Doctoral School Of General And Quantitative Economics

SUMMARY OF THESIS

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CHILDBEARING DECISIONS AND FERTILITY TIME SERIES BETWEEN 1970 AND 2011

Ph.D. dissertation

Supervisor:

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Professor

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Department of Macroeconomics

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1. Motivation and previous research

Hungary's and the European countries' well-known demographic problem is ageing of the society. It has/had two important factors: fluctuating decrease and low level of number of liveborn and increase of life expectancy in case of both women and men. Demographical rearrangement has serious economic results: decrease of number of potential contributors in relation to that of pensioners, medical care imposes increasing financial burden on elderly people while labour market supply narrows. The problems are worsened by the fact that activity and employment of working-age population is low in Hungary.

Downturn of birth rate is caused by decreasing number of of the female population of reproductive age, by decreasing childbearing willingness, and the increasing mean age at childbearing. In the thesis we are focusing on the second and third factors on both micro and macro level.

Level of fertility (i.e. average childbearing willingness), being relatively stable in the past for decades, remarkably changed after 1990. Value of total fertility rate radically decreased between 1990 and 2000: from 1,87 to 1,32 (*KSH* [2011a]), then relatively stagnated in the next decade. On European level, Hungary has very low fertility, after the turn of the millennium its value was some times „lowest-low" (by using demographic term of *Kohler–Billari–Ortega* [2002]), being under or around 1,3.

In parallel with it, in past decades women postponed the birth of their first (and by this way the next) child: mean age at birth increased from 22,86 (1980) and 22,99 (1990) to 28,23 (2010) (*KSH* [2011a]). While mean age was almost stable in the 1980s, it increased by more than five years in the next two decades. Consequently the ratio of childlessness females relatively to the female population of reproductive age is higher and higher in Hungary, furthermore the one-child family model is more and more dominant relatively to the two-children family model.

The question therefore arises whether transformation of childbearing willingness was affected by transformation of family policy. Family policy system had several changes in the past 40 years, affecting childbearing decision on both micro and macro level. Packages of measures in 1970s and 1980s aimed population; after changing of the regime current governments determined conversions of scope of aids and rules by considering economic situation, political commitment and target and trends of fertility. When comparing total amount of family support with GDP it becomes clear that if comparing with European countries, Hungary spent/spend high amount of money on child dependent benefits in the past two decades, but it did not improve value of traditional total fertility rate.

Other external factors affecting childbearing were also changed after changing of the regime in Hungary. In the thesis, only changes and effects of family policy system will be analysed on both micro and macro level. Transformation of fertility on macro level arises from total of individual responses: when studying total fertility indicators, it is important to understand how specific measures and legal amendments alter childbearing decision of different families.

Although knowing data and the relevant literature, several open questions appear when making comprehensive characterization of Hungary's fertility and its transformation. Ther art he following ones:

1. Did drastic downturn of fertility happen only in the 1990s?
2. Is total fertility rate able to reflect real fertility process correctly?
3. How does timing of childbearing affect traditional fertility indicator? Which institutional and economic factors formed and affected the level of childbearing?
4. How should be Hungarian fertility trend more precisely assessed and shown on macro level?
5. What factors did form and effect the average number of children in Hungary in the parst and in the present?
6. In Hungarian environment, what are the factors that motivate childbearing at individual level in the part few years?
7. How do childbearing motivations of families with differnet educational qualification differ from each other?
8. Which family policy measures and benefits effect on average level of childbearing and which ones affect timing of childbearing?

The thesis consists of three parts, all of them concentrating on topics related to estimate the level and timing of fertility on micro or macro level. The macro analysis starts in 1970 and goes on to 2011 in case of Hungary, but the micro analysis deals with the time period 2006-2014.

