
ECONOMICS

Sociology

Jacek Jankiewicz,
*Poznan University of Economics
and Business,
Poznan, Poland,
E-mail:
jacek.jankiewicz@ue.poznan.pl*

Received: July, 2016
1st Revision: October, 2016
Accepted: February, 2017

**DOI: 10.14254/2071-
789X.2017/10-1/7**

GDP, TIME ALLOCATION AND ANNUAL TIME WORKED PER ADULT IN CENTRAL AND EASTERN EUROPEAN COUNTRIES

ABSTRACT. When decisions taken in the context of monetary price and monetary income are investigated, economists have naturally tended to focus their attention on the market activities of households. Consequently, a significant portion of the economic decisions that are taken in the non-market sphere have remained overlooked. Thus it has been recognised that it is necessary to take into account the production generated by households in the measurement of economic wealth. The aim of this paper is to analyse differences in the economic activity of selected Central and Eastern Europe societies. The use of traditional statistics and time-use data for this purpose made it possible to compare the conclusions that can be drawn using different sources of information. As the statistical material has been supplemented with time-use data, prior conclusions about creating the economic welfare of these societies needed to be modified. The different allocations of time in the individual societies and the different extents to which household production is substituted by market goods and services have an impact on the level of prosperity of households. The significant differences in terms of compensating for market work with household production which were observed when comparing the daily activity of unemployed men and women, turned out to be a common feature of the analysed populations.

JEL Classification: D60, I31 **Keywords:** CEE countries, time-use, total market work, HETUS, economic welfare.

Introduction

For decades, the Union of Soviet Socialist Republics (USSR) maintained tight control over the present-day countries of Central and Eastern Europe (CEE). They were either an integral part of the socialist state, or a kind of satellite within the so-called Eastern Bloc formed after World War 2. In the early 1990s, as a result of the Soviet Union's collapse, the situation changed. Regaining independence and the resultant opening up of the economies to cooperation with Western Europe and the US marked the beginning of the transformation processes. In each country the transformation was characterised by different intensities, leading to differing levels of prosperity. These political, economic and social changes were

accompanied by certain processes taking place on a global scale, including the information revolution, the growth of female participation in the labour market, the marketization of domestic production, and the increasing role of the service sector in the structure of economies. Virtually all of these phenomena had a significant impact on people's time allocation, exerting a different influence on the behaviour of men and women (Freeman and Schettkat, 2005; Lee and Wolpin, 2010; Bridgman, 2013; Ngai and Petrongolo, 2014).

An interesting direction of research in this area is an analysis of the decisions taken within households and the changes in the standard of living of their members (Hill, 1979, pp. 31-39; Hawrylyshyn, 1977, pp. 79-96). In this case, the findings of sociological research should be complemented by observations done from the perspective of economics. Unfortunately, in economics the traditional methodology of explaining human behaviour overlooks a large part of the activities connected with managing limited resources. By investigating decisions taken in the context of monetary price and monetary income, economists naturally tend to focus their attention on the market activities of households. In this way, a significant part of economic decisions that are taken in the non-market sphere remain overlooked (Michael and Becker, 1973, p. 380). Numerous analyses show that the structure of total work time (market and household) depends on gender, with men usually performing more market work and women dominating in terms of non-market production activity (Gershuny and Robinson, 1988, pp. 544-545; Bianchi *et al.*, 2000, p. 196; Eurostat, 2004, p. 75; Burda *et al.*, 2006, pp. 15-16; Gimenez-Nadal and Sevilla, 2014, pp. 1901). In this context it is worth noting that the distinction between market work and leisure used in the traditional model of labour supply ignores non-market production activities, thereby reducing the role of women in creating that part of the social well-being of households which can be fulfilled through economic activity.

Gross domestic product, the commonly used measure of growth and prosperity at the macroeconomic level, focuses on market productivity activities, which means that the value of such statistics does not fully reflect the productive activities of societies or their wealth (Landfeld and McCulla, 2000, pp. 290-291; Goldschmidt-Clermont and Pagnossin-Aligisakis, 1999, p. 520). For a long time there have been calls for changing or expanding this aggregate and, more generally, for changing the system of national accounts (SNA) (Kuznets, 1934, p. 4; Hawrylyshyn, 1977, p. 94; Eisner, 1988, p. 1612; Lützel, 1989, p. 337; Landfeld and McCulla, 2000, p. 290). In recent times, which in this case means for more than two decades, there have been proposals for real change in this respect (System of National Accounts, 1993, p. 608 and following). The idea of so-called satellite accounts has a chance to be implemented and become a permanent instrument in official statistics. However, it will take some time before this happens.

It is also difficult not to agree with the argument that using such a macroeconomic indicator of market activity can lead to incorrect conclusions in international comparisons (Ferber and Birnbaum, 1980, p. 387; Burda *et al.*, 2006, p. 64). In the case of countries which differ significantly in terms of women's participation in the labour market and the proportion of people who indicate the category "fulfilling domestic tasks" as their economic activity, taking into account time-use data helps to better reflect differences in economic welfare. Therefore, many publications contain arguments regarding the need for taking into account the production generated by households in the measurement of economic welfare, and increasingly this kind of data is included in income statistics (Ferber and Birnbaum, 1980, p. 388; Church *et al.*, 2000, pp. 12-13; Szulc, 2007, p. 132).

In numerous studies of time-use survey data Europe has been divided into countries of the north and the south, so these developed economies have been analysed, including the specificity of countries in the Mediterranean region (Burda *et al.*, 2007). In addition comparisons relating to time allocation have been made for the populations of Europe and the

USA (Alesina *et al.*, 2006; Freeman and Schettkat, 2005). So far little attention has been devoted to the analysis of time allocation in CEE countries. The few instances referring to the results of surveys conducted prior to the beginning of system transformation (Łobodzińska, 1995) That is why the aim of this paper is to analyse differences in the economic activity of selected CEE societies from two points of view. The use of traditional statistics as well as time-use data for this purpose make it possible to compare the conclusions that can be drawn through using two types of data. It was shown that there was a need for the inclusion of non-market activity statistics in the comparisons of well-being creation in CEE countries. As housework time is such a large part of total work time, drawing conclusions merely on the basis of market statistics can lead to misleading conclusions. What is more, non-market production is dominated by women. Therefore it must be concluded that omitting this sphere of human activity reduces the role of women in shaping the well-being of households and entire societies. Additionally, it was shown that the changing share of household production within production as a whole modifies the wellbeing of the unemployed as compared to the employed. The changes in this regard are also significant during the lifecycle of agents.

The remainder of the paper is divided as follows: section II outlines the adopted theory as well as the data used for the comparisons presented, while section III presents the picture drawn from traditional data. In section IV, a number of comparisons concerning the allocation of time are included, with particular focus on productive activities. Finally, section V summarizes the principal conclusions of the paper.

