



Remember when it rained – Schooling responses to shocks in India

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ABSTRACT

Despite long-standing international agreements like the Millennium Development Goals, 264 million children in developing countries are not enrolled in school, and children in rural areas remain twice as likely to be out of school as children in urban areas. One potential explanation for this pattern is that children's education in rural areas is vulnerable to weather shocks, but there is no consensus about whether rainfall shocks help or harm school enrollment in the existing literature. This paper explores whether changes in the relationship between rainfall shocks and schooling outcomes over time can explain the different results in the literature by using household survey data from India across three decades. My study finds that adverse rainfall shocks have an increasingly stronger positive impact on school enrollment over time, whereas enrollment is increasingly falling after positive rainfall shocks. This effect is stronger for girls than for boys, more pronounced for older children, and is consistent with an increase in the importance of opportunity costs of a child's time in more recent years. Children may have to drop out of school when employment opportunities are more readily available after a positive rainfall shock, but are able to go to school when jobs are scarce. These results offer a potential explanation for the different results in the literature, where studies on countries with higher economic development tend to find results consistent with an opportunity cost story, whereas this is not the case for studies on countries with a lower level of development. The results suggest that policymakers need to pay close attention to the obstacles faced by girls and older children to make access to education universal, and should develop policy tools that incentivize households to send their children to school even when employment opportunities are readily available.

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1. Introduction

Ensuring universal access to education for children of school-going age is a long-standing goal for the international policy community. Prominent international agreements like the Education for All (EFA) movement or the Millennium Development Goals (MDG), both adopted in 2000 and supposed to be achieved by 2015, prominently featured the goal to achieve primary school education for all children regardless of socio-demographic characteristics such as social status or gender. But while the net primary school enrollment rate in developing countries improved massively from about 80 percent in 1990 to 91 percent in 2015, about 264 million children under the age of 18 remain out of school, and 17 percent of children do not complete primary school (United Nations, 2015; UNESCO, 2017). Further improvements to school enrollment and the quality of education at the primary and secondary school level are therefore demanded in the Sustainable Development Goal

number 4, which the international community has committed to achieve by 2030.

While there are many potential obstacles for school enrollment, the location of a household remains an important factor: Despite urbanization, over 60 percent of the population in regions such as South Asia and Sub-Saharan Africa live in rural areas, and survey data from 63 developing countries between 2008 and 2012 has demonstrated that the average out of school rate in rural areas remains about twice as high as in urban areas (United Nations, 2015). One plausible explanation for this pattern is that many children continue to grow up in rural households that are dependent on agriculture and vulnerable to weather shocks such as droughts. To help their families cope with these shocks, children may have to drop out of school. To further improve access to education for children and to help shape policy responses by governments and the international community it is therefore important to understand how vulnerable school enrollment is to weather shocks and whether this relationship has changed over time. As rainfall variability is projected to increase dramatically in many developing countries due to climate change, the importance of this effect will

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only increase in the future (Thornton, Ericksen, Herrero, & Challinor, 2014).

Two main channels are typically thought to drive children's vulnerability to rainfall shocks with respect to school enrollment, with the effects going in opposite directions. On the one hand, children may have to drop out of school after a negative shock because of a lack of household resources, typically referred to as a credit constraints explanation. A negative rainfall shock lowers household income due to a worse harvest, and parents may no longer be able to afford sending their children to school. On the other hand, children may actually be more likely to enroll in school after a negative rainfall shock because the employment opportunities during a drought may be worse than during times of better rainfall. While children may have to work to contribute to household income, this opportunity cost channel predicts that the opportunities to do so may be far better after positive rainfall shocks when more jobs in agriculture and related industries will be available. The overall impact of rainfall shocks on school enrollment therefore depends on the relative strength of these two channels.

A number of existing papers test the impact of rainfall shocks and other economic shocks on children's school enrollment. The majority of studies finds that school enrollment decreases after an adverse shock, suggesting a larger role for the credit constraints channel (Baez, Lucchetti, Genoni, & Salazar, 2017; Björkman-Nyqvist, 2013; deJanvry, Finan, Sadoulet, & Vakis, 2006; Jacoby & Skoufias, 1997; Jensen, 2000; Thomas et al., 2004).¹ But a couple of papers also document a positive enrollment effect after a negative shock, which implies that the opportunity cost channel dominates (Duryea & Arends-Kuenning, 2003; Kruger, 2007; Schady, 2004; Shah & Steinberg, 2017). The existing literature even finds opposite results for the same country: Both Jacoby and Skoufias (1997) and Shah and Steinberg (2017) study the impact of rainfall shocks on school enrollment in India, but Jacoby and Skoufias (1997) find school enrollment effects consistent with a credit constraints explanation, whereas the impacts in Shah and Steinberg (2017) support an opportunity cost story.

