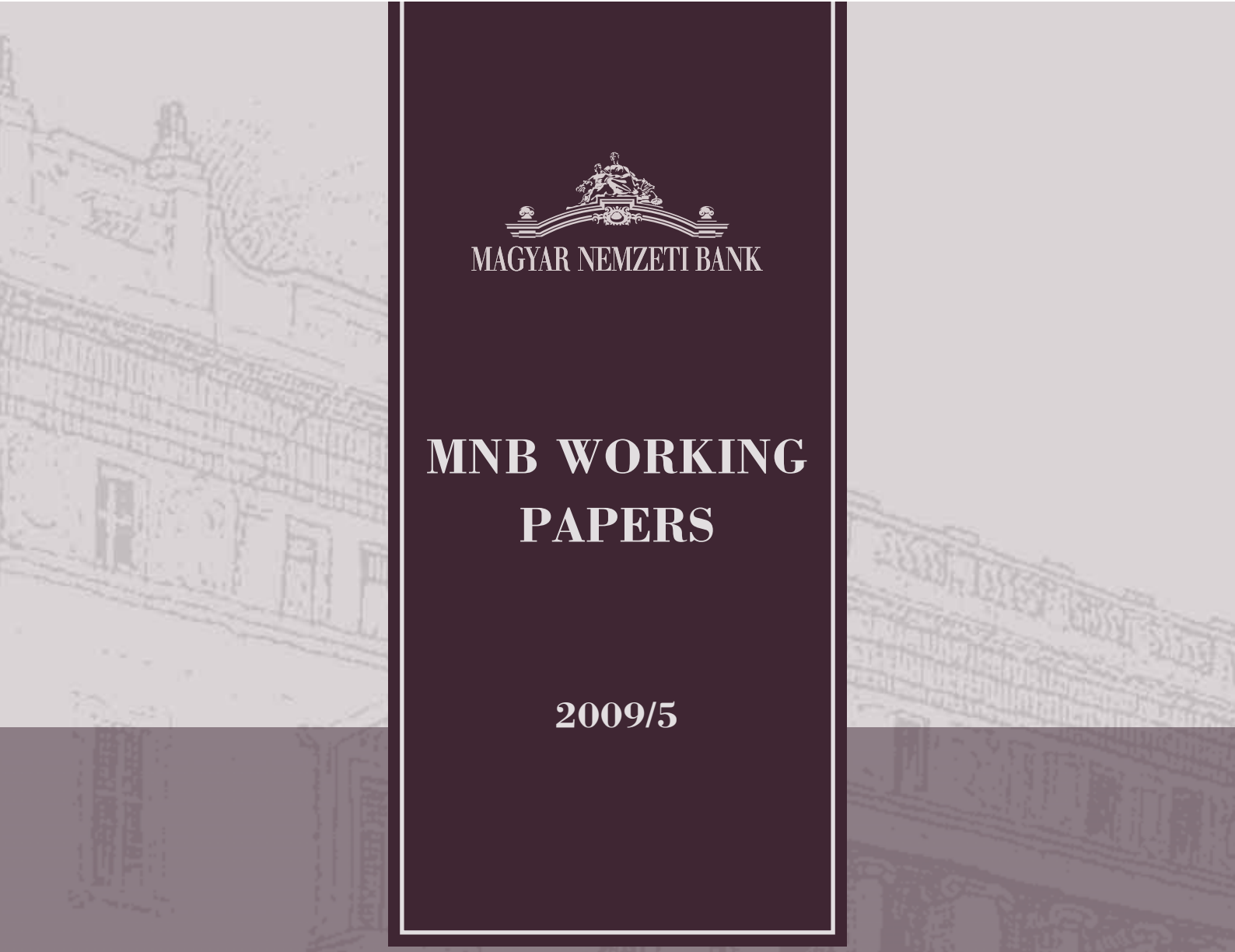

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Driving Forces Behind Changes in the Aggregate Labour Force Participation in Hungary

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Driving Forces Behind Changes in the Aggregate Labour Force Participation in Hungary

(Az aggregált aktivitást befolyásoló tényezők Magyarországon)

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Contents

Abstract

This paper proposes a simple and transparent methodology for decomposing changes in the aggregate labour force participation rate over time into changes in the labour force participation behaviour of different population groups and changes in each group's population share. Unlike traditional decomposition methods based only on demographic factors, our approach also identifies the contribution of all major factors that can account for the developments in the labour force participation such as change in the general educational level or the most important social welfare programs. An application on Hungarian labour force data shows that the selected variables explain the evolution of the participation rate quite well – especially on the long term. More specifically, our results indicate that the rising labour supply since '97 in Hungary was principally driven by the increasing average level of education and, most importantly, the gradual tightening of the conditions of old-age retirement. The other estimated effects are also in line with our expectations. Given that the residual term not captured by the model has no visible trend but fluctuates with economic cycles, the explained part can also be interpreted as an indicator of the underlying labour supply.

JEL Classification: J11, J21, J22, J26.
Keywords: labour force participation, decomposition, demographic change, schooling, social transfers.

Összefoglalás

Tanulmányunkban egy egyszerű és transzparens módszert javaslunk, amelynek segítségével az aggregált aktivitási rátát felbonthatjuk a népesség egyes csoportjain belül jelentkező viselkedési- és a csoportok egymáshoz viszonyított arányának megváltozásából adódó összetétel-hatásra. A demográfiai hatásokat kiszűrő hagyományos dekompozíciós módszerektől eltérően az általunk bemutatott megközelítés az aktivitási ráta alakulását befolyásoló egyéb jelentős faktorok, így a jóléti ellátások és az iskolázottság hatásait is számszerűsíti. A módszert a magyar aktivitási adatokon alkalmazva kiderül, hogy a kijelölt változók – különösen hosszú távon – jól magyarázzák az aktivitás változásait. Eredményeink szerint az aktivitási ráta 1997 óta tartó növekedése az átlagos iskolázottság emelkedésének és még inkább az öregségi nyugdíj feltételeiben bekövetkezett fokozatos szigorításnak köszönhető. A további becsült hatások is megfelelnek korábbi várakozásainknak. Miután a reziduumban nem figyelhető meg egyértelmű trend, hanem inkább a gazdasági ciklus függvényében változik, a becsült összetétel-hatás a munkaerő alapvető, ciklikus hatásoktól szűrt indikátoraként is felfogható.

