WAGE DETERMINATION IN UKRAINE: DOES RELIGIOSITY MATTER?

by

Volodymyr Korsun

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Thesis Supervisor: _____ Professor Olena Nizalova

Approved by _____
                  Head of the KSE Defense Committee, Professor Roy Gardner

Date _____

Kyiv School of Economics

Abstract

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Previous studies have demonstrated an effect of religious affiliation and religiosity on economic outcomes at both country and individual level. Such an effect is significant, but different across various countries. However, there is no work investigating such relationship in Ukraine. This paper estimates the effect of religiosity on individual earnings of Ukrainians while solving the issue of endogeneity of the former. The major finding is that the wage penalty for being religious is significant for males and turns out to be even higher when accounting for omitted variable bias: Ukrainian men, who pray about once a month, earn on average 24% lower wage than their atheistic colleagues. Meanwhile, the relationship between religiosity and earnings of Ukrainian females appears to be insignificant.

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If God did not exist, it would be necessary to invent him

Voltaire

Chapter 1

INTRODUCTION

There is no doubt that religion has been playing an important role in human life. Each religion implies a set of beliefs and specific moral rules to follow. Some of those rules and beliefs could be incorporated in everyday choices people make and may define their way of being.

A number of papers have been devoted to the macroeconomic influence of religion and religiosity. For example, McCleary and Barro (2006) find a positive relationship between the country's growth rate and religiosity of people, living within its borders. Although only few works are devoted to the effect of religion or religiosity on the individual decisions and attainments, they confirm the essential role of religious aspects in the life of individuals. For instance, Ewing (2000), Chiswick and Huang (2006), Lehrer (2004) and Beyerlein (2004) suggest that the estimated effect of religion on the individual wage is significant but different across countries. While Jews are likely to earn more and have higher educational attainments all over the world, the representatives of other religious affiliations differ in wage premium/penalty in each particular country.

Although there is a significant influence of religious affiliation in the USA, Canada and Germany, the situation in Ukraine may be quite different. For about 70 years Ukraine was a part of the USSR, within which politics of the eradication of religion had been pursued and all religious organizations were prosecuted. Individuals accused of being religious could have been deprived of high education and job positions of

influence (Pospielovsky 1987). This could explain the fact that a significant part of Ukrainian population still remains atheistic or agnostic (about 20% in 2008 according to the State committee of Ukraine for Nationalities and Religions http://www.scnm.gov.ua).

After the collapse of the Soviet Union the freedom of thought and religion was proclaimed in Ukraine. This led to a considerable growth in the number of people having belief in God (about 80% in 2008 according to the survey conducted by the Kyiv International Institute of Sociology (KIIS)[1]).

As the KIIS survey shows about a quarter of Ukrainians pray at least once a day and more than a half prays at least few times a month. At the same time a significant part of the population views themselves as being religious. About 60% of Ukrainians claim that they possess at least moderate religiosity while there are only 10% of people who claim that they are *definitely* atheistic.

How the shift to freedom of religion impacted on individuals is hard to estimate. However, the effect of religious affiliation and religiosity on the individual earnings in Ukraine is possible to estimate. But there is no paper investigating this issue in Ukraine despite the distinct and special history of religion participation in this country. This work aims at filling up this gap and studying possible differences in wages across religious groups. Using the data of the 2008 KIIS survey this paper contributes to the existing literature on the determinants of individual earnings in Ukraine. Besides, it expands the literature on the economic effect of

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[1] This survey was conducted in October 2008 and incorporates answers of 2036 respondents about their religious beliefs and affiliation - http://www.kiis.com.ua

religiosity at individual level by accounting for the endogeneity of the latter.

The paper is organized as follows. The second chapter provides an overview of the literature concerning the effect of religion on economic outcomes (including wages and earnings). The third chapter discusses the methodology. Chapter four focuses on the data description. The fifth chapter presents estimation results and is followed by general conclusions in chapter six.

Chapter 2

LITERATURE REVIEW

Since this work aims at estimation of the effect of religiosity on individual earnings in Ukraine, it is natural to provide a brief overview of the literature concerning the impact of religion on economic outcomes. First, papers investigating the influence of religiosity and religious affiliation at the macroeconomic level are reviewed. Second, studies focusing on the effect of religion on individual economic outcomes and educational attainment are described. Further, for the purpose of choosing the appropriate specification of Mincerian equation for Ukraine, literature devoted to the estimation of the latter is discussed. Finally, a contribution of this paper to the existing studies is highlighted.

The influence of religion on economic development was first considered more than a century ago. In 1905 Weber (1958) wrote one of the first papers proposing a significant relationship between religion and economic behaviour. He stated that protestant ethic was one of the probable reasons for the rapid development of capitalism in Northern Europe. Weber argued that the distinct nature of Protestant belief which implied that each profession is a "vocation of God" and that every person should do his or her best to show the absolute devotion to the chosen field of work is likely to have predetermined the economic growth of England, Scotland, Germany and Holland in XVII and XVIII centuries. This was the first attempt to explain the effect of religion on economic welfare of particular nations.

McCleary and Barro (2006) provide some evidence supporting Weber's theory. Using data on religious participation and religious beliefs for 81 countries from 1970 to 2000 they find a positive influence of the belief in hell on the work ethic of a population and, consequently, on the economic growth of a country. At the same time, they show that religiosity of people (the frequency of attending a church) is negatively correlated with country's welfare. Thus they conclude that populations with higher earnings have higher opportunity costs of attending religious institutions.