This lack of consensus on the direction of the impact of shocks on school enrollment raises the question of what drives the differences in results, and whether policymakers should expect children's school enrollment to respond adversely to positive or negative rainfall shocks. Important differences between the studies make it difficult to interpret the empirical patterns: The two studies on India, like the broader literature, differ in terms of the used datasets, the empirical specifications, the geographic location of households and the timing of the surveys. Jacoby and Skoufias (1997) use data from 1975–1978 in their study, for example, whereas Shah and Steinberg (2017) focus on the late 2000s. The different empirical patterns could therefore indicate that there has been a switch in the impact of rainfall shocks over time from a credit constraints channel to an opportunity costs channel. With large changes in economic development and the availability of schools over that time period, it would be plausible to assume that low household resources after a negative shock have become less likely to be the main factor determining children's school enrollment. But the different results could also just be driven by other factors such as different geographic coverage.²

In this paper, I contribute to reconciling the different results from the literature by using household survey data from India. The analysis dataset consists of three large representative cross-sectional household surveys that span three decades (1986, 1995,

2007). The timing of the surveys allows for the rare opportunity to analyze how the impact of rainfall shocks on education has changed in the same context over time, while keeping the empirical specification and creation of the rainfall shock variable constant.

I report the results separately by gender and for children of three different age groups: 6–10 years, 11–14 years and 15–18 years. While the gender gap has become smaller, girls on average still have lower educational attainment than boys, and could therefore be more affected by rainfall shocks (Kingdon, 1996; Kingdon, 2007). It is also plausible to assume that the relative strength of the two channels, credit constraints and opportunity costs, changes depending on the child's gender and age. A 15 year old, for example, is likely to be a much more productive worker than a six year old. While not completely enforced, schooling in India is compulsory for children between six and 14 years, and previous research has suggested that dropout rates start to rise particularly for girls around age 10 (Kingdon, 1996; Muralidharan & Prakash, 2017). This is also the time when children that started school on time finish primary school and start middle school. The three age categories are therefore likely to capture key differences relevant for studying the vulnerability of education outcomes to rainfall shocks.

The results show that the sensitivity of school enrollment to rainfall shocks has fundamentally changed over time. For the youngest children, although to a lesser extent for girls, sensitivity to rainfall shocks drops over time, leading them to be largely unaffected by rainfall variability by 2007. For 11–18 year olds, estimates evolved over time in a direction that is consistent with an increase in the importance of an opportunity cost channel: a negative rainfall shock leads to substantial increases in school enrollment by the most recent survey round in 2007, whereas the estimates are typically much smaller and of the opposite sign in 1986. The reverse is true after a positive rainfall shock, where school enrollment is increasingly negatively affected. These patterns are particularly pronounced for girls, whereas boys are more insulated from the consequences of rainfall shocks. While not always precisely estimated, the effects on work status and educational attainment usually change in a way that is consistent with an opportunity cost explanation: It predicts that children drop out of school to take up employment opportunities, which are more readily available than during periods of worse rainfall. This implies that the probability that a child works should increase and educational attainment fall, with the reverse patterns holding up after a negative shock.

Overall, the results help reconcile the different results in Jacoby and Skoufias (1997) and Shah and Steinberg (2017) by showing that the empirical relationship between rainfall shocks and school enrollment seems to have changed signs over time, moving from a credit constraints explanation in the 1970s to a stronger and stronger opportunity cost channel by the late 2000s. This helps to better interpret the existing results for India. More broadly, the results also offer a potential explanation for the different results in the literature. Table 1 lists existing papers studying the impact of shocks on school enrollment in ascending order of the average GDP per capita in the country during the survey time period as well as the sign of the estimated effect as supporting either a credit constraints or an opportunity cost channel. As the table shows, a credit constraints channel is more prevalent for the studies with lower GDP per capita, whereas the opportunity cost channel tends to be more concentrated at higher GDP per capita levels. While this table does not rule out that there are other factors that explain the different results across studies, such as geographic coverage or type of shock, it would be consistent with the idea that the opportunity cost channel becomes stronger as a country develops. If this is true, developing country governments may have to

¹ These papers estimate the short-term impact of shocks on school enrollment. This is different from papers such as Maccini and Yang (2009), which estimate the impact of early-life rainfall shocks on long-term education outcomes in adulthood.

² Jacoby and Skoufias (1997) use data from six Indian villages in two states, whereas Shah and Steinberg (2017) draw on datasets with national coverage.

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