares owned by the state)	221	6.78
Joint-Stock (50% and more of shares owned by private owners)	227	6.97
Joint-Venture (50% of shares owned by private owners)	42	1.29
Joint-Venture (50% of shares owned by the state)	22	0.68
State	1,921	58.94
Other	78	2.39
Total	3,259	100.00

Table A10. Distribution of wage arrears by type of ownership of the firm

How many month is the firm's payroll in arrears?	Type of ownership								Total
	Private	Joint-Stock (25%-50% of shares owned by the state)	Joint-Stock (50% and more of shares owned by the state)	Joint-Stock (50% and more of shares owned by private owners)	Joint-Venture (50% of shares owned by private owners)	Joint-Venture (50% of shares owned by the state)	State	Other	
Zero months	12 (12.4)	5 (5.15)	3 (3.09)	8 (8.25)	0 (0.00)	0 (0.00)	60 (61.86)	3 (3.09)	97 (100)
1 – 3 months	39 (4.8)	48 (5.96)	56 (6.95)	39 (4.84)	11 (1.36)	7 (0.87)	542 (67.25)	13 (1.61)	806 (100)
4 – 6 months	17 (3.6)	33 (7.01)	30 (6.37)	37 (7.86)	3 (0.64)	1 (0.21)	316 (67.09)	9 (1.91)	471 (100)
7– 12 months	7 (2.3)	20 (6.69)	30 (10.03)	24 (8.03)	2 (0.67)	4 (1.34)	188 (62.88)	8 (2.68)	299 (100)
More than 12 months	11 (2.8)	32 (8.21)	49 (12.56)	53 (13.59)	3 (0.77)	4 (1.03)	163 (41.79)	18 (4.62)	390 (100)
Total	90 (4.29)	140 (6.67)	169 (8.05)	162 (7.71)	19 (0.90)	16 (0.76)	1,282 (61.05)	53 (2.52)	2,100 (100)

* *Note*: In brackets, percentage amounts are given.

Table A11. Incidence of Payments - in - Kind

What proportion of your salary did you receive in kind?	Frequency	Percent
Zero percent	1,987	61.01
1 – 10 percent	342	10.50
11 – 40 percent	339	10.41
41 – 70 percent	224	6.88
More than 70 percent	301	9.24
No Answer	64	1.96
Total	3,257	100.00

Table A12. Hours worked a week at the enterprise

How many hours do you work a week at the firm?	Frequency	Percent
Less than 20 hours	300	9.32
20-39 hours	681	21.16
40-49 hours	1,984	61.63
50 and more hours	254	7.89
Total	3,219	100

Table A13. Estimated Median Levels of Duration of Wage Arrears in Oblasts: Households-Level Data

Regional location of the firm (oblasts)	Median	Interpretation (duration of wage arrears in months)
Crimea	3	4 to 6 months
Kyiv City	2	1 to 3 months
Kyiv oblast	2	1 to 3 months
Vinnytsia	3	4 to 6 months
Volyn	3	4 to 6 months
Dnipropetrovsk	3	4 to 6 months
Donetsk	3	4 to 6 months
Zhytomyr	3	4 to 6 months
Zakarpattia	2	1 to 3 months
Zaporizhzhia	3	4 to 6 months
Ivano-Frankivsk	3	4 to 6 months
Kirovohrad	3	4 to 6 months
Luhansk	3	4 to 6 months
Lviv	3	4 to 6 months
Mykolaiv	3	4 to 6 months
Odesa	3	4 to 6 months
Poltava	3	4 to 6 months
Rivne	3	4 to 6 months
Sumy	2	1 to 3 months
Ternopil	3	4 to 6 months
Kharkiv	2	1 to 3 months
Kherson	3	4 to 6 months
Khmelnytskiy	3	4 to 6 months
Cherkassy	3	4 to 6 months
Chernivtsi	3	4 to 6 months
Chernihiv	4	7 to 12 months

Table A14. Estimated Median Levels of Duration of Wage Arrears in Ukrainian Industries: Households-Level Data

Industry	Median	Interpretation (duration of wage arrears in months)
Agriculture, forestry	4	7 to 12 months
Construction	3	4 to 6 months
Manufacturing	3	4 to 6 months
Transport, Communications	2	1 to 3 months
Trade	2	1 to 3 months
Public Catering	3	4 to 6 months
Hotels, Recreation	3	4 to 6 months
Health, Education	2	1 to 3 months
Finance	2	1 to 3 months
Scientific services	3	4 to 6 months
Other services	1	Zero month
Other industries	1	Zero month