1.1. Theoretical background of measuring fertility[1]

Fertility (i.e. punctual measurement of average childbearing disposition) has crucial importance from both economic policy's and demography's point of view. The precise measurement of fertility is essential for researches delaing with revealing the causes and effets

[1] The chapter's content has overlaps with the joint papers of Berde and Németh (*Berde–Németh* [2014a], [2015a], [2015b]).

between the fertility and other factors. When knowing fertility's real, quantitative, past and present trends, it will be possible to study whether demographic policy's specific set of measures accomplished its targets (had adequate effect on number of births); whether how present family supports should be transformed and what kind of changes should be reckoned on these transformations; or how capacity of childcare institutions (crèche, kindergarten, school) should be transformed. Moreover, when forecasting future population, it is important to use the possibly most precise estimation, for that application of suitable fertility rate (and understanding of its content) is crucial. Only this population forecast gives the base for determining young population size, old dependency rate, ageing index or potential labour supply. Forecasting of these numbers are essential for the planing of future medical care's and pension's expenditure. Knowledge of population and, indirectly, fertility changes is also essential for evaluation and forecast of economic development's direction: exogenous and endogenous growth models' equilibrium solution is mostly based on population's growth rate.

Measurement of fertility level can be performed along two dimensions. When studying childbearing of ones born in the same year (i.e. being the members of one cohort), the cohort completed fertility (or cohort fertility rate, CFR) can be quantified by past (time series) data. If measurement is based on cross section data, the fertility rate will be measure the average childbearing willingness of a women of a specific year. In the course of analyses, researches, impact assessments, selection of the more suitable fertility index (cohort or period year) is important. Content of these indicators widely differs, explanation of the problem will be detailed in the chapter.

Bulk of social policy researches use the most well-known period year indicator number, i.e. total fertility rate. However, accuracy of period year indicators is questionable, their value can be distorted, to a greater or lesser extent. The most important factor that can strongly distort indicators is dynamic transformation of childrearing's timing. For this reason, estimation of fertility behaviour in a specific year (in contradiction to measuring cohort fertility rate) takes up several methodological questions.

When characterizing real fertility situation, instead of total fertility rate, usage of period year fertility indicators would be more suitable as the latters eliminate distorts. The aim of the chapter is to show the adjusted fertility indicators in detail.

1.2. The application of the adjusted fertility rates, with especial regard to characterization of the Hungarian fertility trend on macro level between 1970 and 2011

Developed countries were characterized by falling fertility rates in the decades before 2000. The joint fertility of EU28, when measured by ordinary TFR decreased from around 1,9 in 1980 to 1,45 in 1995, then permanently remained at the lover level till 2002 (VID [2014]). This stagnation was disrupted by a new upward trend, which lasted till 2010. Average TFR was 1,62 that time for the EU member states. In 2013 we could experience a fall-back again to 1,55 for the EU28. The few year long lasting period was presumably a consequence of slowing postponement of child bearing (Eurostat [2016a]). For most of Europe the ordinary TFR dropped significantly between 2000 and 2009, although the pace and timing of deterioration differs by country-groups. In the Central-Eastern-European countries the downward trend intensified in the first half of 1990s and lasted till 2003(VID[2014]).

A good signal of low European fertility that in many EU member states – including the Czech Republic, Greece, Italy Spain and Slovenia – the TFR is at super-low level, below 1,3 (Kohler-Billari-Ortega[2002]). After a relative improvement in 2013 only three countries – Spain, Poland and Portugal remained in this category (Eurostat [2016a]). After a significant fall-back in the 1990s, from the 2000s most CEE countries, including all Visegrád countries, belongs to the group characterized by low fertility, as in the past 15 years the value of TFR was constantly at, or below 1,5.

Between 1970 and 2011, similarly to the European trend, the fertility behaviour significantly changed in Hungary, too. The highest TFR value of the period was 2,36 in 1975, while the lowest value was 1,25 in 2010. This means, if a woman lived her potential child bearing years according to the 1970s age-specific fertility rates, she had 2,36, when according to 2000s, she had 1,25 children. TFR shows a dramatically big difference, which suggests a remarkable drop in average willingness to childbearing in Hungary (KSH[2012]).

During the analised time period the most significant alteration notably influencing and modifying TFR value was the delaying of women's age at birth: the postponement. Postponement in Hungary still started in the 1980s, but accelerated from early 1990s (changing of the regime). While women's mean age at birth was 25,67 in 1990, it increased to 30,03 in 2011. (*KSH* [2012]). Drastic transformation of timing of childbirths is clearly demonstrated by the following comparison: while in 2011 women gave birth to their first child at mean age 28,34 years (*KSH* [2012]), twenty years before the same aged women realized the ordinary family model with two children (*Kamarás* [2012] p. 12.), being mostly the final size of families that time.

