Who Benefits from Child Benefits?

The Labor Supply Effects of Maternal Cash Benefit

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Abstract

This paper examines the effect of restoring maternity cash benefit in 2000 on labor market participation and employment probability of mothers. In the first two years of motherhood, no significant employment effects can be demonstrated. However, after the second year of motherhood, a negative employment effect is found for female with low level of education, although the large cash benefit is received only until the end of the second year. This can be explained with the wealth effect of the cash benefit: the accumulated monetary reserves allow these mothers to choose staying at home instead of undertaking a full-time job.

JEL classification codes: J13, J18, J21
Keywords: female labor participation, child benefit, labor state transitions, motherhood, labor supply

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1. Introduction

Policies have been enacted across Europe, in Poland, Germany and Hungary for instance, seeking to increase female labor force participation and birth rate. Some policies include providing a substantial cash benefit to new mothers for a few years after child birth so that income issues do not restrict family planning. However, low rate of child birth and labor market participation is even more serious a problem for most Southern- and Eastern-European countries, thus, it is of high importance to examine their potential causes in this region. This study aims to examine potential policy reasons for the low labor market participation of mothers in Hungary, one of the low-fertility-low-participation countries in the study region. The policy mix (maternity leave, cash benefit, job protection etc.) has often contradictory effects on the target indicators, and generally only their composite effects are to be identified. In this paper, one single element of the policy mix is examined; the effect of parental cash benefit on female labor supply is identified through a policy change.

This study adds to the literature by being the first to examine the mid-term (1-5 years) effect of a parental leave cash benefit on labor supply in an institutional framework that does not facilitate the reconciliation of family and work. The middle and long-term effects of family policies are rarely examined and the studies available on the issue are carried out on countries with "family-friendly" labor markets, which help parents to reconcile work and family obligations. Drange and Rege (2012) find that Norway's cash-for-care program served as an incentive to exit full-time employment until child age of 2 years. This employment effect lasted until age 4, past the two-year incentive period when mothers were no longer entitled for the benefit, but thereafter the employment effect perished, the mothers returned to employment. The explanation is that mothers stayed attached to the labor market through part-time employment. The parental leave reforms of Austria (1990) which increased the parental leave from one to two years had a large negative effect on the labor market participation probability of mothers with a child of 2. Most mothers in the study started to work part-time immediately after giving birth, and even after ten years from the time of giving birth full-time employment was well below pre-birth employment rates (Lalive and Zweimüller (2009)). It was also shown for Germany's child cash benefit program that the opportunity for maternity leave extensions above the two years increased the spell of maternal non-employment (Schönberg and Ludsteck (2007)). On the labor markets examined by these papers (Norway, Germany and Austria), the government has adopted policies so mothers can balance family and workplace obligations. These countries enable females with young children to participate in the labor market through part-time employment (33%, 35% and 25% of females work part-time in these countries respectively). Moreover in Norway, subsidized childcare is available for a large proportion (47%) of children younger than 2, and 80% for the under 6-year-olds. A remarkable share of Austrian female employees (56.7%) reported in the Labor Force Survey (LFS) questionnaire in 2005 that they can take whole days off for family reasons. Moreover, 61.4% of Austrian women asserted their ability to vary the start or the end of the working day for family reasons. As a result, the mothers of young children in these countries are able to return to the labor market soon by utilizing flexible work arrangements, as the articles show mentioned before.

On the contrary, in many countries of Southern and Eastern-Europe most of the available full-time jobs do not provide flexible work options for new mothers and part-time jobs are scarcely available. Mothers' work options are limited to either working full-time or not working at all. In some of these countries, the case is worsened by low coverage of

institutional childcare below age 3[1]. Hungary belongs to this group of countries. A mere 8.7% of the 0-3 year-olds were placed in nursery schools in 2008. The case is much better for children of age 3-6, more than 85% of these children have access to daycare. Indeed, mothers' labor market participation is proven to be determined in a large part by government-subsidized daycare and part-time job availability. (Bredtmann, Kluve and Schaffner (2009), Gutierrez-Domenech (2003), Bick (2010), Del Boca (2002)) As a result, after birth, most mothers in Hungary have to entirely withdraw from the labor market at least until the child can be enrolled to institutional childcare. Even if child care is available from the government, it becomes a question of whether the mothers would choose to resume working full-time or stay home longer with the child. Those who plan to return to the labor market are urged to start the job search as soon as possible, as their professional knowledge deteriorates and their job network shrinks while at home, leading to their reemployment probability and expected wage decrease On the other hand, mothers may choose to withdraw from the labor market for a longer period, as they deem full-time work and rearing a young child (less than 5 years old) not reconcilable. They prefer that they can stay home when the child is ill, spend the time after kindergarten together, etc. In such an institutional framework, similar family policies may have different effects compared to countries with family-friendly labor markets. The introduction of a parental leave with cash benefit may facilitate work-life balance in two ways. It may help either by providing means for outsourcing some of the housework, hiring a nanny and take a full-time job, or just the opposite, it may supply with financials to afford staying home longer. Sauer-Cubizolles et al. (1999) also emphasize the importance of family benefits in reconciling family and work.

The paper uses micro data of the Labor Force Survey (LFS) to assess the short and long-term labor market effects of the Hungarian parental leave, GYED[2] enacted in 2000. GYED is a cash benefit which may be received until the child turns 2. The beneficiary receives a monthly amount of 70% of the previous one[3] year's average wage, with a ceiling of approximately EUR 360. Apart from Köllő (2008), this is the first paper that evaluates labor market effects of GYED. Köllő (2008) utilizes the termination of GYED in 1995, and finds no significant labor market effects. This paper in turn utilizes the re-launching of GYED in 2000 and finds a significant negative effect on labor supply, which is in line with the findings of Scharle (2007) on the Hungarian labor market.

In 2007, the amount of child cash benefits (in which GYED takes up a significant amount) reached 2.23% of Hungarian GDP, which was the second largest spending of this type among OECD countries after Luxembourg (OECD Family Database). According to the OECD Social Expenditure Database, in 2007 Hungary spent 70% of its GDP per capita on maternity and parental leave, the second largest amount among OECD countries. The fertility and labor market outcomes of this system are very poor though. Hungarian mothers with 0-3 year old kids have the lowest employment rate (15%), and those with 3-6 year olds have the third lowest employment rate in the EU (55%) (Blaskó (2009)). Blaskó (2011) gives a detailed description on the participation preferences of Hungarian women after birth. More than 94% of the Hungarians presume that the mother should stay home at least until the child turns 2. Similarly, Bálint and Köllő (2008) show that an average Hungarian woman stays

[1] This cumulative disadvantage is present in a few European countries, such as Bulgaria, Greece, Hungary, Malta, Poland, Romania and Slovakia.

[2] "Gyermekgondozási díj" is the Hungarian name of the child cash benefit program, abbreviated GYED.

[3] The exact calculation period depends on various factors.

home for 4.7 years after giving birth. On the other hand, the Hungarian fertility rate is positively affected by the present system of cash benefits (see Gábos, Gál and Kézdi (2008) and Kapitány and Spéder (2009)), but still very low compared to the EU average.

This study focuses on the labor supply effect of this system, the probability of participation of mothers with young children on the labor market. A difference-in-differences (D-I-D) analysis is done, where the treatment (eligible for GYED) and the control (non-eligible for GYED) groups are compared before and after the policy change to estimate the labor supply effect (probability of labor market participation) of GYED availability from year 2000 on. First, a hazard model is used to estimate the effect of GYED on participation probability, and estimations with a linear probability model are used to refine the results. The regression results reveal that GYED has a significant negative effect on participation and employment probability after the entitlement for the cash benefit ceased. This causes remarkable delay in returning to the labor market.

There are numerous explanations on why temporary withdrawal should affect long-term labor market outcomes of mothers. First off, the period of non-employment while on cash benefits may decrease women's human capital. (Mincer and Polachek (1974)). Gutierrez-Domenech (2005) finds that the longer a mother stays away from employment after child birth, the lower her reemployment probability. Even if a mother is able to find employment, the probability of reemployment at the previous wage level is also reduced (Mincer and Polachek (1974)). Kunze (2002) examined human capital depreciation in Western-Germany for parental leave and other factors and found that career interruptions due to parental leave has larger wage penalty, compared to interruption due to unemployment or national service. Prolonged absence from the labor market may lead to human capital gains in domestic duties, which further induces women to stay home (Becker (1991)). The size of the career-relevant network also influences the chance of reemployment probability. The longer the mother stays home, her network wanes increasingly. (Rees (1966))

Most papers examining child cash benefits for new mothers focus on immediate labor market effects of maternity leave. The studies are consistent that maternity leave has a significant effect on female labor supply. Longer maternity leaves are proven to increase return rate to previous employer and time spent out of the labor market after the leave ends. (See for instance Baker and Milligan (2008), Brugiavini et al. (2012), Baum (2003) , Berhemann and Riphahn (2011)), Spiess and Wrohlich (2008), Haan and Wrohlich (2007) Fehr and Ujhelyiova (2010).)

The remainder of the paper is organized as follows. In section 2, I give a brief overview the Hungarian child benefit system and its most important changes in 2000. Section 3 gives a detailed description about the data used. In the fourth part, the most important identification issues are discussed. Section 5 presents the estimations and their results. Finally, in Section 6 conclusions are drawn.

