Economics of Education Review 45 (2015) 103–108

Contents lists available at ScienceDirect

Economics of Education Review

journal homepage: www.elsevier.com/locate/econedurev

Note

Demographic changes and education expenditures: A reinterpretation

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ARTICLE INFO

Article history:
Received 11 May 2014
Revised 11 January 2015
Accepted 21 January 2015
Available online 3 February 2015

JEL classification:
H23
H71
I22
J14

Keywords:
Demographic change
Aging population
Intergenerational conflict
Elderly support for schools
Local education finance

ABSTRACT

Several empirical studies have estimated a negative relationship between the share of an area's elderly population and per-pupil education spending. These findings have often been interpreted as evidence that an aging population has hindered the growth in per-pupil expenditures. We offer a reinterpretation of these oft-cited estimates and demonstrate that the population has aged in a way not reflected in these earlier studies' empirical designs. After fully accounting for actual U.S. population trends, we demonstrate that a rise in the elderly share of the population has resulted in a rise in per-pupil education spending, not a decline.

1. Introduction

Beginning with Poterba (1997, 1998), several empirical studies on the topic of public education spending have estimated a negative relationship between the relative size of an area's elderly population and public support for local school systems, as measured by per-pupil expenditure.[3] The conclusion is then often made that the continued aging of the U.S. population augurs poorly for public school support and, hence, public education finances. Towards the end of Poterba's original paper, he notes that projected growth in the relative size of the nation's elderly population (1990–2030) would translate into "… a 10% reduction in per-child spending (pg. 64)". Most recently,

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[3] Poterba's original study measures a state's support for public education using per-child spending. Most subsequent studies, particularly those published by Harris, William, and Schwab (2001) and Figlio and Fletcher (2012), have used per-pupil education revenues as a measure of public support. Because revenues translate directly into expenditures, we treat each of these papers as effectively measuring per-pupil spending.

http://dx.doi.org/10.1016/j.econedurev.2015.01.001
0272-7757/

Table 1
Study summaries.

Study	Education spending measure (lny)	s^{old}		s^{child}	
		Measure	β_1	Measure	β_2
Poterba (1997)	ln(per-child total spending)	ln(pop. share 65+)	−0.264**	ln(pop. share 5–17)	−0.986***
Harris et al. (2001)	ln(per-pupil total revenues)	Pop. share 65+	−0.886***	Pop. share 0–19	−0.907***
Figlio and Fletcher (2012)		Adult share 65+	−0.374**	Share households w/kids	−0.249***

The estimates reported here are taken from the following: Harris et al. (2001), Table 4, Column 2; Figlio and Fletcher (2012), Table 3, Column 3; and Poterba (1997), Table 3, Column 4. *, **, and *** indicate statistical precision at the 10%, 5%, and 1% levels, respectively.

Figlio and Fletcher (2012) hint that raising a community's population share that is elderly may lead to reduced support for the schools, noting that "... the aging of the Baby Boom generation could have substantial implication for school finance in the coming years (pg. 1145)". The papers cited in this note are rich in content and raise a range of interesting policy-related questions regarding how the elderly likely respond to and influence local- and state-level sources of education expenditures, especially when school-aged children belong to a different racial group vis-à-vis the elderly. However, for the purposes of this discussion, we will focus on only a single aspect of this body of work, that which relates the aging of a community's population to public education spending. Moreover, we do not critique the statistical results supporting the statements cited above. Rather, we offer a reinterpretation of the authors' empirical findings. When appropriately considered, we show that their estimates actually suggest that an aging U.S. population has likely resulted in increased per-pupil spending, not a decline.

2. Demographic realities

To empirically investigate the impact of a changing age distribution on education spending, the studies considered here each regress the natural logarithm of an area's per-pupil spending, lny, against variables representing or proxying for the share of the population that is elderly, s^{old}, and the share that is of school age, s^{child}. Using panel data at the state (Poterba, 1997), county (Ladd and Murray, 2001), or school district level (Figlio & Fletcher, 2012; Harris, Evans, & Schwab, 2001), a version of the following general equation is estimated:

$$\ln y = \beta_1 \times s^{old} + \beta_2 \times s^{child} + \mathbf{X}\boldsymbol{\beta} + \varepsilon$$

where $\mathbf{X}$ is a vector of additional covariates, including area fixed effects.[4] Here, the coefficient of primary interest, β_1, measures the relationship between per-pupil education spending and elderly share, ceteris paribus. This relationship is hypothesized to be negative based on the proposition that older populations are less willing to support their local public school systems. As the elderly share of the population grows in size and older households gain political strength, local education expenditures are expected to decline. As part of the ceteris paribus condition, each of these studies includes some measure of the share of the school age population, s^{child}, to account for congestion effects at the local level. When a fixed tax base for school expenditures is distributed across a growing student body, per-pupil spending can be expected to fall. Thus, the coefficient β_2 is hypothesized to be negative as well.

These studies all reach the same general conclusion, although to varying degrees of magnitude: an increase in the elderly share of the population reduces support for education spending, as indicated by negative estimates for β_1. The only exception to this consensus is Ladd and Murray (2001) who estimate a negative, yet statistically imprecise, effect. Among the three studies cited here that estimate meaningfully negative and statistically significant results, there are only slight differences in how they measure an area's population share that is elderly or school-aged, s^{old} and s^{child}, respectively. Table 1 summarizes these differences and reports the estimated sign and precision of selected estimates published within each paper.

Observing that the elderly share of the U.S. population has risen with time, and is likely to continue to rise, one might suggest that the negative estimate for β_1, coupled with demographic trends, bodes poorly for the nation's local public education systems. Presumably, such a conjecture is derived from the calculation $\Delta \ln y = \beta_1 \times \Delta s^{old}$, where Δs^{old} is the projected (positive) change in the elderly share over a particular window of time. However, what must be made immediately clear, and what this simple prediction fails to account for, is that any change in s^{old} will generally be accompanied by an offsetting change in s^{child} and/or an omitted group, s^x, which measures the non-elderly adult share of the population.[5] Accounting for these changes is an important step towards accurately interpreting the parameter estimates reported in Table 1, as these estimates implicitly reflect certain assumptions made by the authors about how these demographic changes occur. In particular, because of the ceteris paribus condition implicit in the estimating equation, the simple simulation described by $\Delta \ln y = \beta_1 \times \Delta s^{old}$ holds s^{child} constant and, hence, requires that there be a negative change in the omitted group, s^x. This paper's central argument is that this is the "wrong" experiment to use when interpreting the overall impact of an aging population on per-pupil education spending, as increases in s^{old} have historically come at the expense of s^{child} and not of the omitted group, s^x. Noting that $\beta_2 < 0$, it is very possible that accompanying declines in s^{child} have partially or even fully offset the direct negative effect associated with any rise in s^{old}. Framed in this way, it is

4 Poterba (1997) and Ladd and Murray (2001) estimate log-log equations, where s^{old} and s^{child} are natural logarithms of the population shares that are elderly and school-aged, respectively. All of the other papers cited here adopt log-linear forms for their estimating equations.

5 For example, Harris et al. treat s^{old} as the population share aged 65+ and s^{child} as the share aged 0–19; the omitted group, s^x, is therefore the population share aged 20–64. As s^{old} rise, s^{child} and/or s^x must decline.