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# Child policy ineffectiveness in an overlapping generations small open economy with human capital accumulation and public education

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ABSTRACT

Motivated by the recent decrease in the number of children experienced in several developed countries, in this paper we consider a small open economy model with overlapping generations, endogenous fertility and human capital formation through public education, and look at the role the government can play in affecting fertility through the widely used child allowance policy. Contrary to conventional view, we show that the public provision of child allowances is fertility-neutral in the long run, that is it is not effective as a pro-natalist policy, while also reducing human capital accumulation. In contrast, the financing of the public education system is beneficial to both fertility and human capital. These results hold in the cases of both fixed and time cost of children.



## 1. Introduction

In the recent decades the literature on economic development highlighted the prominent roles played by human capital formation as well as by the endogenous demographic behaviours of individuals in the economic system, focusing in particular on the interaction between them (e.g. Becker et al., 1990; Galor and Weil, 1996).

Human capital accumulation is widely considered as being one of the most important sources of economic development, and it may occur through different channels: for instance, educational attainment and the learning by doing with the former being mainly reached through formal schooling.[2] In this paper we focus on the formation of human capital through formal schooling, in particular public schooling, motivated by the fact that, historically, Governments have been the main providers of education especially in European countries, but even in North-American ones.[3]

The effects of public provision of education[4] on growth have been explored by Glomm and Ravikumar (1992), Eckstein and Zilcha (1994), Benabou (1996), Fernandez and Rogerson (1996) and many others. However these literatures ignore the effects of public education on (endogenous) fertility. The widely recognised prominent role of the human capital formation in the economic development has important implications for the economy, and can therefore significantly affect the results of analyses concerning for instance fertility and family policies.

The recent demographic behaviour in several developed economies is characterised by a sharp decrease in the number of children as well as by an increasing longevity. As regards the first aspect, since a low fertility rate seems to be the result of a rational choice that individuals make, it is prominent in the political agendas the use of adequate family policies to affect individual fertility. A widespread instrument used is the provision of child allowances to parents (e.g. Neyer, 2003): the reduction in the cost of child rearing due to the existence of a per child subsidy is expected to positively affect the choice of how many children to raise.

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[2] For instance, Mankiw et al. (1992) found that school enrolment is positively correlated with per working-age person GDP.

[3] Indeed, for instance, Glomm and Ravikumar (2001, p. 808) argue that during the last century the fraction of students at the elementary and secondary level attending public schools has been above 95% in Canada and 86% in the U.S.

[4] For the sake of completeness, we note that recent economic literature argued that in the process of human capital formation the private input may complement the public education input (for instance, through effective parental time). As noted by Glomm and Kaganovich (2008, p. 1012) "It is believed that private parental inputs at a pre-school stage as well as parent's time spent helping the child in school related activities such as homework, reading and field trips play a fundamental role in the formation of human capital." The relationship between parental inputs and public education inputs in human capital formation has been explored by Glomm and Kaganovich (2003), Viaene and Zilcha (2003) and Houtenville and Smith Conway (2008).

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There are two important papers by Zhang (1997) and de la Croix and Doepke (2003) that jointly analyse the interplay between fertility, education and economic growth. Both are framed in the literature of the quantity–quality trade-off (along the line of Becker and Barro, 1988) and assume time cost of children in an overlapping generations (OLG) model. Moreover, the former author, different from the latter, assumes that parents care about the utility of their descendants (i.e. complete or strong altruism towards children (see, Razin and Ben-Zion, 1975; Zhang, 1995). In both papers investments in education are *privately provided* by parents and agents choose the number of children as well as the amount of goods to be invested in the education of each child (Zhang, 1997) or the time should be devoted to schooling activities per child (de la Croix and Doepke, 2003) in a context of endogenous growth. However, while de la Croix and Doepke (2003) adopt the standard growth model à la Diamond (1965), Zhang (1997) does not consider the production side of the economy.

In particular, Zhang (1997) looked at the role of education and fertility subsidies finding that a rise in the education subsidies reduces fertility and speeds up economic growth because the relative cost of education shrinks and the educational spending relative to per capita family income increases. In contrast, raising the child allowance increases fertility and depresses economic growth because the relative cost of education raises and the educational spending relative to per capita family income lowers.

