

ANALYSIS OF CHANGES IN THE STRUCTURE OF HOUSEHOLD FINANCES RELATED TO HAVING A CHILD - VALUATION OF LOSS OF BENEFITS¹

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Abstract

The term "significant personal injury" is understood as the loss of health related to dependence or death. Such damage may occur as a result of an accident, in particular caused by the fault of a third party. In the event of a civil liability, the perpetrator of the damage is obliged to remedy any of its consequences. Therefore, for several years, we analyse the economic impact of personal injury.

There is a clear loss for the household in the event of loss of the breadwinner. The damage is usually understood as the lack of income that was previously generated by the accident victim, and the reason for this loss is inability to work. But the loss also arises in the case of a loss of a household member who currently does not generate any income. Therefore the subject should be understood more broadly.

This article deals with the injury that affects the mother in the event of the death of the child. The problem is analysed only in terms of selected aspects of costs incurred by a household in connection with the birth and upbringing of a child, in particular related to lost benefits including related to the loss of spare time and changes in the career path. A valuation model for both these elements was proposed and illustrated with calculations for the Polish market.

Keywords: value of life cost of maternity, household loss, personal finance management, insurance

JEL codes: G22, K13, K41

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1. Introduction

This article is part of the wider research of the scientific team, which concern the financial consequences of loss of health and life by the households' members.

Typical approaches that can be found in the literature for the analysis of the economic consequences of the loss of a household member, include estimates based on the cost of production, willingness to pay approach and utility theory. The first of the mentioned approaches, cost of production, is based on the classical theory of economics (Murphy, 2006), which states that the value of a good is equal to the cost of its production.

The second one, willingness to pay approach, is in use in statistical life valuation (Blomquist, 1981; Knieser, Viscusi, & Ziliak, 2013; Viscusi, 2003). The Willingness to pay approach is used to measure the statistical value of life, involved mainly in the analysis of projects affecting the risk of death. Value of life is calculated on the basis of the value of expenditures - investments that a person is willing to pay for additional safety, to avoid an undesirable event. Research indicates there is considerable controversy in comparison with the valuation of the value of life as such (Freeman, 2003; MacLean, 1990).

The use of the WTP method is related to the expected benefits and the theory of utility from the psychological school of economics (the so-called "Austrian school", to which E. B. de Condillac and C. Menger belong) (Stankiewicz, 2000). In theory, the utility of good is determined by the ability of good to satisfy the specific needs of the investor – in the case of a child, this function is assigned to parents. It is therefore assumed that the child is a special kind of good. It is therefore treated as a long-term resource that causes the flow of well-being and has a certain value - this assumption was the basis of Becker's fertility model (1960).

In our research we use theory about the valuation of goods, including the value of human life (in this case, the child's values), including Hofflander (1966), Schultz (1961) and Becker (1975), Leimer et al. (1999), Letablier et al. (2009) in addition to sociological aspects, such as Zelizer (1994). In our model we contain, both economic aspects (costs of production and utility theory), as well as non-economic aspects (hedonic damage, willingness to pay, etc.). However, in this article we analyse only a part of loss - costs of production.

Previously, we analysed personal injury from the perspective of the changing claim culture and compensation trends on the market (J drzychowska, Kwiecie , 2016, J drzychowska et al., 2014). Our research concerned changes in household finances under several aspects. First of all, in terms of lost income (J drzychowska, Poprawska 2016A, 2016B), increased needs (J drzychowska 2017B), as well as from the side of the protection system resulting from compulsory motor third-party liability insurance (J drzychowska, Poprawska 2016C, Ronka-Chmielowiec et al. 2015, J drzychowska, Poprawska 2014A, 2014B, 2014 C). Also, personal injury related to accidents at work was analysed (J drzychowska, Kwiecie 2015) and medical damage (J drzychowska, 2015). Currently, the authors are considering the damages for indirectly affected (J drzychowska, 2017A, J drzychowska, Kwiecie 2019).

