MODELLING UNPAID HOUSEWORK TIME IN POLAND ON THE BASIS OF A TIME USE SURVEY

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Abstract

Research background: The paper introduces an econometric analysis of unpaid household work in Poland.
Purpose: The purpose is a quantitative analysis of the relations between the time spent on unpaid housework and some selected demographic, economic and social variables.

Research methodology: In the survey, the respondents were grouped by gender and type of locality. It was hypothesized that there are strong differences in the determinants of housework time by gender and type of locality. Multiple regression models for housework time and 23 demographic, social and economic variables were estimated and verified. The analysis was conducted on the basis of individual data from the Time Use Survey conducted by the Statistics Poland in 2013.

Results: The empirical study found no differences in the key determinants of housework time between women and men depending on the type of locality. The main factors of influence were: paid work time, time spent meeting physiological needs (sleeping, eating, washing), time spent on learning, the number of children and, finally, economic activity.

Novelty: The theoretical part outlines barely known economic theories that addressed the issue of unpaid housework. The authors describe the care economy, humanistic economics, economics of happiness, time allocation theory as well as a two-dimensional approach to poverty research. Housework (which means the unpaid activity of household members aimed at satisfying the needs of individuals forming the household) has also been out of economic mainstream categories. Even though unpopular, it has an economic value and

can be replaced by market goods and services or offered by the state. The authors have been persuaded that there are tangible and intangible benefits resulting from this type of work.

Keywords: Unpaid household work, Time Use Survey, Multivariate Regression

JEL classification: C30, J22

Introduction

Housework means unpaid activity for the benefit of household members. Quantitative information on household production is provided by the Time Use Survey, conducted in Poland by the Statistics Poland. The basic activities identified within the time budget of a single person are professional work time, housework time, study time, leisure and personal care (sleeping, washing and eating). All these activities differ according to basic demographic characteristics. It is important to investigate time of the production of goods and services in a household because it is one of the ways of satisfying human needs. Therefore the aim of this paper is the quantitative analysis of the relations between the time spent on unpaid housework and some selected demographic, economic and social variables.

Among the economic theories that address the issue of housework there are those that perceive it in a positive and negative manner. The former emphasize its economic and non-economic value. As early as in the 5th century BC, in his *Oeconomicus*, Xenophon outlined the benefits of working in a household and a number of ways to improve the effectiveness of this work. For example, he advocated the application of the principle of small steps and the careful selection of people to help. E.F. Schumacher (1973) created the foundations for humanistic economics, recognizing the importance of people, their lives and needs. He argued that contemporary people should increase their involvement in the domestic sphere, e.g. by producing more at home. That would reduce consumption and people's dependence on market products (see also Łapniewska, 2016; Himmelweit, 2002, 2007).

The importance of the domestic sphere, including work in the household, family and health, was recognized by R.A. Easterlin (2004, p. 26), the author of the Economics of Happiness theory. He believed that the life satisfaction of an individual was influenced by the material situation, i.e. professional work, as well as the household sphere and health condition (individual and other household members). Therefore, it is necessary to manage time wisely and enforce appropriate amounts of time for each of the described spheres. G.S. Becker (1965), who

formulated the theory of time allocation, put it in a similar way four decades earlier. He attempted to systematically include house work time in economic research, in addition to market work and leisure time (see also Jarosz 2016). R.A. Easterlin stressed that the economic theory of choice would better describe reality if it took into account productivity in households. The relation between Nonmarket Household Production and National Accounts has also been thoroughly studied by J. Landefeld and S. McCulla (2000).

The Commission for Measuring Economic Performance and Social Progress, headed by J.E. Stiglitz, A. Sen and J.Pi Fitoussi (2013), proposed that standard measures of national income be extended to include non-market areas. The Commission proposed, among other things, the use of the category of total production, which meant combined market and household production. Another idea for combining both spheres is the Satellite Account of Household Production. It is a theoretical construct in the form of a document in which the value of household production is added to the System of National Accounts (SNA). The methodology for satellite accounts for European countries has been proposed by the Eurostat (1999).

