The Economic Value of Time - A computational model for estimating household labour time -

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Abstract: *The economic value of household work hours is still a topic of great interest in economic research. Time allocated for housework can be regarded as working time used to produce goods and services which can replace market goods and services. An argument in this sense consists of the positive externalities for consumption within the family. An example is the amount of time that mothers spend at work, but they outsource the children care services. Examples could continue: cooking, housekeeping and home care, elder care or other household work activities.*

In this paper, we propose a computational model for estimating household labour time on the basis of the data provided by three surveys: Time use survey, Labour cost survey, Labour force survey.

Keywords: *household working time, labour cost, labour force, leisure*

JEL Classification: *J22, J31*

1. Introduction

The working time of each individual could be analyzed through a couple of aspects: the economic activities dedicated to earn an income (marketed work activities) and time used in the household (non-marketed work activities), for activities which could be related to the economy.

The individual time budget and time allocation structures by daily activities are influenced by household characteristics. Given the methodological limitations of

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Time use survey, the schematic representation of the life cycle is based on several steps involved in the formation and transformation of the household at different stages.

By analysing the situation in terms of the time budget for the household in Romania, the following could be noticed:

- People living together and having children under 6 years are allocating less time to sleep than the hourly average for the entire population;

- Highest hourly average of the time spent on household work and family care records for married women aged over 65, who do not have minor children to support (over 6.0 hours / day);

- For married persons there are differences in the allocation of time for family activities generated by the presence of minor children in the household;

- Data analysis shows that certain characteristics of household are involved in the allocation of time of individuals who are members of the household.

It is considered that the time used for household work resulted in obtaining goods and services that can be substitutes for the goods/services available on the economic market. One argument in this respect is the existence of positive externalities of time in the family, especially within the families with children. An example could be the amount of time that mothers spend at work, while the care for their children is being outsourced through nurseries or kindergartens. Non-market economic goods that also could be included in this category are the following: meal preparation, cleaning, laundry, do-it-yourself home maintenance and repairs, gardening, shopping, banking, travelling to obtain goods and services and care of family.

The economic value of the hours of work in the household is still a subject, debated and analyzed through international economic research. Thus, it becomes one of the advanced concerns for the improvement of methodologies used in the production of national accounts.

2. Literature Review

The recent economic literature, over the last two decades, the subject of household work has been analysed by collective models since the work of Chiappori (1988). More recently, availability of data provided by time use surveys

increases the interest in the estimation of household model with domestic production. In particular, Aronsson, Daunfeldt and Wikstrom (2001) develop and test a collective model on a sample of Swedish households.

The importance of non-market production has been a research theme in the international national accounts literature since the inception of national accounts. Simon Kuznets (1934) and a long line of other economists who have worked on the accounts have acknowledged the importance of including household production.

In Romania, the first analysis of the time-cost of household production was developed on the basis of the pilot time use survey data, carried out by the National Institute of Statistics in 2000. Like other European countries, after the waves of these pilot studies, many countries adopted the harmonized methodology for the time use survey for obtaining comparable results on time spent by population from different parts of the world. The most recent methodology was adopted by Eurostat in 2008. According to the updated methodology, the second survey on time use was carried out in Romania in 2011 and 2012. Time spent for housework results in obtaining goods/services that can replace goods/services from the market (Caragea, 2013). Many of these goods or services need to be outsourced and their costs should be supported by family. The phenomenon got more attention in the research area as a result of the increasing in female labour force participation.

3. Assessment of the time-cost for household work

Until now, we have developed two methods for assessing similar monetary values of time used in the household: the cost substitution method and the opportunity cost method.

The cost substitution method - according to this method, the number of hours worked in the household is assessed by assigning a cost that would be generated for payment of another person achieving the same tasks. Most often, this cost estimation is done by assigning the average calculation for the economic activities of the national economy. For example, the time spent cleaning the environment is treated as wages for persons employed in similar activities in the labour market.

The opportunity cost method - based on the microeconomic approach to marginal utility. Thus, a person may reduce the working time (paid) to allocate more time to domestic work, up to an amount at least equal to the gain obtained for an hour of work (paid).

The amount of working time spent in households could be estimated according to the cost substitution method. The data available are the following:

- The average duration of daily households (according to Time Use Survey[1]);

- The average earnings by economic activities and occupations (according to Earning Survey);

- The average of working day duration by economic activities and occupations (according to Structure of Earning Survey).

The cost of non-market work could be estimated, replacing some market activities with similar activities within the household, as follow:

- Household and family care activities have been attributed to hotels and restaurants (NACE Rev 2);

- Gardening and pet care activities have been attributed to agriculture activities (NACE Rev 2);

- Construction and repair activities were replaced with market activities in the construction field (NACE Rev2);

- Child care is an activity assimilated to health care and social work (NACE Rev2).

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[1] The specificity of the TUS methodology is that all the activities made by individuals during a day are covered by "the activity coding list". The activity code system is hierarchical, with three levels, the list of the activities being the same for the main and for the secondary activity (if the individual spent two or more activities in the same time). Time Use Survey requires multidimensional probability samples. Not only households/individuals are sampled but also the days when the time use is to be recorded. The general requirement is that all objects in the population have a known probability. For TUS this means that each combination of individuals/households and all days within the surveyed time period have a known probability to be allocated to the sample. There have been subjects covered in the sample of all persons aged 10 years and older with the residence in research centers (urban and rural areas), members of households in randomly selected households in all counties in Romania, including Bucharest.