In this context, consideration is given to a problem related to the economic consequences of a child's death in a household. This problem is important in the context of calculation the value of compensation for this loss (eg compensation from liability insurance). These consequences can be divided into:

- A. Previously incurred costs:
 - A.1 Previously incurred financial expenses for a child (“child services”, including costs of pregnancy, the purchase of food, clothes, etc.),
 - A.2 Work previously done for the child (non-financial expenditures, eg bringing a child to school, preparing meals, doing homework, cleaning),
 - A.3 Lost benefits (including related to the loss of spare time and changes in the career path),
- B. Direct cost related to the child’s death:
 - B.1. Direct expenses related to funeral,
 - B.2 Costs of treatment and psychological consultations related to trauma after losing a child,
- C. Expected benefits from having a child in the future:
 - C.1 Lost expected work performed by a child for a household (non-financial losses, especially important in agricultural families and large families, eg care for younger siblings, help with house and agricultural work),
 - C.2 Loss of expected old-age care (maintenance obligation of children to parents).

The article broadly analyse one of these aspects, ie. lost profits (A.3). We focus on two aspects of this problem:

- I. Lost expenditures of free time (eg resignation from social events, personal interests in order to devote time to the child) - here we illustrate the scale of the problem, based on the data of the Central Statistical Office in Poland.
- II. Changes in the career development (especially in the case of the mother) related to the break and its slowdown as a result of birth and subsequent care of the child. Selected scenarios of career path development will be considered and an income gap assessment model will be proposed. This gap arises as a difference between the expected career path of a childless person and a person with a child.

This problem takes a different scale depending on the economic situation of the country, social policy, social security in a given country, as well as cultural differences resulting from tradition, mentality and the dominant family model, etc. The problem is international and so it will be described. The created model of the valuation of the income gap is also universal. However, the numerical illustration will be based on the Polish reality.

2. Lost expenditures of free time

The normal thing is that when a child appears in the family, parents change the proportion of time devoted to themselves for the time devoted to the child. Most often it is the resignation

from sleep, socializing, holidays or time spent relaxing in front of the TV or reading books. This change is especially important for the mother's time. It is related to feeding and nursing a child and a typical, traditional (still popular in many societies) social system that the mother spends more time with the child at the first stage of its development. Such a change is a voluntary decision of the parents. However, at the moment of the child's death, it can be considered a loss, which can, and should be measured.

2.1. Methodology

In the article, an attempt was made to estimate: firstly, the size of this change of free time for the mother in favor of the time devoted to the child, and then the value of this change. The Polish Central Statistical Office (GUS) prepared the report "Time use survey 2013". This report contains information on how much time each household member dedicates to different activities. Various activities were selected that fit into the broadly defined free time. They were:

1. Personal care (including sleep)
2. Studies
3. Voluntary work
4. Social life
5. Sport activity
6. Hobbies
7. Using mass media

On this basis, the difference in free time of a person without children and one with a child was calculated. Then, to evaluate the lost time off, it was decided to apply the analogy to the labour market. When an employee resigns from his holiday and spends this time at work, the employer pays him an appropriate equivalent. Therefore, it was decided that the mother devotes her free time to work for the child, that is, every hour was valued at the rate of such an equivalent. It has been estimated that in Poland, on average, 21 days are working each month. If we share the average monthly salary (average wage in Poland in 2018: 3390 PLN = 788 EUR) for 21 days, we will get the daily rate. And that, the basic working time is 8 hours a day, it is possible to obtain equivalent hour. Estimates for Poland: $9.73 = 2.26\text{EUR}$ (1 EUR = 4.30 PLN).

2.2. Numerical examples

Therefore, the total value of care (taken by the mother) over the child in the Polish family was calculated. In the first step, it was determined how much less time the mother has for herself. This was considered in the view of a single mother (table 1) and mother living in relationship (table 2). The report in the case of a mother living in relationship gives more accurate data (divided into two categories depending on the age of the child), which was also included in the calculations.

Table. 1 Differences in the spare time between unmarried woman having no children and one child (divided into selected categories)

Spare time category	Time spent on activity [minutes in day]		
	Women without children	Women with children	Difference
Personal care	669	648	21
Sleep	514	503	11
Studies	86	8	78
Voluntary work	15	10	5
Social life	75	50	25
Sport activities	25	17	8
Hobbies	46	22	24
Mass media	114	115	-1

Source: "Time use survey 2013" published by the Polish Central Statistical Office (GUS)

Table. 2 Differences in the spare time between woman living in relationship having no children and one child (divided into selected categories)