Because postponement distorts value of TFR, from 1990s onwards, it is well recommended the usage of adjusted fertility rates being able to eliminate tempo effect. Such suitable rates are TFR*, PATFR* and TFRp*. At the beginning of the following chapter, Hungary's fertility situation is evaluated in comparison with that of Visegrád countries, thus drawing the attention to effects and results of postponement. Moreover, estimation of adjusted fertility rates' suitability being introduced in subchapter 2.4 will also be shown on these countries (with the exception of Poland, owing to lack of data). From fertility rates, the one following cohort fertility rate (CFR) the will be chosen as CFR reflects real fertility effects. On the remaining part of the chapter, only the best adjusted fertility rate will be taken as a base; Hungarian fertility's quantitative changes and measure of postponement's effect will be characterized in detail with this fertility rate for period between 1970 and 2011, by parities.

Until now, Hungarian experts always used value of TFR for introducing period fertility changes and that of CFR to characterize real fertility effects. Practical benefit of adjusted fertility rates is the ability to eliminate tempo effect and other distortions, thus showing whether real, quantitative fertility change happened in given *period year* in comparison with previous years or not. Profound knowledge of fertility's quantitative changes makes it also possible to reassess effects of family policy measures in the past decades and to identify more correctly the structural factors causing transformation of childrearing behaviour. Precise knowledge of fertility's present trend is unavoidable from both demographic and economic point of view: for sake of forecasting proportions of age-groups within the population and likely future-labour supply, managing problems of ageing population, coming to suitable and effective family policy decisions, building or altering of childcare institutions.

Casual relationships are not explored in the chapter, but main measures of family policy during study period are assessed. It is evaluated whether fertility effect appeared in parallel with measures (but not solely by them) or did it change childrearing's tempo effect on macro level. Moreover, it is attempted by technical references to divide structural factors of fertility by tempo effect and quantitative effect.

1.3. Life-cycle model of childbearing decision in Hungary

Aim of present study completing body of knowledge is modelling Hungarian childbearing decision on micro level. For this reason, decision about childbearing should be individually surveyed, institutional and economic factors affecting the decision are to be explored on *micro level*. The model considers important native factors (with especial regard to family support systems) and different behaviour of families with different education level. We have no knowledge about such modelling attempt in Hungarian scientific literature.

Modelling of women's decision about childbearing and working has rich literature. One of the main schools drafts women's decision (childbearing and labour market) within framework of dynamic or life cycle model, under given circumstances and conditions. These models commonly suppose optimizing economic agent and consider all the direct and indirect cost and profit of childbearing. Solving or structural estimation of such dynamic models may give answer to several content issues (role of family policy grantings and childcare institutions in life-cycle decisions, reason of decreasing fertility, alteration of women's employment, differences of fertility and work decisions between different countries (*Arroyo–Zhang* [1997], *Hotz et. al* [1997], *Francesconi*[2002], *Del Boca–Sauer* [2009], *Bick* [2010], *Keane–Wolpin* [2010]).

Structure, features and solubility of dynamic or life-cycle models are comprehensively summarized by studies of Arroyo and Zhang [1997] and Hotz and co-authors [1997]. In the dynamic structural model of Francesconi [2002], married women make decision about working and having children and women differ according to type of their job (full time or part time). This model had several significant results; the one being important from our point of view: if a woman with full time job bears a child and leaves at home for long time, life-cycle utility will be much lower than in a case that she goes back to work soon. At case of women having part time job, this difference is negligible. Keane and Wolpin [2010] used structurally estimated life-cycle model in order to quantify career decision of different Spanish women in relation of different preferences, available welfare services and differences in labour market opportunities. Del Boca and Sauer [2009] estimated a decision rule from life-cycle model based on data of Italy, France and Spain, then drew conclusions about connection of institutional environment, labour market flexibility, childcare institutions and decision about activity and fertility. Bick [2010] calibrated a life cycle model on German data in order to examine effects of two newly initiated reforms in Germany. The main question was the possible relationship between available state-subsidized capacity in crèche and married women's childbearing willingness and their life cycle's job offer. The result of Bick's study [2010] shows that availability of state-subsidized crèche institutions positively effect on labour market activity and at the same time fertility of women having child under three-year-old age.