2. Hungarian child benefit system

The Hungarian child benefit system is rather generous, regarding both the amount and also the duration of the benefits. Among OECD countries Hungary spends the second largest sum on family cash benefits after Luxembourg; in 2007 the amount spent reached 2.23% of Hungarian GDP (OECD Family Database).

In order to understand the institutional environment of the parental leave in focus of this paper, it may be relevant to know how it fits into the system of other family and child

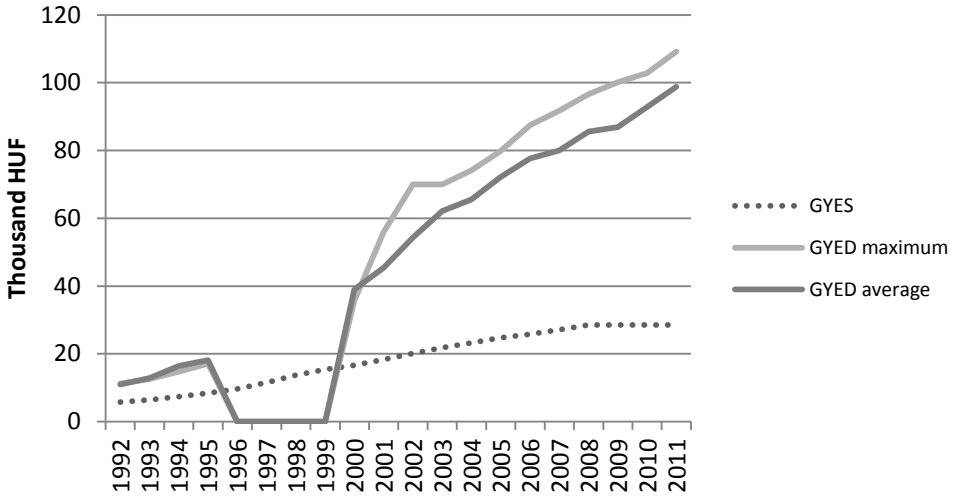
benefits. In the observation period of the analysis (1997-2002), there were three types of benefits that may matter for the present study. Maternity leave (TES, or TGYAS) and parental leave (GYED) were high amount monthly contributions. Extended parental leave (GYES) was a low amount monthly contribution. I give a detailed description of each in Appendix I. and also present a figure on the benefit system (see Figure 3).

Although the system of benefits has changed many times, GYED was basically unchanged between 1985 and 1996. In this period, GYED provided a monthly sum to participants, which equaled 70% of the participant's previous average monthly wage, not to exceed the double of the minimum retirement pension. Mothers who had worked for at least half a year in the two years before birth were eligible. It was supplemented by some other minor rules of eligibility, for instance eligibility with the previous child, full-time student status, etc. GYED was available from age 0.5 to 2 years of the child. Mothers could not receive GYED benefits if they reentered the workforce, but they were eligible for the lower GYES benefit for the entire GYED eligibility period. Those ineligible for GYED received the fixed low amount GYES.

In 1995[4], GYED was removed from the child benefit system. GYED was disbursed for the current program participants through the eligibility period, but no further applications were accepted. GYED was relaunched on January 1, 2000[5]. From that day, GYED was available again for all eligible mothers under the same basic rules and conditions from the 1996 GYED program. Thereafter, GYED rules remained the same until 2009, and not much changed until 2012.

Figure 1 shows the average monthly amount of GYED and GYES through time.

Figure 1: Sum of cash benefits in Hungary (1992-2011)



Data source: Central Statistical Office, Hungary

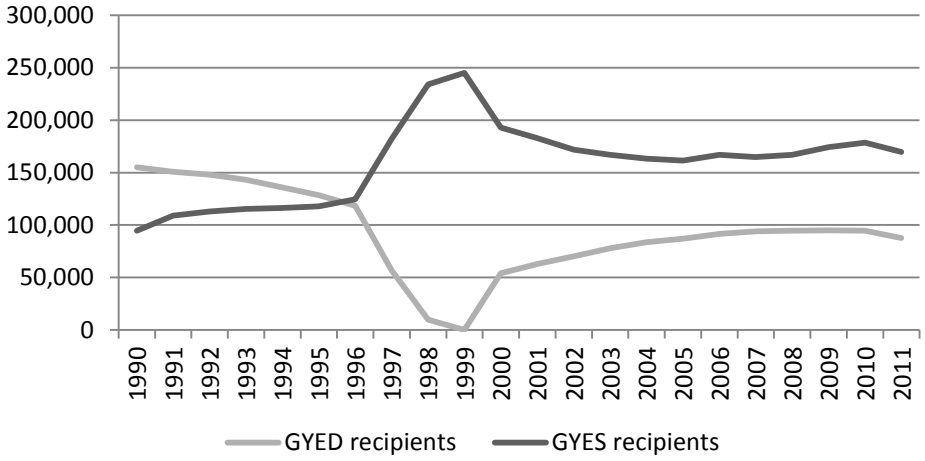
Figure 2 depicts the average monthly receivers of GYED and GYES between 1990 and 2011. As this graph reveals, the share of GYED recipients among mothers with young a child

[4] As a part of the restrictions of "Bokros package".

[5] GYED restoration was announced in the election program of the opposition party in 1998. By the middle of 1999 it could be known for sure that GYED was going to be launched in January 1, 2000. As a result, the reintroduction was by no means a surprise for the mothers.

has shrink since 1990, but their number stayed comparable to the GYES recipient group who are non-eligible for GYED.

Figure 2: Average monthly number of individuals receiving GYES and GYED (1990-2011)

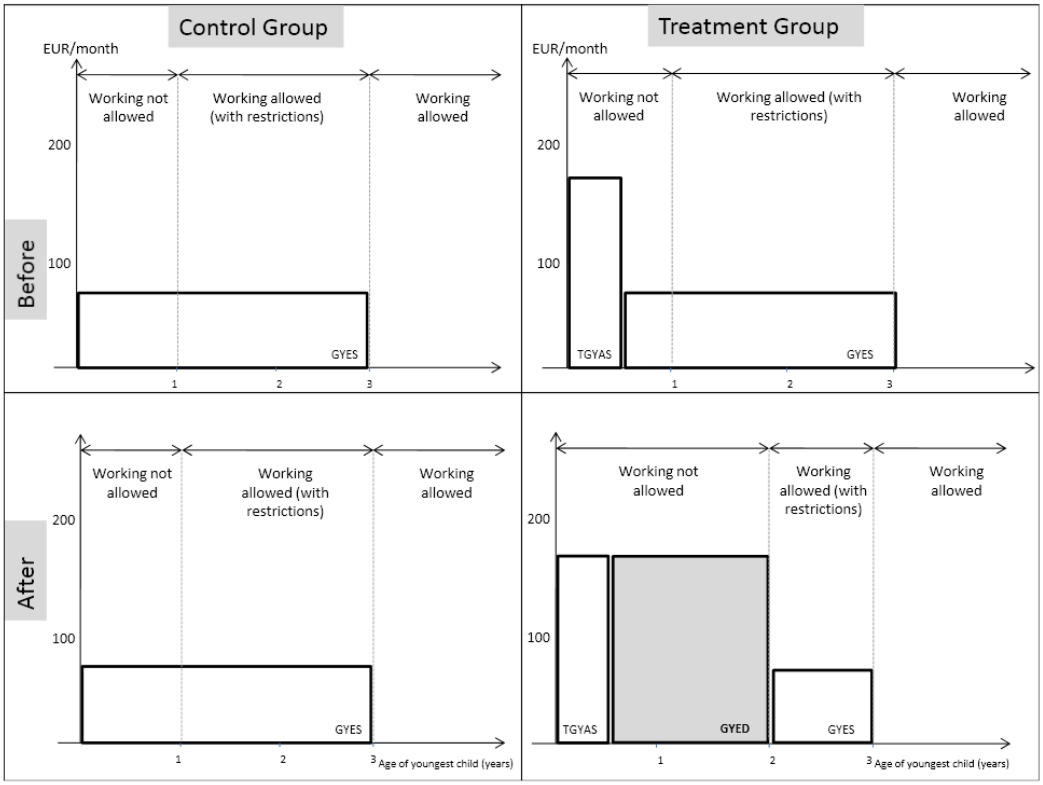


The ceiling of the GYED amount results that the top wage earners have a lower wage replacement rate compared to those who are not affected by this maximum. In 2010, 36.8% of the GYED recipients were affected by the GYED ceiling. This means that 36.8% of the GYED recipients would have received a higher amount in absence of the maximum limit. As a result, they had a less than 70% wage replacement rate. The others remained under the limit, so they had exactly 70% replacement rate

The policy changes in 2000 allow focusing on the labor market effect of GYED in the analysis. Later on, I refer to GYED as Benefit, for the sake of simplicity.

Figure 3 demonstrates the approximate amount and duration of different benefits (except birth grant) and whether the recipient is allowed to work while receiving benefit for an average family in 2001. The top figures show the case before the policy change, years 1996-1999. The bottom figures show the case after the policy change, years 2000-2002. The right and left panel show the control and the treatment group: the control group consists of those ineligible. The treatment group incorporates two kinds of people: would be eligible in the before period, and who are eligible in the after period.