Description of Data Sets: Firms

Table B1. Regional Location of the Firms

Regional location of the firm (oblasts)	Frequency	Percent
Crimea	196	4.96
Kyiv City	433	10.95
Kyiv oblast	55	1.39
Vinnytsia	114	2.88
Volyn	81	2.05
Dnipropetrovsk	339	8.58
Donetsk	481	12.17
Zhytomyr	67	1.69
Zakarpattia	58	1.47
Zaporizhzhia	180	4.55
Ivano-Frankivsk	94	2.38
Kirovohrad	90	2.28
Luhansk	214	5.41
Lviv	301	7.61
Mykolaiv	128	3.24
Odesa	92	2.33
Poltava	163	4.12
Rivne	96	2.43
Sumy	85	2.15
Ternopil	64	1.62
Kharkiv	276	6.98
Kherson	96	2.43
Khmelnytskiy	81	2.05
Cherkassy	87	2.20
Chernivtsi	2	0.05
Chernihiv	80	2.02
Total	3,953	100.00

Table B2. Regional Distribution of Wage Arrears*

Regional location of the firm (oblasts)	How many months is the firm's payroll in arrears?					Total
	Zero months	1-3 months	4-6 months	7-12 months	More than 12 months	
Crimea	95 (51.63)	43 (23.37)	27 (14.67)	11 (5.98)	8 (4.35)	184 (100)
Kyiv City	268 (63.51)	83 (19.67)	30 (7.11)	28 (6.64)	13 (3.08)	422 (100)
Kyiv oblast	15 (27.78)	11 (20.37)	16 (29.63)	7 (12.96)	5 (9.26)	54 (100)
Vinnytsia	48 (43.64)	28 (25.45)	17 (15.45)	8 (7.27)	9 (8.18)	110 (100)
Volyn	34 (43.59)	24 (30.77)	10 (12.82)	7 (8.97)	3 (3.85)	78 (100)
Dnipropetrovsk	138 (42.20)	74 (22.63)	51 (15.60)	38 (11.62)	26 (7.95)	327 (100)
Donetsk	218 (47.19)	81 (30.00)	66 (14.29)	46 (9.96)	51 (11.04)	462 (100)
Zhytomyr	21 (35.00)	18 (30.00)	13 (21.67)	5 (8.33)	3 (5.00)	60 (100)
Zakarpattia	30 (52.63)	20 (35.09)	3 (5.26)	4 (7.02)	0 (0.00)	57 (100)
Zaporizhzhia	92 (51.11)	40 (22.22)	25 (13.89)	19 (10.56)	4 (2.22)	180 (100)
Ivano-Frankivsk	44 (50.57)	20 (22.99)	20 (22.99)	3 (3.45)	0 (0.00)	87 (100)
Kirovohrad	40 (46.51)	20 (23.26)	14 (16.28)	8 (9.30)	4 (4.65)	86 (100)
Luhansk	90 (42.86)	51 (24.29)	31 (14.76)	21 (10)	17 (8.10)	210 (100)
Lviv	138 (47.92)	65 (22.57)	43 (14.93)	30 (10.42)	12 (4.17)	288 (100)
Mykolaiv	67 (57.26)	26 (22.22)	13 (11.11)	5 (4.27)	6 (5.13)	117 (100)
Odesa	62 (68.89)	17 (18.89)	5 (5.56)	3 (3.33)	3 (3.33)	90 (100)
Poltava	89 (57.42)	30 (19.35)	17 (10.97)	9 (5.81)	10 (6.45)	155 (100)
Rivne	42 (49.41)	20 (23.53)	12 (14.12)	8 (9.41)	3 (3.53)	85 (100)
Sumy	21 (26.58)	22 (27.85)	20 (25.32)	8 (10.13)	8 (10.13)	79 (100)
Ternopil	21 (33.87)	19 (30.65)	13 (20.97)	5 (8.06)	4 (6.45)	62 (100)
Kharkiv	132 (49.44)	61 (22.85)	32 (11.99)	29 (10.86)	13 (4.87)	267 (100)
Kherson	54 (58.06)	22 (23.66)	7 (7.53)	5 (5.38)	5 (5.38)	93 (100)
Khmelnytskiy	41 (54.67)	20 (26.67)	11 (14.67)	3 (4.00)	0 (0.00)	75 (100)
Cherkassy	43 (51.19)	21 (25.00)	8 (9.52)	4 (4.76)	8 (9.52)	84 (100)
Chernivtsi	2 (100.00)	0 (0.00)	0 (0.00)	0 (0.00)	0 (0.00)	2 (100)
Chernihiv	35 (44.30)	23 (29.11)	12 (15.19)	5 (6.33)	4 (5.06)	79 (100)
Total	1,880 (49.56)	859 (22.65)	516 (13.60)	319 (8.41)	219 (5.77)	3,793 (100)

* *Note*: In brackets, percentage amounts are given.