In order to construct microeconomic, dynamic or life cycle model about optimal childbearing strategy in Hungary, our model (based on Bick's results [2010]) considers temporal connection between childbearing decision, subsequent re-enter to work and structural factors affecting childrear, and mode of action between them. The model contains all the Hungarian *economic and institutional factors* that are believed to affect childbearing decision on micro level: possibility of taking care of children under three-year-old at daytime;

educational level, labour market status and income of the parents; support of families. Among these factors, study of family policies' effect on childbearing has great emphasize. It is stressed on that several other factors having significant effect on childbearing in real life (changes of value, spreading of new types of relationship, cultural and biological factors and housing of the family) were left out from the model. Accordingly, by taking given system of parental leave and benefits for granted, carreer decision of women having finished school but still being in childbearing age is drafted, solving of the model is based on the comparison of direct and indirect costs and benefits related on childbearing.

The model shows the *optimal number of children and optimal time of childbearing at case of different absence from labour market* for families with different parameters (different education level, etc.) under given parental leave and benefits conditions. In another way, the model *ceteris paribus* shows how several transformation of child care policy system influences families' optimal childbearing. By the model, some details will be also explained: which benefits affect timing of childbearing and which ones affect quick return to work; which benefit helps at most childbearing of families with different education level; how far does the optimal childbearing strategy of families with various education level differ under given subsidy conditions. Three different child care policy regimes were examined: 2006-2010, 2011-2013 and the one established from 2014. The new law package initiated in January 2014 contains new rules for family benefits and parental leave of absence of mothers with young children (GYED extra), it makes study of the current and two previous regulatory environments' effect on childbearing decision even more actual.

2. Apllied methods

2.1. Theoretical background of measuring fertility

- In this chapter we summarised the related original literature about the more recently developed adjusted fertility indicators and about the traditional period fertility indicator. Specifically these indicators are the following:
    - The traditional total fertility rate are presented based on (TFR) Kuczynski [1932] and Sobotka–Lutz [2011]
    - Bongaarts – Feeney Tempo-Adjusted Total Fertility Rate (TFR*) (TFR*) are presented based on Bongaarts–Feeney [1998], [2000]
    - Kohler – Ortega Tempo- and Parity-Adjusted Total Fertility Rate (PATFR*) are presented based on Rallu–Toulemon [1994], Kohler–Philipov [2001], Kohler–Ortega [2002]
    - Bongaarts – Feeney Tempo- and Parity-Adjusted Total Fertility Rate (TFRp*) are presented based on Bongaarts–Feeney [2004], [2006].
- In each case we exhibit the calculation, interpretation, advantages and disadvantages of application of these period indicators.
- We drew attention to two factors, the tempo and parity effects, and how these specific indicators treat the possible distortions.
- We review the technique of relevant demographic literature about how much the cohort fertility rate (CFR) differs from period fertility rate: the choice among the adjusted fertility indicators based on the absolute average differences between adequate CFR and values of the period indicators (TFR*, PATFR* or TFRp*) were calculated. The best period indicator is which is the nearest to the CFR for a longer time period in average. (*Sobotka* [2003b], *Bongaarts–Sobotka* [2012]).
- We summarised the calculation of demographers' related literature of and our own research and evaluate the reliability of adjusted period indicators in comparison to cohort fertility rate.

2.2. The application of the adjusted fertility rates, with especial regard to characterization of the Hungarian fertility trend on macro level between 1970 and 2011

- TFR (total fertility rate) and TFR* (Bongaarts – Feeney Tempo-Adjusted Total Fertility Rate) indicators of Visegrád countries between 1970 and 2011 were quantified, pictured and compared.