Spare time category	Time spent on activity [minutes in day]				
	Women without children	Women with children		Difference	
		Age 0-6	Age 7-17	Age 0-6	Age 7-17
Personal care	669	646	649	23	20
sleep	516	502	497	14	19
Studies	20	4	3	16	17
Voluntary work	13	9	16	4	-3
Social life	65	49	53	16	12
Sport activities	22	16	16	6	6

Hobbies	31	18	17	13	14
Mass media	126	95	126	31	0

Source: "Time use survey 2013" published by the Polish Central Statistical Office (GUS)

The vast difference concerns, for example, the time for their own education, which indirectly affects the further professional development of the mother. Other important categories are, of course, social gatherings and hobbies. In the case of the use of mass media, a negative value of the difference in leisure time was obtained (the mother spends more time on this activity compared to the childless woman), which can be explained by the common viewing of cartoons with the child. In the next step, the total loss of free mother's time was calculated. This was referred to the assumption made by the CSO that a child is in a household for 17 years (this is how the report recognizes it). Thus, the total loss of mother's free time for the custody of the child was finally established. Finally, the total loss received was multiplied by the hourly equivalent of unused holiday. Values for a single mother and for a mother in a relationship include tables 3 and 4, respectively.

Table. 3 Differences in the spare time between unmarried woman having no children and one child (divided into selected categories) - valuation

Spare time category	Total difference (hours)	Total amount in [PLN]	Total amount in EUR
Personal care	128	43 822	10 191
Sleep	67	22 954	5 338
Studies	475	162 770	37 853
Voluntary work	30	10 434	2 426
Social life	152	52 170	12 132
Sport activities	49	16 694	3 882
Hobbies	146	50 083	11 647
Mass media	-6	-2 086	-485
TOTAL		356 842	82 986

Source: own calculation based on "Time use survey 2013" published by the Polish Central Statistical Office (GUS)

Table. 4 Differences in the spare time between woman living in relationship having no children and one child (divided into selected categories) - valuation

Spare time category	Total difference (hours)		Total amount in PLN	Total amount in EUR
	Age 0-6	Age 7-17		
Personal care	140	122	44 313	10 305
sleep	85	116	35 352	8 221
Studies	97	103	34 616	8 050
Voluntary work	24	-18	-245	-57
Social life	97	73	28 478	6 622
Sport activities	37	37	12 520	2 911
Hobbies	79	85	28 355	6 594
Mass media	189	0	26 637	6 194
TOTAL			210 030	48 844

Source: own calculation based on “Time use survey 2013” **published** by the Polish Central Statistical Office (GUS)

As mentioned, the received values are the cost of lost benefits for raising a child, which in the situation of a child's death should be understood as lost free time. In our example the total loss (if in the moment of death child was 17 years old, it means after the whole process of its “production”) is equal:

- For single it's about 83 thousands EUR = about 105 based average wages its equals 8.5 years of monthly wages;
- For marriage it's about 49 thousands EUR = about 62 based average wages its equals 5 years of monthly wages.

3. Change in the career development

Changes in the career path can be caused by many reasons, for the further analysis, three main important reasons has been chosen. In the article, the situation of a mother is taken into consideration, that is why, there are more breaks in career path, and they are longer than for a father.

The first reason of change is related to the break in work connected to period of pregnancy, which is of course not a disease, but sometimes it is associated with recommendations for increased rest, sometimes some medical complications, sometimes the necessity to break the

work due to the profession of increased risk like for example hard physical work, work in medical professions where there is a need for contact with infectious diseases, etc. In Poland also the fact that the sickness benefit during pregnancy is equal to 100% of salaries.

The second break in career is related to maternity leave and parental leave. In Poland it is 20 weeks paid maternity leave paid 100% of salaries, 32 weeks additional leave (the father can take, but in practice almost exclusively the mother) paid 60% of salaries, parental leave is free.

The third reason of changes in career path, especially in slower wage growth are frequent illnesses of children during the first few years of life, which means that especially mothers of young children are perceived by employers worse than childless people and men (medical allowances for childcare are mainly used by women).

The mentioned reasons cause interruptions in professional work and / or in the later period of slower wage growth.

