Policy Brief*

Do pensions foster education? An empirical perspective

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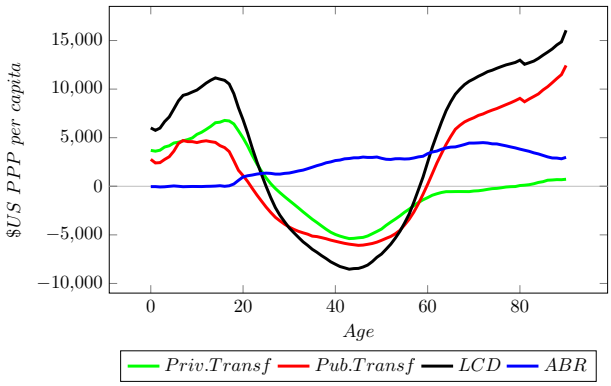
1 Introduction

The biological fact that people are physically dependent on others, especially during childhood and old age, has been tackled in a variety of ways. Before the extension of the welfare states, these dependency needs have been addressed within the family via private transfers, but gradually the latter have been substituted by the market (asset-based reallocations) and mainly by public transfers, see Figure 1. Today, two of the main policies of OECD countries are public education and pensions, two polices that directly impact the extremes of dependency (children and the elderly). More specifically, the size of public pensions in OECD countries in 2012 stood at 7.6% of GDP, while expenditure on public education represented on average 5.5% of GDP.

Figure 1: Life Cycle Deficit (LCD), Public and Private intergenerational transfers and asset-based reallocations (ABR). The higher the LCD, the greater the need for intergenerational transfers.
Data Source: *National Transfers Accounts (NTA) project* http://www.ntaccounts.org/web/nta/show/



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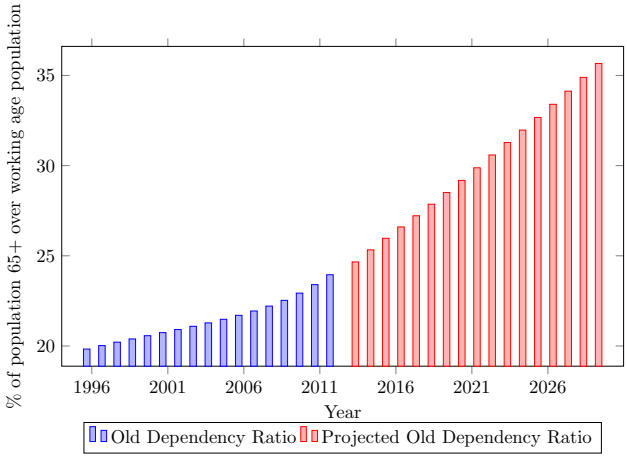
Parallel to this, we have seen the unfolding of the demographic transition. Population ageing has become an issue of growing concern, especially as the generation of "baby boomers" reach retirement age, putting considerable pressure on current pay-as-you-go (PAYG) pension systems. In 2012, the average old-age dependency ratio for the OECD countries was 22.4%, but this figure is expected to rise to 43.4% by 2040, see Figure 2. The forces behind population ageing are declining fertility rates – following on from the post-war "baby boom" – and increased life expectancy. Among other things, the latter is a result of better quality services due to technological progress in the healthcare system, while the former have been linked to the increasing opportunity cost for women of having children in developed economies, increase in human capital investment per child and hence substitution of quantity for quality of children (Becker et al., 1990).

Figure 2: Current and future population ageing on average of 31 OECD countries. Old dependency ratio is defined as population over 65 years old as proportion of the working age population (15-64).
Source: OECD(2015) Demography and Population and Historical population data and projections, respectively. OECD(2015) http://stats.oecd.org/



In a political economy framework, population ageing is translated into an older median voter and hence the political clout of the elderly seems set to grow. In turn, the increasing political power of the elderly -who "push" for pro-pension agenda- transforms the allocation of public resources, shifting more resources towards the older cohorts (e.g. for pensions) and fewer to the younger cohorts (e.g. for education). In other words, the increasing political clout of retirees may result in intergenerational conflict for public resources and, hence, the condemnation of education expenditure (direct effect).

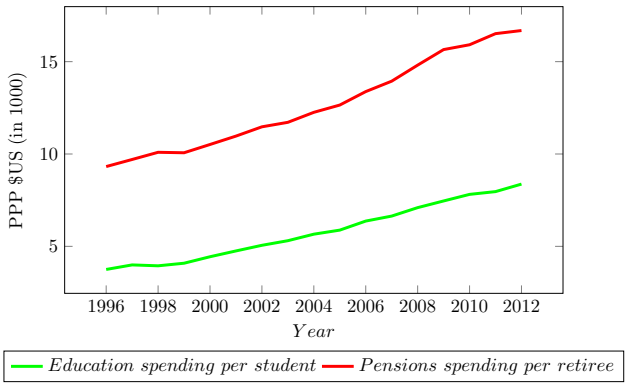
However, this picture could be altered if one takes into account the design of the PAYG pension system: pay "now" for current pensioner's pension, hoping that future workers will pay for you and receive "tomorrow". This design offers incentives for the working-age generation to invest in the public education of the young in order to "reap" the benefits of higher productivity in the future in terms of higher, taxable income, social security contributions and higher returns on savings (indirect effect). The main mechanism of the indirect effect stems from the fact that there are working-age agents who foresee that they are going to live longer because of the increase in longevity. These agents also realize that the increased number of retirees makes the PAYG pension system less generous in terms of spending per retiree. Having anticipated these outcomes, they internalize the positive

externalities of public education and react by investing more in education in the current period in order to take advantage of higher productivity of future workers [Kemnitz (2000); Gradstein and Kaganovich (2004)].