1. Theoretical background and data

A significant portion of the shortcomings in the traditional economic approach has been eliminated by the so-called new theory of consumer choice (Becker, 1965; Lancaster, 1966a, 1966b; Muth, 1966). In this new approach, the concept which became the most popular was the one which in explaining the decisions of household members gave special attention to the allocation of time and its valuation (Hawrylyshyn, 1977, pp. 82-83). Subsequent modification, according to which non-market time was divided into domestic work and the consumption of its outputs, significantly contributed to the popularisation of the theory of household production function (HPF) (Gronau, 1973, 1977, 1980, 1986; Graham and Green, 1984).¹ Moreover, treating consumption time as an argument of the utility function facilitated the use of data on the time-use of populations for the empirical testing of the models' predictions (Jankiewicz, 2015, pp. 2-3).

Regardless of how one evaluates the theory of household production and its usefulness for a theoretical explanation of the decisions made by consumers, the empirical applicability of this construct was, and to a large extent still is, considerably limited. One reason for this is the lack of data on the quantity and value of commodities produced at home (Kooreman and Kapteyn, 1987). Therefore, analysing the impact of changes in preferences and separately the impact of production technology on consumer behaviour is virtually impossible. One of the few attempts to overcome these limitations was made by Gronau and Hamermesh (2003). In the face of this objective difficulty, the application of the concept developed by Becker and Gronau in empirical analysis consists mainly in examining the inputs in the production process and indirectly inferring about its effects, including the level of utility. Hence the growing interest of economists in data on the time-use of households.

However, scant and imprecise data also in this regard effectively hampered any early attempts to empirically verify theoretical predictions (Aguiar *et al.*, 2012, p. 3). It was only in the last two decades that a marked improvement in this respect has been recorded (Eurostat, 2004, p. 3, 2009, p. 21; Cushman *et al.*, 2005, p. 10; Österberg and Baigorri, 1999, p. 1). The frequency of time-use surveys (TUS) increased and, more importantly, considerable effort

was made to ensure the comparability of data in both time and across countries (Fisher *et al.*, 2000; Fahey *et al.*, 2003, pp. 80-81; Bridgman, 2013, pp. 2-3). One of the most popular sources of time-use data, which contains comparative statistics for 15 European countries, is the Harmonised European Time Use Surveys database (HETUS). In 1996 and 1997, Eurostat launched a number of pilot studies and at the turn of the millennium the first set of European guidelines were agreed (United Nations, 2013: 1). This gave a considerable boost to the harmonisation process; allowing, for the first time, the publication of time-use survey data with a good level of comparability and the creation of a harmonised database (Eurostat, 2009, p. 21).

The basic criterion for the selection of CEE countries in the presented analysis was the availability of time-use data in the Harmonised European Time Use Survey database (HETUS). Because of this, the results presented include Bulgaria, Estonia, Latvia, Lithuania, Poland and Slovenia. Details of the research conducted for individual countries are presented in *Table 1*. The analysed units (countries) are arranged according to the chronology of the surveys.

Table 1. Periods of time-use surveys in countries of CEE²

| Country | The period of the survey |
|-----------|---------------------------|
| Estonia | 04.1999-03.2000 |
| Slovenia | 04.2000-03.2001 |
| Bulgaria | 10.2001-10.2002 |
| Lithuania | 01.2003-12.2003 |
| Latvia | 02-08.2003 and 10-11.2003 |
| Poland | 01.06.2003-31.05.2004 |

Source: HETUS metadata.

Taking into account the purpose of the analysis, the 49 categories of main activities that are included in the available tabular reports have been divided into four main groups: personal care, market work, household production and leisure. In order to better compare the data on time allocation with quantitative macro-economic aggregates, in each case the population bracket between the ages of 15-64 years was analysed. Micro-data are not directly accessible, but estimations can be produced by a table generating tool. Unfortunately, the tool does not calculate variances.

In the first place, however, the analysis presented took into account GDP per capita, several indicators for labour market performance (employment and unemployment rates, average annual hours worked by persons employed and per adult), as well as data on the gender pay gap. Calculation of GDP is one way of assessing the economic activity contributing to social well-being. Such kinds of activity can be understood as actions that involve the production, distribution and consumption of goods and services within a society, where production is a fundamental part of the process of creating economic welfare. Labour market statistics are taken into account as labour is the most important resource, or input, that is used to produce output. In each case statistical series at yearly intervals were used, taking into account the period 1999-2004. Thus, the adopted time span was between the first and the last time-use survey conducted in the six selected countries.

After analysing the statistics from several databases – Eurostat, LABORSTA, OECD Employment and Labour Market Statistics, and Penn World Table – the last one was selected. The estimates obtained from the Penn World Table version 8.1³ proved to be the most complete from the point of view of the countries described, the (annual) frequency and the adopted time span.

2. Real GDP per capita and labour market performance

To begin with, a short description of the economic activity of individual countries statistics on real GDP at current purchasing power parity rates (PPPs) was used, which allows for comparing relative living standards across countries at a single point in time (Feenstra *et al.*, 2013). This shows the price level of expenditure-based real gross domestic product per capita (CGDPe) at current PPP rates, defined relative to the US \$ in 2005. The average CGDPe values in the years 1999-2004 expressed *per capita* are shown in *Figure 1* (grey colour). The country that clearly stands out in the analysed group is Slovenia, with almost double the magnitude in relation to the other countries. Bulgaria, on the other hand, has the lowest GDP per capita.

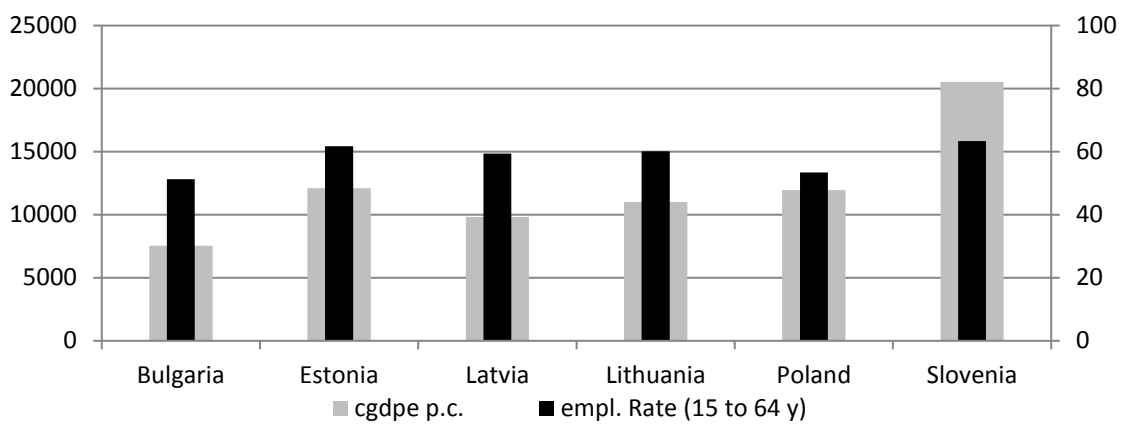


Figure 1. Expenditure-side real GDP at current PPPs in mil. US\$ per capita, average in the period 1999-2004 and the average proportion of employed people in the economically active population in the period 1999-2004

Source: Own calculations based on PTW8.1 (Feenstra *et al.*, 2013) and Eurostat (employment rate).

The observed differences in GDP per capita were then compared with the activity of the population in the labour market, which in the first place was illustrated by means of the total employment rate (%). The average proportion of employed people in the economically active population for each country in the period 1999-2004 is presented in *Figure 1* (black colour).