1 Introduction

Understanding the driving forces behind the evolution of the participation rate is necessary for the projection of labour supply, a key input into the determination of the economy's production potential. Human capital is an important component of the production process and growing labour supply allows increasing output without putting too much pressure on wage costs and consequently on products' prices. This paper shows how changes in the aggregate labour force participation can be decomposed into changes in the labour force participation behaviour of different population groups and changes in each group's population share. Unlike previous similar studies which aim to separate demographic factors from the aggregate changes, our decomposition identifies the contribution of all major factors that can account for the developments in the labour force participation such as change in the general educational level or the most important social welfare programs.

Traditionally, labour force participation projections are derived from the combined effect of age- and gender specific labour force participation rate projections and demographic projections. In its simplest way, it consists of taking historical participation rates for age- and gender specific groups and then combining them with projected changes in the demographic composition of the population. Although the strength of this method undoubtedly comes from its simplicity, these decompositions usually reveal that the changes in labour supply behaviour within the various demographic groups cannot be neglected.[1] Thus, understanding the sources of the changes in age- and gender specific participation rates called for refinement of old methods.

The methodology currently used by many forecasters is based on an approach that explicitly takes into account the evolution of lifetime profiles of participation of different generations. More specifically, these so called cohort-component models presented in Fallick & Pingle (2007) use econometric tools to estimate generation-specific factors that may have influenced the participation rates within the demographic cells. This participation gap between subsequent cohorts reflects sociocultural factors (as for example longer schooling or change in the role of women in households), institutional factors (such as retirement schemes), economic factors or other individual factors (such as attitudes, health, etc). The often mentioned shortcoming of the cohort-based model is that the age-period-cohort effects cannot be identified separately because of the obvious multicollinearity between the three effects. This is usually circumvented by estimating only a dummy variable for every cohort which shifts the whole age-participation profile by a fixed coefficient. In case of changes affecting the cohort asymmetrically over time (e.g. attitudes towards maternity or education during the time of schooling and after), this might seriously bias the results.[2]

An alternative approach of modelling labour supply uses more or less complex models of utility maximizing agents facing labour-leisure trade-off. While these models generally provide useful insight into individuals' decision making process and outcomes, they are rarely used for forecasting exercises and policy simulations because of their complexity and, in most of the cases, the intensive data requirements. Moreover, models focusing on individuals' flows between different labour market states usually concentrate on some specific aspects of the labour supply decisions, a clear overall picture of the main factors affecting aggregate participation rarely emerges.[3]

Our approach consists of a new method to decompose changes in the participation rate. In addition to separating demographic factors, we also investigate the contribution of schooling and the most important transfers on the changes in the aggregate labour supply. After a short history review of the Hungarian labour force developments, the next section shows that a few variables used in our analysis capture the largest part

[1] For a recent application, see e.g. Hotchkiss (2009)

[2] The cohort-component approach has been recently applied to analyse labour supply in Beaudry & Lemieux (1999) for Canada, Fukuda (2006) for Japan, Carone (2005) and, more recently, Balleer *et al.* (2009) for EU countries and Burniaux *et al.* (2004) for OECD countries. The official European Commission participation rate projections are also based on such method (see Commission (2008)). For an early discussion on the problems associated with different accounting models that rely on functional form assumptions, see Mason & Fienberg (1985).

[3] For a concise survey of the literature on labour market flows between activity and inactivity, see Garibaldi & Wasmer (2002).

of individuals' labour supply decisions. Moreover, coefficients remain relatively stable through time, which confirms that the partial effects of these variables did not change significantly during the observed period. Based on this evidence, Section 4 proposes a simple and transparent method to decompose the evolution of the aggregate labour supply. This method remains practically as simple as the classical decomposition based only on demographic factors, requires less assumptions while being more flexible compared to the cohort-component models and appears to capture most of the variation within various demographic cells as well. More precisely, our results presented in Section 5 indicate that the rising labour supply since '97 in Hungary was principally driven by the increasing average level of education and, most importantly, the gradual tightening of the conditions of old-age retirement. The other estimated effects of the factors investigated such as the variations in the demographic composition of the population, the effect of maternity allowances and the disabled pension system are also in line with our expectations. Given that the residual term not captured by the model has no visible trend but fluctuates with economic cycles, the explained part can also be interpreted as an indicator of the underlying labour supply.

2 Short history review

Probably the most striking characteristic of the Hungarian labour market is the low labour market participation. With only 61.9 percent of the 15-64 years old population working or actively seeking employment, Hungary records the second lowest participation rate among the EU member states.[4] This indicator means a shortfall of over 10 percentage points compared to the rate of the EU-15. The low value originates in the economic transition taking place in the early '90s.

Hungary chose a relatively fast way of the transition. The "shock therapy" as opposed to the more gradual approach adopted by several post-socialist countries involved fast and widespread economic system changes, including liberalization of prices, trade, capital markets and all aspects of the labour market. Hungary opted for case-by-case privatization of state assets, instead of mass privatization techniques as for example in the Czech Republic, Lithuania and to a lesser extent Slovakia. Despite the process was occasionally marred by corruption and scandal, it had the widely recognized advantage that the ownership of formerly state-owned companies has flowed largely to genuine private proprietors and strategic investors, with management decisions concentrated in a few hands. As a result, newly privatized firms facing an increasing competition and the loss of previous export markets have engaged in substantial restructuring and large-scale redundancies. In 1992, a fairly strict bankruptcy regulation was introduced, which led to forced exit of a large number of unviable firms and consequently to further drop in employment. Overall, while the decline of the GDP was not outstanding in the region, the shock therapy resulted in a 30 percentage decline in employment during the first few years of the transition process. Only Bulgaria and the Baltic states experienced a similarly high employment loss following the change of the regime. Not only the earlier "indoor unemployed" lost their jobs. The restructuring of the economy required new skills, which caused a serious matching problem in the labour market. While there were serious shortages of suitable workforce in some professions, many of the elderly, less educated people could not acquire the necessary skills in order to get a job among the changed circumstances.