Table B3. Incidence of Wage Arrears in Ukraine: Firms-Level Data

How many months is the firm's payroll in arrears?	Frequency	Percent
Zero months	1,881	49.58
1 - 3 months	859	22.64
4 – 6 months	516	13.60
6 – 12 months	319	8.41
More than 12 months	219	5.77
Total	3,794	100.00

Table B4. Industrial affiliation of the firms

Industrial affiliation of the firm	Frequency	Percent
Construction	520	13.19
Manufacturing	909	23.06
Agriculture	148	3.75
Transportation and Communications	249	6.32
Services (Trade, hotels, recreation business etc.)	1,463	37.11
Health and Education	179	4.54
Finance	75	1.90
Other services	399	13.13
Total	3,942	100.00

Table B5. Wage Arrears by Industry*

How many months is the firm's payroll in arrears?	Industrial affiliation of the firm								
	Construction	Manufacturing	Agriculture	Transport	Services	Health and Education	Finance	Other services	Total
Zero months	146 (7.79)	294 (15.69)	46 (2.45)	91 (4.86)	901 (48.08)	120 (6.40)	62 (3.31)	214 (1.42)	1874 (100)
1 – 3 months	127 (14.80)	240 (27.97)	32 (3.73)	74 (8.62)	283 (32.63)	33 (3.85)	6 (0.70)	66 (7.69)	858 (100)
4 – 6 months	117 (22.72)	163 (31.65)	24 (4.66)	29 (5.63)	135 (26.21)	9 (1.75)	2 (0.39)	36 (6.99)	515 (100)
7 – 12 months	73 (22.88)	119 (37.30)	13 (4.08)	26 (8.15)	56 (17.56)	6 (1.88)	0 (0.00)	26 (8.15)	319 (100)
More than 12 months	47 (21.46)	72 (32.88)	9 (4.11)	22 (10.05)	36 (16.44)	5 (2.28)	0 (0.00)	28 (12.79)	219 (100)
Total	510 (13.47)	888 (23.46)	124 (3.28)	242 (6.39)	1,408 (37.2)	173 (4.57)	70 (1.85)	370 (9.77)	3,785 (100)

* *Note*: In brackets, percentage amounts are given.

Table B6. Size of the firms

Size of the firm	Frequency	Percent
Small firms (1-50 employees)	2,149	54.85
Medium firms (51-250 employees)	947	24.17
Large firms (more than 250 employees)	822	20.98
Total	3,918	100.00

Table B7. Distribution of Wage Arrears by Size of the Firms*

How many months is the firm's payroll in arrears?	Size of the firm			Total
	Small firms	Medium firms	Large firms	
Zero months	1,281 (68.9)	343 (18.45)	235 (12.64)	1,859 (100)
1 - 3 months	377 (44.1)	246 (29.12)	229 (26.78)	855 (100)
4 – 6 months	192 (37.21)	171 (33.14)	153 (29.65)	516 (100)
7 – 12 months	95 (29.97)	96 (30.28)	126 (39.75)	317 (100)
More than 12 months	87 (40.09)	68 (31.34)	62 (28.57)	217 (100)
Total	2,032 (53.98)	927 (24.63)	805 (21.39)	3,764 (100)

* Note: In brackets, percentage amounts are given.

Table B8. Ownership types of the enterprises.

Type of ownership of the firm	Frequency	Percent
Private	1,092	28.03
State	538	13.81
Joint -Stock	1,820	46.71
Joint -Venture	191	4.9
Other	255	6.54
Total	3,896	100.00

Table B9. Distribution of wage arrears by type of ownership of the firm

How many months is the firm's payroll in arrears?	Type of ownership of the firm					Total
	Private	State	Joint -Stock	Joint -Venture	Other	
Zero Months	671 (36.27)	209 (11.30)	745 (40.26)	91 (4.92)	129 (4.65)	1,850 (100)
1 - 3 months	189 (22.18)	145 (17.02)	427 (50.12)	37 (4.34)	54 (6.34)	852 (100)
4 – 6 months	88 (17.22)	74 (14.48)	325 (57.73)	31 (6.07)	23 (4.5)	511 (100)
7 – 12 months	35 (1.04)	58 (18.30)	194 (61.2)	15 (4.74)	15 (4.73)	317 (100)
More than 12 months	34 (15.96)	40 (18.78)	117 (54.93)	9 (4.23)	13 (6.11)	213 (100)
Total	1,017 (27.17)	526 (14.05)	1,778 (47.5)	18 (4.89)	234 (6.25)	3,743 (100)

* Note: In brackets, percentage amounts are given.

Table B10. Changes in employment at firms

Has the firm fired the employees during the last 6 months?	Frequency	Percent
Yes	563	41.89
No	781	58.11
Total	1,344	100.00

Table B11. Distribution of wage arrears for different employment strategies of the firms*

How many months is the firm's payroll in arrears?	Has the firm fired the employees during the last 6 months?		Total
	Yes	No	
Zero months	175 (43.53)	227 (56.47)	402 (100)
1 - 3 months	138 (42.59)	186 (57.41)	324 (100)
4 – 6 months	103 (39.77)	156 (60.23)	259 (100)
7 – 12 months	85 (44.74)	105 (55.26)	190 (100)
More than 12 months	50 (36.76)	86 (63.24)	136 (100)
Total	551 (42.03)	760 (57.97)	1,311 (100)

* *Note*: In brackets, percentage amounts are given.