One of the most important and frequently performed household chores is care. The care Economy emphasizes its economic dimension, and therefore the profits and losses resulting from it (Elson, 1990). Some researchers (Antonopoulos, Masterson, Zacharias, 2012: 6) argue that too many care-related responsibilities make it impossible for some people to participate actively in the labor market. This can, in some situations, lead to impoverishment of the individual or even of the household as a whole (poverty-inducing household chores). On the other hand, in the case of effective household members, the situation may be the reverse. Despite the low incomes of effectively active household members, the household may be successful in terms of its material development.

In the economics literature we can find two basic approaches to the valuation of housework, input and output. In the former, what is evaluated is the input, e.g. time, while the latter approach focuses on the effect, e.g. a cooked meal. To each approach an appropriate valuation method is assigned. The input approach employs the market rate method, the alternative wage cost method, the average housewife's wage rate method and the cost of the subsistence method. The output-based approach uses a single method: the cost of consumption of factors co-producing the service (Mikuta, 2000; Hozer-Koćmiel, 2007, p. 45). In Poland, the majority of empirical analyses aimed at estimating the value of housework use the input-based approach. These studies are based on data from the Time Use Survey by the Statistics Poland (GUS), where the input approach is the only possible one. The value of housework in developed countries is estimated at about 30% of the national income (Becker, 1981; Hozer-Koćmiel, 2007, p. 118; Miranda, 2011, p. 28).

On the basis of the housework description in the source literature the hypothesis has been set: that there are strong differences in the determinants of housework time between men and women living in rural areas and in cities of different sizes. In the further part of the article the methods and data used in the empirical part have been described, followed by an evaluation of the obtained results, and the conclusion with the direction of the complementary discussion on unpaid housework.

1. Methods and Data

The empirical analysis was carried out being based on individual data from the 2013 Time Use Survey. The Survey is conducted cyclically, approximately every 10 years, by the Statistics Poland. Similar surveys have been conducted for most countries in the world. In 2013 the Survey for Poland covered 74,499 people, but in the present analysis the sample is limited to 28,643 respondents. Some observations have been rejected due to incomplete data. The predicted variable was Y – time of unpaid housework in minutes per day. The set of predictor variables includes:

- X_1 – Age,
- X_2 – Marital status,
- X_3 – Voivodeship,
- X_4 – Number of children under the age of 18,
- X_5 – Number of children under the age of 6,
- X_6 – Number of adult men in the household,
- X_7 – Number of adult women in the household,
- X_8 – Economic activity,
- X_9 – Main source of income,
- X_{10} – Additional source of income,
- X_{11} – Nature of work performed in previous week,
- X_{12} – Minimum income per person,
- X_{13} – Maximum income per person,
- X_{14} – Does the person have any extra work?
- X_{15} – How many hours of extra work does the person usually do?
- X_{16} – Main source of household income,
- X_{17} – Monthly net income of the household,
- X_{18} – Range of income earned by the household,

X_{19} – Has the person helped anyone from outside the household?

X_{20} – Socio-economic background of the household,

X_{21} – Time spent on physiological needs in minutes per day,

X_{22} – Time spent on paid work in minutes per day,

X_{23} – Time spent on learning in minutes per day.

The basic descriptive statistics of the time spent on housework are presented below in Table 1.

Table 1. Descriptive statistics of the time spent on housework in 2013

Arithmetic mean	208.72
Standard error	0.89
Median	190.00
Dominant	0.00
Standard deviation	150.82
Variance	22746.20
Classic coefficient of variation	72.26
Kurtosis	X
Skewness of	0.86
Gap	990.00
Minimum	0.00
Maximum	990.00
Sample size	28643.00

Source: own study based on GUS data.

The quantitative evaluation of the correlation between these variables was performed by means of a Multivariate Regression. Variables that best described the time spent on housework were selected using a priori selection method. Due to the fact that the correlations for most of the single predictor variables and predicted variable were linear, the linear character of the multiple regression models was assumed. The models were built according to the formula:

$$Y_i = b_0 + b_1X_{1i} + b_2X_{2i} + \dots + b_kX_{ki} + U_i \quad (1)$$

where:

Y_i – predicted variable,

$X_{1i}, X_{2i}, \dots, X_{ki}$ – predictor variables,

$b_0, b_1, b_2, \dots, b_k$ – regression coefficients,

U_i – error term,

$i = 1, 2, \dots, n$.