Unlike in other post-socialist countries, a large component of employment reduction in Hungary has been accommodated by pushing people out of the labour force rather than into unemployment. A number of policy measures have contributed to the flow into inactive status of those losing their jobs in the course of the restructuring process. Not only the conditions of the old-age pension were alleviated, but the government closed his eyes to many healthy people entering the disability pension system. This treatment was one of the most important causes why many of those who had lost their jobs gave up looking for a new one and became inactive.

The participation rate touched the bottom in 1997, when the labour force participation was only 57.6 percent of the 15-64 years old population, about 10 percentage point lower than the average of the EU-15.[5] Since then, participation rate grew by about 4 percentage points. However, the average of the old EU-members increased by about the same extent, which means that the relative position of Hungary did not improve. In what follows, we will show that most of the growth can be explained by the factors discussed in our paper.

[4] Eurostat data for 2007.

[5] In our estimations we follow the Hungarian convention defining working-age population as those between 15-74 years of age. However, as 15-64 is the more universal definition, we use that for comparison.

3 Probit estimates of labour force participation

Labour force participation decisions are most often analysed using bivariate models. A large set of factors is likely to influence labour supply decisions with the most important being age, sex, level of education, present school attendance and the eligibility to social benefits. In order to examine the stability and the explanatory power of the variables chosen, we run separate probit regressions for each year using a large longitudinal micro dataset stemming from the Hungarian Labour Force Survey (LFS) for the years 1993-2008. The questionnaire is designed according to ILO recommendations with variables and definitions comparable to LFS data from other countries.[6]

The regression can be written as follows:

$$\Pr[a = 1] = \Phi(\beta X) \tag{1}$$

where a is a dummy indicating that the observed person belongs to the labour force and X is a vector containing explanatory variables such as demographical status (age and sex), the level of schooling, school attendance and the person receiving either old-age pension, disability pension or childcare benefit. At the level of education, we take 4 categories into account: 8 elementary or less, vocational, secondary and tertiary education. We do not make distinction between school attendees by the type of school. Due to the methodological changes of the survey during the observation period, we do not classify anyone as a school attendee in July and August. Each category generated by the aforementioned attributes is represented by dummies, which results in more flexibility. However, we do not include cross-effects and year dummies in the regression.

The explanatory power of the variables is reported in Table 1. The estimated probit regressions predicted activity correctly for about 90 percent of the observations.

The yearly changes of the probit coefficients are plotted on Figures 1 and 2. Generally speaking, it can be seen that the coefficients were quite stable during the period observed. The top graphs of Figure 1 shows that the age coefficients using yearly estimations fluctuate around the point estimates using the whole panel. Even if the differences between the yearly coefficients are statistically significants in many cases, no clear trend can be recognized for the most of the age groups. Although the bottom graphs of Figure 1 reveals some trend increase of conditional labour force participation of women aged 55-62 and men aged 60-62 and a decrease among young persons, coefficients remain stable for those belonging to the prime age groups. Figure 2 shows that the most of the coefficients – especially those belonging to the prime age groups, the level of education and the school attendance – were remarkably stable during the period observed. Some trends can only be recognized at the coefficients of the dummies indicating whether the person receives old-age pension or maternity allowance (decreasing relative activity of recipients).

Overall, stable coefficients reveal that the conditional probabilities of labour force participation did not change significantly during the observed period. According to our results, the characteristics generally used in this type of model predict the same probability of participation for all individuals with similar characteristics independently of the year of the observation. For example, a 48 years old woman with secondary education receiving disability allowance has roughly the same conditional probability of working or seeking for a job in 1993 and in 2008. This result is in itself interesting, especially in light of the fact that Hungary has undergone serious changes during these years of the transition.

The results above provide clear evidence on the validity and the relevance of the decomposition we use. As we will see in the next section, the decomposition assumes constant behaviour in all groups of population. If the partial effects of the observed characteristics on the participation probability do not change, all variation in the aggregate participation rate originates either from change in the composition of the population (demographic changes, change in the share of the population receiving social benefits, etc.) or the residual part not explained by these variables. This latter effect can be interpreted as the conditional willingness to work.[7]

[6] for details, see Appendix

Table 1

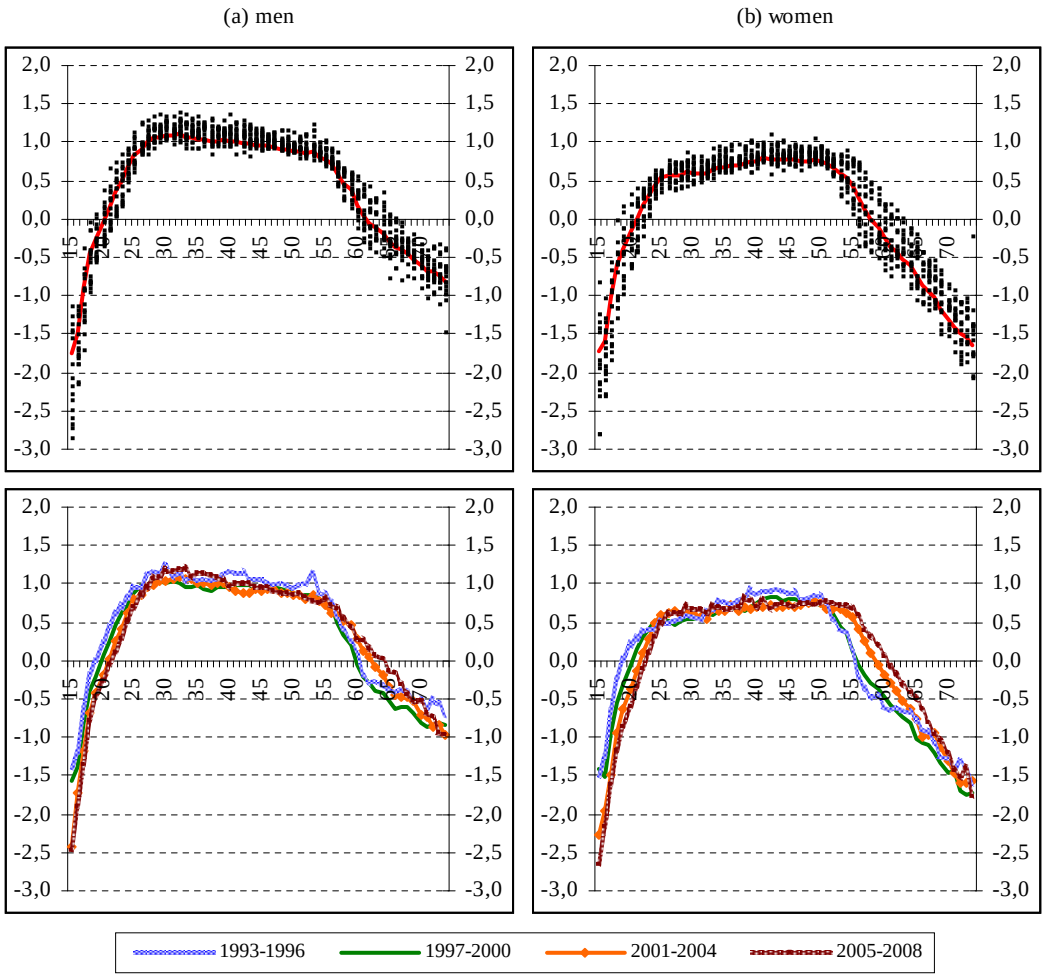
The share of observations correctly predicted