The employment rate seems to have an impact on the differences in GDP per capita. Slovenia has the highest population share economically active in the labour market, while Bulgaria has the lowest. However, the differences are not as pronounced as in the case of the macro-economic aggregate.

Data shows that in the case of Bulgaria not only is the employment rate lower, but so is the average number of hours worked by employees (*Table 2*). As a result of multiplying the employment rates presented above and data relating to average annual hours worked per employee, annual hours worked per adult were obtained for each country. It might be interesting to investigate what institutional factors contribute to this phenomenon; however, such considerations are beyond the scope of the present analysis.

Table 2. Average annual hours worked by employed persons, annual hours worked per adult (persons aged 15 years and over), labour productivity per hour worked in Euro (ESA95) and gender pay gap in %; average values for the years 1999-2004

| Country | Hrs per employed | Hrs per adult | Labour productivity | Gender pay Gap in %; |
|-----------|------------------|---------------|---------------------|----------------------|
| Bulgaria | 1652.9 | 848 | 3.64 | 19.3 |
| Estonia | 1990.3 | 1228 | 7.80 | 24.5 |
| Latvia | 2160.5 | 1284 | 4.78 | 17.0 |
| Lithuania | 1824.3 | 1098 | 6.58 | 16.2 |
| Poland | 2029.1 | 1082 | 7.54 | 11.8 |
| Slovenia | 1713.9 | 1086 | 16.16 | 10.2 |

Source: Eurostat and Feenstra *et al.* (2013).

The *Figure 2* juxtaposes GDP and annual hours worked per adult. The magnitudes presented do not correlate significantly ($r=0.18$).⁴ The compared economies show significant differences in labour productivity, which is one of the main reasons for the recorded discrepancies between annual hours worked and GDP per capita. After taking into account data on labour productivity (in this case, the weights used are the values of labour productivity per hour worked according to the European System of National and Regional Accounts (ESA95) (*Table 2*), the correlation becomes very clear: $r=0.99$.

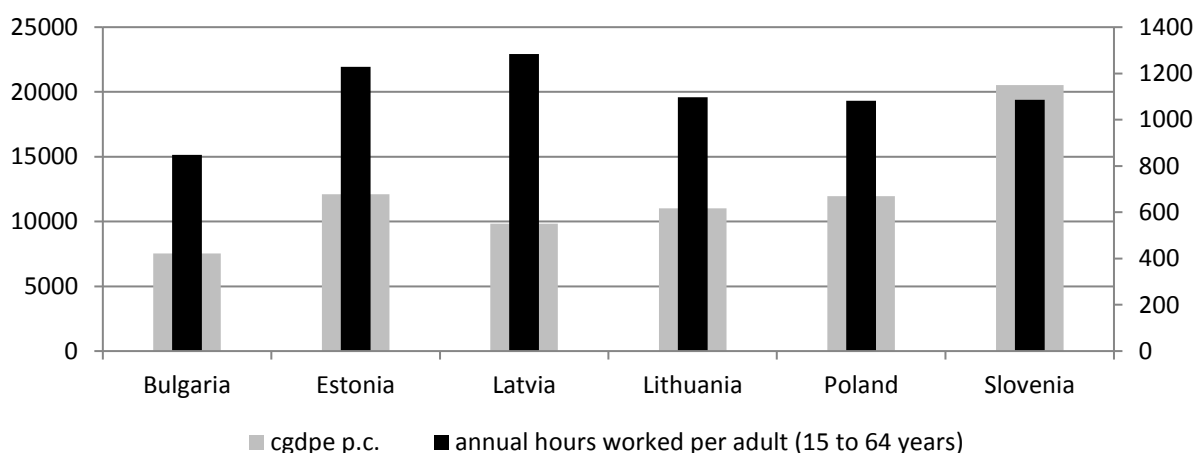


Figure 2. Expenditure-side real GDP at current PPPs in mil. US\$ per capita, average in the period 1999-2004 and annual hours worked per adult (persons aged 15 years and over)

Source: Own calculations based on PTW8.1 (Feenstra *et al.*, 2013) and OECD Main Economic Indicators – complete database.

In order to have a closer look at the market activity of individual societies, data at a lower level of aggregation was used. *Table 3* presents the employment rates for the individual countries, this time further broken down by gender and age. Also, in this case, average values for the years 1999-2004 were used.

Table 3. Employment rate in %, average values for males and females for the years 1999-2004 and gaps in percentage points

| Country | Employment rate | | Difference in p.p. | Employment rate | | Difference in p.p. |
|-----------|---------------------|------|-----------------------|---------------------|------|-----------------------|
| | M | F | | M | F | |
| | Age: 15 to 64 years | | | Age: 25 to 54 years | | |
| Bulgaria | 55.0 | 48.0 | 7.0 | 70.6 | 66.8 | 3.8 |
| Estonia | 65.0 | 58.7 | 6.3 | 78.2 | 74.3 | 3.9 |
| Latvia | 63.7 | 55.6 | 8.1 | 77.7 | 73.2 | 4.6 |
| Lithuania | 62.6 | 57.9 | 4.7 | 77.4 | 76.7 | 0.7 |
| Poland | 59.2 | 47.7 | 11.5 | 75.6 | 63.5 | 12.1 |
| Slovenia | 68.0 | 58.6 | 9.4 | 86.1 | 79.7 | 6.5 |
| | Age: 15 to 24 years | | | Age: 55 to 64 years | | |
| Bulgaria | 21.5 | 18.9 | 2.5 | 37.4 | 17.7 | 19.7 |
| Estonia | 35.1 | 23.9 | 11.2 | 54.4 | 44.7 | 9.8 |
| Latvia | 35.6 | 25.1 | 10.6 | 49.8 | 33.1 | 16.7 |
| Lithuania | 27.4 | 21.3 | 6.2 | 53.1 | 34.1 | 19.1 |
| Poland | 26.1 | 20.3 | 5.7 | 36.1 | 20.7 | 15.4 |
| Slovenia | 35.4 | 28.0 | 7.4 | 34.8 | 14.9 | 19.9 |

Explanations: M – male; F – female

Source: Eurostat.

It can be observed that in all the countries and in all the age groups, without exception, the proportion of men who do market work exceeds the corresponding proportion of women. If one considers the full age range, this is most clearly visible in Poland (gap = 11.5 percentage points). Evidently, this is to some extent caused by the shorter time that women stay in the labour market: in the population segment aged 55-64 years this difference is significantly higher than in other age groups. One can expect that an even greater disparity occurs for people aged over 64 years. Additionally, the smallest differences between men and women in the percentage of people active in the labour market are in the group aged 25-54 years (the only exception is Poland, where the minimum value occurs in the population aged 15-24 years). This may mean that a large proportion of women enter the labour market after graduating from universities (compare: Gronau, 1977, p. 1101). To avoid drawing erroneous conclusions regarding the different levels of participation in market work, *Table 4* additionally shows absolute numbers of economically active people.⁵

Table 4. Total employment (resident population concept – LFS); number of persons in thousands, average values for the years 1999-2004

| | Males | Females | Difference |
|-----------|--------|---------|------------|
| Bulgaria | 1478.8 | 1320.4 | 158.4 |
| Estonia | 299.2 | 292.6 | 6.6 |
| Latvia | 489.4 | 469.8 | 19.6 |
| Lithuania | 707.7 | 705.8 | 1.9 |
| Poland | 7771.6 | 6397.3 | 1374.3 |
| Slovenia | 493.5 | 414.9 | 78.6 |

Source: Own calculations based on Eurostat database.