Table B12. Incidence of unpaid leave

Has the firm put any employees on extended unpaid leave during the last 6 months?	Frequency	Percent
Yes	1,472	37.88
No	2,414	62.12
Total	3,886	100.00

Table B13. Distribution of unpaid leave among the firms with wage arrears*

How many months is the firm's payroll in arrears?	Has the firm put any employees on extended unpaid leave during the last 6 months?		Total
	Yes	No	
Zero months	418 (22.59)	1,432 (77.41)	1,850 (100)
1 - 3 months	379 (44.64)	470 (55.36)	849 (100)
4 – 6 months	295 (57.5)	218 (42.50)	513 (100)
7 – 12 months	215 (67.82)	102 (32.18)	317 (100)
More than 12 months	143 (65.90)	74 (34.10)	217 (100)
Total	1,450 (38.71)	2,296 (61.29)	3,746 (100)

* *Note*: In brackets, percentage amounts are given.

Table B14. Incidence of sales bartered.

Percent of the firm's sales bartered	Frequency	Percent
Zero percent	2,297	59.38
1 – 10 percent	576	14.89
11 – 40 percent	380	9.82
41 – 70 percent	284	7.34
More than 70 percent	331	8.56
Total	3,868	100.00

Table B15. Distribution of sales bartered among the firms with wage arrears*

How many months is the firm's payroll in arrears?	Percent of the firm's sales bartered					Total
	Zero percent	1 – 10 percent	11 – 40 percent	41 – 70 percent	More than 70 percent	
Zero months	1,395 (75.45)	215 (11.63)	135 (7.30)	61 (3.30)	43 (2.33)	1,849 (100)
1 - 3 months	426 (50.47)	158 (18.72)	102 (12.09)	76 (9.00)	82 (9.72)	844 (100)
4 – 6 months	172 (33.99)	92 (18.18)	71 (14.03)	76 (15.02)	95 (18.77)	506 (100)
7 – 12 months	111 (35.13)	60 (18.99)	38 (12.03)	39 (12.34)	68 (21.52)	316 (100)
More than 12 months	91 (42.33)	37 (17.21)	25 (11.63)	25 (11.63)	37 (17.21)	215 (100)
Total	2,195 (58.85)	562 (15.07)	371 (9.95)	277 (7.43)	325 (8.71)	3,730 (100)

* *Note*: In brackets, percentage amounts are given.

Table B16. Changes in net profits of the firms

Change in net profits during the last 6 months	Frequency	Percent
Decreased	1,891	57.65
Stayed the same	1,011	30.82
Increased	378	11.51
Total	3,280	100.00

Table B17. Distribution of net profits among firms with wage arrears*

How many months is the firm's payroll in arrears?	Change in net profits during the last 6 months			Total
	Decreased	Stayed the same	Increased	
Zero months	821 (60.53)	492 (32.48)	197 (13.00)	1,515 (100)
1 - 3 months	434 (57.71)	228 (30.32)	89 (11.83)	752 (100)
4 – 6 months	291 (63.11)	122 (26.46)	46 (9.98)	461 (100)
7 –12 months	184 (66.18)	72 (25.90)	22 (7.92)	278 (100)
More than 12 months	116 (61.05)	62 (32.63)	12 (6.32)	190 (100)
Total	2,190 (57.76)	976 (30.54)	366 (11.45)	3,196 (100)

* *Note*: In brackets, percentage amounts are given.

Table B18. Estimated Median Levels of Duration of Wage Arrears in oblasts: Firms-Level Data

Regional location of the firm (oblasts)	Median	Interpretation (duration of wage arrears in months)
Crimea	1	Zero month
Kyiv City	1	Zero month
Kyiv oblast	3	4 to 6 months
Vinnytsia	2	1 to 3 months
Volyn	2	1 to 3 months
Dnipropetrovsk	2	1 to 3 months
Donetsk	2	1 to 3 months
Zhytomyr	2	1 to 3 months
Zakarpattia	1	Zero month
Zaporizhzhia	1	Zero month
Ivano-Frankivsk	2	1 to 3 months
Kirovohrad	2	1 to 3 months
Luhansk	2	1 to 3 months
Lviv	2	1 to 3 months
Mykolaiv	1	Zero month
Odesa	1	Zero month
Poltava	1	Zero month
Rivne	2	1 to 3 months
Sumy	2	1 to 3 months
Ternopil	2	1 to 3 months
Kharkiv	2	1 to 3 months
Kherson	1	Zero month
Khmelnytskiy	1	Zero month
Cherkassy	2	1 to 3 months
Chernivtsi	2	1 to 3 months
Chernihiv	2	1 to 3 months

Table B19. Estimated Median Levels of Duration of Wage Arrears in Ukrainian Industries: Firms-Level Data

Industry	Median	Interpretation (duration of wage arrears in months)
Manufacturing	2	1 to 3 months
Construction	2	1 to 3 months
Agriculture	2	1 to 3 months
Transport, Communications	2	1 to 3 months
Services	1	Zero month
Health, Education	1	Zero month
Finance	1	Zero month
Other services	1	Zero month