	Inactive correct	Active correct	All correct
1993	86.7%	93.1%	90.1%
1994	85.9%	93.0%	89.5%
1995	86.8%	93.3%	90.1%
1996	87.2%	94.0%	90.5%
1997	87.3%	93.5%	90.3%
1998	85.8%	93.1%	89.4%
1999	86.7%	93.5%	90.1%
2000	87.5%	93.7%	90.5%
2001	87.6%	93.6%	90.6%
2002	87.7%	93.5%	90.5%
2003	87.1%	93.3%	90.3%
2004	87.2%	92.6%	89.9%
2005	87.8%	92.5%	90.1%
2006	88.0%	92.3%	90.2%
2007	88.3%	92.9%	90.6%
2008	88.1%	92.5%	90.3%
All	87.2%	92.9%	90.0%

[7] However, if the participation probability of some groups changes during the years (e.g. 55-64 years-old women). the decomposition method can still be used. In this case, the change in the probability of participation of a specific group will be captured by the residual part. Moreover, the growing trend among the 55-64 years old women and the decreasing trend in the effect of the old-age pension might also be the consequence of lower flexibility of our probit model caused by the lack of cross-effect dummies. In order to verify the importance of behavioural change among 55-64 years old women during this period, we run the decomposition described in the next section for this group. The pattern of the composition effect was highly correlated with that of the participation rate, explaining 12 percentage points of the 16 percentage points participation rate growth between 1998 and 2007.

Figure 1

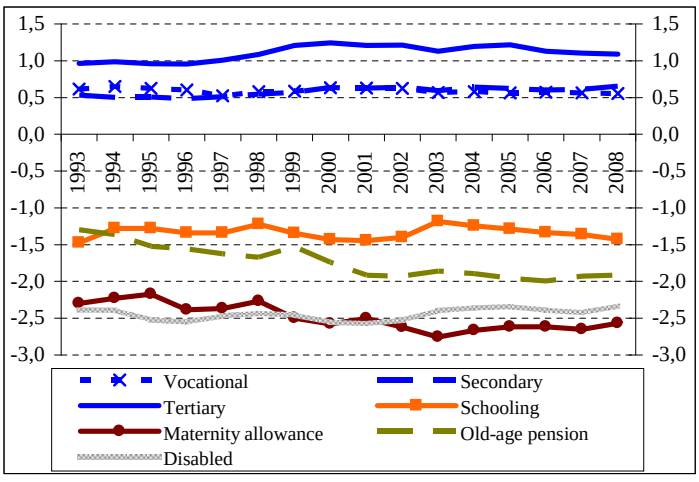
Age profiles for men and women*



** black points denote the coefficients of age dummies for men (a) and women (b) estimated for different years between 1993 and 2008. The red line indicates the coefficients esttimated using the whole panel. The bottom panels show age coefficients of probit estimates for different time intervals.*

Figure 2

Probit coefficients for different years



4 Decomposition method

Our method decomposing the main factors affecting labour supply is inspired by Baily *et al.* (1992). Their so-called BHC method is widely used to decompose aggregate total factor productivity (TFP) into genuine, firm-level TFP growth and reallocation of market shares. To our best knowledge, however, this method has never been used to separate the main factors affecting labour supply.

As a first step, we define clusters within the working-age population using the same attributes that were used in the probit regressions: age, sex, level of education, present school attendance, and an indicator whether the person is receiving any of the 3 most important transfers supporting inactivity: old-age pension, disability pension or childcare benefit.[8] Let s_{it} denote the share of the i^{th} cluster within the working age population in period t and p_{it} its participation rate. Hence, the change in the aggregate participation rate (P_t) can be decomposed into a "composition effect" (first term) and an unexplained "residual effect" (second term):

$$\Delta P_t = \sum_{i \varepsilon I} s_{it} p_{it} - \sum_{i \varepsilon I} s_{i,t-1} p_{i,t-1} = \sum_{i \varepsilon I} \bar{p}_{it} \Delta s_{it} + \sum_{i \varepsilon I} \bar{s}_{it} \Delta p_{it} \qquad (2)$$

where $\bar{a}_{it} = \frac{a_{st} + a_{s,t-1}}{2}, a = \{s, p\}$

As a second step, the composition effect can be further decomposed to show the effect of the main factors separately from each other in a hierarchical order. Hierarchy means that if the change in a higher rank factor initiate a change in a lower rank factor, the effect will be fully assigned to the higher-rank factor. In another words, if there is a rise in the share of old-age pensioners within the working-age population which is caused by demographical processes, the estimated effect of the demography (higher rank factor) on labour force participation will be negative and the effect of the old-age pension (lower rank factor) will be zero. The choice of the hierarchical order is purely intuitive. Demography is considered as exogenous and constitute the highest rank factor. It can have an impact on the other, lower rank factors, i.e. changes in the demographic composition may have an impact on the share of the population with different degree of qualification and the share of individuals receiving social benefits. On the other hand, lower rank factors do not influence demographic composition. The ranking order of the two other factors is less obvious. We assume that in each demographic cell, individuals' level of education may determine the probability of receiving any kind of social benefits but the access to the social benefit system has no influence on individuals' choice of education. While this assumption is questionable on a long horizon, the changing welfare benefit system is less likely to have an impact on people's education on the short run.