Meanwhile, Cantonni (2009) refute Weber's suggestion about the distinct role of Protestant ethic in the economic growth of Germany during XVII-XIX centuries. Using the dataset comprising of 272 German cities for XIV-XIX centuries and controlling for the city's location (e.g. distance to major cities and ports, distance to essential natural resources, location on a navigable river, latitude and longitude of the city), age, size and socio-economic characteristics (e.g, teacher-to-student ratio, number of looms, tax revenue, number of merchants) he finds that the difference in economic growth between Catholic and Protestant cities within German lands was not statistically significant.

Another important issue regarding macro effects of religion is emphasized by Beckworth (2008). He finds that religiosity of U.S. Protestants changes over time and depends on business cycle. His results suggest that a slowdown in the U.S. economy causes a higher rate of church attendance for evangelist Protestant. At the same time, mainline Protestants have the opposite tendency: their religious participation increases during economic booms.

The first systematic attempt to analyse the economic influence of religion at individual level is made by Azzi and Ehrenberg (1975). They develop a "utility-maximizing model of household behaviour which includes among its implications the shape of a household's life-cycle religious-participation profile and the division of religious participation between husband and wife" (p. 27). The authors suggest that religious people have a different utility maximization problem: they should optimize not only their life-time consumption but also the afterlife's consumption.

This theoretical paper has inspired a number of empirical works, which try to test the hypothesis suggested by Azzi and Ehrenberg (1975).

Tomes (1983) shows for Canada that there is a significant difference between rates of return to human capital for different religious groups. Controlling for ethnicity, area of residence, mother tongue, place of work and parents' origin he finds that returns to education are higher for Jews, who tend to invest more in education of their children. Haji and Panizza (2009) find no difference between education received by Christians and Muslims in Lebanon. They use OLS and fixed effect procedures to estimate the effect of religious affiliation on years of schooling received by individuals in Lebanon. After controlling for age, gender, wealth, parents' education and occupation the authors obtain insignificant estimates of the difference between educational attainments of the two major religious groups in Lebanon. However, they do not account for the returns on the years of schooling for the two groups. While there is no difference between the years of schooling attained the return to each additional year of education may greatly differ between Christians and Muslims.

Keister (2003) using data from the US National Longitudinal Survey of Youth for 1985-1998 studies the effect of religious affiliation on individual wealth, home ownership and inheritance. She uses the generalized least squares to model individual welfare and employs logistic regression for the model of ownership and inheritance. Her results suggest that religious affiliation does have a strong impact on the well-being of individuals: Jews, for instance, have much higher net wealth than other religious groups do on average and they are about 50% more likely to receive inheritance. Another paper by Lehrer (2005) suggests a significant impact of religious affiliation on years of schooling and earnings of women in the USA. Using data from the 1995 National Survey of Family Growth she finds that religious affiliation has essential impact on educational attainment and earnings of females. Both zero-order regression and OLS produce significant estimates after controlling for other individual characteristics.

Hence, religious affiliation is likely to be important in determining the economic behavior of an individual and his or her financial status.

While religious affiliation turns out to be significant in many cases, the effect of religiosity on the individual wage was not studied so widely. And one of the possible reasons for this is that religiosity is potentially endogenous in the wage equation. As Iannaccone (1998) shows in his paper religiosity is a function of education, marital status, age, gender, race and religious beliefs of an individual. And these variables, in turn, are likely to determine individual earnings. Moreover, there exist unobserved factors correlated with religiosity which also affect wages (Asadullah, Chaudhury and Dar 2006).

Meanwhile, existing papers studying the effect of religiosity on individual earnings do not address the issue of endogeneity.

Dilmaghani (2009) provide evidence for negative correlation between earnings and religiosity in Canada. Using 2002 Ethnic Diversity Survey she estimates a significant wage penalty for being religious and shows that this penalty varies across groups with different religious affiliation. However, she does not consider omitted variable bias.

The point of interest is the way in which religiosity may influence economic behaviour of an individual and his or her earnings. Several explanations for this phenomenon are possible:

-       **Religiosity as amenity**. Some employers may be cautious of high religiosity of their employees, since the latter may be not able to perform certain tasks which require transgressing their moral beliefs. Hence, religiosity should have negative relationship with the wage due to this factor. Being religious may be viewed as amenity in this case. Thus people are likely to sacrifice a part of their income to follow their religion (Rosen 1986).

-       **Peer group effect**. Some religious groups tend to help their members (to find nicer jobs, to get a good education). Hence, a highly religious individual attending meetings with peers is likely to receive help in case of need. (Brueckner and Lee 1989). So they are more productive and this should have a positive effect on the wage.

-       **Implementation of religious beliefs into the everyday life**. Highly religious people try to follow their beliefs in their daily life. They should do their best to be honest and just, and to do their job well. Thus, they are more likely to be hired and paid more than their atheistic colleagues.

- **Utility maximization**. As Azzi and Ehnerberg (1975) suggest people adherent to some religion should maximize both life-time and afterlife's consumption. Thus, more pious individuals are likely to pay more attention to maximizing their afterlife's consumption. But the effect of maximizing such utility on wages is ambiguous. On the one hand, an individual may pay more attention to attending church thus reducing the amount of time and effort devoted to work. On the other hand, he or she may try to earn more in order to contribute greater amount for charity or tithes. Therefore the net effect depends on the relative size of these two effects.

- **Pious life**. People adherent to their religion may be concerned with austere and abstemious way of life trying to follow the "way of saints" and devoting the maximum possible time for worshipping, while neglecting their mundane affairs. Thus these individuals may be satisfied with low-paying jobs which allow them to follow their "life path". Hence, religiosity may have a negative relationship with wages due to this factor.