APPENDIX C

Estimation Results

Table C1. Unemployment Rates and Wage Arrears by Region

Oblast	Unemployment Rate %, Derzhkomstat as of January 1, 2000	Wage Arrears, UAH mln as of January 10, 2000
Ukraine	4.3	6,339.5
Crimea	2.8	180.8
Vinnytsia	3.8	219.3
Volyn	7.0	112.2
Dnipropetrovsk	4.2	578.1
Donetsk	3.5	984.7
Zhytomyr	7.2	162.1
Zakarpattia	5.8	48.6
Zaporizhzhia	3.2	239.0
Ivano-Frankivsk	6.2	123.6
Kyiv	5.9	224.4
Kirovograd	5.6	190.0
Luhansk	3.7	578.2
Lviv	7.4	219.5
Mykolaiv	3.8	204.9
Odesa	0.9	206.8
Poltava	5.0	238.7
Rivne	7.2	126.8
Sumy	6.9	207.0
Ternopil	6.5	162.6
Kharkiv	3.8	434.1
Kherson	2.9	173.3
Khmelnytski	3.5	196.7
Cherkasy	4.4	210.5
Chernivtsi	4.3	73.5
Chernihiv	7.7	157.0
Kyiv City	0.9	124.4
Sevastopol	1.2	22.8

Source: Derzhkomstat, UEPLAC estimates (1999).

Note: Unemployment rates is defined as a ratio of the officially registered unemployed t o the number of employed in the working age [UEPLAC (1999)].

Table C2. Description of Variables: Workers' Level Data (Probit and Ordered Probit Estimation)

Variables	Type of variable	Interpretation
Demographic Factors **Age**		
16-24	Dummy	1 if a worker is of the age in this range; 0 otherwise
25-44 (benchmark)	Dummy	1 if a worker is of the age in this range; 0 otherwise
45-54	Dummy	1 if a worker is of the age in this range; 0 otherwise
>55	Dummy	1 if a worker is of the age in this range; 0 otherwise
Gender Female	Dummy	1 if a worker is female; 0 otherwise
Regions *Donetsk (benchmark)*	Dummy	1 if a worker works in this region; 0 otherwise
All other regions	Dummies	1 if a worker works in this region; 0 otherwise
Type of Settlement Dummies *Urban (benchmark)*	Dummy	1 if a worker works in this region; 0 otherwise (this category includes large cities, cities and towns of no less than 200,000 residents)
Rural	Dummy	1 if a worker works in this region; 0 otherwise (this category includes villages and settlements, "smts")
Industrial affiliation of the firm *Agriculture, forestry (benchmark)* All the other industries including construction, manufacturing, transport and communications, trade, public catering, hotels, public utilities, recreation, health and education, finance, scientific services (research), other services	Dummies	1 if worker works in this industry; 0 otherwise

Size of the firm		
Large firm (> 250 workers) (benchmark)	Dummy	1 if the worker is from the firm of this size; 0 otherwise
Small firm (< 50 workers)	Dummy	1 if the worker is from the firm of this size; 0 otherwise
Medium firm (< 250 workers)	Dummy	1 if the worker is from the firm of this size; 0 otherwise
Type of ownership of the firm		
State (benchmark)		
Private	Dummy	1 if a worker works in such firm; 0 otherwise
Joint-Stock (25-50% of shares owned by state)	Dummy	1 if a worker works in such firm; 0 otherwise
Joint-Stock (more than 50% of shares owned by state)	Dummy	1 if a worker works in such firm; 0 otherwise
Joint-Stock (more than 50% of shares owned by private persons)	Dummy	1 if a worker works in such firm; 0 otherwise
Joint-Venture (more than 50% of shares owned by private persons)	Dummy	1 if a worker works in such firm; 0 otherwise
Joint-Venture (more than 50% of shares owned by state)	Dummy	1 if a worker works in such firm; 0 otherwise
Other	Dummy	1 if a worker works in such firm; 0 otherwise
Hours worked a week on the firm		
Less than 20 hours a week	Dummy	1 if workers works this amount of time a week; 0 otherwise
20-39 hours a week	Dummy	1 if workers works this amount of time a week; 0 otherwise
40-50 hours a week (benchmark)	Dummy	1 if workers works this amount of time a week; 0 otherwise
More than 50 hours a week	Dummy	1 if workers works this amount of time a week; 0 otherwise
Percentage of salary paid in kind		
Zero percent	Dummy	1 if the worker receives this percentage of wage in kind; 0 otherwise
1-10 percent	Dummy	1 if the worker receives this percentage of wage in kind; 0 otherwise
11-40 percent (benchmark)	Dummy	1 if the worker receives this percentage of wage in kind; 0 otherwise
41-70 percent	Dummy	1 if the worker receives this percentage of wage in kind; 0 otherwise
More than 70 percent	Dummy	1 if the worker receives this percentage of wage in kind; 0 otherwise