Figure 3: Child Cash Benefits in Hungary



3. Dataset and key variables

The analysis is carried out on a combined database, consisting of the Hungarian Labor Force Survey (HLFS) data, T-STAR geographical data and data on the time needed to access the nearest municipality from the settlement of living. HLFS is a rotating panel dataset constructed from quarterly waves, each wave consisting of 70-80 thousand observations. The sample is stratified and clustered geographically. The unit of observation is a household, approximately 1/6th of which are removed and replaced by another household in each wave with each household staying in the sample for six periods at most. Each and every family and family member is documented in the observed household, along with their job market status, search activity and demographics. Based on the anonym identifiers, it is possible to link observations over time, so the database can be used as a panel dataset. The observations are weighted in the sample in order to maintain a representative sample.

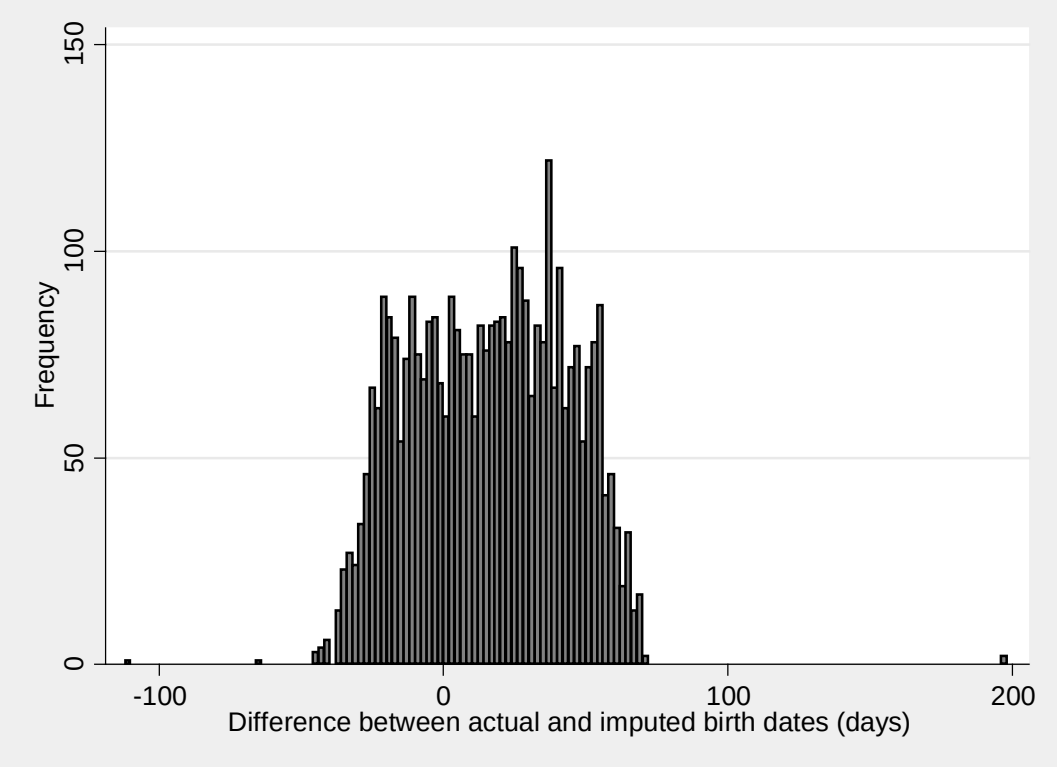
The sample consists of women who gave birth to a child in the past 4 years, and whose family status is “wife”, “companion” or “one parent with a child”. I excluded women from the sample who are loosely attached to the labor market and who have never entered the labor force. I did not include males, because a mere 1.3% of GYED recipients were males (or females other than the mother) in the whole observation period.

Through the whole article, the age of youngest child is referred to as the age of child. There are some cases when a new child is born before an older child becomes two. In this case, GYED eligibility is prolonged. For tractability reasons, I omit such observations from the sample.

The dependent variable is duration from the child's date of birth to the first labor market participation for each survey respondent. I use the standard International Labour Organization (ILO) definition of participation. The analysis time starts for each mother at the date of child birth. In the majority of the cases the mothers do not participate in the labor market after the date of childbirth. Then after a period, mothers start to participate in the labor force again, that is, they start job search or become employed. However, there are mothers who are not followed until reentering to the labor market; thus, there is right censoring in the model. In cases where the child's birthdate is not when the survey begins tracking mother's accepting benefits only those persons are kept in the sample that were unemployed the whole time period between giving birth and the start of the observation sequence. In other cases neither survival time, nor treatment status is available because of the structure of the LFS questionnaire. (See Appendix II for details on this issue.)

The accuracy of measurement of the duration length hinges on two factors, the accuracy of the date of birth and the time of reemployment. For some years, the precise birthdate of a child is not listed. In those years, I estimate the birthdate to be +/- 45 days on a uniform distribution from the quarter in which they were born. In later years, when the precise birthdate is listed, the exact date of birth is used[6]. For the years, where actual date of birth is available in the database, I could plot actual against imputed birth dates. The result is shown on Figure 4.

Figure 4: Data accuracy of birth dates



There are similar data issues with the reemployment dates. There is quarterly data available on the employment status of the mothers, so the measurement error also lies

[6] In the dataset, there is yearly data on the age of the family members. However, utilizing that the quarterly reported age increases by one in the quarter of birth, I have information on which quarter the child was born. This means that the measurement error of the date of birth is of uniform distribution, and lies between 0-90 days, with an expected value of 45 days.

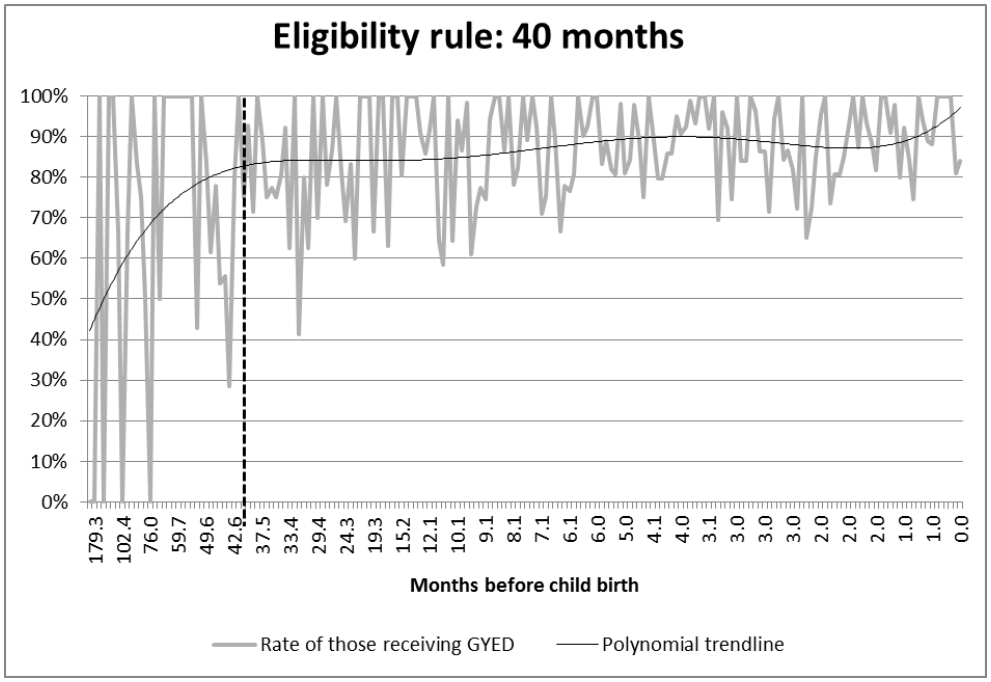
between 0-90 days. On the other hand, the distribution may have some mass points, because of the practice of choosing the first day of the month as starting date. If the distribution were truly uniform, the expected value of the measurement error of the spell length (time elapsed between birth and reemployment date) would be 36 days. This error is independent of other factors related to the hazard rate, and is relatively small compared to the average spell length in the sample.

The key explanatory variables of the model are *Treatment*, *After* and their interaction, *D = Treatment*After*.

Treatment equals 1 if the mother is eligible and 0 if not eligible to receive GYED for two years, that is, belongs to the treatment or the control group. In the 2000-2002 period *Treatment* is observable for those mothers with a child less than 2 years. For the period between 1997-1999 there was no GYED benefit and so no *Treatment* data is available, I have only information about the working history. Also, eligibility cannot be observed for those mothers who have a kid older than two years. Thus, the data on working history is used to impute the eligibility in cases where this information is not available[7].

Based on the 2001-2005 data of mothers (for whom both eligibility data and employment history is available) with children less than 1.5 years of age, I determined the working history which best separates the eligible population from the non-eligible. Those last having worked 40 months or less before child birth are regarded as eligible. On Figure 5, I have plotted the rate of those receiving GYED, relative to the whole group receiving GYED or not. I have also plotted a polynomial trend, which shows that the rule indeed separates the group with low and high probability of being eligible.

