Determinants of household demand for services

– formal versus informal sector

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Abstract: This paper addresses the issue of household demand for services in Poland when informal sector is taken into consideration. The aim of the study is threefold: (i) to investigate the factors influencing households expenses for services, (ii) to find the determinants of households' tax strategy (choice between acquiring services on regular labour market or not), (iii) to investigate the differences between the factors that influence the expenses for formal versus informal services. Two-step Heckman selection model is used to account for the selection into buying household services. Lee's (1983) procedure is adopted to control for the selection into the particular choice of tax strategy when purchasing household services. The decision whether to buy household services and whether formally or informally is modelled as a sequential choice and estimated by bivariate probit with selection. An important novel feature of the model used is the inclusion of variables that capture social norms and personal attitudes toward tax evasion. The study concludes that:factors influencing expenses for services are positively related to financial situation of households, education and age of household head. The probability of avoiding taxes is higher for lower income households, households with more than one member and for those where a positive attitude toward informal employment is expressed. The impact of determinants of expenses for formal and informal services separately is comparable. Only household structure has the opposite effect on expenses for formal services versus informal ones.

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Introduction

The increasing importance of the market service sector is easily observable in recent research in the field. Over the past twenty years, household demand for services in almost all European countries has increased (Cancedda, 2001). Several socio-economic changes have influenced this phenomenon. Demographic and labour market developments like the greater involvement of women in labour activity, population ageing, and the increasing wealth of households has increased the demand for domestic services. Also, the growing number of single-person or single-parent households leads to growing demand for such work. The demand for domestic services has already resulted in the development of a significant number of paid jobs. For example in some European countries (like Germany, Netherlands, Italy, Spain), employment levels in childcare, elderly care, and housekeeping have been increasing over the past 30 years (Cancedda, 2001). Nevertheless, there is still substantial undeclared work in household services in most countries. According to the study by Cancedda (2001), informal employment accounts for between 50% and 80% of domestic work. The study by Illeris and Bell (1989) predicted that service employment growth would slow down and be substituted by work in the informal economy due to the cost increases in the formal economy.

In the expanding stream of economic literature on the market service sector, scant attention is given to the empirical analysis of household demand for services. Furthermore, no specific analyses of the determinants of household expenses for services, while taking into account the possibility to purchase them on the informal labour market, have been carried out in Poland or other countries. This paper aims to fill this gap.

The aim of this research is to investigate the factors influencing household expenditures for services in Poland, while taking into account the possible choices between services provided formally or informally. Specifically, the main research aims are:

- to document the amount and type of services demanded by households in Poland;

- to investigate the factors influencing household expenses for services;

- to find the determinants of households' tax strategies (choice between acquiring services on regular labour market or not);

- to investigate the differences between the factors that influence expenditures on formal versus informal services.

In this paper, household expenses on services are estimated by using the two-step Heckman selection model in order to control for selection when purchasing household services. The decision to purchase household services formally or informally is modelled as a sequential choice: in the first stage, a household decides to purchase the services and in the second stage, the tax strategy is chosen. Consequently, to analyze the determinants of the household decision about what type of services to

use and then the factors influencing spending on these services, a bivariate probit model with selection, followed by Lee's (1983) modification of the Heckman procedure, is applied.

I believe this is the first empirical estimate of household demand for services, where the explicit consideration of services acquired on the regular or irregular labour market is provided. The methodology adopted in this topic is innovative as it takes into account the selection problem to ensure the consistency of the results. Another novel feature of the model used is the inclusion of variables that capture social norms and personal attitudes toward tax evasion.

The main findings of the paper indicate that household expenditures on services are positively related to household income. Household structure seems insignificant in terms of the decision of how much to spend on services, whereas it appears to have a positive impact on the probability of demanding services. Demand for informal services seems to increase for lower income households, households with more than one member and for those where a positive attitude toward informality is expressed. The impact of determinants of expenses for formal or informal services is comparable. Only household structure has the opposite effect on the acquisition of formal services versus informal ones.

The paper has the following structure. First, the literature review is presented. The second chapter describes the data used and methodology adopted. That leads to the presentation of the results and conclusions.

1. Literature review

Very few surveys found in the literature deal with the issue of household demand for services, especially when the possibility of tax evasion is taken into consideration. A direct survey of undeclared work conducted across the EU-27 in May and June 2007 revealed that 9% of the target population says that they have purchased informal services. Results vary considerably between countries. The corresponding number is 1% in Cyprus and 24% in Denmark. In Poland, the percentage of households that admitted to purchasing informal services is 5%. According to the Polish National Statistical Office, in 2010 about 4% of households acquired services on the informal labour market.