Dependent Variable for Probit Wage Arrears	Dummy	1 if the worker has wage arrears as of the date of the interview; 0 otherwise
Ordered Probit Dependent Variables Duration of Wage Arrears	Logically ordered alternatives	1 if the worker has wage arrears of zero months (i.e., no wage arrears) as of the date of the interview 2 if the worker has wage arrears of 1 to 3 months as of the date of the interview 3 if the worker has wage arrears of 4 to 6 months as of the date of the interview 4 if the worker has wage arrears of 7 to 12 months as of the date of the interview 5 if the worker has wage arrears of more than 12 months as of the date of the interview

Table C3. Description of Variables: Firms' Level Data (Probit and Ordered Probit Estimation)

Variables	Type of variable	Interpretation
Regions *Donetsk (benchmark)*	Dummy	1 if a firm operates in this region; 0 otherwise
All other regions	Dummies	1 if a firm operates in this region; 0 otherwise
Type of Settlement Dummies *Urban (benchmark)*	Dummy	1 if a firm operates in this region; 0 otherwise (this category includes large cities, cities and towns of no less than 200,000 residents)
Rural	Dummy	1 if a firm operates in this region; 0 otherwise (this category includes villages and settlements, "smts")
Industrial affiliation of the firm *Agriculture, forestry (benchmark)* All the other industries including construction, manufacturing, transport and communications, trade, services, health and education, finance, other services	Dummies	1 if a firm operates in this industry; 0 otherwise
Size of the firm *Large firm (> 250 workers) (benchmark)*	Dummy	1 if a firm is of this size; 0 otherwise
Small firm (< 50 workers)	Dummy	1 if a firm is of this size; 0 otherwise
Medium firm (< 250 workers)	Dummy	1 if a firm is of this size; 0 otherwise
Type of ownership of the firm *State (benchmark)* Private	Dummy	1 if a firm is of this type of ownership; 0 otherwise
Joint-Stock	Dummy	1 if a firm is of this type of ownership; 0 otherwise
Joint-Venture	Dummy	1 if a firm is of this type of ownership; 0 otherwise
Other	Dummy	1 if a firm is of this type of ownership; 0 otherwise
Percentage of sales made in kind Zero percent	Dummy	1 if firm receives for this percent of sales not cash but barter
1-10 percent	Dummy	1 if firm receives for this percent of sales not cash but barter

11-70 percent (benchmark)	Dummy	1 if firm receives for this percent of sales not cash but barter
More than 70 percent	Dummy	1 if firm receives for this percent of sales not cash but barter
Percentage of salary paid in kind		
Zero percent	Dummy	1 if the worker receives this percentage of wage in kind; 0 otherwise
1-10 percent	Dummy	1 if the worker receives this percentage of wage in kind; 0 otherwise
11-40 percent (benchmark)	Dummy	1 if the worker receives this percentage of wage in kind; 0 otherwise
41-70 percent	Dummy	1 if the worker receives this percentage of wage in kind; 0 otherwise
More than 70 percent	Dummy	1 if the worker receives this percentage of wage in kind; 0 otherwise
Changes in net profits during first 6 months of 1999		
No changes (benchmark)	Dummy	1 if there have been no changes in net profits of the firm; 0 otherwise
Net Profits decrease	Dummy	1 if there have been no changes in net profits of the firm; 0 otherwise
Net Profits increase	Dummy	1 if there have been no changes in net profits of the firm; 0 otherwise
Have the firm fired employees during the last 6 months?		
No (benchmark)	Dummy	1 if a firm has not fired employees during the last 6 months; 0 otherwise
Yes	Dummy	1 if a firm has fired employees during the last 6 months; 0 otherwise
Are there unpaid vacations?		
No (benchmark)	Dummy	1 if a firm has not practiced unpaid vacations for the last 6 months as of the date of the interview; 0 otherwise
Yes	Dummy	1 if a firm has practiced unpaid vacations for the last 6 months as of the date of the interview; 0 otherwise
Dependent Variable for Probit Wage Arrears	Dummy	1 if a firm has practiced wage arrears; 0 otherwise

Ordered Probit Dependent Variables		
Duration of Wage Arrears	Logically ordered alternatives	*1* if a firm has wage arrears of zero months (i.e., no wage arrears) as of the date of the interview *2* if a firm has wage arrears of 1 to 3 months as of the date of the interview *3* if a firm has wage arrears of 4 to 6 months as of the date of the interview *4* if a firm has wage arrears of 7 to 12 months as of the date of the interview *5* if a firm has wage arrears of more than 12 months as of the date of the interview