Table 1 – Activity coding list - Main and secondary activities

A. Personal care	B. Economic activity, study, household and family care, travels	C. Leisure
A.1. Sleep	B.1. Economic activity	C.1. Voluntary work and meetings
	B.2. Study	C.2. Social life and entertainment
A.2. Sick in bed	B.3. Household and family care	C.2.1. Social life
	B.3.1. Food management	C.2.2. Entertainment and culture
	B.3.2. Household upkeep	C.2.3. Resting — time out
A.3. Eating	B.3.3. Making and care for textiles	C.3. Sports and outdoor activities
	B.3.4. Gardening and pet care	C.4. Hobbies and computing
	B.3.5. Construction and repairs	C.4.1. Arts and hobbies
	B.3.6. Shopping and services	C.4.2. Computing
A.4. Washing and dressing	B.3.7. Household management	C.4.3. Games
	B.3.8. Childcare	C.5. Mass media
	B.3.9. Help to an adult family member	C.5.1. Reading
	B.3.10. Other or unspecified of household and family care	C.5.2. Watching TV, Video or DVD
A.5. Other or unspecified personal care		C.5.2. Listening to radio or recordings
	B.4. Travels - travel by purpose	C.6. Other unspecified time use

Source: Time use survey methodology, 2013.

The proposed method is the following:

The average wage corresponding to one working hour in the national economy is calculated according to the formula:

$$s_i = \frac{S_i}{t_i} \tag{1}$$

Where[1]:

S_i – represents the monthly average salary on the i economic activity.

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[1] The monthly average salary is calculated as a the ratio of the amounts of money paid to employees by the undertakings in the reference month, no matter what the period are entitled to, and the average number of employees.

Table 2 – Monthly wage in the Romanian labour market, by economic activity and gender

lei/month

2013	hotels and restaurants	agriculture	construction	health care and social work	Total of monthly salary
Total	898	1179	1191	1456	**2163**
Male	960	1190	1158	1627	**2246**
Female	857	1141	1398	1414	**2070**

Source: Labour force survey, 2013.

t_i – is actual duration of the working week for the economic activity i.

Table 3 – Actual duration of working week for employees, by economic activity and gender

hours/week

2013	hotels and restaurants	agriculture	construction	health care and social work
Total	39	34.4	41.3	40.7
Male	39.8	36.4	41.3	40.8
Female	38.1	32.1	40.1	40.7

Source: Labour force survey, 2013.

Table 4 – Actual duration of working week in certain European Union countries

hours/week

UE-28	36.5
SPAIN	37.2
ITALY	36.3
FRANCE	35.9
POLAND	39.3
CROATIA	39.0

Source: Eurostat, Labour Force Survey, reference year 2013.

The time-cost for the household production attributed to the economic activity i according to NACE is calculated as follows:

$$c_g = s_i \times t_{gi} \qquad (2)$$

Where:

s_i – is the average wage corresponding to one working hour in the national economy.

Table 5 – Hourly cost of labour, by economic activity and gender

lei/month

2013	hotels and restaurants	agriculture	construction	health care and social work
Total	5.2	7.8	6.6	8.1
Male	5.5	7.4	6.4	9.1
Female	5.1	8.1	7.9	7.9

Source: author's calculation based on the data provided by Labour force survey, 2015.

The cost of time allotted for certain activities in household:

$$C_g = S_i \times t_{gi} \times z \qquad (3)$$

Where:

z – is the average days spent to work in the national economy (it was considered to be z=22 working days/month).

Table 6 – Time spent on household work, by household activity and gender

hours/day

2013	Household and family care	Gardening and pet care activities	Construction and repair	Child care
Total	3.17	0.29	0.04	0.15
Male	2.05	0.17	0.08	0.09
Female	4.24	0.23	0	0.2

Source: Time Use Survey, 2013.

If we sum up all the time allotted to the household activities whose costs can be outsourced, we can estimate the total monthly cost of household work:

$$C_g = \sum S_i \times t_{gi} \times z \qquad (4)$$

Table 7 – Total monthly cost of household work, by household activity and gender

lei/month

2013	Household and family care	Gardening and pet care activities	Construction and repair	Child care	Total cost of HH work per month (C_g)
Total	365.0	49.7	5.8	26.8	**447.3**
Masculin	247.2	27.8	11.2	17.9	**304.2**
Feminin	476.9	40.9	0.0	34.7	**552.5**

Source: author's calculation, 2015.

The ratio of the total monthly cost assigned to activities within the household to the average monthly wage earned by an employee in the national economy can be calculated using the formula:

$$C_g(\%) = \frac{C_g}{\overline{S}} = \frac{\sum S_i \times t_{gi} \times z}{\overline{S}} \times 100 \qquad (5)$$

In accordance with the algorithm presented, the following results were obtained:

Table 8 – Total monthly cost of household work, as % of the average wage in Romanian labour market, by gender

lei/month

	total	male	female
as % of the average salary in Romanian labour market	447.7	304.2	552.5
	20.7	13.5	26.7

Source: author's calculation, 2015.

The results differ significantly from those in Germany (34.3%) and Belgium (17.5%). The methodology proposed by the authors of the study conducted in Germany and Belgium is different from that applied to estimate the cost of household work time in Romania.

4. Conclusions

In this paper we developed a new technique that allows us to estimate the cost of the time spent on household production in Romania.

The cost of time spent on household activities considered in the calculation algorithm represents 20.7% of the average wage in Romanian labour market.

The cost of household activities is higher for females (552.5 lei / month) than for males (304.2 lei / month). This is due to more time spent by women, not by a higher hourly rate of labour cost.

Acknowledgement

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