One reason for the differences in the unemployment rates may be different expectations regarding the remuneration that can be obtained for work. And in fact in all the analysed countries a gender pay gap exists. *Table 2* shows the averages in unadjusted form for the years 1999-2004 obtained from national sources and published by Eurostat. The size of the pay gap, however, does not correlate with the degree of women's participation in the labour market. For instance, in Estonia there was the greatest disparity in the structure of earnings while the employment rate for women was relatively high.

The statistics presented above can be a basis for drawing certain conclusions relating to the causes of differences in the value of economic activity and national wealth. The presentation of labour market performance with the use of several indicators shows that the overall level of economic welfare of the societies analysed is determined by labour market activity, working time, and productivity. The latter depends on a number of factors, including the qualifications of the workforce, capital equipment, production technology, and the organization of work. Additionally, the data presented can imply that the economic wealth of the societies analysed is created to a greater extent by men than women.

The next section discusses the results of research on time-use. The methodology adopted for the analysis involves using macroeconomic aggregates and data that describe people's activity from a microeconomic perspective. This strategy has made it possible to create a more comprehensive picture of national activity. Moreover, as the statistical material has been supplemented with additional data, prior conclusions about the creation of economic welfare in these societies need to be modified.

3. Time-use perspective

The manner of presenting data on time-use was dictated by the conviction that performing household work affects the economic welfare of households, and consequently of societies.⁶ In order to show the total work time (market and household), aggregated statistics for time-use data were used. The statistics of the average time the survey population spent on a specified activity determines the place of a given activity in the time use structure:

$$Y_{az} = \frac{\sum_{i=1}^N Y_{aiz}}{\sum_{z=1}^8 N_z}$$

where:

Y_{aiz} – the duration of an activity “a” of i -person on z day of a week,

N_z – the number of diaries filled on z day of a week.

First, the total number of minutes per day (1,440) was divided between the four main types of activity (personal care, market work, household, leisure). The daily average time of all the activities in the entire populations analysed is presented in *Table 5*.

The data presented in *Table 5* shows that in each of the populations analysed the total average working time for women is longer than that of men. Moreover, some regularity in the allocation of working time can be observed. Men do on average 77 minutes more market work than women; whereas women do more household work, the difference between the genders here being almost double that figure. The disparities are evident in virtually every age group (15-24; 25-44; 45-64), but they are the most clearly marked among people between 25 and 44 years of age, when the market activity of both genders is the highest (compare *Table 3*).

Table 5. Time allocation – daily average time (minutes)

| | Bulgaria | | Estonia | | Latvia | | Lithuania | | Poland | | Slovenia | |
|-------|----------|-----|---------|-----|--------|-----|-----------|-----|--------|-----|----------|-----|
| | M | F | M | F | M | F | M | F | M | F | M | F |
| PC | 707 | 690 | 632 | 628 | 643 | 645 | 650 | 651 | 641 | 657 | 628 | 629 |
| MW | 261 | 203 | 316 | 238 | 358 | 277 | 336 | 265 | 288 | 180 | 283 | 213 |
| H | 167 | 310 | 181 | 311 | 136 | 259 | 151 | 288 | 181 | 329 | 185 | 316 |
| L | 309 | 236 | 311 | 264 | 303 | 256 | 301 | 235 | 329 | 275 | 340 | 281 |
| ALL_W | 428 | 513 | 497 | 549 | 494 | 536 | 487 | 553 | 469 | 509 | 468 | 529 |

Explanations: M – male; F – female; PC – personal care; MW – market work; H – household; L – leisure; All_W – all work

Source: Own calculations based on HETUS data.

Because of the fact that the involvement of men and women in work significantly changes depending on their age, the figures below show the average daily time devoted to market and non-market work separately for men and women (*Figure 3 and 4* respectively) for the three age groups mentioned above.

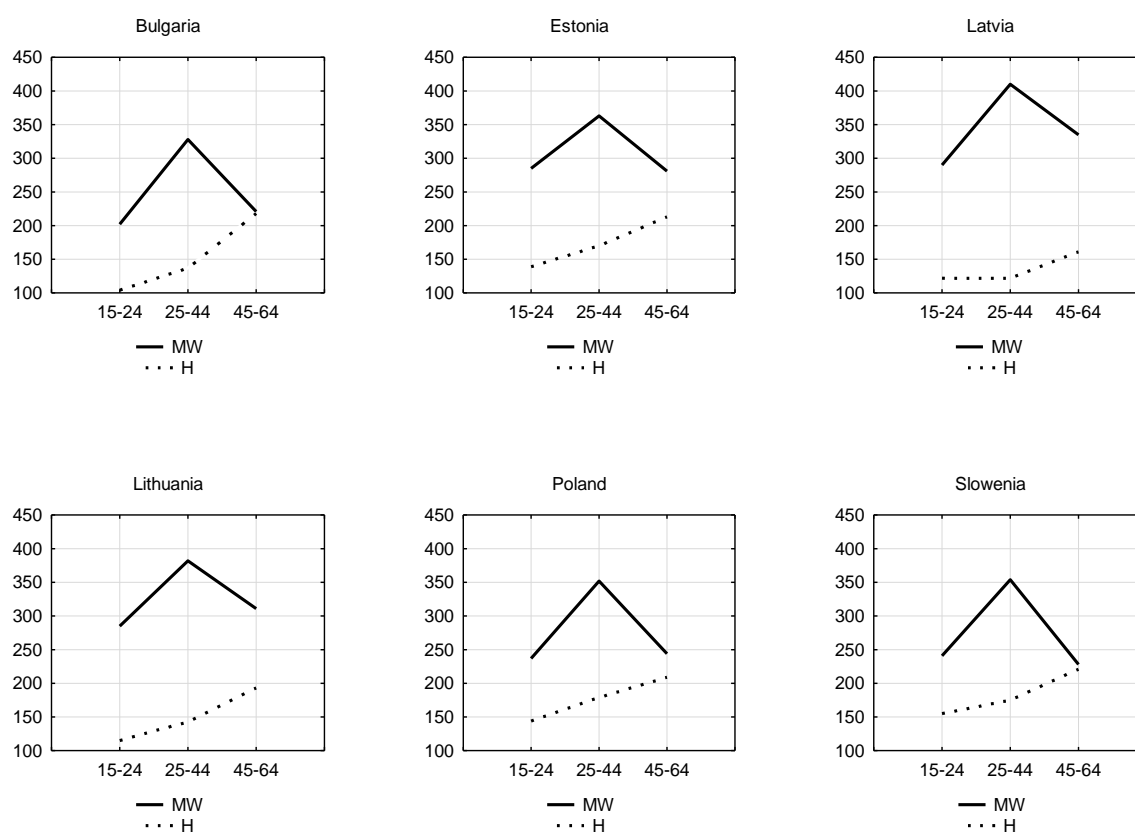


Figure 3. Market and household work for different age groups of males

Source: Own calculations based on HETUS data (explanations as in Table 6).

