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Effects of Intergenerational Public Transfers on Fertility: Test on Hungarian Data

Abstract

Two approaches are present in the microeconomic models of fertility. One of them considers children as durable consumer goods, so the child is a value *per se* for his/her parents. The alternative approach looks at them as capital goods. Parents consider the returns from transfers and services, child labor and old age care, as well as the benefits from the increased risk community. It is likely that both motivations can be observed when looking at real fertility decisions. However, theoretical models set aside one of the images, in order to simplify the otherwise complicated structure of decisions.

We set out, basing our analysis on the capital good theory, that replacing the flow of intergenerational transfers in family with one between generations of society has several positive effects. Yet negative consequences also can be observed, from which we consider fertility effects only. We investigate the fertility effects of intergenerational transfers on Hungarian data, in the period between 1951 and 2001, using multivariate statistical methods. We consider a single model including two adversely directed social transfers, family benefits and pensions.

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Introduction*

There are two approaches to the micro-economic models of fertility. One of them considers children as durable consumer goods, so the child is a value *per se* for his/her parents. The alternative approach looks at children as capital goods. Parents consider the returns from transfers and services, child labour and care in old age, as well as the benefits from an increased risk pool.¹ It is likely that both motivations play a part in real fertility decisions. However, theoretical models generally set aside one of the aspects, in order to simplify the otherwise complicated structure of decisions.

Henceforth, we base our analysis on the capital goods theory. We establish that replacing the flow of intergenerational transfers in the family with one between generations of society has several positive effects. Yet there are also certain negative consequences, among which we consider only effects on fertility. A simple form of the argument is as follows. Within a family, and faced with a lack of alternative vehicles of accumulation, income security in old age is guaranteed by a high number of children. When the risk pool is broadened, the number of children required decreases. Those people who do not contribute to the cost of child rearing, or who contribute only indirectly, also share in the returns on investment in children. People receive a pension even if they have no children, though of course they do contribute to the rearing of the next generation of taxpayers by helping to finance education and other public programmes. A part of the literature supports the old age security hypothesis, while another part contests it. As a continuation of the argument, we can state that decreasing fertility induces the family benefits system, which in turn stimulates the childbearing propensity of couples.

This paper investigates the effects on fertility of intergenerational transfers on Hungarian data, in the period between 1951 and 2001, using multivariate statistical methods. We consider a single model that includes two social transfers in opposite directions: family benefits and pensions.

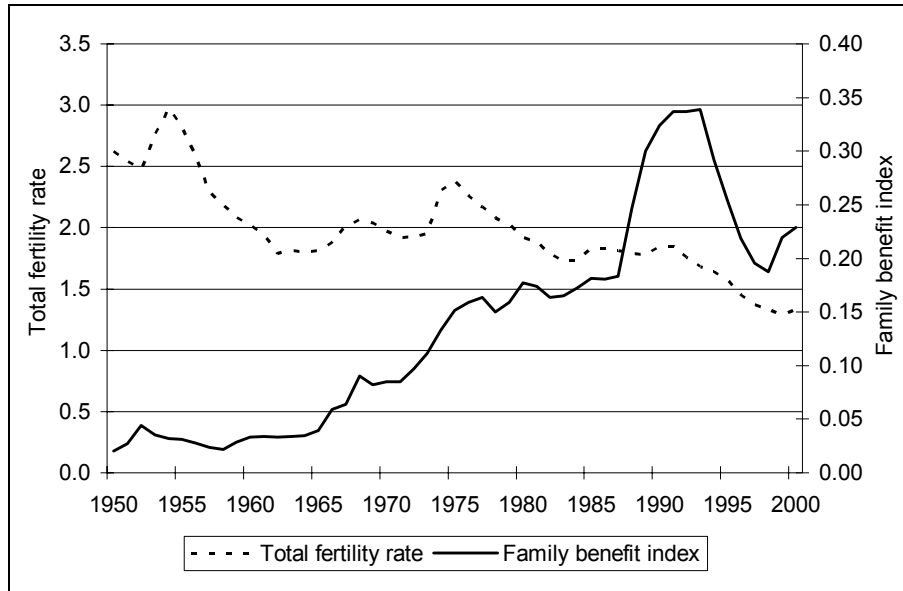
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¹ For the consumer goods approach, see Becker (1993), Razin and Sadka (1995). For the capital goods approach see e.g. Willis (1980), Cigno (1993).