Soberon-Ferrer et al. (1991) used data for about 5 000 households from quarterly data from the 1984 and 1985 Bureau of Labor statistics Interview Panel Consumer Expenditure Survey (CES) to examine the effect of household production variables, family-life-cycle variables, and other factors influencing household expenditures on services. Households selected for the study were two-earner households, in which both the husband and wife worked. Significant differences were found between families with full-time and part-time working wives in terms of expenditures on child care, food away from home and total services. Household production variables, like the wage rate, time spent in market production, and unearned income were found to have a significant impact on service

expenditures in most instances, while the effects on other variables such as the family life cycle, education, race, and geographic location varied by service category and the employment status of the wife.

Brück et al. (2006) analyzed the determinants of household work contracted in the German shadow economy using a socio-economic household panel data set from 1984. The regressors included regional wage rates, household income, control variables for household composition and other household characteristics. The main results confirmed that household structure plays an important role in the demand for household services, with all coefficients on household composition being significant. Also, relative income is highly significant and has a positive coefficient. The age of the household head has a significant impact on the demand for informal services. Households with older heads have less demand, but this effect diminishes for households with very old heads.

The study by Williams and Windebank (2002) reports the results of interviews with 511 households. They distinguished between two types of households: those situated in higher- and lower-income neighbourhoods of several British cities. A higher percentage of undeclared work was provided in households in higher-income neighbourhoods and the monetary reward was also much higher. About 68% of all paid informal exchanges in the lower-income neighbourhoods were conducted by friends, neighbours or family members, whereas in higher-income areas, the number was only 16%. The authors conclude that in lower-income neighbourhoods, paid informal work mostly involves transactions between close social relatives. In higher-income neighbourhoods such work is provided mainly by anonymous employees. When considering the reasons for informal employment, it appears that the vast majority of paid unregistered work in higher-income neighbourhoods is undertaken for economic gain only, whereas in lower-income neighbourhoods, such work is conducted for redistributive and community-building reasons. The research of the same authors (2000) looking at deprived urban neighbourhoods in Britain shows that 3,8% of all household services were provided informally. The main reasons for using such labour are the social relations that exist among people.

Gardes and Starzec (2009) analysed the differences and links among various types of informal activities in Poland (buying, employing or working). They based their survey on matched data of informal market participation (of individuals and households) from the 1995 Extended Labour Force Survey (ELFS), the Panel of Household Budget Surveys and the Household Budget Survey (HBS). The estimated model of participation in the informal economy was based on the ELFS database. The survey was applied to predict the participation probabilities of each household in the panel. These predicted probabilities were added as explanatory variables in the demand system analysis of the regular consumption. The authors define "informal market participation" as a positive response by anyone involved in one of the three undeclared activities (working, buying or employing) permanently or occasionally. The main results show that the overall probability of a household's

participation increases with the number of children. Buying and employing informally is more likely to happen in families with at least three children. Unemployment of the head of household is a strong factor influencing the probability of informal participation. In such a case, the probability of buying informally is reduced. A male head of household has a higher probability of working or employing others without formal contracts than a female head. There is no significant difference in the probability of participating in any informal activity with respect to age. A university education considerably and significantly increases the probability of participation in any kind of activity, while other education categories have no significant impact.

Kim (2003) estimated the size of the Soviet informal household economy based on the Soviet Family Budget Surveys from 1969 to 1990. The surveys were a rotating panel based on interviews which took place at least twice a month and on household diaries with detailed accounts of their income and spending. He finds that the average share of informal expenditure out of total expenditure amounted to 22,9% from 1969 to 1990. This number displayed downward trends over time until 1988, despite the fact that the absolute size of the informal economy increased during that period. The reason might be a decline in the consumption of self-produced goods, which was defined in this survey as informal expenditure.

Heinesen (1999) estimated the degree of substitution between the informal economy and that part of the formal economy which is related to consumer demand for services. To do so, he used error correction models using Danish macroeconomic time series data from 1966 onwards. He estimated consumption demand equations for paid and taxed services with income, relative price and tax wedge as explanatory variables. The main results show that the long-run tax wedge and price elasticities are rather large numerically. This suggests that increases in the consumption of paid and taxed services could be obtained if the price of these services were reduced.

Flipo et al. (2007) examined the impact of tax reduction on the demand for home services by using household individual data collected in 1996. In their structural model of demand, net hourly wage paid to the domestic employee, household preferences for consumption of in-home services, and the decision to take advantage of tax reduction are considered endogenous variables. The results show that the probability of consuming services increases with income and age. Similarly to the results in Heinesen (1999), an increase in the tax reduction would increase the proportion of households benefiting from the tax reduction among those who consume paid home services. The results also suggest that an increase in the tax reduction would encourage households who do not consume services to do so.

2. Data and methodology

Data. Both household and household member data are collected by the Polish Ministry of Labour and Social Affairs in 2007. The database is created especially for a study of informal

employment. Approximately 8 000 households is interviewed. Persons aged 15 years and over provide socio-demographic and economic information about themselves and their households. The response rate is moderately high. About 73% of individuals answered all questions significant for my research. People that did not provide information about the households' income and expenses for services are excluded from the estimates. The final sample consists of 5 788 observations. The unit of analysis is the household, and where possible, household member data are combined to form household measures.