An advantage of including religiosity variable instead of religious affiliation in the current setting is that most Ukrainians follow Christianity (more than 70% according to the KIIS survey). Thus, while the effect of religious affiliation on economic behavior of Ukrainians may be insignificant due to the similarity of religion beliefs, the effect of religiosity is more likely to be identified precisely. But the difference between atheists and people having some religious affiliation is likely to be evident and may also be estimated by including corresponding dummies.

Since, this study will employ Mincerian equation for the estimation of the effect of religiosity on individual earnings in Ukraine it is worth noting that there is a lot of papers devoted to the estimation of this model. Thus, for the purpose of brevity, a review of works focusing on Ukrainian specification of Mincerian model is provided.

Constant, Kahanec and Zimmermann (2006) employing UMLS data for 2003 and 2004 and the Oaxaca-Blinder decomposition find a significant impact of ethnicity on individual earnings in Ukraine. They use regional, industrial and occupational dummies as additional controls and incorporate education in the Mincerian model by including a set of dummies. Gorodnichenko and Peter (2005) estimate basic Mincerian equation using adjusted years of education, potential market experience, gender and location dummies and augmented Mincerian model (adding controls for tenure, size and ownership of the firm). They find no difference between the two specifications for the obtained estimates of educational returns for Russia and Ukraine. Other studies by Bisovetska (2006) and Sliusarenko (2007) show that place of residence, marital status and number of children are important determinants of earnings in Ukraine. Controlling for these variables allows finding more precise and unbiased estimate of religiosity on individual earnings.

Hence, the current work contributes to the existing literature on the wage determination in Ukraine and expands the existing studies on the economics of religion by estimating the effect of religiosity on individual earnings in Ukraine and addressing the issue of endogeneity of the latter.

Chapter 3

METHODOLOGY

To estimate the effect of religiosity an augmented log-wage model proposed by Mincer (1974) is employed:

$$\ln W_{it} = \alpha_0 + \beta_i X_{it} + \gamma_i R_{it} + w_{it}$$

where:

W_{it} - is monthly wage of an individual i in period t;

X_{it} - vector of explanatory variables;

R_{it} – continuous measure of religiosity represented by number of prayers per month;

$\alpha_0, \beta_i, \gamma_i$ – corresponding parameters;

$w_{it} = (u_i + v_{it})$, where u_i - individual specific time invariant unobserved characteristics (ability, morbidity, etc.) and v_{it} – idiosyncratic error.

Explanatory variables include standard wage determinants used in the literature which also have significant impact on the individual wage in Ukraine (Gorodnichenko and Peter 2005, Sliusarenko 2007): experience, education, marital status and gender. Second-order term of experience is added to the model in order to account for non-linearity of the latter. Control variables include: area of residence, ethnicity, public employment, trade union membership and number of persons in household. The religiosity is measured by the frequency of praying and is constructed as continuous variable (see Appendix A for full description).

Some Econometric Issues

As mentioned above, existing studies on the effect of religiosity on individual wages do not account for **omitted variable bias**: $E(R_{it}|w_{it}) \neq 0$. There are two possible sources for this type of bias:

- **Unobserved personal traits.** They may both affect wages and correlate with religiosity, since religiosity of individual has potential impacts on his or her attitudes and predispositions, which, in turn, are the determinants of earnings. For example, religious people may be more honest or responsible and employer may value these characteristics more thus paying higher wages. In such a case the estimate on religiosity is subject to upward bias.

- **Unobserved pre-existing conditions.** A significant part of soviet nomenclature is still at positions of influence (where the wages are higher). And, as have been mentioned above, those people were required to be atheists. So they are more likely to adhere to the atheist conception and they are less likely to switch to being highly religious (though they might have taken some religious affiliation). This may lead to an overestimation (if positive) or underestimation (if negative) of the effect of religiosity on individual earnings.

To address the issue of omitted variable bias an instrumental variable regression is used. This approach allows determining the casual effect of religiosity on individual wage in the presence of a good instrument z_{it}, which is uncorrelated with the error term in the initial Mincerian equation: $E(z_{it}|w_{it}) = 0$, but which can explain a significant part of the effect of religiosity on the individual earnings.

Besides, the estimate on religiosity may suffer from **measurement error**. Highly religious people are less likely to conceal their earnings, while less religious individuals and atheists may report lower wage in order to pay lower taxes. Since the available data cannot provide information about true earnings of each respondent the reported wages of atheists may suffer more from measurement error. Hence, the measurement error appears to be systematic and IV approach can also solve this issue.

Choice of an Instrument

Choice of appropriate instrument is one of the major concerns for researchers dealing with omitted variable bias. Some researchers in labour economics instrument individual characteristics with corresponding parental characteristics (e.g., Lei (2005) use parents' educational attainment as an instrument for individual one). So it is tempting to follow such practice and use parent's religiosity to instrument individual religiosity. But it may be argued that mother's or father's religiosity might have brought up responsibility or honesty in their child, the characteristics which are not observed to researchers. This, in turn, might have resulted in higher earnings (e.g., Ferral (1995) shows that jobs, which require higher responsibility, pay more on average). Thus parent's religiosity is likely to be invalid instrument because of its endogeneity.[2]

Meanwhile, an aggregate instrument is capable to overcome this concern. In spite of its potential weakness, it is exogenous with respect

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[2] In fact, the author has tried to use parent's religiosity to instrument individual religiosity. But the tests have showed that such instruments enter the second stage and, therefore, are invalid. Results are available upon request.

to individual specific characteristics. Hence, an aggregate measure of average frequency of praying by oblast is used to instrument individual religiosity. To insure the full exogeneity of the chosen instrument the individual frequency of praying is excluded from the construction of aggregate religiosity for every given observation.