- Tendency of fertility in the past forty years was analysed by two indicators.
- Simple 5-year moving average of TFR*, PATFR* and TFRp* (MA after the indicator names refers to this) relating to the first three parities were quantified and pictured at case of Hungary, Czech Republic, and Slovakia for different period years.
- By data of Human Fertility Database (*HFD* [2014]), adequate CFR values from 1971[2] were pictured until the year that CFR made comparison possible. Adequate CFR value means that in each studied year the specific cohort's CFR (or estimated CFR) value (concerning given parity) was indicated by the value concerning the same parity of the period year fertility rate, which cohort had the mean age at birth in the specific calendar year in case of the studied parity.
- If needed, estimated CFR values for Hungary, Czech Republic and Slovakia were calculated by the following methodology: the age-specific fertility rates of the cohort we wanted to estimate were cumulated by parities until the age we had data about the cohort; then sum total of (period year) age-specific fertility rates concerning missing years were added that related to the last observation year[3] of HFD database. Closed fertility rate was estimated by this methodology for only that cohort, for which real age-specific fertility rates were known for 40 year age, so CFR was estimated by 1962-1971 cohort for Czech Republic, by 1960-1969 cohort for Hungary and Slovakia.
- Absolute average of differences between adequate CFR, TFR*, PATFR* and TFRp* values were calculated for different periods by parities at case of Czech Republic, Hungary and Slovakia, then the corrected indicators showing the least deviance were chosen by parities.
- Using the above mentioned techniques, indicators providing the best estimation for CFR were given for each parity.
- Value of total fertility rate (TFRp*) corrected by Bongaarts – Feeney Tempo-Adjusted Total Fertility Rate (until now treated as the best method) was quantified for Hungary, for first three parities between 1970 and 2011.
- Mean age at birth and its annual average change for first three parities between 1970 and 2011 were quantified.
- Hungary's fertility and degree of tempo effect for first three parities between 1970 and 2011 *were collectively characterized by abovementioned indicators.*

[2] Comparison starts from 1971 and not 1970 as lack of data hindered the quantification of PATFR* for 1970.
[3] The last year from that HFD [2014] contains data is 2011 for Czech Republic, 2009 for Hungary and Slovakia.

- Main changes of family support system in the studied forty years were presented chronologically.
- In parallel with family policy measures, several changes could be observed on macro level about timing of childbearing and fertility level measured by TFRp*; trends and extents of the changes are discussed.
- Opinion of technical literature about abovementioned measures' effects (tendency and extent) on childbearing was collected.

2.3. Life-cycle model of childbearing decision in Hungary

In accordance with relevant literature our life-cycle model have the following general features. The family consists of a female and a male: they decide on the number of children, time of childbearing, using time and income along the life-cycle. We assume that the couple maximize the life-cycle utility featured by a well-defined set of preferences, subject to time and budget constraints, to technological constraints which govern the production of children and to constraints on the production of the woman's productivity. About the life-cycle models of fertility Hotz, Klerman and Willis [1997] and Arroyo and Zhang [1997] give a comprehensive overview, and in Hungarian language the features of these model summarized by studies Gábos [2005]. We now briefly describe the specifications of our model features. We supplement or simplify the general settings of the life-cycle models in many points according to the Hungarian environment, so we apply the following life-cycle model. We have calibrated the model's parameters for Hungarian data.

In the household the woman is the real decision maker: she decides in each period on consumption, childbearing, when having small children she decides on her employment. In the meantime the man is passive, works in each period (only exception is the family without any qualifications) (*Hotz et. al* [1997], *Keane–Wolpin* [2010], *Fehr–Ujhelyiova* [2011]). We assume, that in periods when there is no small child in the family, the woman is employed full-time, too (with the exception she has no qualifications, in which case she remains inactive during her lifetime). But if there is a child under three years, the woman decides on whether taking a job or not.

In the model all families can have three children as a maximum, only one child can be born in one time period, an in the year of birth the woman spends all her time with the child. After their birth the children have similar consumption patterns as their parents, and if the mother works, they need childcare facilities (family nursery, private nursery). In the model we do not differentiate based on different „qualities" of children, meaning different parents spend differently on the education of their children. In order of simplification we assume that free

kindergarten and school is available for each child in the same quality. Thus we account for zero childbearing costs above three years. We do not include in the model that costs of childbearing change by age of the child and by the level of education of the parents (*Bartus et al.* [2013]).