The structure of the work done by men is closely linked with the age group to which they belong. This is illustrated by data from all six CEE countries. Significant differences

between the time spent on market work and household production which were recorded for the youngest segment of the population are even more evident in the case of the 25-44 age group. Only among the oldest representatives of the countries analysed are these differences markedly reduced, and in Bulgaria and Slovenia they completely disappear. It should also be noted that with the increasing age of the male population, the amount of time devoted to home production steadily grows. Thus, the major difference between men aged 15-24 and 25-44 is an increase in total work. In contrast, the oldest group is characterized by a reduction in total work with the simultaneous evident substitution of household work for market work.

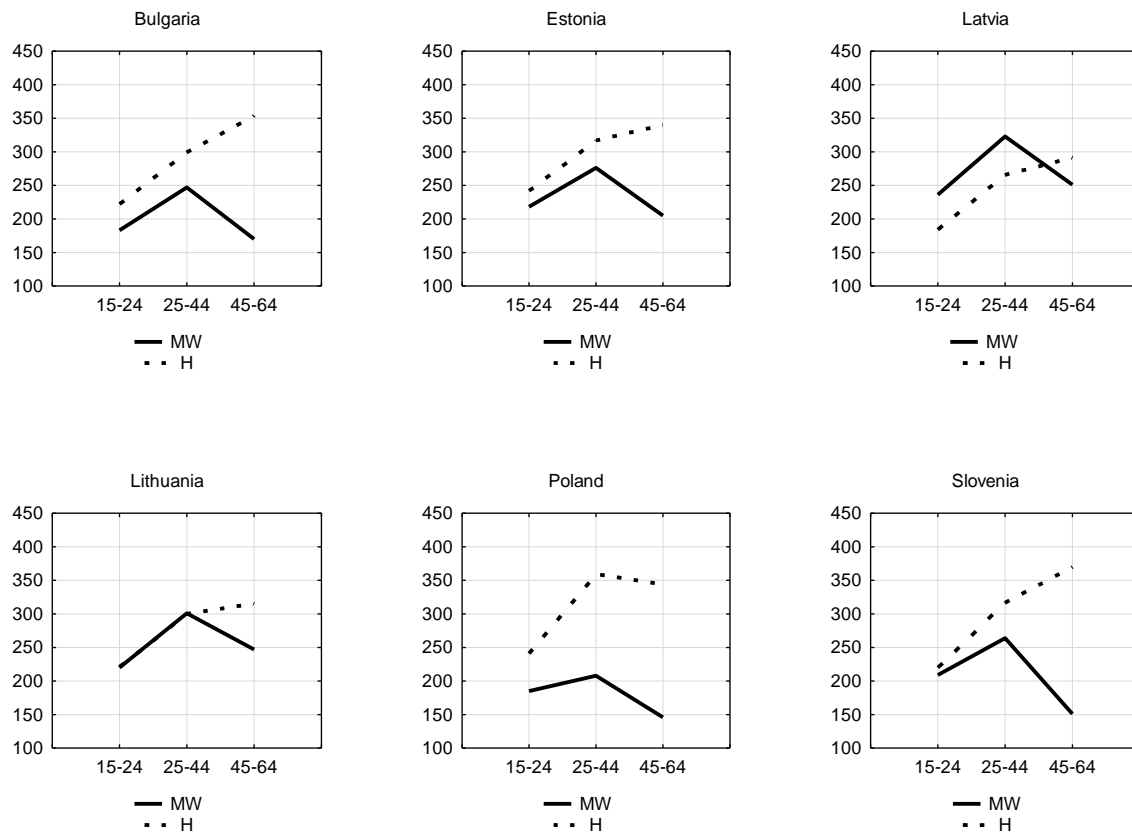


Figure 4. Market and household work for different age groups of females
Source: Own calculations based on HETUS data (explanations as in *Table 6*).

In the case of women the structure of working time is completely different than for men; it also follows a different pattern of change depending on age. With a longer total work time (in comparison to the corresponding group of men), young women are more involved in home production than in market activity. Two exceptions are women from Lithuania, where the involvement is equal, and women from Latvia, who devote more time to market work. A substantial increase in the supply of market work occurs in the 25-44 age group, and then, in the 45-64 age bracket there is an equally significant, or even greater, decline in this respect (Bulgaria, Estonia, Poland and Slovenia). On average, the greatest imbalance between the total work time of men and women can be observed for the 25-44 age group (60 minutes per day more for women). This figure is only slightly lower for the oldest group (58 minutes a day). With five working days a week and 52 weeks a year, this gives an average of between 251 and 260 hours per year. In the context of the previously presented data on annual hours worked per adult (*Table 2*), this difference is highly significant.

Additional data which supplements the description of the time structure in the analysed populations is shown in *Table 6*. Taking into account the entire population (15-64 years) as well as the "most important" age bracket (25-44), the largest difference between the genders with regard to the share of household work within all work occurs in Poland (26 and 30 percentage points respectively). In addition, one can notice that the average household work importance expressed as a proportion of all work in the countries analysed ranges from 23% (men 25-44 years old in Latvia) to 71% (women 45-64 years old in Slovenia). Similar patterns of results were recorded in the analysis of eight time-use surveys conducted in Germany, Italy, The Netherlands and the US (Burda *et al.*, 2006, p. 64).

Table 6. Share of Household work in all work

| | Bulgaria | | Estonia | | Latvia | | Lithuania | | Poland | | Slovenia | |
|---------|----------|------|---------|------|--------|------|-----------|------|--------|------|----------|------|
| | M | F | M | F | M | F | M | F | M | F | M | F |
| 15-64 y | 0.39 | 0.60 | 0.36 | 0.57 | 0.28 | 0.48 | 0.31 | 0.52 | 0.39 | 0.65 | 0.40 | 0.60 |
| 15-24 y | 0.34 | 0.55 | 0.33 | 0.53 | 0.30 | 0.44 | 0.29 | 0.50 | 0.38 | 0.57 | 0.39 | 0.51 |
| 25-44 y | 0.29 | 0.55 | 0.32 | 0.53 | 0.23 | 0.45 | 0.27 | 0.50 | 0.34 | 0.63 | 0.33 | 0.54 |
| 45-64 y | 0.50 | 0.68 | 0.43 | 0.62 | 0.32 | 0.54 | 0.38 | 0.56 | 0.46 | 0.70 | 0.49 | 0.71 |

Source: Own calculations based on HETUS.

In order to produce a more comprehensive description of time allocation, statistical information about all the four major categories of activities at the same time (market work, household production, leisure, personal care) was used. An index of difference between men and women was constructed according to the following formula:

$$D = \sum_i \left| \frac{(T_{im} - T_{if})}{\sqrt{T_{im} * T_{if}}} \right|$$

where

i – main activity aggregates – market work, household production, personal care and leisure (consumption),

T – average time of an activity,

m – male,

f – female.

Indexes of difference can be used for comparisons because the data for calculating them come from the harmonized HETUS database, where the individual categories of activities have been standardized. If there were no differences between the genders in terms of the average expenditure of time for individual activities, the value of the statistic would be zero. Levels of D indexes and its components for individual countries are shown in *Table 7*.