To account for correlations of individual religiosities within particular region standard errors are clustered at oblast level.

Chapter 4

DATA DESCRIPTION

To study the effect of religiosity on individual earnings in Ukraine the data of a recent social survey by Kyiv International Institute of Sociology is employed. A random sample of 2036 respondents corresponds to the ISSP (International Social Survey Programme) standards and represents adult population of Ukraine (aged over 18)[3]. This survey incorporates 60 questions of the subject module, which refer to self-appraisal of a person's religiosity, attitude to religion, involvement in religious practices, etc. Thus the dataset provides a nice opportunity to study the effect of religious aspects on individual earnings in Ukraine.

Wage is measured by individual earnings per month. To account for the type of community a dummy variable "urban" is created which takes the value of 1 for the city with at least 20 thousands of population, and 0 otherwise. Besides, another set of dummy variables are created to account for marital status, trade union membership, public employment, ethnicity[4] and gender. Education is measured by years of schooling attained.

To account for religiosity a continuous variable representing number of prayers per month is created (see Appendix A for detailed explanation).

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[3] The survey held on October 11-20 2008 by Kyiv International Institute of Sociology and the Center "Social Indicators". The project was financially supported by the Royal Norwegian Embassy in Ukraine and the Open Ukraine Foundation with the framework of the International Dialogue Program supported by the Victor Pinchuk Foundation.
[4] Ethnicity dummy takes the value of one if respondent reported being Ukrainian and zero otherwise.

Since there is no question about actual experience of individuals in the survey potential experience is calculated as the difference between individual's age, number of years of schooling and 7[5] (the age at which children should start attending school in Ukraine).

The sample is restricted to working age population. Thus, individuals who reached the retirement age are not accounted for (observations for males older than 60 years and females older than 55 years are eliminated).

The outliers in the wage distribution are also eliminated: individuals with earnings higher than 8000 gryvnas (the highest 1% of wage distribution) and lower than or equal to 300 gryvnas[6] are not taken into consideration.

A procedure of constructing the sample is represented by Table 1. Dropping individuals who did not report their earnings and considering only working age population reduces the initial sample more than twice. Eliminating observations with missing values and outliers reduces the number of observations by another hundred. Hence, a sample of 659 individuals is left for further analysis.

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[5] One may argue that children have started to go to school at 6 since 1991. In fact, since 1991 a part of children began to go to school at 6, and another part began their study at 7. Available data do not allow distinguishing between these two groups. Thus 7 is chosen.

[6] Individual earnings lower than 300 gryvnas are not taken into consideration since they are well below the minimum for living needs.

Table 1: Steps performed to construct the sample for further analysis

Step performed	Number of observations lost
Dropping individuals who do not have earnings or who did not report their wage	654
Eliminating observations for retired people	600
Eliminating outliers in wage	38
Eliminating observations who did not report type of their job (public or private)	26
Eliminating observations for people reporting no education or reporting zero years of schooling	23
Considering only individuals with positive potential experience	20
Eliminating observations for people who did not report their trade union status	9
Eliminating observations for people who did not report the number of persons in household	3
Dropping people who did not report their marital status	2
Dropping people who did not report their frequency of praying	2
Observations dropped	**1377**
Observations left	**659**

Table 2 presents the descriptive statistics for the constructed sample and by gender.

As one could notice females are more religious than males. They pray on average 13.8 times a month which is twice the number of prayers conducted by an average male. The average number of prayers in the whole sample constitutes about 10.8 per month or about one prayer per three days.

The data suggests a significant gender gap. Men earn about 1700 gryvnas on average, which is 635 gryvnas or 60% more than their female counterparts.

Table 2: Descriptive statistics by gender, 2008 (KIIS survey)

	Males	**Females**	**Total**
Monthly wage	1703.50***	1066.14***	**1336.95**
	[1097.89]	[667.05]	**[930.65]**
Level of individual religiosity	6.80***	13.76***	**10.80**
	[12.75]	[15.69]	**[14.91]**
Age	41.34	40.84	**41.05**
	[11.87]	[10.01]	**[10.84]**
Years of schooling	12.67	12.91	**12.81**
	[2.46]	[2.55]	**[2.51]**
Years of potential experience	21.67	20.93	**21.24**
	[12.16]	[10.54]	**[11.26]**
Married	0.70	0.67	**0.68**
	[0.46]	[0.47]	**[0.47]**
Urban	0.54	0.54	**0.54**
	[0.50]	[0.50]	**[0.50]**
Ukrainian	0.83	0.82	**0.82**
	[0.38]	[0.39]	**[0.38]**
Public employment	0.51***	0.62***	**0.57**
	[0.50]	[0.49]	**[0.49]**
Trade union	0.27***	0.41***	**0.35**
	[0.45]	[0.49]	**[0.48]**
Number of persons in household	3.19	3.30	**3.25**
	[1.31]	[1.35]	**[1.33]**
Number of observations	280	379	**659**
Standard deviations in brackets			

Note: stars denote the significance of t-test of equality of means: * significant at 10%; ** significant at 5%; *** significant at 1%

The average age of the constructed sample is about 41 years. At the same time, the average potential experience constitutes about 21.24 years with no significant gender difference.

