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THE IMPACT OF FISCAL INSTRUMENTS ON FERTILITY: A SYNTHESIS OF THE ECONOMIC THEORY*

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Abstract

The observed decline in fertility in developed countries raises the question about the possibility of implementing a pronatalist government policy. In particular, possible policies involve modification of: income taxes, consumption taxes and the introduction of subsidies on children. The effectiveness of the listed fiscal policy instruments is debatable and it can be considered from theoretical or empirical point of view. The present work mainly focuses on the first approach, making a synthesis of existing economic theory in terms of the postulated effects of the fiscal instruments used to stimulate the number of children in families. The survey pinpoints two prevalent classes of models: the life cycle with taxpayer having children and multi-period overlapping generation models. The predictions of the models have been criticized, especially in the context of several simplifying assumptions undermining the practical utility of the results. Based on the literature review it can be seen that regardless of the context of redistribution of wealth, the fiscal instruments should affect the number of children in households. Additionally the effective pronatalist policy is not unique and in most cases, it should cover more than one fiscal policy instrument stimulating increase of birth rate.

Keywords: *fertility, optimal taxation, fiscal instruments.*
JEL classification: *D1; H21; J10.*

Introduction

A general decline in fertility that can be evidenced in developed countries raises the question about the implementation of possible pronatalist government policy. This type of policy can be introduced through fiscal instruments posing incentives to have more children. Naturally, the key issue is to determine whether fiscal policy instruments, such as: income taxes, consumption taxes and subsidies on children may affect fertility in a meaningful way. In general this issue can be considered from both theoretical and empirical point of view.

The present work mainly focuses on the first approach, making a synthesis of existing economic theory in terms of the postulated effects of fiscal instruments on the number of children in families. At the same time the details of individual solutions are characterized from a methodological point of view, high-

lighting the two prevalent classes of models: the life cycle models with taxpayer having children and multi-period overlapping generation models. Unfortunately some simplifying assumptions of these models undermine the practical utility of a part of the obtained results.

A survey of the theory could be useful for stating the new hypotheses for empirical testing, for the development of better economic models and for the determination of the state policy promoting fertility. From the conducted review it can be seen that regardless of the context of redistribution of wealth the fiscal instruments should affect the number of children in households. At the same time there is more than one effective pronatalist policy that can be implemented. In most cases such a policy should also cover more than one fiscal policy instrument stimulating higher fertility.

The article is constructed as follows: Firstly, the theoretical literature is reviewed with a critical assessment of its assumptions and outcomes. Secondly, in conclusion, further theory development is provided which can also be treated as postulate for future research.

1. The taxation of family when fertility is exogenous

The family size can be driven by economic factors. This statement was firstly proposed by G. Becker, who started the theoretical discussion on the possibility of the social state policy stimulating the optimal number of children. For example, if the choice of consumption and fertility is simultaneous then in the overlapping generation framework with altruistic parents, the fertility should be positively affected by: the world's long-term real interest rate, the degree of altruism and the growth of child-survival probabilities and negatively affected by the rate of technical progress and the growth rate of social security (Becker, Barro, 1988). Therefore the taxation can decrease the fertility rate only in one generation and it does not impact the optimal path of fertility rate if the long term interest rate remains unchanged. There are two caveats to this approach; firstly it is dubious whether altruism is an important factor in fertility decisions; secondly the fertility could be considered exogenous or endogenous. Nevertheless it should be noted that the many theoretical works assume fertility to be exogenous (Mirrlees, 1972; Cremer, Dellis, Pestieau, 2003). It means that the number of children stays beyond the control of families. This assumption is often used as a starting point for comparison with the solutions implied by models

of endogenous fertility. However, it seems implausible to set up the total lack of control over the number of children in families[*].

The optimal linear taxation of family size literature was initiated by the paper of J. Mirrlees (1972). He constructed the economic model with uncertainty, different tastes and unequal exogenous fertility across families. Based on the distributional reasoning, the taxation or subsidization of family size had been proposed. According to his statement, the families with marginal product of labor below the average product should be taxed and families with marginal product exciding the average one – should be subsidized. This is because in the latter case each additional person increases the average consumption. This situation is common in developed economies. Therefore, contrary to the popular belief we should not decrease the fertility rates with policies in that kind of economy.