The dependent variable is household expenditure for all services as well as expenditures for formal services and informal services separately.

In order to create the consistent set of independent variables I follow two prominent papers in the field of household service consumption – paper of Soberno-Ferre et al. (1991) and the work of Brück et al. (2006). The huge advantage of the work of Soberon-Ferrer et al. (1991) is their use of information about the households head and her partner. As argued in the paper, it significantly influences the decision about the use of services. The short-coming of the whole analysis is the structure of the sample. It limits the possibility of using additional information, which I own in my database. In order to implement the extensive control variables I follow the work of Brück et al (2006).

Consequently, information important for my analysis are classified into the following groups:

– *Household economic factors* approximated by the income quantiles and composition of household members labour status. Higher income is supposed to increase expenses on services. Similarly, expenses on services are expected to increase with higher fraction of working household members.

– *Household structure*, where broad range of households are classified by characteristics assumed to have an impact on decision whether to acquire services. It includes one-member households, households comprised of at least two-member adults, families having at least one child aged 0-2 and older, 3-6 and older and 7-15. Such a division was created as a consequence of the distinction between different stages in child life. Children aged 0-2 mainly stay at home with mother or babysitter, or attend nursery. From 3 to 7 they can attend kindergarten. 7-15 is a schooling age, where the demand for several services emerges. When a person is 16 she is allowed to work formally in Poland.

– *Other households characteristics* include composition of households gender, composition of education and age of the household head.

– The last group of variables includes *personal perception of informality* on the labour market. More particularly, the individuals' opinion about advantages and disadvantages of informal

employment are taken into consideration. It is assumed that personal perception of informality influences significantly the decision whether to use informal services (Jørgensten et al., 2005).

The detailed description of the variables created is provided in Table 5 in Appendix.

Methodology. It is a common feature of studies estimating determinants of household expenses that a significant fraction of individuals do not purchase anything during the study period. In this case, the dependent variable is censored at zero and standard OLS estimates are inconsistent. In order to take this bias into account, several solutions are proposed. For example Soberon-Ferrer et al. (1991) apply the Tobit model in order to analyze household expenditures for services. However, the drawback of the Tobit model is that it assumes that censoring is determined by the same model that influences the outcome analyzed. In other words, the decisions at the extensive and intensive margins are assumed to be identical.

The two-step Heckman procedure model has been widely used as an alternative to the Tobit when values cluster at zero due to selection bias rather than censoring. The two-step Heckman procedure consists of a probit model, which estimates whether a household decides to acquire a good or service or not, and of a regression model, in order to estimate how much to spend on that good. For example, Flipo et al. (2007) use a generalized type 2 Tobit model, which is the Heckman two-step model in the Tobit framework, in order to examine the impact of tax reduction on the demand for formal or informal in-home services.

However, applying the two-step Heckman procedure has proven to be problematic as well. The difficulty lies in the choice of proper instruments, the so called exclusion restrictions that influence the first-step decision, but do not enter the decision in the second-step. Flipo et al. (2007) rely on the exclusion restriction resulting from the tax schedule imposed in France by law, namely, that the presence of a child that is less than six years old in the household affects the net hourly price actually paid. However, it is assumed that this does not directly influence household preferences for the consumption of services and the household decision to employ a worker informally.

The extensive information contained in the database enables to create the following instruments for self-selection. When estimating the determinants of expenses for services, I use the composition of working household members as a determinant of the choice about whether to demand services or not. It is believed that working household members spend less time providing in-home work and consequently they need additional help from outside. Then they demand additional services for the home. Consequently, in the first part of this analysis, in order to estimate household expenses on services of any type I apply the two-step Heckman selection model.

In the second part of my analysis, however, I am interested in analyzing the choice between the acquisition of services in the formal versus informal labour market as well as the amount spent on the two types of services. In my database some households are observed not demanding any kinds of

services and it is assumed they provide in-home services on their own. Others purchase domestic services and either obtain an invoice, or do not get any confirmation of the service acquired. A household which declares that it does not receive an invoice from the employee is assumed to obtain services informally. I assume that the decision to purchase household services formally or informally is modelled as a sequential choice: in the first stage, a household decides to purchase services and in the second stage the tax strategy is chosen. This sequential decision is estimated using the bivariate probit model with selection. The results of this model are then used to construct the appropriate selection terms for the estimation of the determinants of expenses for each type of services, using Lee's generalization of the two-step Heckman selection method (1983). In order to account for the problem of generated regressors, a bootstrap procedure is applied.

When estimating the determinants of household choice of formal versus informal services, personal attitude toward informality and social norms are used as instruments that influence the decision of whether or not to purchase services on the regular or irregular labour market. Several studies suggest that economic considerations alone cannot explain the observed high level of tax compliance (see for example, Jørgensten et al., 2005). Norms are an important factor in explaining people's willingness to demand informal work Consequently, two models are introduced. In order to estimate households' expenses on services, a two-step Heckman model is imposed. In the second part of the analysis, expenses on certain types of services are estimated, using a bivariate probit model with selection as the first step and a linear regression model augmented by a selection term using Lee's extension of Heckman model.