3.1. Methodology

To compare the consequences of changes in career path connected to giving birth of a child, four variants of career path are analysed:

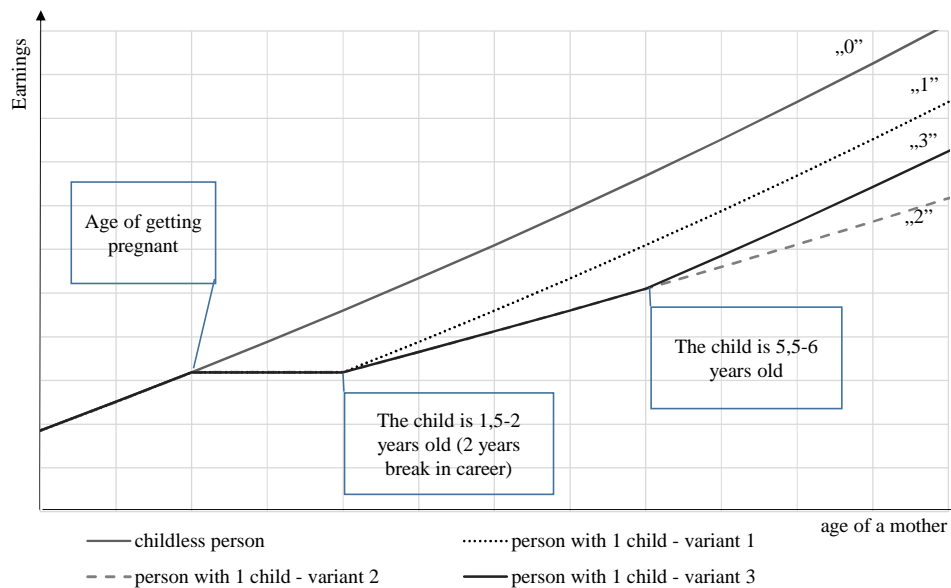
Variante „0” - childless person – in which a constant wage growth rate throughout the entire period of work is assumed.

Variante „1” - person with 1 child – in which it is assumed, that there is a break in work for 2 years, when the level of salaries is constant, and then the salaries are growing according to the original wage growth rate, the same as before the break.

Variante „2” person with 1 child – in which it is assumed, that there is a break in work for 2 years, when the level of salaries is constant, and then the salaries are growing according to the reduced wage growth rate, because the mother "missed" the moment of the best professional development.

Variante „3” person with 1 child – in which it is assumed, that there is a break in work for 2 years, when the level of salaries is constant, for the next 4 years salaries growth according to reduced wage growth rate (because she still cannot get fully involved in the work, because of frequent medical exemptions for the child), then return to the original rate of wage growth.

The comparison of the variants is shown in Figure 1.

Figure 1. Comparison of career development in four analysed variants

Source: own work

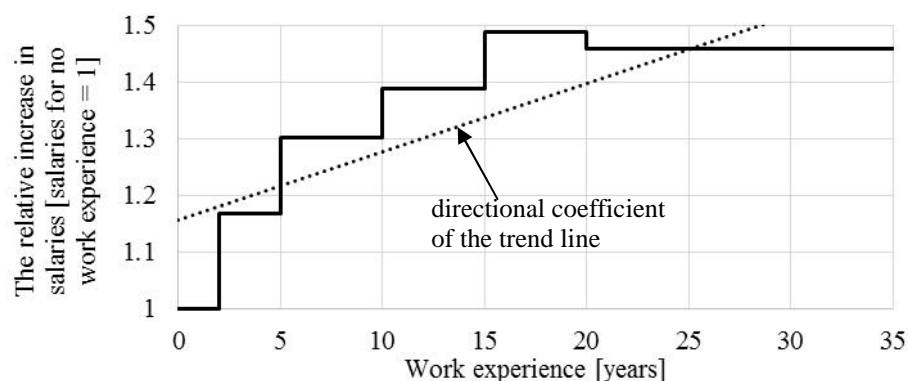
In the analysis, the wage growth rate is treated as a real grown rate, i.e. above inflation. Thus, the reported wages are also real values, so they can be compared with each other without additional calculations. In the analysis, we compare, for all four options, the total amount of earnings earned over the entire career, that is, until retirement age.

3.2. Numerical examples

There are four factors that has influence on result (differences in total amount of salaries during the whole career): salaries at the beginning of work, the age of beginning of career, the age of getting pregnant and age of retirement. In the example, the following assumptions has been done:

- Salaries at the beginning of work – it has been assumed that the level of wages at the beginning of career path is equal to the average wage in the economy (net value);
- The age of beginning of career – two cases are taken into consideration: 20 years old woman (without studies), 25 years old woman (after studies);
- The age of getting pregnant: two cases are analysed: after 1 / 5 years from the beginning of work;
- Age of retirement: 65.