The recent approaches to the optimal tax policy with exogenous fertility postulate the subsidization of the family size (Cigno, Pettini, 2002). This is the consequence of the tradeoff between repayment of expenses on children making the household with children equally well off as the household with no children or, in other way, the respective compensation of the utility loss for the household with children (Colombino, 2000). The second best solutions involve: the poll subsidy and taxation of adult specific goods or poll tax with the subsidies to children specific goods[**]. In fact the equivalence or compensation measures apply only to the net benefit of children not to the total expenses on upbringing. Therefore the "exogenous children" approach is not justifiable if we consider constant utility of the household. The household consists of parents and children and the utility of the former should be maximized as a part of the parents' utility. In turn it requires the previous choice of the number of children. But the last is excluded if the number of children is exogenous. According to A. Cigno (1996): "the members of (given) family size must be collectively compensated for the misfortune of not belonging to a family" including only adults.

[*] The empirical data are consistent with the endogenous fertility based on non-altruistic considerations (Cigno, Rosati, 1996). Especially, the fertility is positively affected by male income and negatively by female income and subsidies can increase the number of children in families (at least for the United Kingdom). Higher social security decreases fertility and increases saving, stimulating the economic growth and hampering the financial capacity of pay-as-you-go public pension system.

[**] These results are reported in details further.

2. The taxation of family when fertility is endogenous

The modern literature on the endogenous fertility has started with the work of A. Cigno (1983) who postulated taxation on consumption and subsidization of family size in the model implementing the utility of future adults in the objective function and the endogenous number of children. This work differs from the previous literature because it concerns the coincidence of the social and the private optima. The social optimum involves the population level or the population path, while the private optimum is the number of children upbrought in families. Consumption created by children provides only costs to the families, but the number of children increases the future utility for the parents. This makes an externality because parents receive only part of the social benefit from having children, but bear the full cost of their upbringing. If there are no externalities (there is no social benefit from having children for the future) these two optima are the same (Cigno, 1983; 1986). However, in most cases the social optimum population level could be higher than private, especially if the yet-unborn--generation increases the welfare. Therefore subsidizing the children can correct the improper choices of parents and even lead to overpopulation. At the same time such a policy is not sufficient to promote the optimum level of savings which remains too low. However, if the number of children is endogenous and there is no externalities the public intervention is not justifiable on distributional grounds (Cigno, 1986; Cigno, Pettini, 2002). This is because the marginal cost of children in families is equal to their marginal benefits. There is also no need for the compensation based on the horizontal inequity because identical individuals behave identically. It implies that utility and the number of children are negatively correlated which is not true in general. For example, children subsidies are proper only when: fertility is exogenous, husband's and wife's income are positively correlated and families differ only in their earning abilities (Cigno, 1986).

Similarly, the number of children in families is Pareto efficient if we apply overlapping generation model instead of simply maximization utility model (van Groezen, Leers, Meijdam, 2003) because it generates two effects which perfectly cancel out each other. The first effect, so called "dependency-ratio effect" increases future outcomes and the second effect, the "capital dilution effect" decreases the relation of capital to labor. The first effect manifests in the increasing production of larger future generations and the second decreases the productiveness of an average member of the future society. Eventually interaction of these effects leads to unaffected production and consumption per capita.

The public intervention in fertility is reasonable only when dealing with external effects, but it requires the use of distortionary policy instruments and sometimes can lead to unexpected outcomes. For example, children subsidies in poorer families induce a higher number of offspring, but in the end it can make the members of poorer households worse off, especially if the subsidies are not large enough to cover all upbringing costs. In particular it concerns low-income families, where child subsidies account for a larger share of the budget (Cigno, 1996). In the context of fiscal policy, the subsidies alone encourage the higher procreation level but they lower the accumulated human capital of children (Cigno, 1986). The same is true for the reduction in the marginal rate of tax on the earnings of married men because it increases the cost of children quality and positively affects the time that mothers spend with children. Obviously, if we abstain from the optimal investment in children human capital, the optimal pronatalistic policy requires the subsidization of families equal to the increase of the expenses on children (Kudła, 2011). Especially it would be very desirable to provide incentives for marginal families which are indifferent to having or not-having the additional child. The other way of inducing higher fertility requires the differentiated commodity taxation: higher for adult specific goods and lower for child specific goods (Cigno, Pettini, 2002). Nevertheless it raises the problem of distinguishing the child-specific goods from adult-specific goods when children grow up. From the listed propositions, the latter (different commodity taxation) should be preferred as the method improving the situation of low-income families with high share of fixed raising costs the most. Potentially such a policy could achieve two objectives at once: increase the human capital of children in poorer families and positively stimulate the overall fertility rate (Cigno, 1996). Finally it is reasonable only if we can precisely discriminate between children and adult goods in the commodity taxation.