Trends in fertility, pensions and family benefits

The decrease in fertility in Hungary dates back to the end of the 19th century. This decline has been fundamentally consistent, although we have noticed temporary blips in the trend both in calendar years and in terms of completed fertility indices. The growth segments of the fertility series, five in number since 1950, are linked to the important changes in the family benefit system. This can be observed when we look at the trends shown in *Figure 1*. The first line shows the value of the total fertility rate (TFR), while the second illustrates the amount of total family benefits expenditure divided by the population aged 0–14, expressed as a fraction of net earnings. Despite the fact that the two trends were in opposing directions, we noticed a negative correlation between fertility and spending on family related transfers throughout the entire period.

From among the periods of growth in question, the first, that is, 1953–1955 coincides with the complete ban on abortion. The second stage, 1965–1969, contains the implementation of an extended (up to three years) maternity leave allowance in 1967. Stage three (1973–1975) coincided with the 1973 implementation of a complex population policy programme, which simultaneously contained yet another tightening of abortion practices and the introduction of cheaper contraceptives. The package contained positive incentives, such as significant housing support for couples with children, and it increased the real value of cash family benefits. Stage four (1984–1985), although it lasted only one year, coincided more or less with the introduction of yet another new form of support, the earnings-related child care allowance in 1985. Compared to the previous stage, however, there is a significant difference. The growth period is not followed by an instant and relatively rapid decline, but rather by stagnation. Finally, the last growth stage, 1988–1990, was preceded by a substantial increase in cash family-related transfers, above all, child allowances.

Figure 1: *The family benefit index* and the total fertility rate, 1950–2000*

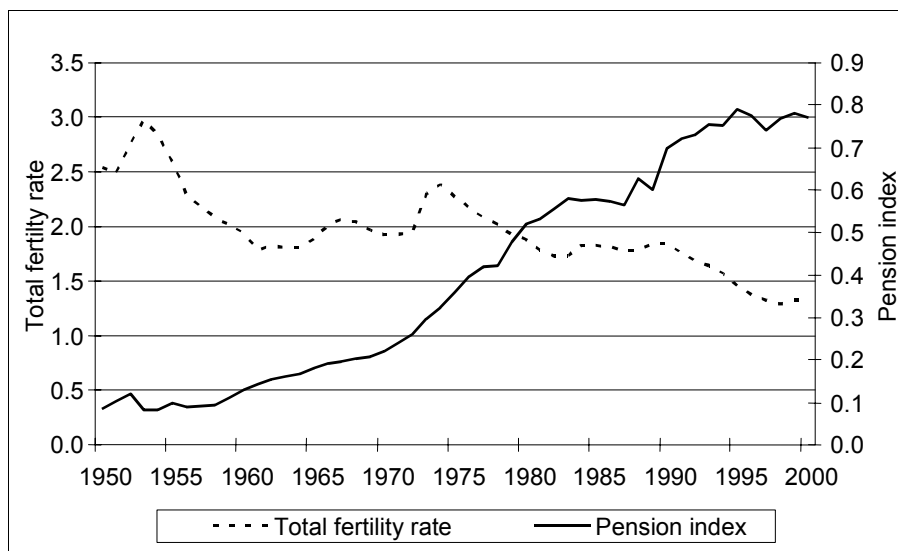
Note: *Family benefit index: per capita ratio of family benefits for children compared to wages (measured on the right axis).