The models were constructed according to gender and locality. In the case of gender, there were two variants: 1) man, 2) woman. The locality was categorized as cities with a population of: 1) 500,000 and more; 2) 200,000–500,000; 3) 100,000–200,000; 4) 20,000–100,000; 5) below 20,000, and 6) a village. The quality of modeling was measured using the coefficient of determination (R^2), standard errors of regression coefficients $D(b)$ as well as the p-value. The significance of regression coefficients was assessed by means of the Student's t-test. The analysis of variance was performed with the F-test (Fisher-Snedecor) (Hozer, 1998; Weinbach, Grinnell, 2007).

2. Evaluation of Results

The models of regression of unpaid housework time and selected variables for men by type of locality are presented in Tables 2–4. Due to the large number of variants of the locality variable, the study was limited to a large city, a small city and a village. The goodness of fit of models and empirical data was rather low. The determination coefficients (R^2) for all the variants varied between 0.31 and 0.37.

Table 2. Regression model of unpaid household time with selected covariates for men in large cities in 2013

Men, large city 200–500 thousand population				
Summary of regression of predicted variable: Unpaid Housework Time $R = 0.579$; $R^2 = 0.335$; Adjusted $R^2 = 0.326$; $F(13,978) = 37.892$; $N = 992$				
Variable	Regression coefficient b	Standard error $D(b)$	t -statistics	Probability p
1	2	3	4	5
Paid work time	–0.284*	0.021	–13.357	0.000
Intercept	356.105	29.986	11.876	0.000
Physiological needs time	–0.347	0.030	–11.538	0.000
Learning time	–0.289	0.040	–7.151	0.000
Number of children <6	55.505	10.370	5.353	0.000
Number of children <18	22.845	5.935	3.849	0.000
Economic activity on day of survey	4.572	1.547	2.956	0.003
Marital status	12.406	4.262	2.911	0.004
Socio-economic background of the household	–13.768	8.392	–1.641	0.101

1	2	3	4	5
Number of extra work hours	1.318	0.863	1.528	0.127
Number of adult women in the household	8.852	6.041	1.465	0.143
Number of adult men in the household	9.448	6.862	1.377	0.169
Does the person have extra work?	-7.099	5.505	-1.290	0.197
Main source of household income	7.226	6.270	1.153	0.249

* Values marked in red indicate a significant correlation at $\alpha = 0.005$.

Source: own study based on GUS data.

Table 3. Regression model of unpaid household time with selected covariates for men in small cities in 2013

Men, small city 20–100 thousand population				
Summary of regression of predicted variable: Unpaid Housework Time R = 0.561; R² = 0.314 ; Adjusted R ² = 0.310; F(13,2199) = 77.513; N = 2,213				
Variable	Regression coefficient <i>b</i>	Standard error <i>D(b)</i>	<i>t</i> -statistics	Probability <i>p</i>
Paid work time	-0.314*	0.014	-21.884	0.000
Intercept	408.521	21.595	18.917	0.000
Physiological needs time	-0.341	0.022	-15.626	0.000
Learning time	-0.345	0.034	-10.036	0.000
Number of children <6	42.981	7.108	6.047	0.000
Economic activity on day of survey	8.839	1.986	4.450	0.000
Number of children <18	12.000	4.144	2.896	0.004
Age	-0.747	0.331	-2.260	0.024
Nature of the work in previous week	-6.697	3.750	-1.786	0.074
Main source of income	2.007	1.408	1.425	0.154
Marital status	3.890	2.972	1.309	0.191
Number of adult men in the household	-5.516	4.330	-1.274	0.203
Socio-economic background of the household	-2.185	1.993	-1.096	0.273
Has the person helped anyone from outside the household?	-5.239	5.110	-1.025	0.305

* Values marked in red indicate a significant correlation at $\alpha = 0.005$.

Source: own study based on GUS data.