In the overlapping generation setting the optimal policy (van Groezen, Leers, Meijdam, 2003) requires the children allowances financed by the lump sum taxation[*]. The first part of policy decreases the opportunity cost of children and the second part transfers wealth from young to old (for example through pay-as-you-go public pension system). It means that in the opposite case (of transfers from old to young members of population) the number of children should be taxed. The further consequence is that, if transfers from young to old increase, for example because of higher longevity, then the children allowances

[*] The children allowances can be financed by income as well as consumption taxes (Yasuoka, Goto, 2011).

should also increase (van Groezen, Meijdam, 2008). Additionally, if costs of raising children are increasing with wages then the return on saving should be taxed. The latter is obvious if we assume that greater number of children crowds out savings and then it decreases the future capital to labor ratio. Finally, lower ratio of capital to labor lowers the future costs of raising children and restores the equilibrium.

3. The problem of quantity-quality trade off

The policies described up till now focus mainly on the objective to bear more children (irrespectively of their "quality"), but if we take into account the interaction of quantity and quality then the option of policy-mix should be applied. The policies increasing the number of children without deteriorating their quality require the use of at least two fiscal instruments. For example, the government can provide the subsidies for the number of children and tax the child specific goods if the share of the last type of good is significant[*]. The other possibility would be to introduce an income split (join taxation of couples) while simultaneously increasing the taxation of mothers and decreasing the taxation of fathers, if the share of mother time in the children cost function is prevailing (Cigno, 1996). The other way of providing second best taxation involves the introduction of commodity taxation of adult specific goods and subsidization of child specific goods together with the taxation on the number of children (Cigno, Pettini, 2002). This rather strange policy, should be applied when expenditures on child specific goods decrease with wage. Without a policy-mix parents would have too little children and endow them with too little resources than it would be socially desirable. This is the direct reason for the tradeoff between the quality and quantity of children postulated in the mainstream of fertility literature (Becker, Lewis, 1973; de Tray, 1973; Becker, Tomes, 1976)[**]. The greater number of children increases the cost of raising their quality, since the higher quality applies to more children and reversely, higher parental contribution to the quali-

[*] The tax-subsidy-policy-mix is also expected, if the relation between government and families is modeled in a principal-agent framework, with government striving to correct the distribution of income in the favor of households having comparative advantage in raising children and against households with a comparative advantage in income producing (Cigno, 2001).

[**] This concept refers to preferences for the quantity or the quality of children. Poorer parents can prefer higher quantity of children and affluent parents higher quantity measured in the terms of human capital accumulated in the children.

ty raises the cost of an additional child*. Finally, we can try to use subsidies differentiated with the ability of "producing" successful children by parents (Cigno, Luporini, Pettini, 2003; 2004). It requires the split of subsidies into two parts: first payable when children are young – distributed on equal basis – and the second available only for parents successful in raising children. For example the latter can take the form of an additional pension benefit (like for example scholarship) when the children are in young adulthood. This policy can be augmented with the payments to parents with children of low ability (if most parents care about their children) in order to compensate for their misfortune. There is an open question whether such a policy should be conditional on the number of children raised in families but because we assume social preference for greater number of children with higher abilities certainly it could be attractive to policymakers.

4. Some methodological comments

From a methodological point of view (Cigno, 1986, 1996; Cigno, Pettini, 2002) the children cost function in endogenous fertility models includes all expenses and opportunity cost of having the specified number of children with the utility of children held constant. Therefore it is neither an equivalent of utility loss for parents nor the compensation of their expenses (Cigno, 1996). Households maximize the ordinary consumption and the product of number of children multiplied by their quality (Cigno, Pettini, 2002). The latter reflects the expected lifetime consumption created by children and depends on the parent attendance to children upbringing and financial spending. Only the mother's time is needed for the production of child quality and quantity and the male labor time is exogenously determined by institutional factors. This assumption is questionable because it is based on the higher labor elasticity of mothers than fathers. It should be noted that despite the Cigno's models operated in two periods, the number of children has been chosen only for the first. This approach was close to simplified overlapping generation model but without intergenerational transfers between old and young members of society. The overlapping generation models overestimates the impact of future on the present decision, but are very useful in modeling pension policy in the pays-as-you-go system.

* However, the public endowment increases the quality elasticity in lower income classes which implies the decrease of the quantity elasticity. For high income classes the quantity elasticity becomes higher and the quality elasticity becomes lower (Becker, Tomes, 1976). Eventually the number of children in families diminishes with income first and then raises.