The intuitive comparison of growth periods of fertility and family policy indicates that the existence of family benefits and the continuous changes thereof affected period fertility rates. However, we cannot determine whether the effect was temporary or lasting: did it merely affect the timing of births or did it have an effect on completed fertility? The relationship between the nature of policy incentives and fertility trends appears obvious. Disincentives caused significant breaks in the fertility trend with effects that were short lived and influenced only the timing of births. In contrast, incentives suggest longer-lasting changes in trends.

Figure 2 shows the development of pensions, which are transfers flowing from the active to the elderly. We again included the development of the total fertility rate. For reasons of comparison, the pension index is defined in a similar way as the family benefit index. It also relates total pension expenditure to the target population (to those at retirement age instead of individual pensioners) and expresses this amount as a percentage of real earnings.²

² The pension index, like the family benefit index, is defined as the product of coverage and replacement. The trends of these indices show very clearly how the pension system becomes mature. Coverage increases as more individuals at retirement age achieve the minimum con-

Figure 2: The pension index* and the total fertility rate, 1950–2000



Note: *Pension index: pensions per person of retirement age compared to wages (measured on the left axis).

The pension index basically stagnated until the extension of eligibility under the 1958 law, and it is only from then that stable growth began. The annual growth rate increased following the 1970 implementation of annual pension indexation. By the beginning of the 1980s, when the system had become mature, the pension index again stagnated. From the end of the 1980s, the beginning of the mass influx of those under retirement age, until the mid 1990s it again began to grow significantly. Following 1995 the pension index once again stagnated, the decreasing influx being counterbalanced by the drop in relative pensions.

At first glance the figure suggests that the rare and small decreases in the pension index do not increase fertility. In contrast, however, frequently—though not always—significant jumps coincide with increased drops in the total fertility rate. The other important observation is that fluctuation in the pension index is not so readily linked directly to specific institutional changes. We should also add that, without filtering out the effect of the control variables, the above visual examinations would only be suitable for providing some kind of first impression.

tributory period. Replacement increases as the contributory period becomes ever longer, which results in higher starting pensions.

Model specifications

We used linear regression to isolate the independent effect of intergenerational transfers on fertility. All time series examined were integrated to the first degree with stochastic trends. Therefore, time series are not stationary. Since they are not co-integrated we used first differences instead of levels.³ Consequently, we did not explain the level of total fertility rate with that of the family benefit index and the pension index. Instead, we examined annual changes. Since we used logarithms for explanatory and control variables in order to make interpretation simpler, the differences in the logarithms approach relative changes, thus they estimate elasticities.

Considering the experiences of the international literature, our benchmark model is specified in the following way:

$$\begin{aligned} \text{Fertility} = & \beta_0 + \beta_1 \text{ family benefit index} + \\ & + \beta_2 \text{ pension index} \\ & + \beta_3 \text{ marriage rate} \\ & + \beta_4 \text{ residual infant mortality} \\ & + \beta_5 \text{ female employment} \\ & + \beta_6 \text{ female employment squared} \\ & + \beta_7 \text{ net average real wages} \\ & + \beta_8 \text{ cost of avoiding pregnancy.} \end{aligned} \quad (1)$$

Table 1 contains a description of the variables used in the models.

The dependent variable is total fertility rate. Explanatory variables operationalize intergenerational transfers flowing forward and backward in time. Family benefits and expenses on public education can be listed in the first group, while pensions are in the second. We modelled the family benefit variable based on the total annual expenditures of the entire system. These expenditures were divided by the number of potential users of the system (population aged 0–14), and then per capita expenditures were compared to monthly net average earnings. The number of those applying for individual elements of the entire system can differ significantly, and therefore it was impossible to determine the actual number of those entitled. For this reason we chose the under-15 age group as potential users. In doing so we tried to screen out influences caused by changes to the age structure of the population in question. To create the pension index we took the pension per individual of retirement age compared to the average wage.