Estimation results

Sample characteristics. The data in Table 1 indicates that over 38% of households demand home services. Only 30% of them acquired services formally during the last 12 months. Average expenses on home services account for about 27% of total disposable income, out of which only 26% is devoted to formal services on average.

Table 1. Household demand for services by household characteristics

	Percentage of households that demand services	out of which only formal services are demanded	Average expenses on services related to household income	out of which expenses on formal services
All	38,5%	29,4%	27,4%	26,0%
Household economical factors				
1st income quintile	31,1%	19,3%	31,6%	9,2%

2nd income quintile	28,6%	18,8%	24,8%	25,6%
3rd income quintile	39,0%	34,1%	41,1%	39,4%
4rd income quintile	40,2%	25,7%	36,7%	17,0%
5rd income quintile	59,4%	45,0%	13,0%	41,8%
At least one household member works part-time	30,6%	25,2%	19,8%	16,1%
All household members work full-time	44,2%	31,4%	30,4%	28,6%
At least one household member does not work	36,7%	26,5%	27,6%	25,8%
All household members work	47,5%	40,4%	26,4%	26,6%
Household structure				
One member households	33,1%	27,0%	27,3%	23,7%
Only adults	40,1%	38,2%	24,0%	39,3%
Households with children 0-2	33,6%	53,3%	31,5%	17,6%
Households with children 3-6	54,6%	5,3%	42,9%	9,5%
Households with children 7-15	36,2%	19,5%	27,1%	9,6%
Other households characteristics				
More women in the household	41,8%	26,4%	15,4%	14,6%
More men than women in the household or equal	36,0%	32,1%	25,0%	35,6%
Better educated	46,4%	37,5%	30,0%	33,5%
Lower educated	31,9%	19,3%	23,9%	13,9%

Household head aged 15-29	41,6%	36,5%	14,4%	37,4%
Household head aged 30- 59	41,1%	29,4%	29,6%	27,3%
Household head aged 60+	30,9%	23,5%	30,7%	17,7%
Advantages				
- cheaper	37,4%	24,2%	30,5%	23,3%
- more effort from employee	39,0%	23,0%	31,2%	22,6%
- based on trust	37,5%	25,4%	25,7%	20,1%
Disadvantages				
- no possibility to complain	41,0%	38,3%	25,5%	38,3%
- it is illegal behaviour	44,9%	33,4%	32,8%	29,60%

Source: own calculations

The percentage of households that demand services increases with income. The income group with the greatest interest in services is in the 5th income quintile, while the households in the 1st and 2nd income quintile have the least interest (31,1% and 28,6%, respectively). An analogous distribution is observed for the acquisition of formal services out of total demand for services. The distribution of average expenses on services related to household income by income quintiles reveals a mixed path. The richest households demand the most, but their relative expenses for services are the lowest. Not surprisingly, in the 3rd income quintile demand for services is relatively high (over 10 pp higher than in the 2nd quintile and only 1pp lower than in the 4th quintile) and consequently their relative expenses are the highest.

Table 1 shows that household interest in demanding services appears lower when the fraction of part-time working members increases. The same holds for the demand for formal services. Relative expenses on services are lower for households where at least one working household member works on a part-time basis. An analogous relation is observed with respect to relative expenses on formal services.

Expenses for all services (as well as formal ones) are comparable among households regardless of the composition of the employment status of household members. On the other hand the preferences for the consumption of services are higher by over 10 pp for households where all household members work. This suggests that the working status is significant for the decision of whether to

acquire services or not, but seems to be insignificant in terms of how much money to spend on services.

No clear pattern in demand for services is apparent, when considering household structure. Over 40% of households with children aged 3-6 and households comprised of only adult members express their interest in services. The comparable number is about 33% for one-member households and households with children younger than 2 years old. 50% of households with children aged 0-2 acquire services only on the formal labour market. In the other groups this number does not exceed 40%. Households comprised of children aged 3-6 show substantially less interest in formal services. Only 5% of them purchase services formally. Again, the highest relative expenses on services are found in households with children aged 3-6, which is also where the lowest level of expenses on services provided formally is observed.

Table 1 shows that household preferences for the consumption of services appears higher in households with a higher fraction of women. Also considerably higher expenses on services are observed in this group. However, the fraction of services demanded formally, as well as expenses on them, are much lower when compared to households where the fraction of men is at least equal to the fraction of women.

Households comprised of better educated members have a higher interest in demanding services, and also in demanding them formally. Also their expenses on both categories are higher when compared to households with less educated members.

Households with older heads express a lower demand for services, despite the fact that expenses for services increase with the age of head of the household. The demand for services provided on the regular labour market has an opposite path. It is the highest for households with younger heads and the lowest for the oldest group. Similarly, expenses for formal services are relatively high for the youngest households and decrease with the age of the household.