For example, we separate the effect of demographic changes (age and sex, first term) from all other compositional changes (second term) as follows:

$$\sum_{i \varepsilon I} \bar{p}_{it} \Delta s_{it} = \sum_{i \varepsilon I} \bar{p}_{it} \bar{s}_{dt} \Delta S_{dt} + \sum_{i \varepsilon I} \bar{p}_{it} \bar{S}_{dt} \Delta s_{dt} \qquad (3)$$

where $S_{dt} = \sum_{i \varepsilon D} s_{it}$ stands for the weight of the given cluster d defined by sex and age within the working age population in time t and $s_{dt} = s_{it} / \sum_{i \varepsilon D} s_{it}$ denotes the share of all lower-rank factors defined by education, schooling and benefits within the demographic cluster d.

In case of the demographic changes, our approach is the same as commonly used in the literature. However, the demographic components are usually found to be responsible for only the minor part of the variation of the data. In fact, only the first part of the expression in eq. 3 is generally separated from the aggregate variation and all remaining part (i.e. $\sum_{i \varepsilon I} \bar{p}_{it} \bar{S}_{dt} \Delta s_{dt} + \sum_{i \varepsilon I} \bar{s}_{it} \Delta p_{it}$) is considered to be driven by behavioural changes. In our case, behavioural changes only affect the residual term, i.e. $\sum_{i \varepsilon I} \bar{s}_{it} \Delta p_{it}$.

[8] In our data, about 2/3 of the cells defined as presented are empty, as they represent unlikely combinations of attributes. An average non-empty cell contains 181 observations per year and only 1% of the sample can be found in a non-empty cell containing less than 15 observations.

In the same way, we can further separate the successive effects of education (e), schooling (s) and receiving any kind of social benefit (b) to obtain a full decomposition of the composition effect[9]:

$$\sum_{i \varepsilon I} \bar{p}_{it} \Delta s_{it} = \sum_{j \varepsilon \{d,e,s,b\}} \left[\sum_{i \varepsilon I} \bar{p}_{it} \Delta S_{jt} \left(\prod_{k \neq j} \bar{S}_{kt} \right) \right] \tag{4}$$

As the third step, we also separate the effects of the three mutually exclusive transfers by the following formula:

$$\sum_{i \varepsilon I} \bar{p}_{it} \bar{S}_{dt} \bar{S}_{et} \bar{S}_{st} \Delta S_{bt} = \sum_{w \varepsilon \tau} \sum_{i \varepsilon I} \bar{p}_{it} \bar{S}_{dt} \bar{S}_{et} \bar{S}_{st} \Delta S_{w,t} \tag{5}$$

where $\tau = \{\text{old age; disability; maternity}\}$, while $\Delta S_{w,t}$ denotes the change of the share of individuals receiving transfer $w \varepsilon \tau$ for clusters receiving transfer w and the change of the share of individuals not receiving transfer w for clusters not receiving any transfer at all. $\Delta S_{w,t} = 0$ if cluster i receives any other transfer than τ.

The effects computed using eq. 5 can be interpreted as the effect that would occur if there were no direct transitions between the transfers. For example, if there is a strengthening in the old-age pension entitlement which causes the share of old-age pensioners decreasing in many clusters, but many of those losing entitlement will gain an entitlement to disability pension, this second-round effect will appear in the effect of the disability pension and not that of the old-age pension.

[9] Note that the the share of the i^{th} group within the working age population is $s_{it} = S_{dt} S_{et} S_{st} S_{bt}$

5 Results

The yearly effects of the change in the composition of the working age population and the residual term computed according to eq. 2 is plotted on Figure 3. *The residual component* contains the effect of all factors on participation which are not included in our decomposition – e.g. the strictness of the supervision of job seeking, the effect of demand, changes of preferences, health or unobserved benefits, etc. The non-explained part was negative during the early nineties, which is likely to be caused by the transition shock.

Figure 3

Decomposition of the aggregate participation rate

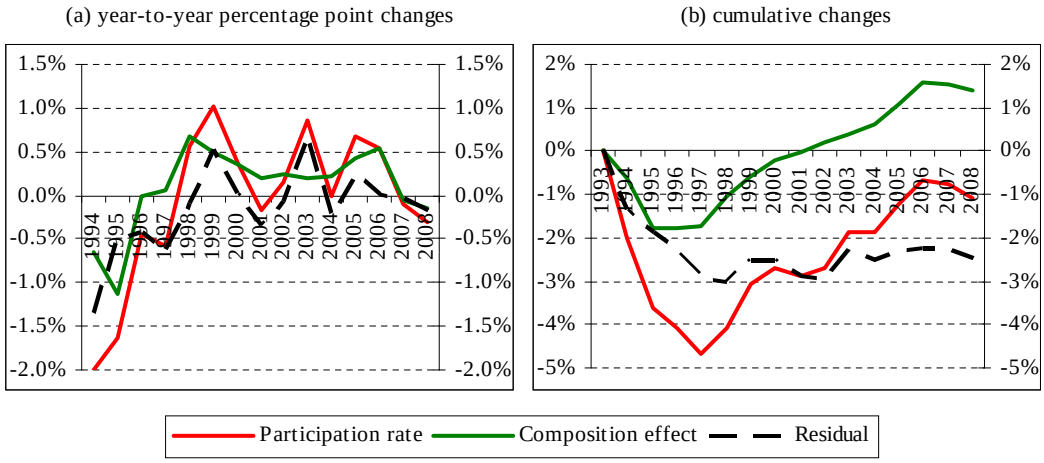
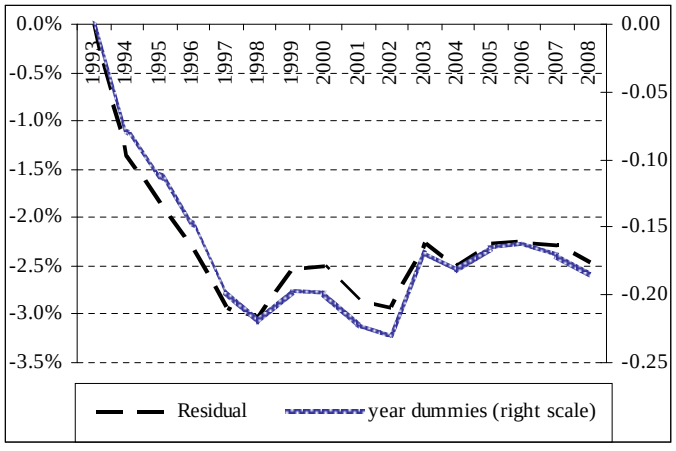


Figure 4 also shows that the cumulative changes in the residual effect derived from the decomposition coincides with the year dummy coefficients of the probit model in Section 3 estimated on the whole sample.[10] However, there is no strong trend but only relatively weak cyclical movements in the residual afterwards. Although we neither can exclude that this seemingly neutral effect is the sum of significant effects of conflicting factors, nor can we eliminate the possibility that a significant change in this factor will happen in the future, the weak and cyclical residual effect suggests that the factors chosen include those which are the most important on the long run. It appears that the willingness to work or other nonobserved factors have not changed considerably since 1997.