The share of married individuals and individuals residing in urban area is similar across gender groups. About 70% of respondents are married and approximately 54% live in towns with population greater than 20 thousand people. The average number of years of schooling received constitutes about 12.81 years and is slightly higher for females, though this difference is not statistically significant.

There is also no difference between shares of males and females who report being Ukrainians – about 82% of population claim their Ukrainian ethnicity.

The difference, however, arises in the shares of public employment and trade union membership: 62% of women have public jobs and 41% are members of trade union. The corresponding shares for males are lower – 51% and 27% respectively.

Considering the average wage across religious groups suggests that religiosity must have a negative effect on individual earnings in Ukraine. As Figure 1 demonstrates average earnings have a tendency to decline as the frequency of praying increase.
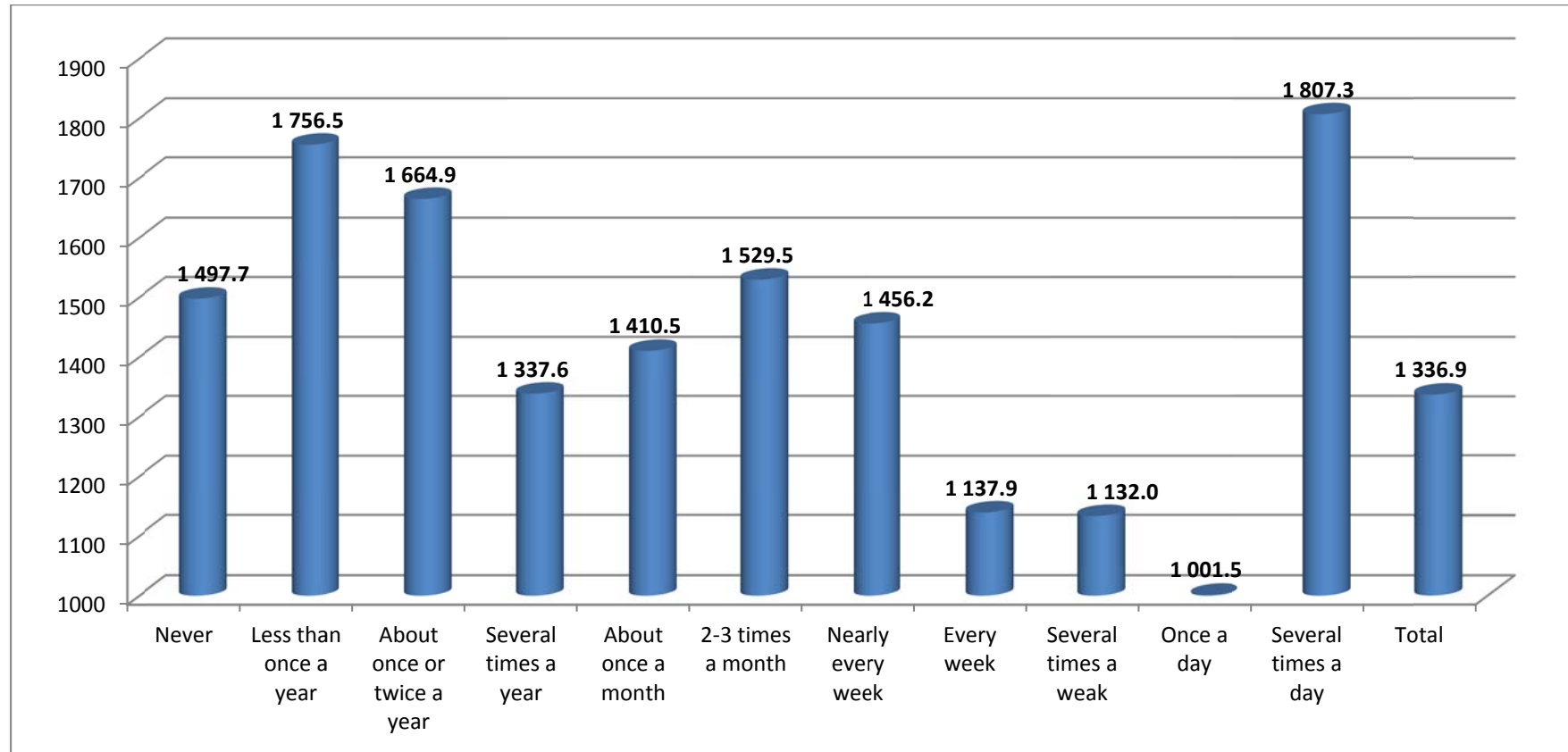
Figure 1: Monthly wage across religious groups, 2008 (KIIS survey)

The exception is group of respondents who pray the most (several times a day). They earn the highest wage – about 1800 gryvnas on average, which is 470 gryvnas higher than average earnings in the whole sample.

Interestingly, people who never pray, while having higher than average wages, earn on average about 160-260 gryvnas less than individuals who pray less than once a year or about once or twice a year. Hence, one may suggest that people possessing low level of religiosity are better off in terms of earnings than their atheistic colleagues.

A number of factors, however, may influence such a distribution of earnings across religious groups. For example, people who possess lower level of religiosity may have higher number of years of schooling or respondents who pray once a day may have higher share of rural residents. Further analysis should reveal the average effect of praying on individual earnings in Ukraine.