Table 4. Regression model of unpaid household time with selected covariates for men in villages in 2013

Men, village				
Summary of regression of dependent variable: Unpaid Housework Time R = 0.610; $R^2 = 0.372$; Adjusted $R^2 = 0.370$; $F(13,3962) = 180.59$; N = 3,976				
Variable	Regression coefficient b	Standard error $D(b)$	t -statistics	Probability p
Paid work time	-0.357*	0.011	-33.156	0.000
Physiological needs time	-0.434	0.017	-25.855	0.000
Learning time	-0.416	0.025	-16.428	0.000
Number of children <6	36.874	5.356	6.884	0.000
Economic activity on day of survey	7.371	1.475	4.997	0.000
Number of children <18	8.382	2.596	3.230	0.001
Number of adult men in the household	-5.978	2.596	-2.303	0.021
Age	-0.489	0.258	1.897	0.058
Number of extra work hours	-0.713	0.391	-1.825	0.068
Nature of the work in previous week	-5.331	3.245	-1.643	0.100
Number of adult women in the household	-3.477	2.435	-1.428	0.153
Monthly net income of the household	0.000	0.000	-1.224	0.221
Does the person have extra work?	-3.527	3.060	-1.152	0.249
Intercept	-479.456	515.568	-0.930	0.352

* Values marked in red indicate a significant correlation at $\alpha = 0.005$.

Source: own study based on GUS data.

The key determinants of men's household work hours were the same in all types of locality, from large cities to rural areas. These included variables such as paid work time, physiological needs (sleeping, eating, washing), time spent on learning, number of children and economic activity. The strongest determinants turned out to be variables connected with the need to take on specific responsibilities. The decision to engage in a professional career means that a significant part of the day is spent on related activities. The decision to study away from home also consumes a certain amount of time. The decision to have children means agreeing to many hours spent on childcare. The two former variables (paid work time and learning time) have a negative impact on housework time, while the number of children has a positive effect, i.e. the more children you have, the more time you spend on unpaid housework.

As regards correlations, all key determinants were relatively and most strongly correlated with housework time. It is however important to note that the correlation coefficients among the

variables under study were not high as their modules were below 0.4. The only variable that was markedly weakly correlated with the predicted variable was the time devoted to physiological needs.

Table 5. Regression model of unpaid household time with selected covariates for women in large cities in 2013

Women, large city 200–500 thousand population				
Summary of regression of dependent variable: Unpaid Housework Time R = 0.695; $R^2 = 0.483$; Adjusted $R^2 = 0.480$; F(9,1734) = 180.22; N = 1,744				
Variable	Regression coefficient b	Standard error $D(b)$	t -statistics	Probability p
Intercept	466.430*	22.284	20.931	0.000
Paid work time	−0.364	0.018	−20.592	0.000
Physiological needs time	−0.376	0.024	−15.357	0.000
Learning time	−0.435	0.032	−13.405	0.000
Number of children <6	84.369	7.941	10.625	0.000
Number of adult men in household	31.987	3.666	8.725	0.000
Number of children <18	33.398	4.327	7.719	0.000
Economic activity on day of survey	10.006	2.163	4.626	0.000
Nature of the work in previous week	−11.208	4.140	−2.707	0.007
Age	−0.901	0.353	−2.555	0.011

* Values marked in red indicate a significant correlation at $\alpha = 0.005$.

Source: own study based on GUS data.

Table 6. Regression model of unpaid household time with selected covariates for women in small cities in 2013

Women, small city 20–100 thousand population				
Summary of regression of dependent variable: Unpaid Housework Time R = 0.694; $R^2 = 0.482$; Adjusted $R^2 = 0.481$; F(10,3846) = 357.77; N = 3857				
Variable	Regression coefficient b	Standard error $D(b)$	t -statistics	Probability p
1	2	3	4	5
Intercept	591.512*	16.625	35.580	0.000
Paid work time	−0.451	0.014	−33.149	0.000
Physiological needs time	−0.491	0.018	−27.945	0.000
Learning time	−0.609	0.031	−19.572	0.000
Number of children <18	36.554	3.018	12.113	0.000
Number of children <6	57.563	5.547	10.378	0.000
Number of adult men in the household	24.601	2.733	9.002	0.000

1	2	3	4	5
Economic activity on day of survey	11.587	1.593	7.272	0.000
Age	-1.804	0.261	-6.919	0.000
Nature of the work in previous week	-13.453	3.240	-4.152	0.000
Has the person helped anyone from outside the household?	10.978	3.830	2.866	0.004

* Values marked in red indicate a significant correlation at $\alpha = 0.005$.