Figure 5: Determining treatment status from time length out of work



[7] According to law, eligibility is determined by working history in a large part. There are some minor conditions of eligibility, but from the analysis of the post-policy data at hand, it is clear that working history is by far the most important among the rules. The dataset contains information about the date when the mother was last employed. This variable proves sufficient to impute the treatment status.

The eligibility rule presented above predicts eligibility fairly well in the sample from 2001-2005, the treatment status is predicted correctly in 74% (69% + 5%) of the cases. There is no reason to think that the precision of the eligibility imputation would be worse in the 1997-1999 period.

Table 1: Percentage correctly predicted: treatment versus control status

		Data		
		Treatment	Control	# of observations
Imputation	Treatment	69%	12%	15 233
	Control	13%	5%	3 474
	# of observations	15 391	3 396	18 707

After is a dummy variable indicating whether the child was born in a period, when the whole 1.5 year of GYED was available. As GYED was reintroduced on January 1, 2000, all mothers belong to the *After* period, whose child was younger than half year on that day[8]. Consequently, *After* equals 1 if the child was born on July 1, 1999 or later. Those born before that, belong to the *Before* period. *Before* and *After* periods consist of three years of data each.

The treatment effect is measured by the coefficient of D, which equals 1 if Treatment=1 and After=1, and equals zero in any other case.

The rest of the explanatory variables are standard factors of participation decision (i.e. age, level of education, regional variables, local unemployment, etc.).

Table 2 provides descriptive statistics about the sample divided by treatment status and *Before* and *After* policy periods. The statistics were calculated using population weights.

Table 2: Descriptive statistics by treatment status and period

Variable	Control, Before	Control, After	Treatment, Before	Treatment, After
Number of observations	7,900	7,666	16,452	14,386
Probability of returning to labor market (in 0-5 years)[9]	2.43	5.28	4.33	4.59
Probability of reemployment (in 0-5 years)	3.25	6.13	5.18	5.93
Probability of reemployment (in 2-5 years)	4.41	8.98	8.62	10.28
Age (years)	31.2	31.9	28.9	29.7
Level of education (%)[10]:				
less than 8 years of primary school	3.35	2.36	1.03	0.65
primary school	29.49	22.59	20.54	18.40
vocational school	27.37	28.65	32.00	32.41
high school graduation w/o profession	8.42	9.86	10.84	9.71
high school graduation w/ profession	19.11	20.10	23.43	25.02
college	8.67	10.79	9.03	10.20

[8] There is a transitional sample of the mothers, whose child was less than 2 years old in January 1, 2000, but older than half year. These mothers became eligible for GYED on January 1, but they did not receive it through the whole 1.5 year, only for a shorter period, until the child turn 2. It is up to a decision in which group to add them. In this paper, these mothers belong to the Before period, in order to have the After group potentially receive the whole 1.5 year of GYED.

[9] Based on quarterly transition data. The average probability of transition from non-participation to participation in a quarter, among mothers with a kid aged 0-5.

[10] The percentages show column shares. For instance, 3.35% of the Control Before group have fulfilled less than 8 years of primary school.

university	3.58	5.65	3.12	3.61
# of children (%)	1.56	1.51	1.26	1.27
Partner (%): none	9.16	9.61	8.62	9.32
partner w/o job	16.86	12.95	11.88	9.58
partner w/ job	73.98	77.44	79.51	81.10
Local unemployment level (%)	4.0	3.7	3.8	3.5
Previous employment, within 8 years (%):	26.23	23.98	33.58	27.80
state-owned				
privately owned	25.13	38.11	40.43	52.60
other	18.75	13.95	25.46	19.22
none	29.89	23.96	0.53	0.39
Size/type of settlement of living (%):				
Budapest	25.73	27.44	29.34	29.27
large city	42.09	36.43	35.95	34.67
small city	17.34	17.95	19.07	20.78
village	14.84	18.19	15.63	15.28
Region of living (%):				
Region1: Közép-Magyarország	26.03	30.77	27.28	28.48
Region2: Közép-Dunántúl	10.36	10.51	12.37	10.91
Region3: Nyugat-Dunántúl	11.00	8.71	9.59	10.27
Region4: Dél-Dunántúl	8.63	11.18	9.50	9.67
Region5: Észak-Magyarország	12.98	10.20	12.06	11.80
Region6: Észak-Alföld	18.03	15.24	14.35	14.99
Region7: Dél-Alföld	12.97	13.40	14.84	13.87

The table above indicates the composition of the treatment and the control groups are different in a few important aspects: education level, employment history and local employment prospects (local population, local unemployment level). In order to compare the treatment and control groups with similar characteristics, I used propensity score matching and dropped those observations from both groups that proved to contrast the most with the other group. In this way, 25% of the observations from both the treatment and the control group were dropped. As a result, the similarity of the treatment and the control group increased.

Table 3: Descriptive statistics by treatment status and period, after matching

Variable	Control, Before	Control, After	Treatment, Before	Treatment, After
Number of observations	6,849	5,037	11,822	11,842
Probability of returning to labor market (in 0-5 years)[11]	2.97	5.23	5.89	5.87
Probability of reemployment (in 0-5 years)	2.23	4.45	5.00	4.61
Probability of reemployment (in 2-5 years)	4.17	9.25	9.03	10.81
Age (years)	31.1	30.8	30.4	29.7
Level of education (%):				
less than 8 years of primary school	2.42	1.77	0.89	0.37
primary school	26.51	19.16	18.51	15.75
vocational school	26.39	31.39	25.79	30.35
high school graduation w/o profession	8.99	11.71	11.70	10.37

[11] Based on quarterly transition data. The average probability of transition from non-participation to participation in a quarter, among mothers with a kid aged 0-5.

	high school graduation w/ profession	20.58	22.92	24.23	27.25
	college	9.39	8.45	13.58	11.19
	university	5.74	4.60	5.29	4.72
# of children (%)		1.48	1.41	1.31	1.22
Partner (%):	none	9.29	9.56	8.23	9.29
	partner w/o job	15.75	12.11	11.24	9.29
	partner w/ job	74.96	78.33	80.53	81.42
Local unemployment level (%)		4.0	3.7	3.6	3.4
Previous employment, within 8 years (%):		27.31	23.90	39.08	28.77
	state-owned				
	privately owned	26.60	40.03	34.48	51.11
	other	19.76	14.92	25.91	19.84
	none	26.32	21.14	0.52	0.28
Size/type of settlement of living (%):					
	Budapest	25.23	32.13	27.68	29.26
	large city	41.40	36.54	34.45	34.04
	small city	17.99	16.98	19.10	20.38
	village	15.37	14.35	18.76	16.31
Region of living (%):					
	Region1: Közép-Magyarország	27.12	26.97	30.28	29.07
	Region2: Közép-Dunántúl	10.41	11.63	11.73	10.33
	Region3: Nyugat-Dunántúl	11.10	7.71	9.64	10.72
	Region4: Dél-Dunántúl	8.48	11.50	8.95	9.48
	Region5: Észak-Magyarország	12.52	11.86	11.22	11.88
	Region6: Észak-Alföld	17.77	15.78	14.23	14.74
	Region7: Dél-Alföld	12.61	14.55	13.95	13.78

As Table 3 shows, both reemployment probability and probability of returning to the labor market increases for the control group between the two periods. The same probabilities increase by much lower or even decrease in case of the treatment group. The increase of employment probability between the two periods likely reflects the improving economic conditions in the country, starting from 2000. (see Figure 11 in the Appendix III.)

4. Identification

If a randomized experiment could be done, it would unfold the true effect of the treatment on the treated group. Though such an experiment is impossible to carry out, the thought experiment helps reveal the most important identification issues.

In this experiment, there would be women thinking about giving birth in period 0. In period 1, the experimenter assigns them randomly between the control group and the treatment group. The individuals in the control group do not receive Benefit, while those in the treatment group do. Then their fertility outcomes and their consequent labor supply decisions are observed. Finally, the labor supply outcomes of the two groups are compared. The difference is the effect of the Benefit on female labor supply. Labor supply is assumed to be affected by the treatment through various channels, which are presented below.

First, treatment may affect fertility decisions. Some of the control group members may decide not to have a child, as income lost from being unemployed would be too high and a lack of cash benefit would lead to a decision to not have children. In other words, they have a high alternative cost of giving birth. They decide not to bear children and stay active

in the labor market. Through this channel, treatment could decrease labor market participation. Let us call this channel “sample selection”.

Second, after birth until the child turns two, the treatment group members receive a high sum of cash benefit. This increases the reservation wage of the treatment group members; thus, fewer of them return to the labor market in this period. They may start to look for a job later than those in the control group because they stay home longer on average. This affects their human capital and the reemployment probability. Let us call this channel “income effect”.

Third, after the second birthday of the child the treatment group mothers no longer receive the Benefit. However, the Benefit may have a longer-lasting effect, through the wealth accumulated through the months of receiving the benefit, this is called the wealth effect. Even if the amount of GYED were not accumulated, it may have helped the recipient families to preserve their savings, so the wealth effect still applies. In contrast, the non-eligible families had to use up their own savings to make their living in the period when the mother is out of work. Those who have more savings left (eligible group) may decide to stay home a few more months to take care of the child. On the other hand, those stringent of money (ineligible group) need to return to the labor market. On average, treated individuals have more wealth accumulated, which allows them to decide to stay home. This channel is called wealth effect. Income and wealth effect are going to be examined with linear probability models.