No particular difference can be found in the demand for services and expenses spent on them in households classified by their personal perception of informality. The percentage of households that purchase services range from 37.4% to 39% for households that indicate some advantages of informal employment. The comparable number is 41%- 44.9% for households in which disadvantages are indicated.

Graph 1 illustrates the demand for services by the type of service and the form of their acquisition. The most demanded services are related to home and car maintenance (house renovation, such as painting or minor repairs). Services related to care or education make up a minor share of total demand.

Graph 1. Percentage of services demanded by households, by type of service and by tax strategy
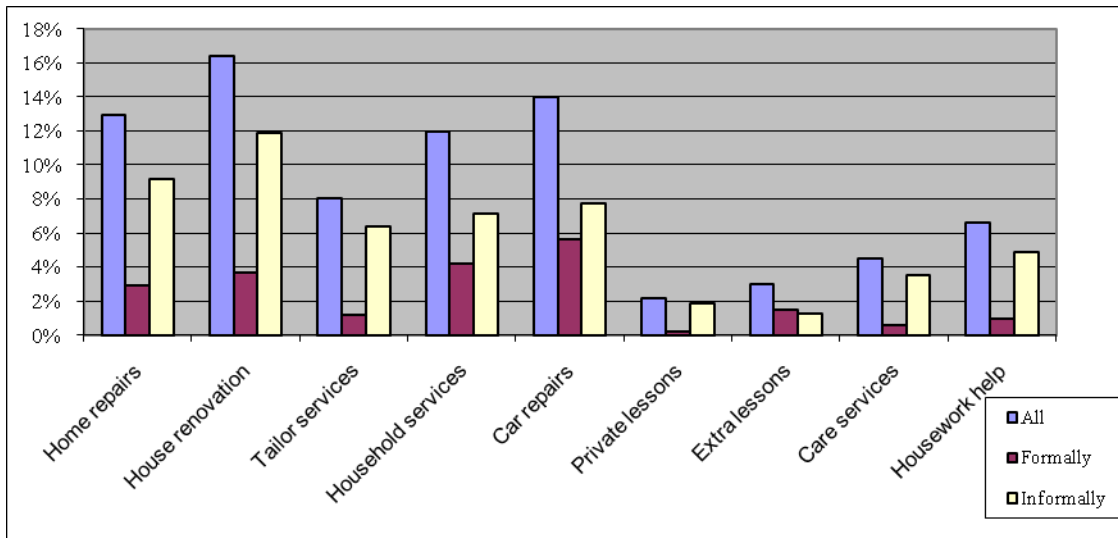
Source: Own calculations

Two reasons lie behind this phenomenon. First, one might state that Polish households mainly demand the most necessary services due to the relatively low revenues when compared to the EU average. Household members prefer to undertake most of the work themselves rather than employ an external professional in order to save money. Another explanation might lie in Polish cultural attitudes, where the major responsibility of taking care of elderly or young children is still considered a family duty. The situation on the Polish labour market confirms that women have the lowest participation rate, when compared to the EU average.

The highest share of informal demand for services out of total demand is observed for services such as private lessons (like individual home tutoring), care, and tailoring services or housework help. The opposite is true for extra lessons, i.e. additional language courses, piano lessons, and car repairs. Table 6 in the Appendix presents the summary statistics of the sample.

Determinants of expenses for services. Table 2 presents the determinants of household expenses for services estimated using the two-step Heckman specification. For comparative reasons an analogous OLS estimation is provided in Table 7 in the Appendix. It is found that characteristics related to the financial situation play an important role in the volume of expenses for household services. Almost all coefficients of income quintiles are statistically significant and positive. Their magnitude suggests that the expenses are the highest in the 4th quintile. The coefficient is statistically insignificant only for the 2nd income quintile due to the comparable economic characteristics of households in this group and households in the 1st quintile. A higher fraction of part-time workers in a household decreases expenses on services. This might be related to the fact that a person who stays at home usually does not delegate work outside.

Table 2. Determinants of household expenditures for services

Outcome Equation	
Variable	Coefficient
Household economical factors	
2nd income quintile *(Ref: 1st income quintile)*	0,087 (0,167)
3rd income quintile	0,463*** (0,102)
4th income quintile	0,751*** (0,091)
5th income quintile	0,400*** (0,131)
Composition of part-time working household members	-0,556*** (0,049)
Household structure (Ref: one-member household)	
Only adults	0,065 (0,093)
Households with children 0-2	-0,066 (0,163)
Households with children 3-6	0,520*** (0,175)
Households with children 7-15	0,040 (0,117)
Other households characteristics	