Source: own study based on GUS data.

Table 7. Regression model of unpaid household time with selected covariates for women in villages in 2013

Women, village				
Summary of regression of dependent variable: Unpaid Housework Time R = 0.712; R² = 0.506 ; Adjusted R ² = 0.506; F(8,6675) = 856.23; N = 6684				
Variable	Regression coefficient <i>b</i>	Standard error <i>D(b)</i>	<i>t</i> -statistics	Probability <i>p</i>
Intercept	675.493*	12.239	55.191	0.000
Paid work time	-0.507	0.009	-58.064	0.000
Physiological needs time	-0.573	0.014	-41.725	0.000
Learning time	-0.637	0.020	-31.239	0.000
Number of children <6	58.460	3.983	14.676	0.000
Economic activity on day of survey	16.409	1.124	14.593	0.000
Number of adult men in the household	22.055	1.737	12.694	0.000
Age	-2.207	0.191	-11.558	0.000
Number of children <18	21.407	1.865	11.475	0.000

* Values marked in red indicate a significant correlation at $\alpha = 0.005$.

Source: own study based on GUS data.

The study of the dependence of housework time on 23 selected demographic, economic and social variables showed no differences in the key determinants for women and men according to the type of locality. The models for women showed a slightly better fit to the empirical data than the models built for men. The R² coefficients ranged from 0.482 to 0.506. In each case (Tables 5–7) the list of determinants of housework time was shorter by several factors than in the case of men (Tables 2–4). All the regression coefficients in the models created for women were statistically significant; as regards men, several parameters did not meet that criterion. Nevertheless, they were still shown in the results, because the *t* statistics indicated a relatively

strong influence of the variable they concerned on the predicted variable. Yet, they did fail to meet the criterion of significant impact in the statistical sense.

Beside the key ones, the other determinants that deserve attention include the variable describing the number of adult men in the household. This variable appears in most models both for women and men. It is generally believed that housework essentially consists in a caring for children and the elderly. In fact, a lot of time is spent on taking care of other adult men in the household. Another variable that appeared rather often among the determinants was age. The correlation between age and housework time was always negative, which means that the variables changed in different directions. The older the person, the less time devoted to homework he/she declared. The effect of age was stronger for women than for men, as is evidenced by higher absolute values of the *t* statistic module.

Conclusions

Economics explores human activities related to the production, exchange and consumption of goods that are aimed at satisfying human needs. These needs may be met by goods and services produced by households, purchased on the market or provided by the state. Unfortunately the problems of activity in the domestic domain were rarely included in mainstream economic theories. Prominent classical, neoclassical and Keynesian economists focused almost exclusively on market processes. Therefore, the main objective of this paper was to analyse the former way of satisfying needs by gender and type of locality.

When we compare the economy to a layer cake (Henderson, 1990), we can see that the production system of the whole of society is fuelled by the contribution from several layers of this part of society. The bottom layer of this cake are natural resources, on which rests unpaid, often invisible, household work. The next layer of the cake represents the public sector, and the highest – the private sector. Disregarding household work, or missing this piece of the cake, depreciates the contribution of many people to the economy.

The empirical analysis shows that there is no considerable difference in determinants of household work time between men and women living in rural areas and cities of different sizes. The empirical study showed that the key determinants of housework were the same in each case. Those key determinants were: paid work time, time devoted to physiological needs, time spent on education, the number of children and economic activity.

Household work is recognized by those who see the economy as a way of satisfying human needs in a broader context, as well as by those economists who investigate non-monetary,

informal and non-market processes besides monetary, formalized and market processes. The next step in the study on unpaid housework will be to assess its correlation with poverty in Poland.

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