Instrument Description

A good instrument, in addition to its exogeneity, should explain the maximum possible part of variation in the instrumented variable. One of the potential problems of aggregate instruments is their weakness due to low variation: it is able to explain only a tiny part of variation in the endogenous variable. But this does not seem to be the case when aggregate praying by oblast is used. As Figure 2 demonstrates average number of prayers by oblast varies significantly from region to region.
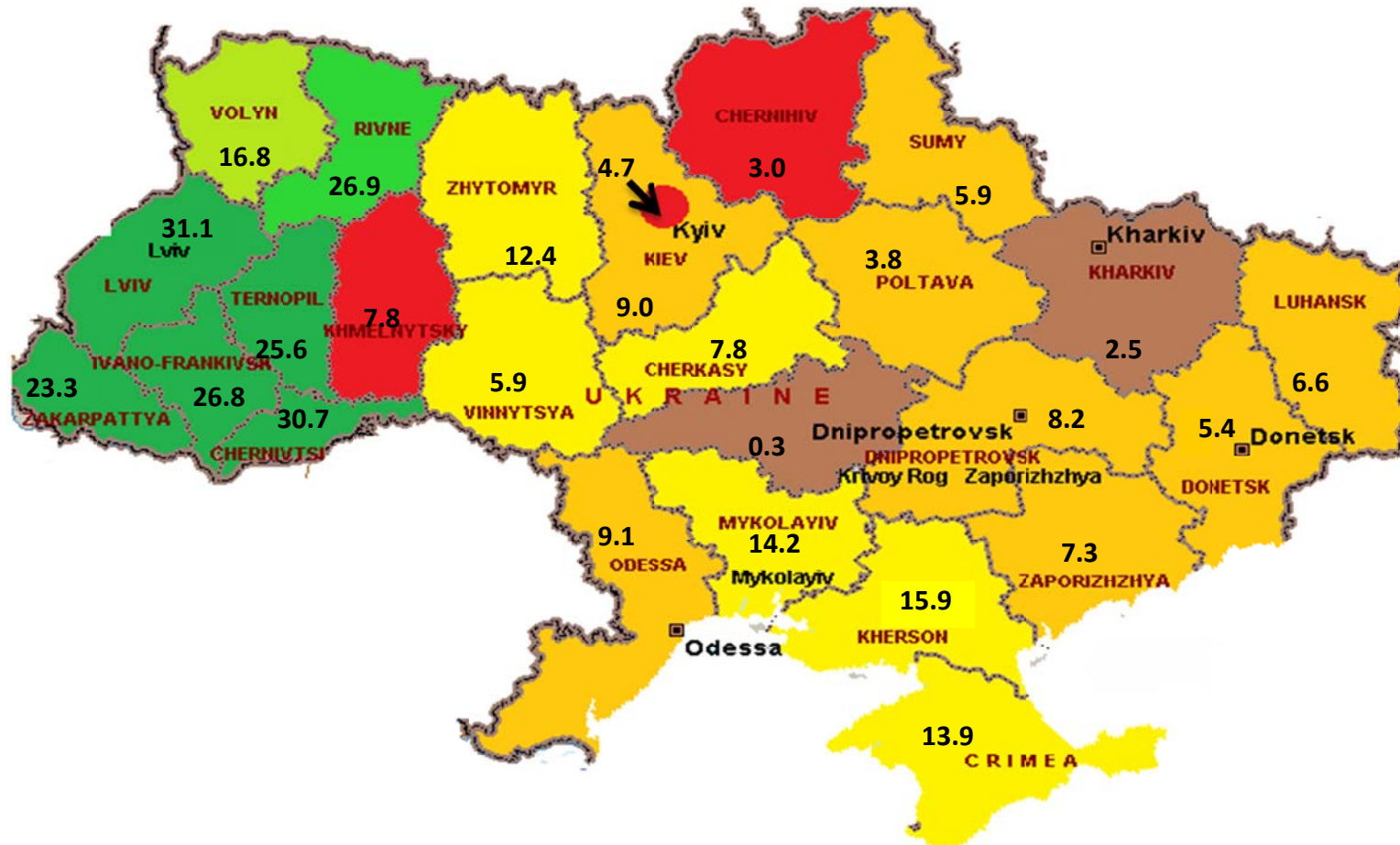
Figure 2: Average number of prayers per month by oblast, 2008 (KIIS survey)[7]

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[7] - Color of the oblast is also informative. It denotes the average category of praying and varies from dark green (praying about once a day) to brown (praying once or twice a year)

It has the minimum value of 0.3 in Kirovograd oblast and maximum value of 31.1 and 30.7 in Lviv and Chernivtsi oblast (people in these regions are praying about once a day). One could also notice that average religiosity in the West is much higher than that in the East of Ukraine.

Chapter 5

ESTIMATION RESULTS

Using the corresponding sample constructed on the basis of the KIIS survey and estimating the basic OLS regression of logarithm of wage on religiosity and set of wage determinants and controls yield the results presented in the first column of the Table 3.

The estimate for religiosity is significant within 95% confidence interval and suggests an average wage penalty of 0.34% per prayer in a month. Thus an individual who prays once a day receives on average 10% lower wage than his atheistic colleague.

According to the estimates each additional year of schooling increases wages by 4%. The effect of potential experience is positive but decreases with each additional year.

The gender wage gap constitutes about 40.8% of the wage. Meanwhile people residing in urban areas earn on average 27% more than people living in small towns and villages.

It should be noticed that estimates on years of schooling, years of potential experience, female and urban dummy for the whole sample are very similar to the ones obtained by Gorodnichenko and Peter (2005), though they have used ULMS data for earlier years.