Composition of household gender	0,059 (0,124)
Composition of education	-0,094** (0,059)
Age of the household head	0,018*** (0,002)
Selection Equation	
Economic Factors	
2nd income quintile *(Ref: 1st income quintile)*	-0,177*** (0,056)
3rd income quintile	-0,019 (0,056)
4th income quintile	-0,114** (0,054)
5th income quintile	0,271*** (0,081)
Composition of part-time working household members	0,033 (0,030)
Household structure (Ref: one-member household)	
Only adults	0,269*** (0,049)
Households with children 0-2	0,341*** (0,088)
Households with children 3-6	0,809***

	(0,086)
Households with children 7-15	0,334***
	(0,073)
Other household characteristics	
Composition of household gender	0,304***
	(0,057)
Composition of education	-0,178***
	(0,025)
Age of the household head	0,008***
	(0,002)
Instrument: Composition of working household members	0,772***
	(0,077)
Mills lambda	0,505*
	(0,297)

Note: Bootstrap standard errors in parenthesis

Source: Own calculations using two-step Heckman procedure

Household structure does not seem to play an important role in the volume of expenses for household services, with almost all coefficients on household composition being statistically insignificant. Only households with children aged 3-6 have significantly higher expenses for services compared to one-member household. This phenomenon perhaps reflects the results of the descriptive analysis provided in Table 1. Regardless of household structure, relative expenses for services are at comparable level, except in households with children aged 3-6.

The composition of household gender seems to be statistically insignificant in terms of the amount spent on services. Having better educated household members increases the expenses for services. Also, the age of the household head has a positive impact on expenses for services.

In the second part of Table 2, results of the selection equation are presented. The instrument, *composition of working household members*, is highly significant and has a positive coefficient. The higher the number of household members that work, the higher the demand for services. The choice

of instrument is based on two facts. First, it is found in the literature that this variable has a significant impact on the decision of whether or not to acquire services (Flipo et. al, 2007) and it is not considered a factor influencing expenses (Soberon-Ferrer et. al, 1991). Second, as found in Table 1 in the descriptive statistics, this characteristic differentiates the demand for services between households without influencing differences in expenses for services.

An unusual pattern is observed when analysing income quintiles as determinants of household choice in acquiring services. Individuals in the 1st and the 5th income quintiles are more likely to buy services than individuals in the 2nd and 4th quintiles. Households from the 5th quintile are even more likely to buy services than their counterparts from the 1st and 3rd quintiles. This is most likely due to the rare distribution of households purchasing services by income presented in Table 1. A higher fraction of households demanding services is observed in the 1st income quintile than in the 2nd one. Not much difference is observed between the 3rd and the 4th quintiles. This is probably due to the fact that a broad range of services are taken into consideration in the study. Some of them are more acquired in the poorer households, while others are preferred by richer ones.

As expected, household structure also has a significant impact on the decision whether or not to acquire home services with all coefficients on household composition being significant and positive. This indicates that households with more than one household member are more likely to acquire services.

All other household characteristics are statistically significant as well. Having more women in the household increases the chances of using services. Also, the higher the education level of household members, the more likely the household is to acquire services.

Determinants of expenses for particular types of services. In the next part of the analysis, I attempt to denote the determinants of household expenses for services by explicitly considering two sub-samples of households, namely those demanding services only on the regular labour market and those that choose informal services as well. In order to account for the selection effect in these two sub-samples, first, I provide estimates for the probability of demanding only formal services using the bivariate probit model with selection. The probability of demanding formal services only rather than informal is conditional on demanding services. Results are presented in Table 3. Second, by applying Lee's (1983) generalisation of the Heckman two-step procedure, I estimate the determinants of household expenses for formal and informal services, respectively. Results are provided in Table 4.

Table 3. The probability of demanding formal services only

Outcome Equation

Household economic factors	
2nd income quintile *(Ref: 1st income quintile)*	-0,126 (0,128)
3rd income quintile	0,311*** (0,072)
4th income quintile	-0,007 (0,096)
5th income quintile	0,466*** (0,099)
Composition of part-time working household members	-0,088* (0,055)
Household structure (Ref: one-member household)	
Only adults	0,275*** (0,075)
Households with children 0-2	0,475*** (0,164)
Households with children 3-6	-0,822*** (0,171)
Households with children 7-15	-0,085 (0,120)
Other household characteristics	
Composition of household gender	0,178 (0,113)
Composition of education	-0,096**

	(0,038)
Age of the household head	-0,007***
	(0,002)
Advantages	
- cheaper	-0,327***
	(0,088)
- more effort from the employee	-0,404***
	(0,081)
- based on trust	-0,008
	(0,075)
Disadvantages	
- no possibility to complain	0,740***
	(0,092)
- illegal behaviour	0,048
	(0,063)
Selection equation	
Household economical factors	
2nd income quintile *(Ref: 1st income quintile)*	-0,170***
	(0,057)
3rd income quintile	-0,012
	(0,045)
4th income quintile	-0,099*
	(0,058)
5th income quintile	0,283***