Figure 4

Year dummy coefficients and cumulative changes in residual effect

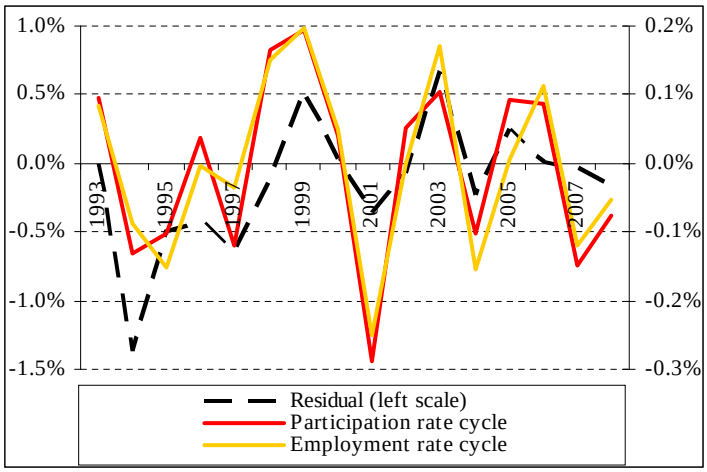


[10] including year dummies in the regression or not does not change the coefficients of the other variables.

The cyclical pattern of the participation rate has been documented by several authors. As shown in Figure 5, a large part of the cyclicality in the participation rate is driven by the residual effect and it is highly correlated with employment cycles. The cyclical pattern of the participation is often explained by labour demand effects. Procyclical behaviour is usually attributed to the presence of workers who traditionally have less attachment to the labour force. Many of the non-working persons are willing to work and constitute a significant provision of labour services, but their search action or availability do not meet the ILO definition of unemployment. This group of "discouraged workers" is conceptually close to unemployment as it mostly comprises persons who have stopped to search actively for work because of a perceived lack of jobs, even though they would accept one at the going market conditions. On the contrary, "added worker effect" suggest a negative short-term correlation between participation and employment. "Added workers" are formerly inactive members of families who are becoming active to sustain the living standards of the family as the primary breadwinner loses (or is likely to lose) his job.[11]

Figure 5

Residual effect, participation rate and employment rate cycles



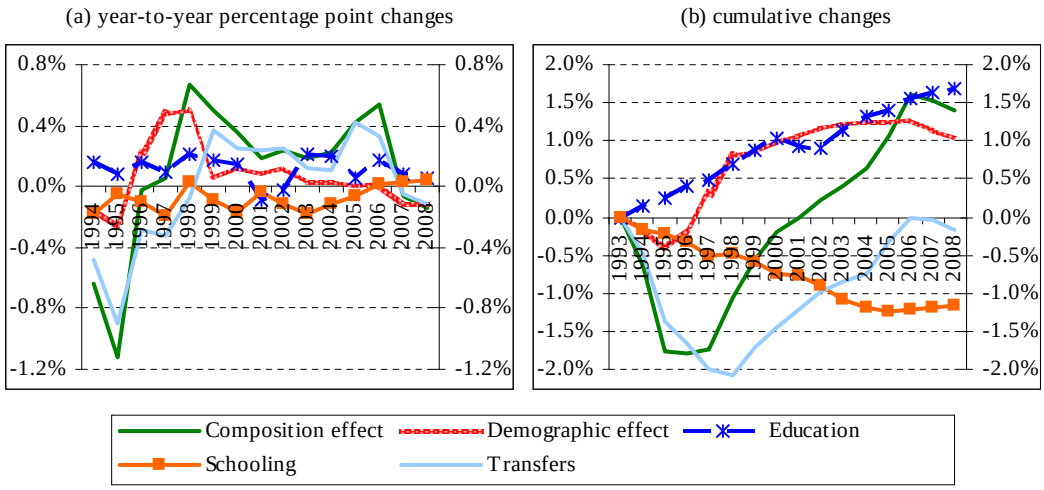
** Employment and participation rate cycle are annualized HP filtered quarterly series*

In order to go deeper in our analysis, we further decompose the composition effect according to eq. 4 (see Figure 6). Although the method we use does not provide any information about causality, the major changes in the aggregate measures are in line with our expectation based on commonly known stylized facts.

The sharp rise in the *demographic effect* in the second half of the ’90s can be explained by the baby boom following World War II. This period was marked by the highest rate of natural increase of the Hungarian population. Apart from a decline in mortality and the well-known post-war increase in fertility, this was also a result of drastic restrictions on abortion: pregnancies could be terminated or birth induced only if there was a danger of harm to the foetus or the mother’s life was in danger. Meanwhile childless couples had to pay a "childlessness tax". These years became known as the Ratkó period, named after the health minister, Anna Ratkó, who imposed the measures. The ban on abortion was lifted and the childlessness tax was abolished after the revolution of 1956. Later, in the mid-’70s, there were generous child-care benefits introduced, just when those born around 1953-55, the so-called "Ratkó children" reached the most fertile age. This was a "peak on peak" situation resulting in a huge temporary increase in the number of babies in the mid-’70s (the "Ratkó-grandchildren"). This wave of baby boomers mostly entered the labour market at the end of the ’90s, which resulted in a raise in the participation rate. Nevertheless, the last years were rather dominated by the retirement of the Ratkó children and consequently, the total demographic effect on the aggregate participation turned into negative. This later effect is going to be dominant in the following years.

[11] See e.g. Finegan & Margo (1993) about this debate.