Table 3: OLS results of estimation of Mincerian equation for the whole sample and by gender. KIIS survey, 2008. Logarithm of monthly earnings is a dependent variable

	The whole sample	Male	Female
Level of individual religiosity	-0.0034	-0.0045	-0.0032
	[0.0013]*	[0.0025]+	[0.0015]*
Years of schooling	0.0402	0.0482	0.0363
	[0.0080]**	[0.0137]**	[0.0096]**
Years of potential experience	0.0114	0.0187	-0.0029
	[0.0067]+	[0.0107]+	[0.0087]
Experience squared	-0.0004	-0.0007	0.00005
	[0.0002]**	[0.0002]**	[0.0002]
Married	0.0398	0.0883	0.0182
	[0.0436]	[0.0773]	[0.0515]
Female	-0.4080		
	[0.0402]**		
Urban	0.2710	0.3812	0.1757
	[0.0397]**	[0.0659]**	[0.0488]**
Public employment	-0.1413	-0.1896	-0.0748
	[0.0419]**	[0.0703]**	[0.0523]
Trade union	0.1093	0.1088	0.0885
	[0.0435]*	[0.0782]	[0.0511]+
Number of persons in household	0.0054	0.0021	-0.0066
	[0.0158]	[0.0276]	[0.0188]
Ukrainian	0.0597	0.1762	-0.0136
	[0.0505]	[0.0867]*	[0.0605]
Constant	6.5852	6.3237	6.4376
	[0.1449]**	[0.2394]**	[0.1785]**
Observations	659	280	379
R-squared	0.3018	0.3059	0.1404
Standard errors in brackets			
+ significant at 10%; * significant at 5%; ** significant at 1%			

The OLS estimates for the whole sample also suggest that people having public jobs receive on average 14.1% lower earnings, while members of trade unions get a wage premium of 10.9%.

At the same time, estimates on number of persons in household, marital status and ethnicity are positive, but insignificant.

Estimating OLS for males and females separately yields different results. The wage penalty for religiosity for males is 1.5 times higher than that for females and constitutes about 0.45% of earnings per prayer in a month. Men also have higher returns to education gaining 4.8% increase in wage for each year of schooling.

Males residing in urban areas earn on average 38.1% lower wage than their rural counterparts. At the same time, the urban-rural gap for females is much lower and constitutes only about 17.6%.

Estimates across gender groups also reveal that men involved in public jobs receive 19% lower wage, while males who identify themselves as Ukrainians receive a wage premium of 17.6%.

Meanwhile, the estimates on marital status and experience are insignificant for females. The main reason for this may be the fact that this variables are strongly correlated with having a child/children: the effect of potential experience may be even negative for mothers; the share of women having a child/children among married females is also high and, as Sliusarenko (2007) shows in her paper, there is a significantly large wage penalty for mothers in Ukraine. Unfortunately, the available data do not capture this information.

Ethnicity and public employment also turn out to be insignificant in female regression. The trade union membership yields a significant 9% wage premium for females, while being insignificant for males.

It should also be noted that the variation in variables included into the OLS regressions explains about 30% of variation in men's wage and

about 14% of variation in women's wage, which is standard in the literature.

Thus one may conclude that there exists a definite difference in wage determination mechanism of females and males. Hence, it is reasonable to report and analyse only separate regressions for both genders in the rest of this paper.

Estimating IV regression reveals a positive bias in OLS estimates for males. The average wage penalty for religiosity turns out to be almost two times higher (see Table 4) and constitutes about 0.81% per prayer in a month. The marginal contribution of the aggregate measure of praying to explaining variation in individual religiosity constitutes about 35.33%. Besides, the null hypothesis of weak identification test can be rejected[8]. Hence, average praying by oblast turns out to be a strong instrument for individual religiosity of males.

The results for female regression, however, are not so strong. The estimate on religiosity turns out to be insignificant in the second-stage regression. One of the possible reasons is small sample size which prevents from obtaining precise and significant estimates.

The other 2SLS estimates are almost the same as in the case of simple OLS.

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[8] First-stage results and corresponding statistics are given in Appendix B

Table 4: 2SLS results of estimation of Mincerian equation by gender. KIIS survey, 2008. Logarithm of monthly earnings is a dependent variable[9]

	Male	Female
Level of individual religiosity	-0.0081	-0.0038
	[0.0046]+	[0.0034]
Years of schooling	0.0484	0.0364
	[0.0134]**	[0.0110]**
Years of potential experience	0.0196	-0.0029
	[0.0091]*	[0.0063]
Experience squared	-0.0007	0.00003
	[0.0002]**	[0.0002]
Married	0.0945	0.0195
	[0.0593]	[0.0637]
Urban	0.3797	0.1745
	[0.0774]**	[0.0638]**
Public employment	-0.1803	-0.0748
	[0.0680]**	[0.0659]
Trade union	0.1017	0.0904
	[0.0859]	[0.0475]+
Number of persons in household	0.0063	-0.0061
	[0.0239]	[0.0217]
Ukrainian	0.1772	-0.0134
	[0.1013]+	[0.0562]
Constant	6.3175	6.4389
	[0.2092]**	[0.1615]**
Observations	280	379
Partial R-squared of instrument	**0.3533**	**0.2141**
F-statistics of instrument	**70.9**	**75.7**
Robust standard errors in brackets		
+ significant at 10%; * significant at 5%; ** significant at 1%		

Note: Errors are clustered at oblast level

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[9] GMM has been also used to estimate the given equation. The results, however, are not statistically different from the 2SLS and therefore are not reported here, but are available upon request.