	(0,071)
Composition of part-time working household members	0,796*** (0,071)
Household structure (Ref: one-member household)	
Only adults	0,255*** (0,054)
Households with children 0-2	0,358*** (0,097)
Households with children 3-6	0,794*** (0,078)
Households with children 7-15	0,329*** (0,078)
Other households characteristics	
Composition of household gender	0,334*** (0,054)
Composition of education	-0,170*** (0,021)
Age of household head	0,008*** (0,001)
Instrument: Composition of working household members	0,796*** (0,089)
Athrho	0,577** (0,257)

Note: Bootstrap standard errors in parenthesis

Source: Own calculations using bivariate probit model with selection

The results presented in Table 3 reveal that generally speaking, the probability of demanding only formal services is positively related to household income. On the one hand one might assume that higher household revenues enable households to buy formal services. But on the other hand, richer households often prefer consumption of services that are not easily accessible to poorer people (like language courses or car services). Also, these services are more difficult to find on the informal labour market.

A higher number of part-time workers in the household decreases the probability of formal acquisition of services. Differences in household structure influence the probability of demanding formal services. Households comprised of adults or families with children aged 0-2 are more likely to acquire formal services, whereas such a probability decreases for households with children aged 3-6. Such a situation might be explained by the fact that within these types of households the acquisition of services is the highest (as stated in Table 1). Having a limited household budget (almost 24% of them belong to the 3rd or 4th income quintile, whereas only 9% of them to the 5th one), they choose cheaper forms of employment.

The composition of household gender is statistically insignificant for the probability of choosing formal services. Lower education gives higher chances to avoid taxation when acquiring services. Also the probability of employing outsiders formally decreases with age.

Several studies suggest that economic considerations alone cannot explain the observed high level of tax compliance (see for example Slemrod, 1992). Norms are a significant factor in explaining people's willingness to evade taxes (Erhard et al, 1994; Barth et al., 2004, Jørgensen et. al, 2005). An important novel feature of the model used is the inclusion of variables that capture social norms and personal attitudes toward tax evasion. As stated in the literature, personal perception of irregular employment significantly influences the probability of purchasing services informally. Households that indicate advantages they see in informal employment are more likely to acquire services informally. The opposite is true when they indicate disadvantages.

The results of selection equation are analogous as in Table 2.

Table 4 summarizes the results of estimations of determinants of expenses for services divided by formal versus informal services. At a glance, an important result emerges. The impact of determinants of expenses for services, all, formal and informal, is comparable. Financial factors approximated by income quintiles are statistically significant and positively influence the expenses on all types of services. The composition of part-time working household members decreases expenses. The composition of household gender is statistically insignificant, whereas higher average education of the household and the higher age of the head of household increase expenses on both types of services.

Table 4. Expenses for services by type of sector

Variable	At least one informal	Only formal services
Household economic factors		
2nd income quintile *(Ref: 1st income quintile)*	-0,148 (0,158)	1,079*** (0,248)
3rd income quintile	0,289** (0,138)	1,492*** (0,257)
4th income quintile	0,691*** (0,129)	1,131*** (0,286)
5th income quintile	0,382*** (0,165)	0,421 (0,286)
Composition of part-time working household members	-0,524** (0,064)	-0,726*** (0,124)
Household structure (Ref: one-member household)		
Only adults	0,364** (0,149)	-0,230 (0,164)
Households with children 0-2	0,314 (0,379)	-1,400*** (0,271)
Households with children 3-6	0,392** (0,194)	0,693 (0,530)
Households with children 7-15	0,245 (0,198)	-0,999*** (0,327)
Other household characteristics		
Composition of household gender	-0,061 (0,160)	0,406 (0,303)

Composition of education	-0,084* (0,052)	-0,145 (0,110)
Age of the household head	0,013*** (0,004)	0,018*** (0,005)
Lambda	0,363*** (0,139)	0,989** (0,403)

Note: Bootstrap standard errors in parenthesis

Source: Own calculations using Lee's (1983) procedure to control for selection. Lambda, the selection term, is constructed based on the bivariate probit model with selection, which is used to estimate the sequential choice of buying household services and using a particular tax strategy (see Table 3). The exclusion restrictions are: - advatages of informal employment (it is cheaper, more effort from employee, it is based on trust); - disadvantages on informal work (no possibility to complain, it is illegal behaviour).

An important difference emerges when analyzing the coefficients of household structure. Households which consist of only adults and households with children aged 3-6 have higher expenses on informal services when compared to one-member households[1]. On the other hand, the households with the youngest children and with children aged 7-15 have lower expenses on formal services. These results clearly state that more than one-member households choose to spend more on informal services rather than on formal ones.

Concluding Remarks

The aim of this paper is threefold. First, an attempt to investigate factors influencing household expenses for services is provided. Second, determinants of households' tax strategy (choice between acquiring services on the regular or irregular labour market) are investigated. Finally, an attempt to determine whether there are differences between factors influencing expenses for formal or informal services separately is examined.

