Permanent Effects On Education Of Transitory Shocks In Childhood

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Abstract

This paper investigates the impact of transitory income shocks in childhood on final educational attainment, controlling for secular trends. Using state-level cohort data for about half a million men and women born in 1960-1984 across the 15 major Indian states, we estimate age-specific income effects. The baseline fixed effects specification suggests that income shocks that strike anywhere between the ages of 1 and 17 are predictive of final attainment. Exposure to income shocks in the pre-school years marks adult levels of education. The "scarring" coefficients rise up to age 6, remain similar till age 12 and then start to decline to about the size of the pre-school coefficients. Overall, the stock of adult education is most sensitive to changes in income at age 6-12. In a specification that conditions upon cohort trends, the only age at which income shocks leave a lasting impact is age 6. Children exposed to a 10% drop in state income at age six have, on average, 0.03 years less schooling as adults. This suggests that age 6, the age at which most Indian children enter school, is a critical age range for interventions such as cash transfers that seek to relax liquidity constraints. We investigate gender-specific coefficients and prolonged booms and busts. We find that while boys are more sensitive at primary school ages, girls are more sensitive at pre-school and secondary school ages. Busts hurt both boys and girls. Booms benefit girls but they lower boys' educational attainment, possibly because they draw them away from school and into the labour market. Consistent with their greater poverty, we find that low caste children are more vulnerable to income shocks than upper caste children. Distinct from shock effects, we find that the average rate of income growth within the state over the entire period has a significantly positive effect on years of completed education which is much larger for girls and for low caste children than for upper caste boys.

Keywords: education, income shocks, liquidity constraints, India, gender, caste, religion, child labour.

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1. Introduction

This paper investigates the effects on completed years of schooling of transitory aggregate income shocks experienced through childhood. Economic theory does not provide an unambiguous prediction of these effects Adverse shocks will tighten liquidity constraints and force some children to drop out of school to help maintain family consumption. However, labour market alternatives are less attractive in economic downturns. So, the effect on school attendance may be positive or negative. The effect on completed education is even more uncertain since children who drop out at the time of a shock may return to school and continue to a target level (or complete their desired years) of education.

There is limited evidence in the literature of the extent of this sort of catch-up. Most previous studies investigate the effects of income shocks on the contemporary enrolment of children (section 2). A contribution of this paper is that it exploits cohort data on the completed education of adults to measure the net cumulative effect of shocks that strike throughout childhood. In this way it also contributes new evidence on the age(s) at which education is most sensitive to shocks. Using a large sample of about half a million Indian adults, it investigates heterogeneity in impact by gender, caste, religion, rural/urban location and cohort. This enriches our understanding of the mechanisms at play. It also contributes to understanding the role that liquidity constraints play in explaining the remarkable inequality in educational outcomes in India. India's educational performance is poor, even at its level of per capita income. Both education and income have improved over time, especially in the 1990s (Deolalikar 2008) and income volatility has declined, although dropout rates have not fallen very much (Bhalotra and Zamora 2008). Reducing school dropout is probably the most important policy problem in India and many other developing countries.

2. Previous Literature

A number of previous studies have shown that adverse income shocks result in school drop out (e.g. Jacoby 1994 using Peruvian data) or in lower enrolment rates (e.g. Flug et al. 1998 using cross-country data, Beegle et al. 1999 using Indonesian data). However, this is not a universal result. Cunningham and Maloney (2000) show that

Mexican children are less likely to drop out during an economic crisis whereas, in Argentina, girls, but not boys, are more likely to drop out. In his analysis of the 1988-1992 macroeconomic crisis in Peru, Schady (2002) finds that both employment and school attendance of 6-17 year old children declined, and that mean educational attainment in this age group was higher for children exposed to the crisis, which he argues is because their lower employment rates allowed them to put more effort into school work. We know of no previous work that looks at the effects of shocks at different ages on final educational attainment [we need to check]. Also, most if not all of the available evidence pertains to the effects of sharp and widespread macroeconomic crises which present an opportunity to look for a discontinuity in the current enrollment rate. In contrast, our specification captures the average permanent effects at the end of the school-going period of regular annual (or two-yearly) state-specific changes in income across a period of seventeen years.

3. Data

We pool data from three cross-sections of the household consumer expenditure survey conducted by the Indian National Sample Survey Organisation (NSSO) in 1993-1994 (round 50), 1999-2000 (round 55) and 2004-2005 (round 61). These are large sample surveys that are representative at the state and all-India levels. Information on completed years of education is recorded for all individuals aged at least five. As the data indicate a sharp fall in school participation at age 17, we restrict the sample to individuals who are at least 20 years old at the time of the survey and, from this sample, we further drop a small percentage of individuals that report being enrolled in formal education. An upper limit to the age of individuals in the analysis is set by the fact that state-level aggregate income data are only available from 1960 onwards. This implies that the oldest individual in the sample is aged 38, 44 or 49 in rounds 50, 55 and 61 respectively. An advantage of these upper limits on age is that they limit the problem of age-selective mortality, which we may expect would leave an unrepresentatively well-educated sample of older people. The data analysed contain 514,732 individuals in the age range 20-49 born in 1955-1984.[1] We are assuming the interstate migration is negligible. In other words, we are assuming that individuals spent age 0-17 in the state that they live in at the time of interview. This is consistent with evidence in Topalova (2005) and Rosenzweig and Munshi (2009).

[1] If we decide to keep shocks at age (-1) to age 5 (preschool) then for older cohorts we need NSDP data prior to 1960 which we don't have. So the sample will then be down to about 436383 individuals aged 20-44 born in 1960-84.