Chapter 6

CONCLUSIONS

A vast literature studies the impact of various religious variables on economic welfare of the individual. However, the works devoted to the effect of religiosity on individual earnings are scare. And none of them explores this relationship for Ukraine or any other CIS country. The present paper fills up this gap and estimates the effect of religiosity (measured by frequency of praying) on monthly wage of an average Ukrainian worker. The OLS estimates show that on average wage penalty is 0.45% per prayer in a month for Ukrainian males. The corresponding estimate for Ukrainian females is 1.5 times lower.

Furthermore, by accounting for the omitted variable bias and employing average frequency of praying in a corresponding region of Ukraine to instrument individual religiosity this research provides evidence that the wage penalty for being religious is almost two times higher for Ukrainian males than that from the OLS estimates. The small sample size, however, does not allow precise estimation of the relationship between frequency of praying and earnings of Ukrainian women.

Religious discrimination may be suggested as one of the possible explanations for wage penalty for Ukrainian males: a significant part of Ukrainian population is employed at public enterprises, where managers assigned in the USSR are still working. These managers may discriminate religious people following the usual practice of the former Soviet system. Religiosity may also be considered as amenity providing employees with freedom of thought and belief. Hence, they are willing

to accept lower wage for being able to follow their religion in their work practices and attitudes. However, the true source of wage penalty for working men in Ukraine is uncertain and still to be found.

Employing difference-in-difference, fixed effect and random effect procedures to estimate the effect of religiosity may be considered in further studies of this phenomenon in Ukraine. However, an appropriate panel data should still to be gathered.

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APPENDIX A

Constructing Measure for Religiosity

The dataset contains categorical variable representing frequency of praying. This variable is transformed into continuous by assigning a number of prayers per day for each category. If the number can take several values the average of the minimum and maximum possible values for this category is computed. The construction of continuous variable is demonstrated in Table A1.

Then the values for number of prayers per year are divided by 12 in order to obtain the number of prayers per month.

Table A1: Continuous values assigned for each category of religiosity measured by frequency of praying

Frequency of praying (category)	Continuous value of religiosity	Explanation
Never	0	
Less than once a year	0.5	between 0 and 1 prayer a year
About once or twice a year	1.5	between 1 and 2 prayers a year
Several times a year	7	between 2 and 12 prayers a year
About once a month	12	there are 12 months in a year
2-3 times a month	30	between 24 and 36 prayers a year
Nearly every week	44	between 36 and 52 prayers a year
Every week	52	there are 52 weeks in a year
Several times a weak	208.5	between 52 and 365 prayers a year
Once a day	365	there are 365 days in a year
Several times a day	730	assuming that average frequency of praying for these individuals is twice a day

APPENDIX B

First-stage Results and Statistics for IV Regressions

Table B1: First stage results of IV regressions by gender. KIIS survey, 2008. Individual religiosity is a dependent variable

	Male	Female
Aggregate level of religiosity	1.091	1.028
	[0.130]**	[0.118]**
Years of schooling	0.105	0.321
	[0.285]	[0.387]
Years of potential experience	0.004	0.161
	[0.130]	[0.298]
Experience squared	0.0004	0.001
	[0.003]	[0.007]
Married	2.100	1.274
	[1.258]	[1.580]
Urban	0.596	-0.395
	[1.123]	[2.138]
Public employment	2.203	0.167
	[1.490]	[1.741]
Trade union	-1.113	0.817
	[1.569]	[1.950]
Number of persons in household	0.257	-0.033
	[0.523]	[0.487]
Ukrainian	-0.555	-2.493
	[1.499]	[2.538]
Constant	-9.999	-5.360
	[4.220]*	[7.229]
Observations	280	379
R-squared	0.374	0.263
F-statistics	18.59	82.71
Robust standard errors in brackets		
+ significant at 10%; * significant at 5%; ** significant at 1%		

Note: Errors are clustered at oblast level

Tests performed after IV regression show the following results:

For male regression:

Underidentification tests:

Ho: matrix of reduced form coefficients has rank=K1-1 (underidentified)
Ha: matrix has rank=K1 (identified)
Kleibergen-Paap rk LM statistic   Chi-sq(1)=35.34   P-val=0.0000
Kleibergen-Paap rk Wald statistic   Chi-sq(1)=93.16   P-val=0.0000

Weak identification test:

Ho: equation is weakly identified
Kleibergen-Paap Wald rk F statistic   86.37
See main output for Cragg-Donald weak id test critical values

Underidentification test:

Kleibergen-Paap rk LM statistic: 35.337
                              Chi-sq(1) P-val =   0.0000

Weak identification test:

Kleibergen-Paap rk Wald F statistic: 86.367
Stock-Yogo weak ID test critical values: 10% maximal IV size   16.38
                         15% maximal IV size   8.96
                         20% maximal IV size   6.66
                         25% maximal IV size   5.53

For female regression:

Underidentification tests:

Ho: matrix of reduced form coefficients has rank=K1-1 (underidentified)
Ha: matrix has rank=K1 (identified)
Kleibergen-Paap rk LM statistic   Chi-sq(1)=46.22   P-val=0.0000
Kleibergen-Paap rk Wald statistic   Chi-sq(1)=75.73   P-val=0.0000

Weak identification test:

Ho: equation is weakly identified
Kleibergen-Paap Wald rk F statistic   70.89

Underidentification test:

Kleibergen-Paap rk LM statistic: 46.220
          Chi-sq(1) P-val =   0.0000

Weak identification test:

Kleibergen-Paap rk Wald F statistic: 70.887
Stock-Yogo weak ID test critical values: 10% maximal IV size   16.38
          15% maximal IV size   8.96
          20% maximal IV size   6.66
          25% maximal IV size   5.53