Figure 6
Decomposition effect in details



It is well known that those having a better *qualification* have a stronger connection to the labour market. Younger generations are typically more qualified than the older ones, which results in a permanent rise in the participation rate as generations are replaced. Along with a slow but permanent improvement, we can also identify the effect of two major expansions of the Hungarian education system. The first of those is the expansion of the secondary education following World War II., while the second is the expansion of the tertiary education following the regime change in 1989. These educational shocks have an increasing effect on the participation rate until the first cohorts affected leave the labour market. The beginning of the observation period was dominated by the first effect, while the recent years have already been dominated by the second.

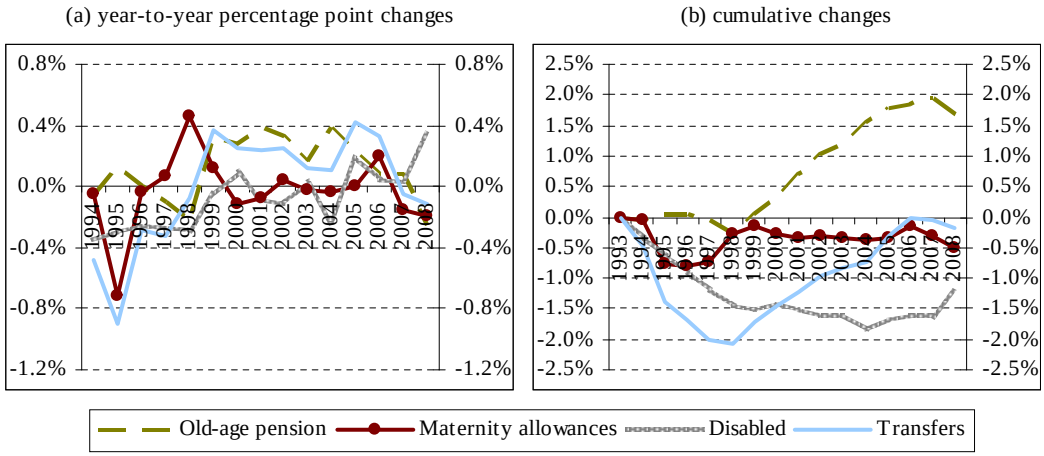
However, the expansion of *schooling* results in a decreasing participation rate on the short term, since getting a higher degree takes longer time, which makes the younger generations enter the labour market later. During the period observed, the negative effect of the expansion of tertiary education almost neutralized the positive effect of the rising qualification of the population. The sum of the two effects began to slowly increase only around 2004.

More than the half of the increase in the participation rate since 1997 is explained by the *transfer effect*. It is striking that without changes in the share of the population receiving some form of social benefit, the participation rate would only have increased by 1.8 percentage points since the turning point. The effect of the different social benefits are plotted in Figure 7.

The strong upward trend of the effect of the *old-age pension* starting in 1998 is probably the most important change affecting labour force participation. The turning point in 1997 is largely due to the increased activity of elder persons and it is alone responsible for almost 2 percentage points growth in the aggregate participation rate since then. The Hungarian pension reform adopted in 1997 and taking effect in 1998 and afterwards was the first systemic pension reform implemented in post-socialist countries. According to the new regulation, the statutory retirement age for claiming a full pension was gradually raised between 1998 and 2009 from 60 to 62 years for men and from 55 to 62 years for women. Moreover, the net wage indexation has gradually been replaced by the so-called "Swiss indexation"[12], which further reduced the incentives to retire. Although the gradually strengthened normal retirement conditions were effective, there was less strengthening in the conditions of early retirement. The negative effect in 2008 is likely to be caused by the multitudinous early retirement before a stricter pension formula was put in force in 2008. During the transition in the early '90s, many of those losing their jobs escaped into the *disability pension* system. Most

[12] Swiss pension indexation is a composite index defined as the average of price inflation and wage growth.

Figure 7
Transfer effect in details



of the studies analysing the transition period agree that the weak supervision of considering claims was the result of a political decision, trying to ease the stress originated by the rising unemployment. Although the transition shock came to an end by about 1997, the effect of the disability pension was almost neutral in the following decade. More disaggregating the data (not presented in this paper) reveals that this neutral effect resulted from the decreasing share of the younger and the increasing share of the older disability pensioners. The former process might be the consequence of some strengthening policies and the ageing of the generations affected by the transition shock, while the latter is likely to be a second-round effect of rising the age limit of the old-age pension: those left out from the old-age pension system remained (or became) disability pensioners.

The *childcare benefit* system in Hungary is relatively generous in international comparison.[13] Prior to 1996, parents have been eligible for either GYED or GYES, two types of childcare benefits until a child is aged two. The amount of GYED depends on the previous income while the latter type of benefit is a fixed amount equal to the minimum old age pension. When the child was between two and three years of age, the parent at home was entitled to GYES, independently of his previous income level. As part of the fiscal stabilization package (the so called "Bokros package" named after the former minister of finance), the GYED was abolished and GYES became a means-tested benefit in 1996. These measures became gradually effective in 1997-1998. As shown in Figure 7, it increased the total participation rate by about 0.5 percentage points during these two years.[14] In 1999, the means-test of GYES was abolished and since 2000, working parents were, again, eligible for GYED with the same benefit level of 70 percent of the previous wage. The restoration of the benefit system had a negative effect on labour force participation.

A considerable part of the social benefit system, the *social- and unemployment benefits* are not discussed in this paper. While we recognize their importance on participation decisions, these type of benefits are much less a reason than a consequence of non-employment. Their case is also good example to demonstrate why causality is a crucial question in our analysis. If we include them in our decomposition, the typical effects of receiving these benefits are negative. However, if we only estimate the effects for those not having a job, they turn into positive. This is the typical case of selection bias: the benefits are targeting job losers, many of whom are not active job seekers. Consequently, the selected groups have a lower participation rate than those not receiving these benefits. On the other hand, the criteria of the benefits may force the non-employed to seek a job, and the regulators are trying to exclude those who do not even want to work. All in all, with

[13] see Bálint & Köllõ (2008) for a detailed analysis

[14] Due to methodological change in the database, years 1994 and 1995 are not comparable in this regard. The large negative peak in 1995 is likely biased.

the exception of the early '90-s, the estimated effects are relatively weak for both the active and the inactive, and according to the abovementioned factors, they also seem to be overestimated.