4. Empirical Model

The estimated equation is

$$S_{icr} = \Delta y'_{icrt}\gamma + X'_{icr}\delta + \alpha_r + \alpha_c + \lambda_{ct} + e_{icr} \qquad (1)$$

S is the completed school years of individual (adult) *i* born in year *c* in region *r*, which is allowed to depend upon income shocks, Δy (a vector), at every pre-school and school-going age, *t*, where t ranges from -1 (the year in utero) to age 17. Note that the shocks are specific to groups of individuals born in the same year and the same region. So, for example, for individuals born in 1960, we model the effects of shocks in their state of residence in 1959 to 1977 when they are age -1 to 17. For individuals born in 1970, the relevant shocks occur in 1969-1987, which is when they are age -1 to 17. We investigate alternative specifications of income shocks, which are described in the Results section.

Secular income growth is captured, along with common trends in fertility and other unobservables, by the cohort dummies, α_c, and the cohort-specific quadratic trends, λ_{ct}. Region fixed effects, α_r, pick up all time-invariant or sluggish influences on schooling, including supply side differences, cultural attitudes and regional demographic composition. The vector X contains individual-level indicators for gender, caste, religion, location (rural/urban). In extensions of the model, we allow the coefficients of interest, γ, to vary with X, for example, to be different for boys and girls.

5. Descriptive Statistics

The mean years of schooling of adults aged 20-49 in our data are 5.3 and the range is 0-17 years. Towards the end of the period, our data (described below) show that the average years of completed schooling of adults individuals aged 20-29 in 2004-05 (birth cohorts 1975-1985) was 6.4. Of this sample, 24% had no education and 19% had more than 10 years of education. Figures xx are kernel density plots showing the distribution of individuals in the sample by age and birth year. The number of observations is declining in age, which is largely by design- recall that the maximum age in the first round is 38 and in the third round is 49. Figures xx show the all-India and state-specific trends in real per capita income (henceforth *income*) and in completed school years by birth cohort. Remark at all-India and state-specific humps and bumps in income.

6. Results

Table 1 below shows the results of applying equation (1) the NSS data described above. In all regressions we added year of birth and state fixed effects. As expected, the number of completed years of schooling varies by caste, gender, location and religion. For example, Muslims, females and people living in rural areas have each of them two years of education less compared to Hindus, males and those in urban areas, respectively.

Now we focus on the effect of aggregate income shocks at different ages. In column (1) we consider only shocks between the ages of six and 17. In all cases, the parameters are positive and statistically different from zero. For example, if at age six, the state economy grew at one percent then a child will have an additional 0.39 years of schooling. This number is not necessarily small as it represents five percent of the sample mean. Comparing the magnitudes at different ages we observe that the larger effects are found at ages 11 and 12 where children make the transitions from primary to secondary education. In column (2) we include shocks before age six. Note that we have fewer observations because GDP growth is not available for the early ages of the older cohorts. Again, all parameters are positive indicating that a positive aggregate growth in income in each year is associated with an increase in the number of school years. Also, all parameters are statistically different from zero except for shocks in-utero and age 16. Similar to column (1) shocks at ages 11 and 12 have the highest impacts. However, we also see an important effect at age six now. These results suggest that there some ages are more vulnerable than others and these vulnerable ages coincide with the times where children are starting a new education level.

Since we look at state-wide shocks, supply constraints within states are constant across social groups. We can therefore interpret group differences in terms of the demand constraints and simulate the impact of poverty on educational inequality across social groups.

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Preliminary Results

Table 1. Effects of aggregate income shocks on completed years of schooling

	Dependent variable: Completed years of schooling	
	(1)	(2)
Muslim (=1)	-2.446	-2.441
	[0.020]***	[0.022]***
Christian (=1)	1.099	1.105
	[0.045]***	[0.052]***
Sikh (=1)	0.389	0.419
	[0.059]***	[0.070]***
ST (=1)	-2.621	-2.7
	[0.022]***	[0.026]***
SC (=1)	-2.565	-2.516
	[0.016]***	[0.019]***
Female (=1)	-2.294	-2.21
	[0.013]***	[0.015]***
Rural (=1)	-2.703	-2.558
	[0.014]***	[0.016]***
Growth in-utero		0.008
		[0.095]
Growth at age 1		0.243
		[0.107]**
Growth at age 2		0.334
		[0.118]***
Growth at age 3		0.589
		[0.137]***
Growth at age 4		0.513
		[0.146]***
Growth at age 5		0.644
		[0.152]***
Growth at age 6	0.391	1.06
	[0.088]***	[0.155]***

Growth at age 7	0.239	0.845
	[0.098]**	[0.154]***
Growth at age 8	0.431	0.911
	[0.110]***	[0.156]***
Growth at age 9	0.451	0.66
	[0.111]***	[0.153]***
Growth at age 10	0.543	0.830
	[0.114]***	[0.148]***
Growth at age 11	0.692	0.937
	[0.113]***	[0.141]***
Growth at age 12	0.818	0.901
	[0.118]***	[0.147]***
Growth at age 13	0.584	0.535
	[0.116]***	[0.154]***
Growth at age 14	0.448	0.302
	[0.115]***	[0.156]*
Growth at age 15	0.367	0.194
	[0.108]***	[0.152]
Growth at age 16	0.472	0.430
	[0.099]***	[0.139]***
Growth at age 17	0.266	0.274
	[0.095]***	[0.127]**
Constant	7.226	7.502
	[0.054]***	[0.066]***
Observations	502,509	382,921
R-squared	0.230	0.220

Robust standard errors in brackets, Regression includes year of birth and state fixed effects. * significant at 10%; ** significant at 5%; *** significant at 1%.