When solving the model we take into account that agents with different educational background possess different fertility and income patterns during their lifetime. Accordingly we separately solve the model for unqualified (maximum eight classes of primary school), poorly qualified (vocational training), middle qualified (high school) and highly qualified (at least college, university) groups and we represent qualification in the model by initial gross income and the level of productivity parameters. For men we assume an exogenous productivity profile depending on age and qualification. The productivity profile of the women is endogenous because we take into account that in periods when she raises her child and does not work, her human capital depreciates (*Bartus et al.* [2003]). For simplification we assume that members of a household are equally qualified. In the 2010-2011 environment of the model we used 2011 gross wages, in 2014 environment the 2013 gross wages to estimate parameters of the productivity curve for both men and women and for each level of qualification.

The base model was solved in three different subsidy environments: the 2010, 2011 and 2014 family benefit schemes were applied. From 1st January 2014 there was a significant change in child care policy, compared to previous schemes a more flexible system was introduced. As far as an abstracted model allows we tried to build in the model the benefit providing rules of the old and new regimes, the level of benefits, tax rules and income curves depending on qualification. Other transfers were not taken into account, because they are not relevant in our model.

In the model the following direct and indirect costs of childbearing/childrearing are for the families:[4]:

- Consumption of the children (direct cost)
- Cost of day-time child care facilities if the mother is working (direct cost)
- The mother's omitted wage during the time spent at home with children (direct cost)
- Because of human capital loss of mother the life-time income will lower (indirect cost)
- Onetime fix cost of mother's return to the labour market, which cost is increasing with the number of children (indirect cost)

[4] Gábos András and Gál Róbert Iván use similar cost and benefit factors of childbearing (*Gábos–Gál–Keller* [2007]).

In the other view the childbearing is attractive for the families because of the following factors:

- The child is pleasure for the parents. The instantaneous utility function depends positively on the number of children.
- The parents get a lots of transfer after children.
- The parents get tax allowance after the children.

Sum up the representative household maximizes the life-cycle utility subject to the constraints. We use Belmann-equation for solving the dynamic problem of the household. We solve the model by backward recursion accordingly to the method of dynamic programming using MATLAB. The model eventually calculate the optimal timing and number of children to bear and optimal duration of breaks in labour market participation of a representative familiy during their life-cycle. In all we analise the optimal childbearing-labour supply strategy (the maximum life-cycle utility) for 12 different families (by four different level of education and three different child care policy systems). In other words the model shows that ceteris paribus the recurring changes in child care policies how much and in which direction modified the optimal strategy of families.

3. Results of the thesis

The thesis consists of three parts, all of them concentrating on topics related to estimate the level and timing of fertility on micro or macro level. The first part draws attention to the importance of fertility measurement, the second part demonstrates practical applications and comparison of previously introduced indicators and analyses the development of fertility in Hungary in the past forty years from a macro perspective. In the third part we introduce a life-cycle model applicable for Hungary, where the optimal childbearing strategy of different individual agents can be found, taking into account the influencing economic and institutional factors. In the following points we summarize main results of each section of the thesis.

3.1. Theoretical background of measuring

- It gives a comprenhensive, methodological review about fertility measuring. It introduces the evaluation process and the results of the reliability of adjusted period indicators in comparison to cohort fertility rate in Hungarian language.
- It introduces the following adjusted period fertility rates: Bongaarts – Feeney Tempo-Adjusted Total Fertility Rate (TFR*) (*Bongaarts–Feeney* [1998], [2000]); Kohler – Ortega Tempo- and Parity-Adjusted Total Fertility Rate (PATFR*) (*Rallu–Toulemon* [1994], *Kohler–Philipov* [2001], *Kohler–Ortega* [2002]); Bongaarts – Feeney Tempo- and Parity-Adjusted Total Fertility Rate (TFRp*) (*Bongaarts–Feeney* [2004], [2006]).
- It describes the indicators using an integrated framework. In each case we exhibit the calculation, interpretation, advantages and disadvantages of application and possible distortions characteristic to the specific indicator.
- We drew attention to distortion factors (first of all the tempo effect) which heavily distort the period fertility measurement and to the importance of removing it.
- We emphasized that in period strengthening postponement it is recommend to use adjusted fertility rates instead of common Total Fertility Rate.
- Based on the results of relevant literature and on our own research, we showed TFRp* to be the best in period fertility measurement to characterize the fertility trend.