Despite the various explanations, all fertility theories agree that the decrease in fertility in industrial societies is related to the labour market participation of women, which signals a rise in the opportunity cost of child-

³ Results of unit root and co-integration tests are available from the authors.

rearing. This can be approached using several variables, such as female wages, the level of women's education or the rate of economic activity among women. Of these, data availability allows us to use the economic activity of women for the period since 1950. The female employment trend is not linear and nor is its relationship to fertility. The reason for this is that the general decrease in fertility rates was associated with increasing female employment before transition, and with decreasing female employment after. This problem was dealt with by including the square of the employment variable as well.

Theoretical predictions on the relationship between income and fertility are not unambiguous. Income effect is positive, but the substitution effect results in a negative relation between income and fertility. The opportunity cost of raising a child has already been included. As a proxy for household income we used real earnings. In this context, wage is a particularly good proxy for income since the most important of the other factors that separate income from wage—pensions and other transfers—appear as explanatory variables in the model.

Table 1: Definition of variables in the regression model

Variable	Definition
TFR	Total fertility rate
LNFAMEDU	Combined family benefits and public education expenses per capita of age 0–19 as ratio of average net earnings (logarithms)
LNFAMBEN	Family benefits per capita of age 0–14 as a ratio of average net earnings (logarithms)
LNEDU	Public education expenses per capita of age 5–19 as ratio of average net earnings (logarithms)
LNPENSION	Public pension expenditures per capita of those in retirement age as ratio of average net earnings (logarithms)
MARRIAGE	Number of marriages per 1000
RESIM	Standard residuals of infant mortality per 1000 live births regressed on net average earnings
FE	Employed women as ratio of women in fertile age (%)
FE2	Employed women as ratio of women in fertile age squared (%)
LNRWAGE	Average net real earnings in year 2000 (logarithms)
RATKO	Effect of 1953 abortion ban: 1—between 1953 and 1956, 0— for all other years

Infant mortality and marriage propensity is used in most studies as a control variable. When specifying the variable of infant mortality, we assumed that it depends on the amount spent on child healthcare on the one hand and the income of households with children on the other. Since we included a proxy of income, we cleaned the variable for infant mortality rate of the effects of wages in order to independently measure child healthcare. We regressed infant mortality to net real wages and used the standard residuals in the fer-

tility model. Marriage is not a prerequisite for having children, though the majority of births still take place in wedlock. Thus we expect the relationship between marriage and fertility to be positive.

When building our model, we strove to eliminate the shock-like changes caused by the stringent abortion policies of the early fifties (the so-called Ratkó period, named after an infamous minister of social affairs) when developing the annual fertility rate. Thus, we have included a binary variable (RATKO) in the models. This produced a value of 1 between 1953 and 1956, and 0 in all other cases. We are aware that this variable is not capable of capturing the costs of avoiding pregnancy. The appropriate data (e.g. the price of birth control pills and other contraceptives) however, is not available.

We used one year of lag in the dependent variable. Values of the independent variables in year t produce an effect on fertility a year later, in year $t+1$. The only exception to this is the influence of the Ratkó period with its binary variable, for there is no reason to consider a time lag between the abortion ban and changes to the annual fertility index.

Results

Table 2 contains the results of our analysis. The goodness-of-fit indices of the model described by equation (1) are good and the non-standardized regression coefficients of the explanatory variables are significant at least at the five per cent level. The value of the Durbin–Watson statistic of 1.87 testifies that the procedure mostly eliminated first-order autocorrelation, although there is still a small-degree, second- or even higher-order, autocorrelation remaining. The coefficient of determination is 50 per cent.

Signs of the regression coefficients of the explanatory variables meet our preliminary expectations. Accordingly, the relation between family benefits and fertility are positive, while the effect on fertility of the pension system is negative.⁴ In the first case this means that a 10 per cent change in the family benefit index from year $t-1$ to t results in a 2.5 per cent change in total fertility rate from year t to $t+1$. The estimated elasticity of both family benefits and pensions is 25 per cent. In international comparison, our estimated elasticity of family benefits is relatively high.