In order to take into account the possible endogeneity of the sample, the elaborated methodology is adopted. First, household expenses for services are estimated using the two-step Heckman selection model. Second, in order to derive the determinants of the household decision on what type of services to use and then factors influencing expenses on them, bivariate probit model with selection, followed by Lee's (1983) modification of the Heckman procedure is applied.

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1   Statutory paid maternity leave duration is 20 weeks in Poland. It is possible to ask additional 6 weeks of maternity for one child. Parental leave can last up to 3 years and can be demanded until the 4th birthday of a child.

The main results indicate that household expenses on services are positively related to household income. Household structure seems insignificant for the decision about how much to spend on services, whereas it appears to have a positive impact on the probability of demanding services.

Preferences for informal services seem to increase for lower income households, households in which more than one member live and for those where a positive attitude towards informality is expressed. The impact of determinants of expenses for formal or informal services is comparable between these groups. Only household structure has a negative effect on the expenses on formal services, whereas its impact is positive on spending on informal ones.

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Annex

Table 5. Definition of selected variables

Variables	Variable definition
Demand for service	=1, if household member states that she did not receive an invoice for the services acquired; =0, otherwise
Expenses for services	Log of average monthly expenses for services
1st income quintile	=1, if households income belongs to the first quintile; =0, otherwise
2nd income quintile	=1, if households income belongs to the second quintile; =0, otherwise
3rd income quintile	=1, if households income belongs to the third quintile; =0, otherwise
4th income quintile	=1, if households income belongs to the fourth quintile; =0, otherwise
5th income quintile	=1, if households income belongs to the fifth quintile; =0, otherwise
Composition of working household members	Number of workers divided by number of household members
Composition of part-time working household members	Number of part-time workers divided by number of working members in a household
Only adults	=1, if all households members are older than 16 and there are at least two members in a household; =0, otherwise
Households with children 0-2	=1, if there is at least one child aged 0-2 within a household, =0, otherwise
Households with children 3-6	=1, if there is at least one child aged 3-6 within a household and no children aged 0-2, =0, otherwise
Households with children 7-15*	=1, if there is at least one child aged 7-15 and no children aged 0-6; =0, otherwise
Composition of household gender	Number of women within a household divided by number of household members
Composition of education	The average education of household head and her partner
Advantages	
- cheaper	=1, if household states that informal employment is cheaper; =0, otherwise
- more effort from employee	=1, if household states that informal employment requires more effort from employee; =0, otherwise
- based on trust	=1, if household states that informal employment is cheaper; =0, otherwise

Disadvantages

- no possibility to complain	=1, if household states that there is no possibility to complain in case of informal employment; =0, otherwise
- it is illegal behaviour	=1, if household states that informal employment is an illegal behaviour; =0, otherwise

Note: This table presents definition of those variables for which the name used in the tables is not self-explaining or for which providing further information is necessary.

Source: own elaboration.

Table 6. Summary statistics

Variable	Observations	Mean	Std. Dev.	Min/Max
Household economical factors				
1st income quintile	5 788	0,284	0,451	0/1
2nd income quintile	5 788	0,119	0,451	0/1
3rd income quintile	5 788	0,204	0,403	0/1
4rd income quintile	5 788	0,259	0,438	0/1
5rd income quintile	5 788	0,134	0,341	0/1
Composition of working household members	5 788	0,373	0,364	0/1
Composition of part-time working household members	5 788	0,0589	0,219	0/1
Household structure				
One-member household	5 788	0,278	0,448	0/1
Only adults	5 788	0,436	0,495	0/1
Households with children 0-2	5 788	0,047	0,212	0/1
Households with children 3-6	5 788	0,089	0,285	0/1
Households with children 7-15	5 788	0,149	0,356	0/1
Other households characteristics				
Composition of household gender	5 788	0,5727	0,301	0/1
Composition of education	5 788	2,333	0,949	0/5
Age of the household head	5 788	48	15,7	15/93
Advantages				
- cheaper	5 788	0,791	0,407	0/1
- more effort from	5 788	0,727	0,445	0/1

employee				
- based on trust	5 788	0,747	0,434	0/1
Disadvantages				
- no possibility to complain	5 788	0,655	0,475	0/1
- it is illegal behaviour	5 788	0,549	0,498	0/1

Source: own elaboration.

Table 7. OLS results

Variable	Coefficient
Household economical factors	
2nd income quintile *(Ref: 1st income quintile)*	0,139 (0,148)
3rd income quintile	0,453*** (0,108)
4th income quintile	0,774*** (0,096)
5th income quintile	0,281** (0,109)
Composition of part-time working household members	-0,487*** (0,041)
Household structure (Ref: one-member household)	
Only adults	0,021 (0,082)
Households with children 0-2	-0,044 (0,172)
Households with children 3-6	0,354*** (0,092)
Households with children 7-15	0,004 (0,120)
Other households characteristics	
Composition of household gender	-0,034 (0,723)

Composition of education	-0,037
	(0,048)
Age of the household head	0,017***
	(0,002)

Note: Boostrap standard errors in parethesis

Source: Own calculations by OLS procedure