4.1. Sample selection

The first identification issue to deal with is sample selection, namely negative and positive selection into motherhood. The standard negative selection into motherhood (Lundberg and Rose (2000)) works as follows: those mothers with lower productivity (less talent, less career-oriented) are more likely to bear a child as the alternative cost of the child is lower in their case. Career-oriented attitude is likely to be correlated with reemployment probability, so the sample selection is endogenous. Accordingly, unobserved heterogeneity of women causes endogenous sample selection. Mroz (1987) examines the exogeneity of fertility to labor supply decision, and confirms that including such an exogeneity assumption does not imply significant change in the results. Modena and Sabatini (2010) come to the same conclusion, that is, data does not support that higher opportunity cost of motherhood is responsible for lower fertility. On the contrary, Lundberg and Rose (2000) find evidence by visual inspection on negative selection into motherhood, but its magnitude and significance is unknown. Adda and Stevens (2011) detect negative selection into motherhood. Those with high ability represent 27.4% of their sample, and the total fertility rate of this group is 1.53 compared to 1.83 of the low ability group. This suggests a 17% fertility decrease on average. Similarly, Gayle and Miller (2006) find that the number of children is negatively related to the level of education, because the higher alternative cost of children for higher educated. There are some further papers that underpin endogenous fertility (e.g. Keane and Sauer (2009)). This type of sample selection may be present throughout the whole observation period (1997-2002).

After the reintroduction of GYED in 2000, there is positive selection. Those who had a job before child birth, which made them eligible for GYED (a higher sum of benefit than before), would decide to bear a child, as the alternative cost of child bearing decreased for them. Of course, the alternative cost of childbearing did not change for the ineligible. Laroque and Salainé (2005) show that financial incentives indeed increase fertility, a child

benefit of 0.3% of the GDP is expected to raise total fertility by 0.3 percentage point. Gábos et al. (2008) demonstrate a similar effect on Hungarian data.

As a solution to this problem, many authors assume joint fertility and labor supply decision (e.g. Apps and Rees (2004), Laroque and Salainé (2005), Bick (2010)). The structure of the problem in this article does not allow for such a structural model. However, the direction of the bias can be derived, as follows.

In the period where the GYED did not exist, there is only negative selection present. In the post-policy period there is the possibility for negative and positive sample selection present at the same time. Assuming that the magnitude of the negative selection does not change in these years, it is fairly easy to show that there is upward bias resulting from the selection.

Let H_{ij}^{k} denote the hazard of participation, where

$$i = \begin{cases} t & if\ Treatment\ Group \\ c & if\ Control\ Group \end{cases}$$

and

$$j = \begin{cases} 0 & if\ Before\ Policy\ Period \\ 1 & if\ After\ Policy\ Period \end{cases}$$

and

$$k = \left.\begin{cases} 0 & if\ no\ sample\ selection \\ - & if\ only\ negative\ sample\ selection \\ + & if\ negative\ and\ positive\ selection \end{cases}\right\} assumed$$

Let TE^{k} denote treatment effect for three different cases, indicated by superscript $k = \{0, -, +\}$.

Let's start with the case when there is no sample selection. In this case, the treatment effect is:

$$TE^{0} = (P_{t1}^{0} - P_{c1}^{0}) - (P_{t0}^{0} - P_{c0}^{0})$$

This is the true treatment effect.

In the next step, look at the case when negative selection is taken into account. I assume that the magnitude of the selection bias (ε_{ij}) does not change between the two periods. However, selection bias may be different for treated and control groups, such that: $\varepsilon_{i0} = \varepsilon_{i1} = \varepsilon_{i}$. This assumption indicates that the change in GYED regulation did not affect productivity and expected wage. I do not assume anything about the size and sign of ε_{c} and ε_{t}. The participation hazards in this case are the following:

$$H_{t1}^{-} = H_{t1}^{0} - \varepsilon_{t}$$

$$H_{t0}^{-} = H_{t0}^{0} - \varepsilon_{t}$$

$$H_{c1}^{-} = H_{c1}^{0} - \varepsilon_{c}$$

$$H_{c0}^{-} = H_{c0}^{0} - \varepsilon_{c}$$

It can be shown easily that $TE^{-} = TE^{0}$:

$$TE^{-} = (P_{t1}^{-} - P_{c1}^{-}) - (P_{t0}^{-} - P_{c0}^{-}) = ([P_{t1}^{-} - \varepsilon_{t}] - [P_{c1}^{-} - \varepsilon_{c}]) - ([P_{t0}^{-} - \varepsilon_{t}] - [P_{c0}^{-} - \varepsilon_{c}]) = TE^{0}$$

In the third case, I assume that both negative and positive selection is present. In fact, this is what can be measured with the methodology used in this paper. I assume that the overall selection bias is additively separable: $S(p) = \varepsilon(p) + \mu(p)$ where μ denotes the

bias caused by the positive selection. The positive selection is present only in the treatment group, in the second period, $i = t,\ j = 1$.

The participation probabilities are the following:

$$P_{t1}^{+} = P_{t1}^{-} + \mu_t$$

$$P_{t0}^{+} = P_{t0}^{-}$$

$$P_{c1}^{+} = P_{c1}^{-}$$

$$P_{c0}^{+} = P_{c0}^{-}$$

A further assumption is that $\mu_t > 0$. This assumption owes the idea that the higher the expected benefit – that is, the higher the productivity and the probability of participation – the stronger the positive selection will be. As a consequence, on average, individuals with higher participation probability will select into the treatment sample more frequently after the policy change, so the average participation probability will be higher.

It is straightforward to show that $TE^{+} > TE^{0}$:

$$TE^{+} = (P_{t1}^{+} - P_{c1}^{+}) - (P_{t0}^{+} - P_{c0}^{+}) = ([P_{t1}^{-} + \mu_t] - P_{c1}^{-}) - (P_{t0}^{-} - P_{c0}^{-}) = TE^{0} + \mu_t > TE^{0}$$

Thus, the overall selection process causes a positive bias in the regression results. If the Benefit has a negative effect on labor supply as expected, this bias means that a smaller negative effect is measured in the regressions.

4.2. Endogenous treatment

The present paper makes use of the policy change in 2000, when the Benefit was reintroduced after four years. This time variation allows assessing the labor supply effects of such a large amount of cash benefit.

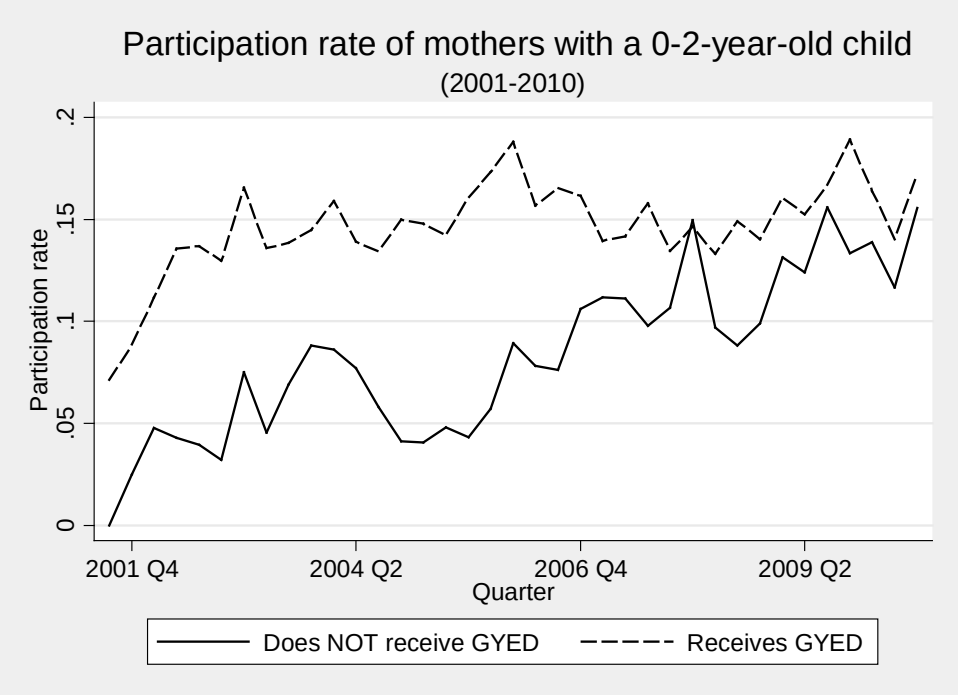
To gain unbiased estimation of the treatment effect, it is important that

$$y_i = \alpha + \beta w_i + X'\gamma + u_i \quad st.: w_i \perp \begin{pmatrix} y_i(0) \\ y_i(1) \end{pmatrix} | X_i \Big)$$

where $y_i(0)$ is the outcome variable if in the control group, $y_i(1)$ is outcome if in the treatment group, and w_i is the treatment dummy. This means that the selection into treatment is exogenous to the outcome, conditional on the explanatory variables X_i.