Among the control variables, female employment and residual infant mortality proved to be significant at least at the 10 per cent level, while the coefficients of the marriage rate, real wages and the RATKO variable do not differ statistically from zero. The sign of the significant coefficients are in

⁴ For empirical analysis of the fertility effects of the Hungarian family benefits system see Gábos (2003a, 2003b). Comparing those results to the present ones, a high robustness of the effects of family benefits can be observed.

accordance with expectations: female employment and child healthcare performance have a negative effect on fertility. We can interpret the last factor as the improving performance of infant hygiene negatively affecting fertility decisions.

By the very content of the variables endogeneity is present in our models. Many of the explanatory and control variables are not independent of changes in the total fertility rate. The relationship between female employment and fertility is two-way. Decreases in fertility are partly caused by increases in female employment, whereas female labour market participation is partly induced by the low birth rate. The same applies to the relationship between family benefits and fertility. The dramatic jump in family benefits in certain periods is a reaction, easily traceable, to drops in fertility. This effect is counterbalanced to some extent by the time lag between the dependent and the explanatory variables.

Table 2: Regression models to test the influence of family-related transfers on fertility. Non-standard regression coefficients and model indices

	Unstandardized coefficient	Standard error	Value of t-statistics	Level of significance
LNFAMBEN	0.249	0.053	4.71	< 0.0000
LNPENSION	-0.252	0.097	-2.59	0.0131
MARRIAGE	0.016	0.012	1.31	0.1974
RESIM	0.096	0.043	2.23	0.0316
FE	-3.655	1.831	-2.00	0.0526
FE2	1.971	0.965	2.05	0.0473
LNREALW	-0.140	0.122	-1.14	0.2613
RATKO	0.037	0.025	1.47	0.1498
Constant	-0.003	0.009	-0.32	0.7484
N=	50			
F-statistics (Prob>F)	5.147 (0.0002)			
R ²	0.50			
Durbin-Watson statistics	1.87			

Note: The logarithm of total fertility rate is the dependent variable of the model.

The relationship between the expansion of the pension system and fertility is also bi-directional. The expansion of the pension system, with growth in the value of benefits, affects fertility negatively. However, decreases in fertility can also influence the public choice pertaining to the pension system, although there is a long-term lag effect in this relationship. Inasmuch as our predictions, based on the theory applied, are correct—and the empirical results partially back this up—we assume that there is a triple endogeneity ‘loop’ between intergenerational transfers (family-related transfers and pensions) and fertility. Accordingly, an increase in the importance of the pension system decreases fertility, which results in increased family-related transfers; this, in turn, results in incentives to have children.

Remaining questions and direction of further clarifications

The most important result of our research is that intergenerational transfers, in line with theoretical expectations, influence fertility and family benefits positively, and pensions negatively. Results can be refined in part by improving the data and in part by changes in methodology.

We used time series that were in part incomplete. Due to incomplete data we were unable to include housing support linked to the number of children in family-related transfers, even though these most likely influence fertility decisions. Choosing the correct potential target group also caused problems pertaining to family benefits.

Currently the data on female labour market activity are incomplete: we barely have any data on the fifties and sixties, and we had to make estimates. Eliminating estimates is desirable for two reasons. One, this will bring us closer to actual processes; two, linear substitution of data itself leads to unnecessary auto-regression in the models. A further problem is the lack of a conceptually consistent female activity time series. It would be most desirable to focus on the economic activity of females at fertile age, for when explaining fertility this is the relevant variable. It would be even more fortunate if we were able to substitute the female employment index with female education data.

The total marriage rate time series is similarly incomplete: so far we have data dating back only to 1956. Therefore we had to use the marriage rate; this, however, also contains the effect of changes in cohort size at marriage age.

Finally, some methodological changes also add a new perspective to the picture. As we have stated, endogeneity is expected between the dependent variables and several explanatory variables. Currently the method we have applied only eliminates first-order autocorrelations. It is, however, possible that it is not only the value at $t-1$ that influences the value at t , but also the value at $t-2$ or previous values as well.

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