2 Evidence and Analysis

The evidence from the raw data in Figure 3 show that there is an increasing trend in per student and per retiree spending in education and pensions on average of OECD countries, respectively. Hence, in contrast with the predictions of the direct effect education spending increases alongside with pensions. This fact creates the necessity to examine more closely the effect of ageing on education expenditure paying specific attention to the rather neglected in the empirical literature aforementioned indirect effect.

Figure 3: Education and pension spending per student and retiree, respectively, increase over time period studied. *Source: Our own calculation using Total Education Spending from UNESCO (2015)(http://data.uis.unesco.org/Index.aspx?DataSetCode=EDULIT_DS and Total Pension Spending from OECD(2015) (http://stats.oecd.org/Index.aspx?DataSetCode=SOCX_AGG)*



We use panel data for 31 OECD countries on annual basis over the period 1996-2012.[1] The time period of our sample, apart from the current population ageing (1996-2012), also allows us to capture the retirement of the "baby boomers" (2013-2029) - generations born from 1946-1964 - when we use as a proxy variable the future old dependency ratio that is projected 17 years in the future (2013-2029).

First, we are concerned with the impact of demographic transition on public education expenditure in total. More specifically, how voters of different ages react on current and future population ageing (see Figure 4). Current population ageing is proxied by old dependency ratio (ODR) and the future population ageing by the projected old dependency ratio (PRODR). The latter corresponds to the period (2013–2029), allowing us to capture the retirement of the generation of "baby boomers" and, hence, the massive increase in the elderly population. This also allows us to examine how the electorate react on the projected demographic changes with respect to education spending in total and per student. Conducting our analysis we carefully control for the key variables that

[1] Australia, Austria, Belgium, Canada, Czech Republic, Denmark, Estonia, Finland, France, Germany, Greece, Hungary, Iceland, Ireland, Israel, Italy, Japan, South Korea, Mexico, Netherlands, New Zealand, Norway, Poland, Portugal, Slovak Republic, Slovenia, Spain, Sweden, Switzerland, U.K., U.S.A.

might affect education spending, namely, level of economic development, business cycle, the size of the government and the generosity of the welfare state. In addition, we control for the quality of education and a set of institutional variables.

Figure 4: Generation effect on education spending

	Middle aged (indirect effect)	Elderly (direct effect)	Overall
ODR	moderate positive	strong negative	**moderate negative**
PRODR	strong positive	weak negative	**strong positive**

Second, we go one step further by investigating which educational levels could be the driving forces behind the impact of future population ageing on total education expenditure. To that end we examine the effect of population ageing on public education per level. From the obtained results it seems that spending on non-mandatory, pre-primary and tertiary education is positively affected by the increasing percentage of the elderly. In contrast, the impact on the mandatory, primary and secondary educational level. One can argue that an increase in the projected old dependency ratio raises the future welfare state fiscal requirements (pensions and other social expenditure) as the number of beneficiaries increases. Hence, enhancing the productivity of the current and future generations as an attempt to generate additional fiscal resources (tax revenues) can be considered as the main reaction of the working-age population to handle the forthcoming financial sustainability issues of the welfare state. Thus, in order to boost current and future productivity, voters decide to support investments in the non-mandatory levels of education and those more related to productivity, pre-primary and tertiary education. Probably, the investment in non-mandatory education takes place only because there is a space for political intervention. In other words, increasing the quality of the non-compulsory educational levels may have a larger positive effect on the participation rate of these educational levels than on participation in mandatory education.

Last but not least, we evaluate the effect of increasing number of old people on pensions spending per retiree. On the one hand, there is the "fiscal leakage" hypothesis, which suggests that the increased proportion of elderly people decreases the expected profitability of pay-as-you-go pension system for current working-age voters, thereby inducing them to favour lower current pensions. Therefore, the working-age generation repudiates the social security system (Razin et al., 2002). On the other hand, population ageing makes the median voter older and hence more inclined to support higher expenses on pensions, the well-known in the literature "political power of elderly" hypothesis (Browning, 1975). Our empirical findings provide an indication that population ageing has a non-linear effect on pension expenditure per retiree and therefore both effects are present. Thus, the outcome and the strength of both effects depend on the proportion of old people. Hence, when the old dependency ratio is at a very high level, the "elderly power" effect is dominated by the "fiscal leakage" effect.

3 Results, Policy Implications and Recommendations

In our study we show that the direct effect is dominated by the indirect effect even when population ageing is unfolding. This implies that population ageing can foster the investment in education.

More specifically, using a panel data for the OECD countries during the period 1997-2012 our results indicate that population ageing has a positive effect on the quality of education measured as per student spending. The intuition behind this result is that working age voters foresee the prolonged longevity and less generous future pensions in terms of spending per retiree. They react to the increasing needs of their retirement by investing "today" in education in order to finance pensions "tomorrow". This result could have a number of policy implications in the context of the imminent demographic crisis faced by PAYG-financed pension systems. Educational expenditure can be seen as a complement or as an alternative pre-funding device to the long-discussed transition to a capitalization system.

Moreover, investment in pre-primary public education can positively affect the productivity of young parents (especially young mothers) by supporting them with such a time-consuming process as child-raising. Therefore, improving the quality of pre-primary education could eventually lead to an increase in productivity. However, in the case of primary and secondary education, the mandatory character of participation prevents such an investment from being beneficial for the productivity of current workers. Regarding the productivity of future workers, there is a positive impact from the projected population ageing on higher education spending. Consequently, one can expect that this could bring about an increase in participation in tertiary education and eventually lead to a future working generation with enhanced skills and productivity.

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