De la Croix and Doepke (2003), instead, mainly focused on the inequality issue and showed that fertility differentials between the poor and the rich matter for inequality and growth. However, they did not deal with public policies.[5]

Different from the previous literature, in this paper we analyse the effects of child and education policies in an economy with endogenous fertility, *public education* and fixed cost of children, and look at the role the government can play in affecting fertility rates, by developing a small open economy model where individuals derive utility from material consumption over the life cycle and the *number* of children they have (i.e. the so called weak form of altruism towards children, see Zhang and Zhang, 1998),[6] and assuming, in particular, the standard OLG model of neoclassical growth à la Diamond (1965).[7] It is shown that human capital accumulation is reduced by child allowances, while their overall effect on the choice of the number of children crucially depends on the relative strength of the substitution effect due to the reduced cost of children and the income effect due to the negative change in the endowment of human capital.[8] Therefore we argue, rather unexpectedly, that a child allowance policy is fertility-neutral. Indeed the individual demand for children ultimately depends only — in a positive way — on the educational contribution rate. These results hold even when child rearing activities are time consuming and thus reduce the time spent working. Our results contribute to shed new light on the relationship between fertility, education, economic growth and public policies in the OLG literature.

In particular, the results by Zhang (1997) are the most related to ours. Let us now briefly explain the reasons why while Zhang (1997) concluded that the public provision of child allowances pulls up fertility and education subsidies decrease fertility in the long run, in this paper the opposite result is obtained. In fact, while in the model by Zhang individuals face a trade-off when choosing between material consumption, education expenditure and the quantity (i.e. the number) of children, in our model the trade-off is only between material consumption and the quantity of children. This is because while in the former model education is privately chosen by individuals, in the present context it is publicly provided and thus it does not represent an individual choice variable. Moreover, while the results by Zhang are in line with the commonplace, that is child allowances shift private expenditures from education (and material consumption) to the number of children, and education subsidies, instead, make the opposite, in our model: (*i*) as regards child allowances, in the long run the substitution effect towards the number of children (which is the prevailing effect in the Zhang's model) is exactly counterbalanced by the negative income effect[9] induced by a reduced human capital accumulation due to the increased number of children that attend school over which the public schooling expenditure must be split; (*ii*) as regards policies supporting education, in our model, where, different from the Zhang's model, there is no trade-off between private expenditure in education and the quantity of children, the effects go as follows: a rise in the financing of public education requires an increase in the educational contribution rate, which implies, in turn, a reduction in the disposable income of the young workers. However, this negative effect is overweighed by the positive effect on the working income due to the increased human capital accumulation. Therefore, the overall effect of a rise in the educational contribution rate is a stimulus to fertility.

Moreover, in the Zhang's model there exists an additional effect that tends to reinforce his conventional results on economic growth: that is, the assumption of time costs of children. In such a case in fact a rise in the child allowance contributes to decrease the expenditure in education and increase the quantity of children, while also causing a reduction in the supply of labour as the time needed to care about children increases (in contrast, when education subsidies shift from the number of children to the educational expenditure also cause a rise in the supply of labour).

In order to check for the robustness of our findings, we have also introduced the hypothesis of time costs of children following Zhang (1997). It is shown that even by considering such a child cost structure, although a multiplicity of equilibria and an obvious negative relationship between fertility and income emerge, the "neutrality" result of the effect of child allowances as well as the positive effect of the public education policy on fertility are confirmed.

To sum up, our findings suggest that the public provision of child allowances misses its pro-natalist purpose while also dampening the formation of human capital. In contrast, an enlargement of the public provision of education monotonically increases both human capital and fertility and can therefore be used with pro-natalist purposes.

[5] A crucial hypothesis of their model is that teachers instead of parents provide education. This creates, in turn, a positive externality on the accumulation of human capital, while also implying that the cost of education is fixed for parents, so that the cost of educating children is higher for poor parents. They found that the poorer the parents, the higher the demand for children and the lower their education level. The fertility differential depends on the initial distribution of income. The larger such a differential the lower is the average education.

[6] Notice that we did not choose a class of model with complete or strong altruism (Barro, 1974; Becker and Barro, 1988; Ehrlich and Lui, 1991), where parents internalise the utility of their descendants, because we concentrate on the effects of taxes and expenditures. Therefore, such public policies, as known, tend to be ineffective in that class of models because there is in practice an individuals' infinite horizon. In fact, "in these models the effects of changes in taxes are negated via changes in bequests, and so are ill suited to analysing social security or publicly funded education." (Pecchenino and Pollard, 2002, p. 149).

[7] Other papers, such as van Groezen et al. (2003) and Fenge and Meier (2005) adopted the same framework (i.e., for instance, weak form of altruism and small open economy in an OLG Diamond's model), but, different from ours, they abstract from human capital formation and focus essentially on the interaction between family and pension policies.

[8] Indeed, the idea that a child allowance policy should act as a fertility-enhancing device is essentially based on the effect of a strong substitution effect through a reduced cost of child rearing. However, Fanti and Gori (2007) showed, in an OLG closed economy à la Diamond, that such an idea is valid only in either the short-run or in a partial equilibrium context with fixed factor prices, but it may not hold in a closed economy general equilibrium model.

[9] We recall that in this type of models with endogenous fertility and fixed cost of children the fertility rate is positively related with income (see Eq. (7)).