The wage growth rate has been calculated on the basis of the Polish Central Statistical Office (GUS) published in „Structure of wages and salaries by occupations in October 2016” (and the relevant publications „from the years 2014, 2012, 2010, 2008, 2006 and 2004). The data concerning dependence between salaries and the length of the work experience has been used – wage growth rate has been obtained as average directional coefficient of the trend line, as described on Figure 2.

Figure 2. The dependence of wages on the length of work experience - women 2016

Source: own work

By using this kind of data it was possible to obtain average real wage growth rate (above inflation) = 1.75%. For variant 2 and 3 the reduced wage growth rate equal to 1% above inflation has been used.

The results of calculations of total amounts of salaries in four variants of career development and differences between given variant and variant "0" (childless person) in selected cases are given in table 5.

Table 5. Total amounts of salaries in four variants of career development and differences between given variant and variant "0" in selected cases of age and pregnancy

	Variant „0”	Variant „1”	Variant „2”	Variant „3”
20 years old woman, the age of pregnancy - 21				
Sum of net salaries till retirement age (65) [PLN]	2 838 714	2 745 418	2 333 699	2 672 022
Sum of net salaries till retirement age (65) [EUR]	660 166	638 469	542 721	621 400
Difference between this variant and variant "0" [PLN]	0	-93 296	-505 014	-166 692
Difference between this variant and variant "0" [EUR]	0	-21 697	-117 445	-38 766
20 years old woman, the age of pregnancy - 25				
Sum of net salaries till retirement age (65) [PLN]	2 838 714	2 751 367	2 402 883	2 683 147

Sum of net salaries till retirement age (65) [EUR]	660 166	639 853	558 810	623 988
Difference between this variant and variant "0" [PLN]	0	-87 347	-435 831	-155 567
Difference between this variant and variant "0" [EUR]	0	-20 313	-101 356	-36 178
25 years old woman, the age of pregnancy - 26				
Sum of net salaries till retirement age (65) [PLN]	2 409 710	2 331 044	2 025 534	2 269 731
Sum of net salaries till retirement age (65) [EUR]	560 398	542 103	471 054	527 844
Difference between this variant and variant "0" [PLN]	0	-78 666	-384 175	-139 979
Difference between this variant and variant "0" [EUR]	0	-18 294	-89 343	-32 553
25 years old woman, the age of pregnancy - 30				
Sum of net salaries till retirement age (65) [PLN]	2 409 710	2 336 993	2 085 462	2 280 855
Sum of net salaries till retirement age (65) [EUR]	560 398	543 487	484 991	530 431
Difference between this variant and variant "0" [PLN]	0	-72 717	-324 248	-128 854
Difference between this variant and variant "0" [EUR]	0	-16 911	-75 406	-29 966

Source: own calculations

Of course the worst variant is variant "2", but even variant "1", with only 2 years of break in career development, cost from 16,000 to more than 20,000 EUR. In all of the variants, the differences are higher for younger mothers.

4. Conclusions

The presented valuation model can be used to determine the amount of the compensation for indirectly affected person, in this case for a mother. In the compensation of personal damages, the loss for the victim's household is increasingly appreciated. This may be used in civil liability insurance (medical malpractice, MTPL).

This model is universal, but it is presented on the example of Polish realities, eg. the length of maternity leave, the Polish economic parameters, but can easily be adapted to the reality of another market.

Of course there are a lot of simplifications, that can be developed in further research. First of all, since has paid lower premiums, amount of pension will also be smaller. The analysis of the influence of the break in career path caused by giving birth to a child on the amount of pension is also important, especially in the contexts of lost expected benefits from having a child in the future, especially loss of expected old-age care.

Second of all, in this article, the difference in the level of earnings at the beginning of the job of a person without education and one with higher education (only the moment of entering the labour market), and the differences in the rate of increase in wages depending on the profession and education has not been taken into account. Moreover it would be possible to apply the wage growth rate not averaged, but according to the curve that comes from the Central Statistical Office (GUS) data, then the differences would probably be higher.

It would be also possible to introduce a different model to the calculations, eg an actuarial rent, which also takes into account probabilities of death for a mother. Finally, it would be useful to analyse the effect of giving birth to more than one child.

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