However, in this case treatment variable is clearly endogenous, as it is defined by previous working history, which affects employment probability and labor supply. Still, the time variation allows for identification, if DID approach is used. The most important assumption for identification in a DID setup is that the participation probability of the treatment and the control group follow a common trend. If it can be assumed that the participation rate of the groups move together, then DID identifies the treatment effect. Figure 6 shows that the groups mostly have a common trend through time, with the exception of the 1st quarter of 2008. As can be seen from the graph, the 2008-2009 economic downturn does not seem to have a different impact on the participation rate of those receiving and not receiving GYED until 2010.

Figure 6: Common trend



To make sure that the D-I-D approach is valid, it is important that there is no other major policy change in the near history that would affect the outcome variables. In the period of the examination, a major policy change was implemented, which could potentially have an effect on the labor supply. The mandatory minimum wage was nearly doubled in two steps in 2001 and 2002, which was quite a large change compared to the previous years (see Figure 10 in Appendix III). Though there is no wage data available in LFS, it seems a plausible assumption that the wage level correlates with the level of education. The distribution of education is more or less the same in the treatment and the control group after matching (check Table 2), thus, the ratio of individuals affected by minimum wage laws are comparable in the two groups. As a result, the difference between the treatment and the control group should not come from the minimum wage change. Nevertheless, I test the minimum wage effect by directly including its yearly sum in the regressions, which does not change the estimation results (tables are omitted).

5. Econometric design and results

5.1. Hazard model of participation

The duration of non-participation in the labor market after giving birth is measured with a hazard model. Let T be the random variable of the duration, with $T \geq 0$. Let t be a realization of T. Let the participation hazard function show the probability that a given mother will return to the labor market in the next day.

$$\lambda(t) = \lim_{h \to 0} \frac{\Pr(t \leq T \leq t + h | t \leq T)}{h}$$

and the resulting probability distribution function is:

$$f(t) = \lambda(t)e^{-\int_0^t \lambda(s)ds}$$

There are a few important points to stress about model selection. First, it is important to review all the factors affecting the hazard of reentering. At the beginning of the spell, the hazard of reentering is very low, because only few women would like to go back to work with a less than one year old child in Hungary. Then the hazard starts to increase faster, as more and more women want to get back to work. As time moves further from the birth of the child, reemployment becomes more difficult because women at home do not follow the trends of their profession, their knowledge becomes outdated or they fell out from the daily business routine. This effect is presumed to be stronger for a high-skilled workforce. This means that the duration dependence of the hazard ratio is likely to be negative.

$$\frac{\lambda(t)}{dt} < 0$$

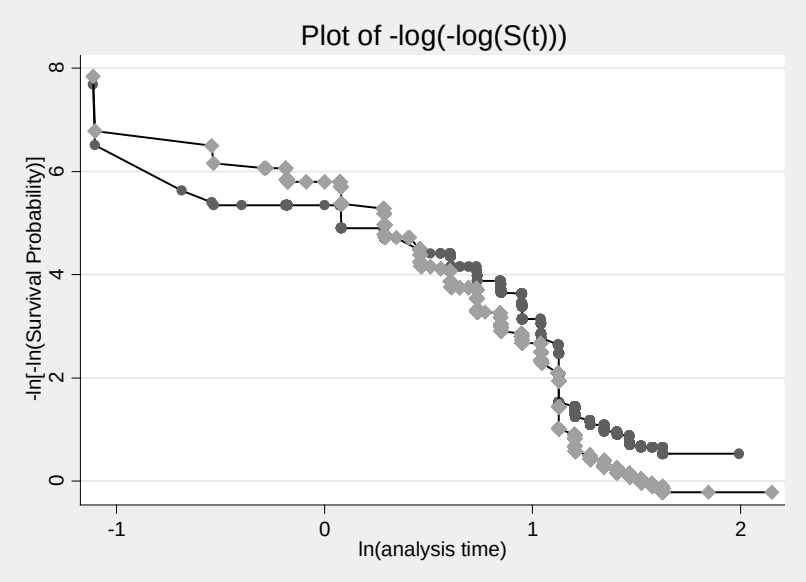
Semi-parametric model

First, Cox proportional hazard model is estimated, in which

$$\lambda(x,t) = \lambda_0(t)e^{\beta' x}$$

is assumed. The advantage of this model is that $\lambda_0(t)$ is estimated non-parametrically, thus, no specific assumptions are needed. The only important assumption needed is the proportionality assumption. The estimated cumulative hazard curves of the treated and the control group are plotted on Figure 7.

Figure 7: Proportionality assumption



The cumulative hazard curves are mostly parallel to each other, especially after the first year (ln(0) on the horizontal axis), which is of special interest to this paper. This confirms the assumption that these are scaled versions of each other, that is, the survival functions are proportional to each other.

The hazard sample consists of 6,685 subjects, and of which 1,158 exits from non-participation is observed. The rest of the sample is censored; these individuals are still out of the labor force when they exit from the sample. The large number of censored observations

is likely to introduce an expansion bias (bias away from zero (Rigobon and Stoker (2007))), because those with longer duration are more likely to be censored. At the extreme, those never returning to the labor market after giving birth will be censored for sure. The likelihood function of the estimation with censored observations is the following:

$$\ell_i = f(x_i, t_i; \theta)^{1(t_i<c_i)}[1 - F(x_i, t_i; \theta)^{1(t_i=c_i)}]$$

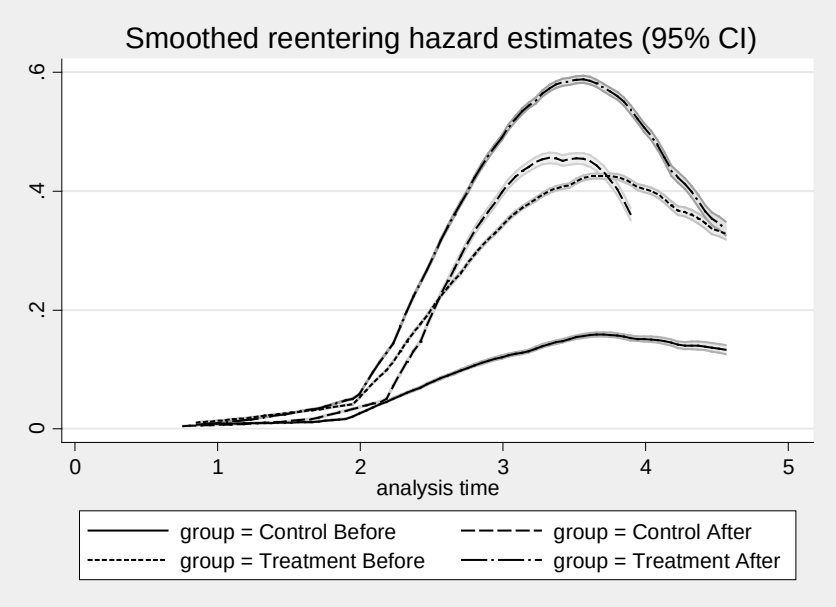
where t_i is the analysis time for individual i, and c_i is the date of censoring.

The parametric part of the model is the following:

$$\exp\{\beta' x_i\} = \exp\{\beta_0 + \beta_1 * After_i + \beta_2 * Treatment_i + \beta_3 * D_i + \delta' Controls_i + \varepsilon_i\}$$

The estimated baseline hazard functions and the 95% confidence intervals are shown on Figure 8 by treatment status and before and after periods.

Figure 8: Hazard curves



After the 2000 policy change, reentering hazard following the second birthday increases for both the treatment and the control group. However, it is clear that the increase is larger in case of the control group.

First, the regression results from the Cox model are reported with the standard errors under the estimated parameters.

Table 4: Cox proportional hazard model results (exponentiated coefficients)

Variable	Specification1	Specification2	Specification3
After	1.408	1.378	1.475*
	(0.26)	(0.25)	(0.27)
Treatment	5.726***	5.708***	5.975***
	(0.76)	(0.76)	(0.80)
D	**0.619****	**0.651****	**0.630****
	(0.09)	**(0.10)**	**(0.10)**
1997	2.019	2.467	

	(1.05)	(1.28)	
1998	1.325	1.565	1.639
	(0.41)	(0.48)	(0.51)
1999	0.910	1.052	1.115
	(0.23)	(0.27)	(0.29)
2000	0.815	0.930	0.954
	(0.20)	(0.23)	(0.24)
2001	0.824	0.928	0.946
	(0.20)	(0.22)	(0.23)
2002	0.987	1.089	1.083
	(0.22)	(0.24)	(0.24)
2003	1.087	1.169	1.166
	(0.23)	(0.24)	(0.25)
2004	1.226	1.332	1.315
	(0.25)	(0.27)	(0.27)
2005	1.594*	1.759**	1.756**
	(0.33)	(0.36)	(0.37)
2006	1.394	1.493	1.507
	(0.29)	(0.31)	(0.32)
2007	1.090	1.147	1.159
	(0.23)	(0.24)	(0.24)
2008	1.220	1.241	1.272
	(0.25)	(0.26)	(0.27)
2009	1.046	1.071	1.143
	(0.22)	(0.23)	(0.24)
2010	1.261	1.286	1.352
	(0.26)	(0.27)	(0.28)
# of 0-6 kids		0.909	0.921
		(0.06)	(0.06)
Partner w/o job		1.118	1.163
		(0.21)	(0.22)
Partner w/ job		0.938	0.928
		(0.09)	(0.09)
Educ: voc.		1.237**	1.239**
		(0.10)	(0.10)
Educ: high s.		1.490***	1.517***
		(0.12)	(0.12)
Educ: univ.		1.740***	1.785***
		(0.18)	(0.18)
Age		1.108*	1.110*
		(0.05)	(0.05)
Age squared		0.998*	0.998*
		(0.00)	(0.00)
Partner: University		1.273*	1.293*
		(0.15)	(0.15)
Partner: High sc.		1.306**	1.312**