Table C4. The Incidence and the Duration of Wage Arrears: Workers'-Level Data

Independent Variables	Incidence of Wage Arrears (Probit Estimation)			Duration of Wage Arrears (Ordered Probit Estimation)	
	Probit Estimate	*z*	*Marginal Effects, $\partial\Phi/\partial x_j$*	*Ordered Probit Estimate*	*z*
Age of the Worker *25-44 (benchmark)*					
16-24	0.028	0.20	0.024	-0.193	-1.45
45-54	-0.073	-0.75	-0.024	-0.052	-0.59
>55	-0.009	-0.05	-0.001	-0.174*	-1.859
Gender of the Worker Female	-0.042	-0.060	-0.016	-0.207*	-1.862
Regional dummies *Donetsk (benchmark)*					
Crimea	-0.060	-0.41	-0.023	0.168	1.09
Vinnytsia	0.069	0.39	0.025	0.168	0.98
Volyn	0.117	0.63	0.042	-0.140	-0.81
Dnipropetrovska	-0.034	-0.28	-0.012	0.163	1.32
Zakarpattia	-0.030	-.18	-0.011	-0.446***	-2.66
Zhytomyr	0.668***	3.14	0.243	-0.067	-0.39
Zaporizhzhia	-0.336**	-2.06	-0.121	0.011	0.07
Ivano-Frankivsk, Ternopil, and Chernivtsi	0.364***	2.74	0.131	0.090	0.74
Kyiv and Chernihiv	0.085	0.67	0.031	0.195	1.55
Cherkassy and Kirovohrad	-0.029	-0.20	-0.011	0.023	0.15
Lviv	0.040	0.32	0.015	-0.041	-0.33
Luhansk	0.434***	2.70	0.157	0.371***	2.74
Odesa	-0.218	-1.56	-0.079	0.197	1.86
Mykolaiv	0.095	0.46	0.034	-.0104	-0.52
Poltava	-0.014	-.009	-0.004	0.163	1.12
Rivne	0.864***	4.17	0.313	0.013	0.09
Sumy	0.367**	1.96	0.132	-0.207	-1.33
Kharkiv	0.069	0.50	0.026	0.107	0.73
Kherson	0.202	1.07	0.073	0.559***	3.24
Khmelnytsk	0.123	0.60	0.045	0.548***	2.79
Kyiv City	-0.384***	-3.00	-0.139	-0.028	-0.19
Type of Settlement Dummies					
Rural (villages and settlements)					

Urban (cities and towns)	-0.182	-2.82	-0.066	-0.206***	-3.30
Industrial affiliation of the firm					
Agriculture, forestry					
Construction	-0.113	-0.74	-0.041	-0.697***	-5.11
Manufacturing	-0.105	-0.95	-0.038	-0.385***	-4.04
Transport, Communications	-0.479***	-3.90	-0.173	-0846***	-4.30
Trade	-0.955***	-6.53	-.0345	-0.939***	-5.36
Public Catering	-0.728***	-3.76	-0.263	0.169	-0.77
Hotels, Recreation	-0.152	-1.12	-0.054	-0.568***	-4.56
Health, Education	-0.416***	-3.76	-0.151	-0.944***	-7.45
Finance	-0.987***	-5.46	-0.465	-1.397***	-3.99
Scientific services	0.129	0.53	0.047	-0.507**	-2.24
Other services	-0.490***	-3.15	-0.177	-0.912***	-5.74
Other industries	-0.177	-1.03	-0.063	-0.684 ***	-4.31
Size of the firm					
Large firm (> 250 workers)					
Small firm (< 50 workers)	-0.136	-1.81	-0.049	-.0157**	-2.15
Medium firm (< 250 workers)	-0.101	-1.45	-0.037	0.046	0.70
Type of ownership of the firm					
State					
Private	-0.831***	-7.92	-0.301	-0.538***	-4.02
Joint-Stock (25-50% of shares owned by state)	-0.326***	-2.85	-0.118	-0.288***	-2.68
Joint-Stock (more than 50% of shares owned by state)	0.026	0.24	0.010	0.112	1.14
Joint-Stock (more than 50% of shares owned by private persons)	-0.102	-0.92	-0.037	0.154	1.49
Joint-Venture (more than 50% of shares owned by private persons)	-0.408**	-1.79	-0.148	-0.420	-1.54
Joint-Venture (more than 50% of shares owned by state)	0.188	0.58	0.069	0.090	0.31
Other	-0.200	-.105	-0.072	-0.159	-0.94
Hours worked a week on the firm					
40-50 hours a week					
Less than 20 hours a week	0.161*	1.66	0.058	0.198**	2.33

20-39 hours a week	0.055	0.84	0.020	0.182	0.84
More than 50 hours a week	0.103	0.96	0.037	0.192	0.86
Percentage of salary paid in kind *11-40 percent of salary*					
Zero percent	-0.797***	-8.18	-0.289	-0.025	-0.34
1-10 percent	-0.156	-1.20	-0.056	0.243***	2.67
41-70 percent	0.008	0.06	0.003	-0.327***	-3.21
More than 70 percent	-0.998***	-9.2	-0.471	-0.238**	-2.342
Constant (for Probit)	0.992	9.92	0.575	-	-
Ancillary Parameters (for Ordered Probits)					
				_cut1	-2.534 (0.146)
				_cut2	-0.962 (0.139)
				_cut3	-0.312 (0.137)
				_cut4	0.221 (0.137)
$N = 2,922$ Chi2 (53) = 720.43 Log L = -1,545.64 Pseudo R^2 = 0.189				N = 1,873 Chi2 (53) = 386.44 Log L = - 2,594.077 Pseudo R2 = 0.069	

Note: *** - significant at the 1% level; ** - significant at the 5% level; * - significant at the 10% level. Sample consists of employed individuals.