Table 7. Index of difference between men and women

| Country | PC | MW | H | L | D index |
|-----------|------|------|------|------|---------|
| Bulgaria | 0.02 | 0.25 | 0.63 | 0.27 | 1.18 |
| Estonia | 0.01 | 0.28 | 0.55 | 0.16 | 1.00 |
| Latvia | 0.00 | 0.26 | 0.66 | 0.17 | 1.08 |
| Lithuania | 0.00 | 0.24 | 0.66 | 0.25 | 1.14 |
| Poland | 0.02 | 0.47 | 0.61 | 0.18 | 1.29 |
| Slovenia | 0.00 | 0.29 | 0.54 | 0.19 | 1.02 |

Source: Own calculations based on HETUS (explanations as in *Table 6*).

Poland has the highest value for this index. When looking at its constituents (discrepancies within individual activities), it turns out that in the case of this country the distinctive level of this statistic is determined by the disproportion with regard to market work time. In the case of the other categories of activities, Poland does not deviate from the average for the six countries analysed. This "special" situation is confirmed by the data in the Table 3, where employment rates and gaps are shown (population aged 15-64).

Considering the various categories of activities in other countries, the smallest disparities (practically no difference) occur in the case of personal care. Relatively small average differences occur also with regard to leisure. By far the largest disparity exists in the category of "household production", reaching on average double the level of the disparity relating to "market work".

With regard to the issue of measuring economic welfare (including household production in income statistics), it is also worth investigating the extent to which lost market work is replaced with household production in different countries. On this basis it is possible to compare the "cost" of unemployment among men and women.⁷ For this purpose, separate time-use values for full-time employees and the unemployed were extracted from the HETUS database. This time two categories of activities were taken into account: the time devoted to market work, including commuting; and the time devoted to household production. The degrees of compensation for market work with household work (in % and in minutes) are presented in Table 8. It contains calculations based on the average time devoted to these activities. For instance as far as males in Bulgaria are concerned, for each hour of not working, unemployed people devote only 18 minutes to additional home production (0.31x60 minutes =18.44).

Table 8. Additional household production performed by the unemployed in % and in (minutes)

| | Male | Female | All |
|-----------|---------|---------|---------|
| Bulgaria | 31 (18) | 50 (30) | 43 (26) |
| Estonia | 30 (18) | 55 (33) | 39 (23) |
| Latvia | 30 (18) | 48 (29) | 36 (22) |
| Lithuania | 35 (21) | 45 (27) | 39 (23) |
| Poland | 30 (18) | 47 (28) | 41 (25) |
| Slovenia | 33 (20) | 52 (31) | 47 (28) |

Source: Own calculations based on HETUS data.

The calculations presented show that household work is a more significant substitute for market work in the case of women than men. The lowest compensation, calculated jointly for both genders, occurs in Latvia, whereas Slovenia is a leader in this respect with an average level of twenty-eight minutes spent on home production out of every hour not spent on market work.

The data currently available from national accounts not only underestimates the total production of countries but also understates the role of women in its creation. Also, taking into account medium-term fluctuations in economic activity and the concomitant changes in the unemployment rate, statistics on market activity may offer distorted estimates of the total product through overestimating the figures in the recovery phase of the business cycle (because they do not take into account the fact that household production becomes limited as a result of the involvement of household members in market work), and underestimating the figures during a recession (they do not take into account compensation for market work by household production).

It is necessary to remember, however, that in the presented comparisons the length of time devoted to work should not be equated with its outcomes. Bridgman (2013, p. 3) observed that for more than three decades in the post-war period the productivity for enterprises and households in the US grew at a similar rate (2.1 and 2.0%). In the second half of the 1970s a trend emerged as a result of which for the years 1978-2010 productivity changed at an average rate of 0.02% in the household sector and 1.6% in the business sector. Therefore home production has generally declined in importance compared to measured GDP. Assuming that in CEE countries after 1989 there was a similar divergence in productivity between these two spheres of human activity, this observation should be supplemented as follows. Considering the above discussion, it can be concluded on the basis of the performed comparisons and calculations that women's unemployment is less costly for a household than the market inactivity of men. Such an inference can be drawn after analysing the gender pay gap and the compensation for market work by household production.

Conclusions

The aim of this paper is to analyse differences in the economic activity of selected CEE societies as well as to investigate how this activity can influence their level of prosperity. The paper refers to the theory of household production function, which regards time as a key resource of people and an element that is taken into account in all their economic decisions. As a result, this approach can yield a description that is closer to reality, thus making it possible to formulate more accurate conclusions and recommendations, for example in terms of economic policy.

Standard measures of economic activity showed that the countries differ significantly as far as GDP per capita is concerned. This especially applies to Slovenia (with the highest value) and Bulgaria (with the lowest value). In all the countries and in all the age groups, without exception, the proportion of men who do market work exceeds the corresponding proportion of women. On this basis it is possible to draw conclusions on the causes of national wealth diversification or the value of economic activity. Among other things, they result from differences in terms of the level of activity in the labour market, working time, and productivity. In addition, the statistics that were used tend to indicate that since men are significantly more active on the market, they are the main source of household prosperity. Such a conclusion, however, needs to be revised when data on time-use are also taken into account. This kind of information may be useful for correcting the values obtained from the System of National Accounts in its current form, as well as improving comparisons made in

an international context. It is also important that such data help to better describe the roles of the representatives of each gender in creating prosperity.

The data presented shows that in each of the populations analysed the total average working time for women is longer than that of men. The disparities are evident in virtually every age group (15-24; 25-44; 45-64), but they are the most clearly marked among people between 25 and 44 years of age, when the market activity of both genders is the highest.

The structure of the work performed by men is significantly dependent on the age group to which they belong. This is illustrated by data from all six CEE countries. The greatest differences between the time devoted to market work and household production can be observed in the case of the 25-44 age group. Only among the oldest representatives of the societies analysed do these differences (market work vs. household production) become noticeably smaller, and in Bulgaria and Slovenia they completely disappear. It should also be noted that along with the increasing age of the male population, the amount of time spent on home production increases steadily. The main difference between men aged 15-24 and those aged 25-44 is an increase in total work. In turn, the oldest group is characterized by a reduction in the amount of market activity, which is largely replaced by household work.

In the case of women, the structure of working time is different than for men; it also follows a different pattern of change depending on age. With a longer total work time (in comparison to the corresponding group of men), young women are more involved in home production than market activity. Two exceptions are women from Lithuania, where the involvement is equal, and women from Latvia, who devote more time to market work. A significant increase in the time devoted to market work occurs in the 25-44 age group, and then, in the 45-64 age bracket, there is an equally significant, or even greater, decline in this respect (Bulgaria, Estonia, Poland and Slovenia). On average, the greatest imbalance between the total working time of women and men can be observed for the 25-44 age group (60 minutes per day more for women). This gives an average of 260 hours per year, which is a considerable difference.