		(0.13)	(0.13)
Partner: Vocationa..		1.175	1.160
		(0.10)	(0.10)
Partner's age		0.999	0.999
		(0.00)	(0.00)
Reg. unemp. level			0.051**
			(0.05)
Live in village			0.891
			(0.10)
Live in city			0.897
			(0.10)
Live in large city			0.884
			(0.11)
Kozep-Dunantul			1.585***
			(0.15)
Nyugat-Dunantul			1.556***
			(0.15)
Del-Dunantul			1.508***
			(0.17)
Eszak-Magyarorszag			1.628***
			(0.18)
Eszak-Alfold			1.890***
			(0.20)
Del-Alfold			1.563***
			(0.15)
Quarter2			0.848*
			(0.06)
Quarter3			0.747***
			(0.05)
Quarter4			0.915
			(0.06)
N	54437	54435	53919
AIC	32700	32600	32500

The regression results confirm that the Benefit has a significant negative impact on reentering hazard. It decreases by % depending on specification. As a robustness check, two types of parametric models, an exponential and a Weibull model is estimated. The results are omitted, but are similar to the Cox results. The estimated value of the ceteris paribus effect of the Benefit is significant and negative, -37%. That is, the hazard of return to labor market decreases by 37% if someone is ceteris paribus eligible for the Benefit. However, this result is likely to be biased; the real effect is expected to be closer to zero. Thus, the estimation can be regarded as an upper bound (in absolute terms) to the effect. In the next section I aim to give a lower bound of the effect.

5.2. Linear probability models

In this part, I use two-state Markov-chain models for the purposes of the analysis. The dataset is utilized as a panel, in which two consecutive periods are used to calculate the transition probabilities between labor market states. The timing of the model has two periods. In the first period (t=0) working status is observed, individuals are sorted into the treatment or the control group. The age of the child and working status of the mother (thus the starting state of the transition) are also observed in the first period. In the second period (t=1) the new labor market status (the end state of the transition) is observed. For an individual who is present in the database for six waves for instance, we have four transition data available, so she is present in the examined dataset 4 times. To account for these duplications, clustered errors by individual are used in each case.

Certainly, it would be more conventional, simpler and rather natural to model the events with sample probabilities. However, this strategy would not work because of the following data problem. As neither treatment status, nor reemployment date is available for individuals with employment as the starting labor status in the sample, these observations are dropped. As a result, raw state frequencies and probabilities are biased; the employment and participation rate would be seriously underestimated. However, transition probabilities are unaffected by this problem, because these measure flows instead of stocks, and the starting state does not include employed individuals in either case. (See more on this in Appendix II.) Thus, it does not matter whether individuals with employed starting state are dropped or not. Even so, as the stocks build up from flows, this method allows inferring to the magnitude of stocks.

The following linear probability models are estimated.

$$trans(empl)_i = \beta_0 + \beta_1 * After_i + \beta_2 * Treatment_i + \beta_3 * D_i + \ \delta' Controls_i + \varepsilon_i$$

and

$$trans(part)_i = \beta_0 + \beta_1 * After_i + \beta_2 * Treatment_i + \beta_3 * D_i + \ \delta' Controls_i + \varepsilon_i$$

where $trans(empl) = 0$ if the individual is non-employed in t=0 and in t=1, and $trans(empl)1$ if the individual is non-employed in t=0 and employed in t=1. Similarly, $trans(part) = 0$ if the individual does not participate in the labor market in t=0 and in t=1, and $trans(part) = 1$ if the individual is non-participating in t=0 and participating in t=1. Any other cases are dropped. The parameter of interest is β_3.

In Table 5 the results of regressions on the probability of transition to participation are reported. The estimations are repeated for two child age categories. The estimates that incorporate the first two years of the child are meant to check for the income effect. The estimates referring to the period after the second birthday test whether there is any wealth effect. The estimation samples are divided to subsamples. The members of the high education group have a high school graduation with profession or higher education level. Those with lower level of education belong to the low education group.

Table 5: Linear Probability Model for transition (0-2 year old)

Age of youngest child	0-5 years old		0-2 years old						2-5 years old					
Level of education	High & Low		High & Low		High		Low		High & Low		High		Low	
Dependent variable	Empl.	Part.	Empl.	Part.	Empl.	Part.	Empl.	Part.	Empl.	Part.	Empl.	Part.	Empl.	Part.
After	-0.047***	-0.057***	0.000	-0.002	0.005	0.006	-0.000	-0.005	-0.028*	-0.043**	0.005	-0.009	-0.044**	-0.056***
	(0.01)	(0.01)	(0.01)	(0.01)	(0.01)	(0.01)	(0.01)	(0.01)	(0.01)	(0.02)	(0.03)	(0.03)	(0.01)	(0.02)
Treatment	0.009	0.012*	-0.000	-0.001	0.006	0.008	-0.002	-0.004	0.004	0.010	-0.002	0.026	0.011	0.010
	(0.00)	(0.01)	(0.00)	(0.00)	(0.01)	(0.01)	(0.00)	(0.00)	(0.01)	(0.01)	(0.02)	(0.02)	(0.01)	(0.01)
D	**-0.017****	**-0.016****	**-0.005**	**-0.003**	**-0.011**	**-0.012**	**-0.003**	**0.001**	**-0.023***	**-0.017**	**-0.031**	**-0.044**	**-0.024***	**-0.013**
	(0.01)	**(0.01)**	**(0.00)**	**(0.00)**	**(0.01)**	**(0.01)**	**(0.00)**	**(0.01)**	**(0.01)**	**(0.01)**	**(0.02)**	**(0.02)**	**(0.01)**	**(0.01)**
Individual controls	x	x	x	x	x	x	x	x	x	x	x	x	x	x
Region FE	x	x	x	x	x	x	x	x	x	x	x	x	x	x
Year FE	x	x	x	x	x	x	x	x	x	x	x	x	x	x
N	42252	40344	22890	22805	9789	9761	13101	13044	19362	17539	6327	5822	13035	11717
AIC	-8860	-4030	-3220	-3060	-10200	-9540	-25300	-24200	7198.5	9156.7	3952.9	4193.6	2438.2	4480.5

The estimates indicate that the quarterly transition to participation probability increased by 1.6% on average as a result of GYED. Taking into account that there are 4 quarters and 5 years included in the study, this sums up to a 32% effect. Before the second birthday GYED does not have a significant effect on participation or employment either in the group of high or the low educated mothers. This implies that the income effect of the Benefit is not significant.

On the contrary, the effect after the second birthday is significant and negative in case of the employment of mothers with low level of education. This supports the wealth effect hypothesis. The probability of quarterly transition from non-employment to employment after the second birthday decreases by 2.4% as a result of the Benefit. For the whole time span included in the analysis, until the 5th birthday, this equals a 28.8% increase. This estimation is likely to underestimate the effect, as the fact of censoring is not handled in the Markov model.

The result of the survival and the Markov models suggest a participation effect between 32% and 37%. Taking into account the positive selection into motherhood, the real effect should be larger in absolute value, than the estimates. Thus, the 32% lower bound is valid for the effect, but we cannot tell the upper bound from the estimates at hand.

At first glance, these results seem surprising, because GYED is received in the first and second year of the motherhood. So, one would expect a sharp decrease in reemployment probability in these two years, and none or much smaller effect in the consecutive years. However, reemployment probability in the first two years of the motherhood is less than 2% across each group and each period, which indicates a very strong preference for staying home with a child younger than 2 years, regardless of the transfer received. Thus, launching GYED has narrow scope to further decrease reemployment probability in the first and second year after giving birth.

The effect of GYED in the third and fourth year can be explained by its effect on accumulated wealth. Having received a large monthly sum in the first two years of motherhood, makes it possible for the mother to afford one or two more years spent at home with the child. The results are significant in case of the mothers with low level of education, which suggests that those with high level of education, and most probably with higher income, are able to adjust their labor supply timing to their preferences. On the other hand, those with lower income should return to the labor market sooner than their ideal in absence of the Benefit. As Blaskó (2009) suggest, it is not the exact timing of return to labor market that matters for the child wellbeing, rather that the mother can adjust the timing to her personal preferences. Thus, these results suggest that children (and mothers) of low income families benefit from the GYED relaunch, by becoming able to adjust labor supply to their preferences.

6. Conclusion

This paper provides evidence on the long run negative effect of maternal cash benefit on female labor supply. There are a few studies available measuring this effect in countries with an institutional background which supports reconciliation of family and work for young mothers. These studies measured negative significant effect on female labor supply in the middle or the long run. On the contrary, the author of this article does not know about any studies regarding countries where the labor market and childcare institutions do not

facilitate such reconciliation. The hypothesis of the study is that mothers use the monetary resources received to reconcile family and work duties, either by staying home longer or returning to labor market and maybe outsourcing some of the housework or buying childcare services.