Table C5. The Incidence and the Duration of Wage Arrears: Firms'-Level Data

Independent Variables	Incidence of Wage Arrears (Probit Estimation)			Duration of Wage Arrears (Ordered Probit Estimation)	
	Probit Estimate	z	Marginal Effects, $\partial\Phi/\partial x_j$	Ordered Probit Estimate	z
Regional dummies					
Donetsk (benchmark)					
Crimea	0.013	0.06	0.004	-0.316*	-1.77
Vinnytsia	0.299	1.00	0.094	0.008	0.04
Volyn	-0.142	-0.47	-0.044	-0.422*	-1.74
Dnipropetrovska	0.327*	1.68	0.103	-0.044	-0.31
Zakarpattia	0.862**	1.94	0.271	-0.357	-1.34
Zhytomyr	0.110	0.34	0.035	0.306	-1.205
Zaporizhzhia	-0.286	-1.33	0.900	-0.471*	-2.73
Ivano-Frankivsk, Ternopil, and Chernivtsi	0.499*	1.73	0.157	-0.285	-1.53
Kyiv and Chernihiv	0.165	0.56	0.052	-0.042	-0.20
Cherkassy and Kirovohrad	-0.115	-0.50	-0.037	-0.415**	-2.31
Lviv	0.489**	2.34	0.154	-0.160	-1.084
Luhansk	0.271	1.21	0.085	-0.300	-0.18
Odesa	-0.320	-0.92	-0.101	-0.757***	-2.50
Mykolaiv	0.107	0.42	0.330	-0.170	-0.84
Poltava	0.026	0.10	0.008	-0.243	-1.20
Rivne	0.104	0.33	0.032	-0.191	-0.80
Sumy	0.916**	2.08	0.288	0.259	1.13
Kharkiv	0.240	1.16	0.075	-0.053	-0.33
Kherson	-0.211	-0.79	-0.066	-0.418**	-1.96
Khmelnytsk	-0.110	-0.31	-0.034	-0.642**	-2.18
Kyiv City	-0.354**	-1.95	-0.112	-0.523***	-3.59
Type of Settlement Dummies					
Rural (villages and settlements)					
Urban (cities and towns)	-0.239	-0.573	-0.075	-0.157	-0.60
Industrial affiliation of the firm					
Manufacturing					
Construction	0.277*	1.88	0.087	0.250**	2.53

Agriculture	0.329	1.05	0.103	0.003	0.02
Transport, Communications	0.083	0.48	0.026	-0.016	-0.13
Services	-0.352***	-2.72	-0.110	-0.344***	-3.37
Health, Education	-0.288	-1.07	-0.090	-0.418*	-1.83
Finance	-1.766***	-3.17	-0.554	-2.213***	-3.88
Other services	-0.291	-1.30	0.091	-0.117	1.54
Size of the firm					
Small firm (< 50 workers)					
Large firm (> 250 workers)	0.157	1.159	0.049	0.107	1.13
Medium firm (< 250 workers)	0.171	0.382	0.053	0.088	0.86
Type of ownership of the firm					
State					
Private	-0.582***	-3.46	-0.183	-0.437***	-3.45
Joint-Stock	-0.226*	-1.66	-0.071	-0.093*	-0.96
Joint-Venture	-0.222	-0.97	-0.070	-0.067	-0.41
Other	-0.647***	-3.07	-0.203	-0.532***	-3.13
Percentage of sales made in kind					
10-70 percent of sales					
Zero percent	-0.270**	-2.11	-0.085	-0.192**	-2.01
1-10 percent	-0.173	-1.25	-0.054	-0.078	-0.76
More than 70 percent	0.463***	2.54	0.145	0.199*	1.85
Changes in net profits during first 6 months of 1999					
No changes					
Net Profits decrease	0.143	1.40	0.045	0.081	1.07
Net Profits increase	-0.277*	-1.65	-0.087	-0.217*	-1.63
Have the firm fired employees during the last 6 months?					
No					
Yes	-0.208**	-2.23	-0.065	-0.179***	-2.57
Are there unpaid vacations?					
No					
Yes	0.271***	2.840	0.085	0.315***	4.26
Constant (for Probit)	0.979**	2.073	0.307	-	-
Ancillary Parameters				_cut1	-1.084 (0.319)
				_cut2	-0.298 (0.318)
				_cut3	0.331 (0.318)
				_cut4	0.968 (0.319)
N = 1,128				*N* = 1,110	
Chi2 (43) = 241.59				Chi2 (43) = 266.5	
Log *L* = -553.79				Log L = - 1,587.1	
Pseudo R^2 = 0.171				Pseudo R2 = 0.077	

*Note: *** - significant at the 1% level; ** - significant at the 5% level; * - significant at the 10% level. Sample consists of employed individuals.*

APPENDIX D

Figure D1. Map of Ukraine