The problem of family taxation has been also studied in the linear and non-linear optimal tax framework (Cremer, Dellis, Pestieau, 2003). Compensation of high income households for the costs of having children requires a higher subsidy than compensation of low income households for the same reason. The children allowances can be viewed as a mean for obtaining higher vertical equity. Because these two objectives are in conflict, the subsidies cannot be simply linked with the number of children. Therefore the main findings include that the marginal tax rate decreasing with the number of children or even equaling zero for higher ability parents. However, it is ambiguous whether the optimal taxation approach (in the tradition of Atkinson-Stiglitz) is appropriate in the taxation of the family because families differ not only in their earning abilities, but also with their abilities to raise children (Balestrino, Cigno, Pettini, 2002). Therefore the latter authors argue for taxation depending on the number of children as well as on the income of the household (Balestrino, Cigno, Pettini, 2002). This construction is necessary to prevent high income families from "mimicking" the behavior of the low income ones because it would be optimal to make children more like an asset, or less as a liability, to parents with lower wage rates. Eventually, it justifies the policy-mix consisting of: the taxation on the number of children (poll tax), subsidies on child-specific commodities, income support for low-wage households, and positive marginal income tax rates. The striking part of this proposition is the taxation on children (instead of children subsidies), but it strives to counter the effect of quality-quantity trade off triggered by the facilities focused on raising children. The pronatalistic incentives in the policy scheme are indirect and linked with the children specific good (by indirect taxation) and with the opportunity cost of raising children (by progressive taxation of parents' income).

Conclusions and postulates for future research

The pronatalistic policy could be effective only under assumption of endogenous fertility. If fertility is exogenous, then families achieve the maximum physiological number of children and become prone to any financial incentives supporting higher rate of births. Therefore only the models with endogenous fertility deserve further development.

The children upbringing requires three "production" factors: child specific goods when they are very young, adult specific good and "attention" – the amount of time and quality of time that adults spend with children. It seems reasonable to

link the last two factors with older children and rather with the quality than with their quantity. The child specific goods and some attention are necessary just after birth but their amount seems to be more fixed than postulated in surveyed papers. In other words, these factors provide fixed cost of upbringing and the other factors are responsible (to a large extent) for quality improvement. In this context the nonfinancial support offered by the state can be more helpful to the increase of children quality and respectively – to the adults' utility than to encourage procreation. Probably the choice of giving a new life and the choice of investing in children's human capital are separable and they are affected by different factors. Moreover the higher number of children in family should decrease their average "quality". Contrary to this, in typical theoretical setting, quality and quantity are substitutes and they could be increased jointly at the cost of adults' consumption. If the choices of the number of children born and their quality are made sequentially this is not the case. The families set the number of children first and then decide to split the resources between adult's own consumption and the investment in children's quality. Therefore, if we subsequently alter the number of children we expect the decrease of the parents' consumption and the decrease of the quality of already born children. If this inference is correct then the policy focused solely on supporting the early years of children's lives could be set independently of the policy improving children's quality.

The optimal social population level should be higher than private because part of the future benefits of having children is not adequately perceived by parents. This is true even if the part of the costs of having children can be refinanced or substituted by public institutions. For example, in developed countries pensions are assured by the state and adult members of society believe that the quantity of future generation will be sufficient to maintain their consumption on a satisfactory level. Even if the future payments from government are regarded as too low, the number of children in families stays unaffected. In this situation the response of adults concentrates rather on the increase of savings than on procreation. Based on the same argumentation of bounded parent rationality there is a little evidence on the high impact of future situation on fertility choices. Conversely, this kind of decisions seems to be driven by the limitation of the adults' current consumption and not by the future cost-benefit analysis. This undermines the application of overlapping generation or any other two-period models for the description of the interaction of economic factors and fertility. However, it does not preclude any effects on the quality of children and the level of utility. In this context one can believe that the one-period models better reflect the problem of effective pronatalist policy implementation.

The choice of fiscal instruments affecting fertility include: the income taxes, poll tax, subsidies, differentiated indirect taxes on child-specific or adult--specific goods, and benefits in kind (like for example free education or health care). The literature advocates the use of indirect taxation and taxes on income or consumption of adults and sometimes supports the use of grants on children (especially if they are differentiated with the parents' ability to raise children). But if the procreation decisions and the building-quality decisions are separable then different instrument could be effective in both cases. For example, indirect tax allowances on children-specific goods can encourage birth rate when the benefits in kind could stimulate the quality (human capital) of future generations. Probably the policymakers do not have a clear vision of objectives which the pronatalist policy should fulfill and this is also only partially reflected in the economic theory of fertility's incentives.

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