The calculations presented show that household work is a more significant substitute for market work in the case of women than men. The lowest compensation, calculated jointly for both genders, occurs in Latvia, whereas Slovenia is a leader in this respect with an average level of twenty-eight minutes spent on home production out of every hour not spent on market work. Investigating the extent to which lost market work is replaced with household production in different countries lets for conclusions to be formulated about the “cost” of unemployment among men and women. It can be assumed that women’s unemployment is less costly for a household than the market inactivity of men. Such a conclusion can be drawn after analysing the gender pay gap and the compensation for market work by household production. Looking from different perspective and taking into account that the household production of commodities provide utility, the “cost” of unemployment (for instance during business cycle fluctuations) is reduced mainly by women. This is the extent to which lost market work is replaced with household production in different countries

Significant differences have been observed between the picture presented by traditionally used statistics and the results of time-use surveys. This is not only confirms the need for analysing the time allocation of populations but it also means that using time-budget data for the monetary valuation of non-market activity and its outcome may help create a better description of the economic activity of societies. Appropriate estimates in the form of satellite accounts can become very important sources of information, complementing those which are currently available in the System of National Accounts.

It should be underlined that one of the major shortcomings of the presented analysis is the lack of information on the productivity of households and the length of time devoted to work should not be equated with its outcomes. Differences in productivity, sometimes very

significant ones, can exist not only between market and household work, but also between men and women for certain types of activities. That is why in the future the labour productivity indicators for non-market sectors in CEE countries should be calculated. This is required for any quantitative estimates of differences in the value of household production and for drawing conclusions regarding the compared levels of economic wealth.

Notes

1. The concept of household production was not entirely new. An example could be "The Economics of Household Production", a work by M.G. Reid from 1934. However, it was only the publication by G.S. Becker in 1965 that triggered its lasting popularity among economists.
2. The dataset used for the analysis is the most current one available for CEE countries which has been made comparable with the HETUS database. Out of the 6 countries analysed, only 3 have subsequently carried out another round of TUS. These are Bulgaria (survey conducted in the years 2009-2010), Estonia (2009-2010) and Poland (2013) (Fisher and Tucker, 2013). However, the results have not yet been processed and included in the HETUS database. Most national statistical institutes around Europe have taken the HETUS guidelines into account when carrying out time-use surveys. Some countries, however, deviate from this to varying degrees which means that the comparability of individual data sets is lower than between those included in the HETUS database (HETUS, 2007, p. 1). This is why the author decided to focus on the statistics which were made up of harmonised micro-data with a good level of comparability.
3. <http://www.rug.nl/research/ggdc/data/pwt/pwt-8.1>.
4. The HETUS database contains data for only six CEE countries. Due to the fact that the correlation coefficients were calculated for such a small sample, their values were treated as supplementary and no final conclusions were formulated on the basis of them.
5. A small percentage of a large group of people (e.g. women) in absolute terms could mean a larger number than a relatively larger percentage of a smaller population (e.g. men).
6. It is difficult to overlook, or indeed negate, differences in the quality of life for the members of two households which are identical in terms of size and monetary income, when one has a full time homemaker and the other does not (Ferber and Birnbaum, 1980, p. 388).
7. This analysis does not include estimates relating to the value of household work, only comparisons of time expenditure. An overview of the methods for valuating household work together with a discussion of their merits and drawbacks can be found in: Hawrylyshyn (1977); Quah (1986); Goldschmidt-Clermont (1982, 1993); Goldschmidt-Clermont and Pagnossin-Aligisakis (1999).

References

- Aguiar, M, Hurst, E and Karabarbounis, L (2012), Recent Developments in the Economics of Time Use, *The Annual Review of Economics* 4, pp. 373-397.
- Alesina, A. F, Glaeser, E. L and Sacerdote, B. (2006), Work and Leisure in the U.S. and Europe: Why So Different? In: Gertler, M., Rogoff, K., (eds.), NBER Macroeconomics Annual 2005, 20, MIT Press, <http://www.nber.org/chapters/c0073> (accessed 8 July 2015).

- Becker, G. S (1965), A Theory of the Allocation of Time, *The Economic Journal* 75(299), pp. 493-517.
- Bianchi, S. M, Milkie, M. A, Sayer, L. C. and Robinson, J. P. (2000), Is Anyone Doing the Housework? Trends in the Gender Division of Household Labor, *Social Forces* 79(1), pp. 191-228.
- Bridgman, B (2013), Home Productivity, *BEA Working Papers* 0091, Manuscript, Bureau of Economic Analysis, available at: <http://www.bea.gov/papers/pdf/homeproductivity.pdf> (accessed 12 July 2015).
- Burda, M., Hamermesh, D. S. and Weil, P. (2006), *Different but Equal Total Work, Gender and Social Norms*, Published in 8th European Conference of the Fondazione Rodolfo Debenedetti, "Are Europeans Lazy? Or Americans Crazy?", May 2006, Portovenere, Italy. Fondazione Rodolfo Debenedetti, available at: http://www.frdp.org/upload/file/copy_2_report1.pdf (accessed 27 February 2015).
- Burda, M., Hamermesh, D. S., Weil, P. (2007), Total Work, Gender And Social Norms, *Working Paper 13000*, National Bureau Of Economic Research, Cambridge, March, <http://www.nber.org/papers/w13000> (accessed 27 February 2015).
- Church, J., Everaers, P., Mcdonald, M., Pietsch, L. and Weinberg, D. (2000), *Overview of the Proposed Standards for Income Distribution Statistics*, paper prepared for the 26th General Conference of The International Association for Research in Income and Wealth in Cracow, Poland (27 August to 2 September), available at: http://www.iariw.org/papers/2000/mcdonald_everaers.pdf (accessed 12 July 2015).
- Cushman, G., Veal, A. J. and Zuzanek, J. (2005), Leisure participation and time-use surveys: an overview, In: Cushman, G., Veal, A. J. and Zuzanek, J. (eds.), *Free Time and Leisure Participation: International Perspectives*, Wallingford, UK: CABI Publishing, pp. 1-16.
- Eisner, R. (1988), Extended Accounts for National Income and Product, *Journal of Economic Literature* 26(4), pp. 1611-1684.
- Eurostat (2004), *How Europeans spend their time Everyday life of women and men*, Office for Official Publications of the European Communities, Luxembourg, available at: <http://ec.europa.eu/eurostat/en/web/products-pocketbooks/-/KS-58-04-998> (accessed 12 July 2015).
- Eurostat (2009), *Harmonised European time use surveys. 2008 guidelines*, Methodologies and working papers, Luxembourg: Office for Official Publications of the European Communities. Available at: <http://ec.europa.eu/eurostat/ramon/statmanuals/files/KS-RA-08-014-EN.pdf> (accessed 5 May 2015).
- Fahey, T., Layte, R., Smith, E., Whelan, C. and Fisher, K. (2003), *Quality of life in Europe: an illustrative report*, European Foundation for the Improvement of Living and Working Conditions.
- Feenstra, R. C., Inklaar, R. and Timmer, M. P. (2013), *The Next Generation of the Penn World Table*, available at: www.ggdnc.net/pwt (accessed 27 February 2015).
- Ferber, M. A. and Birnbaum, B. G. (1980), Housework: Priceless or Valueless? *Review of Income and Wealth* 26(4), pp. 387-400.
- Fisher, K. and Tucker, J., contributions from: Altintas, E., Bennett, M., Jahandar, A., Jun. J. and other members of the Time Use Team (2013), *Technical Details of Time Use Studies*, Last updated 15 July 2013, Oxford: Centre for Time Use Research, University of Oxford, available at: <http://www.timeuse.org/information/studies/> (accessed 27 February 2015).
- Fisher, K., Gershuny, J., Gauthier, A. and Victorino, C. (2000), Exploring New Ground for Using the Multinational Time-Use Study, *Working Paper*, ESRC research Centre on Micro-Social Change, Colchester: University of Essex.