Overall, all estimated effects are in line with our expectations. Most of the variation in the factors can be explained by well-known facts, i.e. demographic changes or various labour market policy measures. Although not discussed in this paper in details, the good explanatory power, the clear driving forces behind the changes and the relative stability of the individual effects imply that based on some simple assumptions regarding to the factors discussed, the method we used can produce relatively accurate aggregate labour supply predictions and policy simulations. To give an example, let's suppose that the government seeks to gradually raise the statutory retirement age from 62 to 65 years by one year every second year between 2011 and 2015 for both men and women. The baseline "no policy change" forecast can be computed by assuming fixed population shares within demographic cells and simply forecasting demographic changes and their effect on the aggregate participation rate.[15] Assuming that the strengthening retirement conditions are effective - i.e. the government manages to increase the effective retirement age by one year in years of change -, we set the share of individuals concerned receiving old-age pension to the one year earlier level following each year of increase. This simple exercise shows that such a policy would rise the aggregate participation rate by 2.7 percentage points by 2015.

[15] The educational level is fixed within cohorts and we assume no additional increase in schooling for young people. As an alternative, one could assume further increase in schooling, but as younger generations' schooling decisions have no influence on retirement of elder generations, the partial effect of the increase of the retirement age does not change.

6 Conclusion

Our paper presents a simple and transparent method to decompose the recent changes of the participation rate in Hungary. Unlike previous similar studies which aim to separate demographic factors from the aggregate changes, our decomposition identifies the contribution of all major factors that can account for the developments in the labour force participation such as schooling or the changes in the share of those receiving any of the most important transfers not related to job search. Furthermore, our approach requires less assumptions while being more flexible compared to the cohort-component models and it is definitely more simple than models focusing on individuals' flows between different labour market states.

We first showed using separate probit regressions for each year that a few variables used in our analysis capture the largest part of individuals' labour supply decisions. In addition, coefficients remained relatively stable through time, which confirms that the partial effects of these variables did not change significantly during the observed period. Based on this evidence, we broke down the population alongside the aforementioned characteristics and analysed the changes in the composition.

Our decomposition shows that the composition effect fits the participation rate quite well – especially on the long term. The residual effect was relatively weak and neutral on the long term with the exception of the transition period, denoting that other effects – like institutional, cultural changes or the conditional willingness to work, etc. – were less important or balanced on the aggregate level in Hungary. The cyclical changes were strongly correlated with the short-term changes of the employment. This cycle is likely to be the result of fluctuations in the labour demand which affects participation through the discouraged worker effect.

The estimated effects of the factors investigated are in line with our expectations. The demographic effect is dominated by the ageing of two populous cohorts: the so-called Ratkó-children born during a period of a strict abortion policy in the early '50-s and the children of that generation. The average level of education rises permanently, mainly as a result of two remarkable expansions of the schooling system: the expansion of the secondary education following World War II. and that of the tertiary following the transition. However, the growing share of school-goers causes diminishing participation first, which compensated the effect of the growing level of education until the recent years.

The effect of the transfers is dominated by measures related to the pension system. While the job losers' multitudinous inflow into the disability pension system contributed to the sharp decline of participation during the period of the transition, the gradual tightening of the conditions of old-age retirement caused the participation rate to grow by 2 percentage points in the last 10 years, which was probably the most remarkable among the effects observed during this period.

Assuming that the unexplained effect is driven by changes in the labour demand, the composition effect can also be interpreted as an indicator of the underlying labour supply. This method of generating such indicators is certainly an improvement relative to ad-hoc methods like HP-filters which are often used in macroeconomic models. Although not discussed in this paper, the good explanatory power, the clear driving forces behind the changes and the relative stability of the individual effects imply that based on some simple assumptions regarding to the factors discussed, the method we used can produce relatively accurate aggregate labour supply predictions and policy-relevant scenarios.

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Appendices

Our estimations are based on the longitudinal micro data stemming from the Hungarian Labour Force Survey. The questionnaire is answered by about 50-60 thousand working-age - 15-74 years old - people living in about 30 thousand households per quarter. As a rule, households remain in the sample for six consecutive quarters.

The sample contains the 1993-2008 period. During this period, the sample was redesigned and expanded in 1998 and in 2003, and a major questionnaire redesign was implemented in 1999. As the attrition is biased and a significant share of the sample was replaced with the sample redesigns, estimates for the years following them may be less reliable. Following the 2001 census, new weights were introduced, which were only traced back until 1998. We use the old weights until 1998 and the new ones from 1999. As a result, all the errors stemming from the questionnaire redesign and the changing of the weights affect the Q4 1998 – Q1 1999 dynamics.

The questions of the highest importance follow the international LFS standards, while other questions may be country-specific. The later group of questions might have changed more with the time. We have tried to correct these changes by creating fewer categories with essentially equivalent contents based on the answers. The questions concerning gender and the person's receiving old-age or disability pension did not change meaningfully with the time. In the earlier years, the age on the 1st January of the current year was taken into account. The methodology has changed in 1998. Since then, age means the age on the day of answering the questionnaire.

There were many changes in the questions related to the level of education. Most of these changes aimed to handle the difficulties of categorizing qualifications taken in institutions which did not belong to the schooling system. Major changes in the conception of the categorization were introduced in 1999 and 2003. In this paper we use four categories created from the data, which are essentially equivalent during the period. These categories are primary, vocational, secondary and tertiary degree.

The questions related to the present education were refined many times, which could affect the reporting of education in institutions which were absent from the schooling system. From 1999, the question concerning the present school attendance consider the last week's activity. This caused uncertainties during the holiday periods, especially during the summer holidays. In 2006, a new answer option was introduced, mentioning the holiday as the cause of not participating in education. However, the Q3 data recorded in the 1999-2007 period can not be compared with those of the other years. To diminish this problem, we classified everyone as non-school-goers if the questionnaire was filled during the summer holiday (in July or August).

In 1993 and 1994, GYET[16] was not listed on the questionnaire, so the mothers receiving this benefit could not be taken into consideration among those receiving childcare. That causes a level shift in the estimated effect of childcare.

[16] GYET is a childcare benefit for mothers with 3 or more children, which can be received until the 8th birthday of the youngest child. This benefit was received contemporaneously by about 40 thousand mothers in the following years.

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