The estimations show that mothers indeed stay home longer, the cash benefit affects labor supply in the middle run (2-5 years after birth). Those mothers with low level of education, and probably low income, are more affected than those with higher level of education. This suggests an explanation that those with higher level of education are able to adjust their labor supply behavior to their and the family's needs, even in absence of the cash benefit. On the contrary, the benefit helps mothers with low level of education to delay their return to labor market and thus adjust labor supply to their preferences.

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Appendix I.: Childcare benefit system and parental leave in Hungary

Year	GYED	GYES
1992	W	W, PT
1993	W	W, PT
1994	W	W, PT
1995	W	W, PT
1996	-	M, PT
1997	-	M, PT
1998	-	M, PT
1999	-	U, FTH
2000	W	U, FTH
2001	W	U, FTH
2002	W	U, FTH
2003	W	U, FTH
2004	W	U, FTH
2005	W	U, FTH
2006	W	U, FT

Source: Köllő (2008)
(U: Universal; W: Tied to previous working history; M: Means-tested; PT: part time employment allowed; FTH: full-time employment allowed at home 1.5 year after birth; FT: full-time employment allowed 1 year after birth)

GYES
GYES is a childcare aid which is a relatively small amount benefit, but is available for any Hungarian citizen with a child up to 3, irrespective of previous work history.
Between 1996 and 1998 eligibility for this benefit depended on family income. The amount of GYES was fixed at appr. EUR 100 per month per family - independently of number of children - in 1996, and this amount was increased in each year by a rate comparable to the inflation rate.
Until the child is 1.5, the mother should not be working, or else she loses eligibility for GYES. Between 1996 and 1998 the mother was allowed to have a part-time job after the child turned 1.5, and keep eligibility for GYES. From 1999 the mother was allowed to undertake a full-time job while working at home and keep her eligibility after the child has reached age of 1.5. GYES cannot be received together with GYED or TGYAS.

GYED
This type of benefit did not exist in the 1996-99 period, it was launched in 2000. GYED is a childcare benefit of relatively high amount, which is tied to the previous work history of the mother. She is eligible for the benefit if she has worked at least for 180 days in the past 2 years. She is also eligible if she received GYED in the previous period. GYED amounts to the 70% of the average of past 2 years' salary, with a ceiling of twice the old-age pension minimum. This benefit may be received from the date of child birth until the child becomes 2, and the mother should not be working throughout the whole period. This child benefit remained unchanged until 2009.

TGYAS

The amount and the eligibility criteria of this benefit are mostly the same as those of GYED, with two exceptions. TGYAS can be received during the parental leave, which is as long as 24 weeks, of which at least 4 weeks should fall before the child birth, and the remainder may be claimed after birth. Also, there is no ceiling for the amount of TGYAS given, which is advantageous for those having received high wage before.
Only one of GYED, GYES and TGYAS could be received at the same time.

Family allowance
This benefit is a relatively small amount, but - under general circumstances - all households are eligible which have children under 18 - or under 23 and still be studying. The amount of family allowance is appr. EUR 50 per child, increasing with the number of children. The amount may be higher in case of seriously handicapped children, disadvantaged families or single parents. Eligibility and the amount does not depend on previous income, or work history. This benefit may be claimed together with other childcare benefits, like GYES, GYED or TGYAS.

Appendix II.: On data availability

Information on the treatment status (whether she had worked before giving birth) is available only for those women

- whose first observation is before giving birth
- whose first observation is after giving birth and the observed labor status is non-employed.

The reason is that the date of previous employment is asked only in case the individual is not employed at the time of the interview.

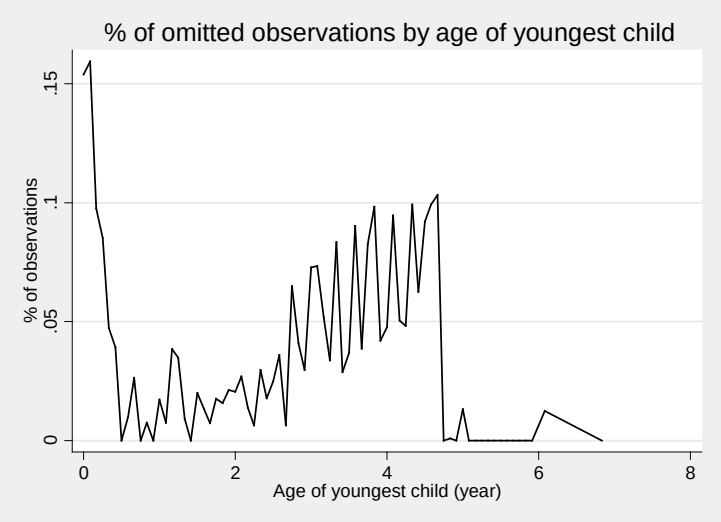
Information on the starting date of the analysis time is available for each individual, as the age of the child is available.

The reemployment date is

- available for those whose first observed labor status is non-employed and the last is employed.
- right censored for those whose first observed labor status is non-employed and the last is also non-employed.
- unavailable for those whose first observed labor status is employed. These observations should be omitted.

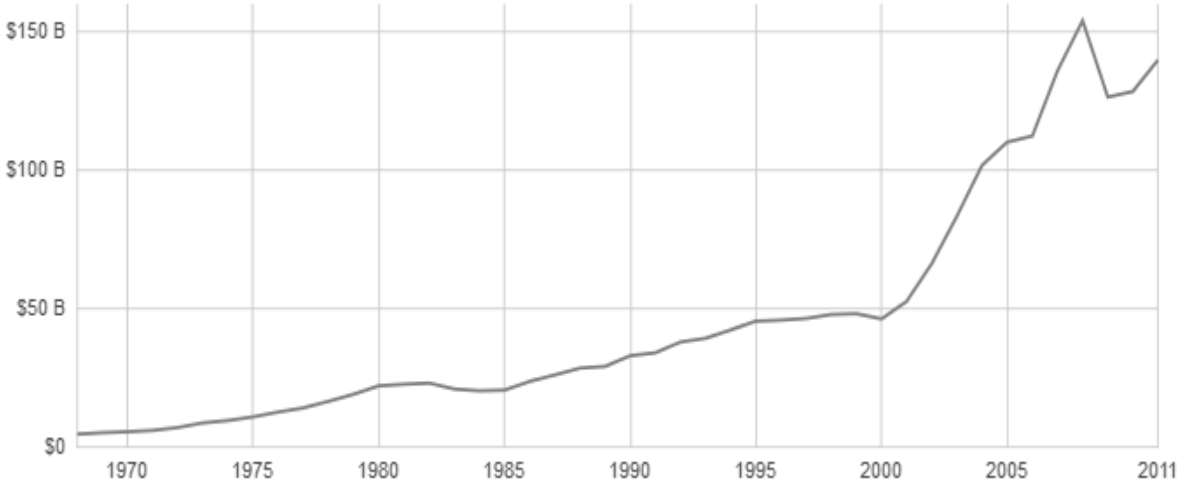
To sum up, nor treatment status, neither reemployment date is available for those observations, for which the first observed labor status is employed. These observations are omitted. The ratio of these omitted observations stays around 5% of the sample, and barely ever exceeds 10%. (It is about 15% just after birth, because of the birth date measurement error.) However, it should be noted that omitting these observations may bias the results.

Figure 9: Omitted observations

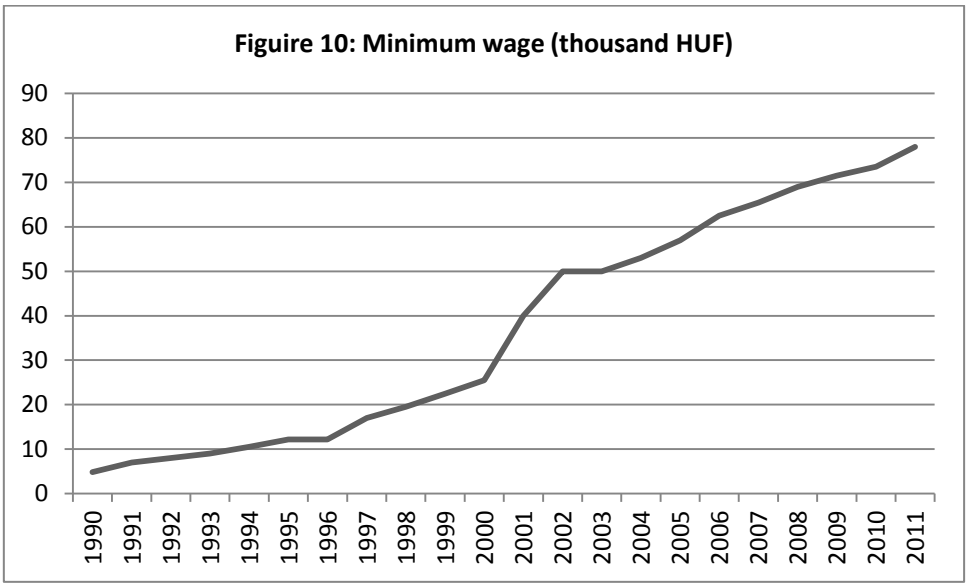


Appendix III: Additional figures

Figure 10: Hungarian GDP



Source: WorldBank GDP data



Source: CSO