- Freeman, R. B. and Schettkat, R. (2005), Marketization of Household Production and the EU-US Gap in Work, *Economic Policy* 20(41), pp. 7-50.
- Gershuny, J. and Robinson, J. P. (1988), Historical Shifts in the Household Division of Labor, *Demography* 25(4), pp. 537-552.
- Gimenez-Nadal, J. I and Sevilla, A. (2014), Total work time in Spain: evidence from time diary data, *Applied Economics* 46(16), pp. 1894-1909.
- Goldschmidt-Clermont, L. (1982), Unpaid Work in the Household. a Review of Economic Methods, *Women, Work and Development Series*, No. 1, Geneva: International Labour Office.
- Goldschmidt-Clermont, L. (1993), Monetary valuation of non-market productive time-Methodological considerations, *Review of Income and Wealth* 39(4), pp. 419-433.
- Goldschmidt-Clermont, L. and Pagnossin-Aligisakis, E. (1999), Households' non-SNA production: labour time, value of labour and of product, and contribution to extended private consumption, *Review of Income and Wealth* 45, pp. 519-529.
- Graham, J. W. and Green, C. A. (1984), Estimating the Parameters of a Household Production Function with Joint Products, *The Review of Economics and Statistics* 66(2), pp. 277-282.
- Gronau, R (1973a), The Intrafamily Allocation of Time: The Value of the Housewives' Time, *The American Economic Review* 63(4), pp. 634-651.
- Gronau, R. (1977), Leisure, Home Production, and Work-the Theory of the Allocation of Time Revisited, *The Journal of Political Economy* 85(6), pp. 1099-1123.
- Gronau, R (1980), Home Production-A Forgotten Industry, *The Review of Economics and Statistics* LXII(3), pp. 408-416.
- Gronau, R (1986), Home Production – A Survey, In: O. Ashenfelter, R. Layard (eds.), *Handbook of Labor Economics*, Vol. 1, Amsterdam: North-Holland, pp. 273-304.
- Gronau, R. and Hamermesh, D. S. (2003), Time Vs. Goods: The Value of Measuring Household Production Technologies, *NBER Working Paper* No. 9650, available at: <http://www.nber.org/papers/w9650.pdf> (accessed 5 May 2015).
- Hawrylyshyn, O. (1977), Towards a Definition of Non-Market Activities, *The Review of Income and Wealth* 1, pp. 79-96.
- HETUS (2007), *General Description*, available at: <https://www.h5.scb.se/tus/tus/doc/General%20description.doc> (accessed 23 May 2015).
- HETUS (online database version 2.0), Created 2005-2007 by Statistics Finland and Statistics Sweden (reference date 2007-10-01), available at: <http://www.tus.scb.se> (accessed 28 May 2015).
- HETUS metadata, available at: <https://www.h2.scb.se/tus/tus/doc/Metadata.pdf> (accessed 21 August 2015).
- Hill, T. P. (1979), Do-It-Yourself and GDP, *Review of Income and Wealth* 25(1), pp. 31-39.
- Jankiewicz, J. (2015), Time allocation in Poland before and after 1989 – working time perspective, *Time & Society*, 0961463X15587836, first published on May 27.
- Kooreman, P. and Kapteyn, A. (1987), A Disaggregated Analysis of the Allocation of Time within the Household, *Journal of Political Economy* 95(2), pp. 223-224.
- Kuznets, S. (1934), *National Income 1929-1932. Letter From The Acting Secretary Of Commerce Transmitting In Response To Senate Resolution No. 220 (72d Cong.), A Report On National Income, 1929-32*, Washington: United States Government Printing Office.
- Lancaster, K. J. (1966a), A new approach to consumer theory, *The Journal of Political Economy* 74(2), pp. 132-157.
- Lancaster, K. J. (1966b), Change and innovation in the technology of consumption, *American Economic Review* 56(1), pp. 14-23.

- Landefeld, J. S. and Mcculla, S. H. (2000), Accounting For Nonmarket Household Production Within A National Accounts Framework, *Review of Income and Wealth* 46(3), pp. 289-307.
- Lee, D. and Wolpin, K. (2010), Accounting for Wage and Employment Changes in the U.S. from 1968-2000: A Dynamic Model of Labor Market Equilibrium, *Journal of Econometrics* 156(1), pp. 68-85.
- Łobodzińska, B. (1995), *Family, Women, and Employment in Central-Eastern Europe, Contributions in Sociology*, Westport, Connecticut, London: Greenwood Press.
- Lützel, H. (1989), Household production and national accounts, *Statistical Journal of the United Nations ECE* 6(4), pp. 337-348.
- Michael, R. T. and Becker, G. S. (1973), On the New Theory of Consumer Behavior, *The Swedish Journal of Economics* 75(4), pp. 378-396.
- Muth, R. F. (1966), Household production and consumer demand functions, *Econometrica* 34, pp. 699-708.
- Ngai, L. R. and Petrongolo, B. (2014), *Gender gaps and the rise of the service economy*. CFM discussion paper series, CFM-DP2014-4, Centre For Macroeconomics, London, UK, available at: <http://eprints.lse.ac.uk/58152/> (accessed 21 August 2015).
- OECD, "Main Economic Indicators – complete database", Main Economic Indicators (database), available at: <http://dx.doi.org/10.1787/data-00052-en> (accessed 11 August 2015).
- Österberg, C. and Baigorri, A. (1999), *Eurostat project on harmonisation of Time Use surveys*, Eurostat, Luxembourg, available at: <http://www.stat.fi/isi99/proceedings/arkisto/varasto/baig0109.pdf> (accessed 21 August 2015).
- Quah, E. (1986), Persistent Problems in Measuring Household Production: Definition, Quantifying Joint Activities and Valuation Issues Are Solvable, *American Journal of Economics and Sociology* 45(2), pp. 235-245.
- Reid, M. G. (1934), *Economics of Household Production*, New York: John Wiley & Sons, Inc., London: Chapman & Hall, Limited.
- Szulc, A. (2007), Dochód i konsumpcja (Income and consumption), In: Panek, T. (eds.), *Statystyka społeczna (Social Statistics)*, Polskie Wydawnictwo Ekonomiczne, Warszawa, pp. 131-163.
- System of national accounts (1993), *Commission of the European Communities, International Monetary Fund, Organisation for Economic Co-operation and Development*, United Nations, and World Bank, OECD, Paris.
- United Nations (2013), *Guidelines for Harmonizing Time-Use Surveys*, United Nations Economic Commission For Europe, Geneva, available at: http://www.unece.org/fileadmin/DAM/stats/publications/2013/TimeUseSurvey_Guidelines.pdf (accessed 12 July 2015).