3.2. The application of the adjusted fertility rates, with especial regard to characterization of the Hungarian fertility trend on macro level between 1970 and 2011

- We draw attention that from 1990 the postponement strhegthend in Hungary also among other Visegrádi countries, and to the necessity of tackling this problem when measuring fertility. Because of this phenomenon it is not enough to analyze the common TFR.
- We calculated Bongaarts – Feeney Tempo- and Parity-Adjusted Total Fertility Rate (TFRp*) using Hungarian data for the first time by parities between 1970 and 2011.
- We calculated the above described adjusted fertility indicators (TFR*, PATFR*, TFRp*) for Hungary, Slovakia and the Czech Republic, we compared the Completed Cohort Fertility and period fertility indicators. Our own calculation – in accordance with current literature – verified that TFRp* both by parities and in general is the best, least biased fertility measure.
- Based on TFRp*, as least biased indicator, we described in detail and interpreted in a new framework the development of Hungarian fertility in past forty years, moreover we highlighted, how important postponement was by parities and by time periods.
- We can conclude, that average childbearing between 1970 and 1990 was relatively stable, but after the transition postponement strengthened and at the same time the average childbearing continuously decreased. The two trends differed by parities and by periods after 1990. Current tendencies reveal that the pace of postponement may have slowed by late 2000's, but the two factors, which negatively influences TFR still persist after 2010.
- The families reacted more sensitively to the indogenous/exogenous factors of bearing the second-third child as of the first child. Presumably the families are less motivated to postpone the bearing of the first child after a neagitve event or to increase it after a positive one.
- The fertility by first parity did not decline singnificantly after the transition but after the middle of the first decade after 2000. In the 1990's one part of families gave up the childbearing of the second child, but the other part only postpone it. By the end of the first decade after 2000 the fertility by third parity decreased to the level of the beginning os 1970's. The fertility of childless women decreased to the biggest extent during the analised 40 years.

3.3. Life-cycle model of childbearing decision in Hungary

- The main results are the building up of a life-cycle model which incorporates characteristics of the domesctic environment, calibration of parameters and the simulation of the model. Based on the simulation results of the model the child care policy scheme between 2006 and 2014 can be analyzed, specifically its influence on optimal childbearing strategies given different levels of qualification.
- As far as we know, in the domestic literature there hasn't been a miliar modelling experiment, where childbearing decision was examined in a life-cycle model.
- The child care policy regime of 2006-2010 made the bearing of the third child optimal for two-childrens families with low- and middle level of qualification. Compared to this in 2011 three children was more optimal than two at each level of qualification, moreover at low- and middle level of qualification having three children was more optimal than one. The 2014 GYED Extra scheme incentivised all the families (with low-, middle- and high qualification) to have three children.
- Among child care policy regimes described here, the family tax benefit system, introduced in 2011 influenced the optimal age of motherhood the most, because it makes earlier childbearing optimal at low-, and middle levels of qualification.
- Families with high qualification and high income were the most incentivised for high paced childbearing by the new tax benefit system introduced in 2011. While the low- and middle income (and qualified) families were most incentivised by certain elements of GYED Extra.
- The mothers' return to the labour market was becoming more strongly supported from 2010 to 2011 and further to 2014 in each category.
- The optimal strategy for the least educated in all systems is having as many children as early as possible. The GYED Extra system influenced their behaviouronly to the extent that having the second child at the first one means a greater improvement in their life-cycle utility than before.

To sum up, the dissertation draft draws attention to the opportunity of measuring period fertility more precisely than before; thanks to the results of the dissertation we understand better the changes of Hungarian fertility on macro level, and the effect of the Hungarian child care policy regime on childbearing on micro level.

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