



Infant Health during the 1980s Peruvian Crisis and Long-term Economic Outcomes

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Summary. — In 1988, Peru entered a severe economic crisis as a corollary of unfavorable external economic conditions, high levels of debt, and heterodox policies (the so-called debt crisis of 1980s). This paper investigates the short-term health shock experienced by infants during the crisis and its long-term impact on human capital accumulation. Because no longitudinal data are available, the estimation of causal effects is performed using multiple cross-section surveys that are representative of the same population over time. The short-term and the long-term effects are estimated exploiting the heterogeneous impact of the crisis across and within birth cohorts. Results indicate that the Peruvian crisis significantly affected the health of infants, particularly that of children born to low-educated mothers. From 1988 to 1990 vaccination declined 12 percentage points and infant mortality increased 2.3 percentage points among children born to low-educated mothers. In the long run, the children who suffered the most severe health shocks during the economic downturn of the 1980s performed worse in school. They had 0.12 fewer years of formal education and their probability of completing primary education by age 15 was three percentage points lower in relation to similar children born after the crisis. The results have strong policy implications. Children in developing countries should be safeguarded against health shocks during economic crises to avoid a decline in the accumulation of human capital in the long-run.

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1. INTRODUCTION

Gestation and infancy constitute a crucial period in life. The body and the brain grow and develop at an exceptionally fast rate. This is also a period when a person is particularly vulnerable to health shocks. Insufficient nutrition and disease tend to increase the probability of death during the early years of life and, if the infant survives, may have lasting implications in adulthood.

The problem of poor infant health is highly prevalent in developing countries, and likely to be exacerbated during economic downturns. A severe economic crisis may affect the quantity and quality of inputs in the production function of children's health through different channels: (i) the mechanisms to smooth consumption among the poor tend to be limited for aggregate fluctuations. As a consequence, consumption may decline (Townsend, 1994), (ii) parents' behavior such as smoking and drinking may change (Dehejia & Lleras-Muney, 2004), (iii) the mother's time spent with their children may adjust (Hidrobo, 2014; Miller & Urdinola, 2010), and (iv) the supply of health care may deteriorate due to a decline in public spending (Paxson & Schady, 2005). As a result, the health of children may be affected both temporarily and permanently.

This paper explores the short-term and the long-term consequences of health shocks experienced in early childhood by those born in Perú during a severe economic crisis in the late 1980s. As a consequence of heterodox policies and previous mismanagement of the debt crisis (Glewwe & Hall, 1994), Perú experienced a sharp economic contraction in late 1980's. Between 1987 (pre-crisis peak) and 1990 (trough) the Peruvian GDP fell 30%, real wages in Lima decreased 80%, and inflation reached four digits. Previous evidence indicates that a consequence of the severe crisis was an increase in infant mortality resulting in 17,000 excess deaths (Paxson & Schady, 2005). In this paper, I focus on individuals who were born dur-

ing the crisis but survived childhood. The same adverse conditions that increased infant mortality may have affected the health of survivors and their ability to accumulate human capital in subsequent years.

Combining information from eleven repeated cross-sections (*Encuesta Nacional de Hogares (ENAH)* survey from 2004 to 2014) with health information from the economic downturn (obtained retrospectively from *Demographic and Health Surveys (DHS)*, rounds 1991, 1996, and 2000), I exploit the within-cohort heterogeneous impact of the crisis and the between differences in cohort exposure observed at different points in time to explore the mechanisms through which the crisis affected the health of infants and determine if health shocks in infancy had any consequence on education in adolescence. The empirical strategy has two parts. The first part estimates the contemporaneous impact of the crisis on infant health and shows that children born to low-educated mothers suffered the most during this period. Using a different sample, the second part of the empirical strategy follows the same groups of children 15 to 18 years after the crisis ended to identify and estimate long-term effects in relation to human capital accumulation.

The results indicate that individuals who experienced the most severe health shocks during their infancy had 0.12 fewer years of education and were three percentage points less likely to complete primary education by age 15. In terms of mechanisms, the evidence suggests that the decline in health expenditure was one of the main determinants through which the crisis impacted the health of infants (consistent with Paxson & Schady, 2005). The number of antenatal doctor visits declined on average in one unit and the probability that a child born to a low-educated mother got vaccinated decreased 12 percentage points. Breastfeeding increased during the crisis, but its positive effect on the health of infants was insufficient to

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compensate the negative effect of the reduced health expenditure. These two opposite effects, the increase in breastfeeding (or more generally the mother's time input) and the decrease in health expenditure, may explain why economic downturns have in some cases a positive effect on infant health (e.g., Dehejia & Lleras-Muney, 2004 on US business cycles) while in others a negative effect.

The above-mentioned results on health are lower bound effects of the crisis because they may be downwardly biased by a selection effect. Those who died during the crisis may be infants who naturally had below-average health and consequently could not tolerate the health shock. To account for this problem, I use a partial identification approach that provides the lower bound and the upper bound effects of early-life health shocks. The strategy consists of making two extreme assumptions about the health of infants who died during the crisis, had they survived and reached adolescence. The first of these extreme assumptions is that there was no selection effect. Assuming that the infants who died were naturally as healthy or unhealthy as those who survived provides the lower bound health impact of the crisis. To estimate the upper bound, the assumption is that there was a 'complete' selection effect. In this case, I assume that all infants who died during the crisis would have failed to complete primary education by age 15, had they survived.

This paper contributes in several dimensions to the growing literature on the long-term consequences of fetal and infant health, popularized by Barker (1990) and recently surveyed by Almond and Currie (2010). First, it studies the long-term impact of early-life health shocks associated with economic crises. There is consistent evidence that several temporary shocks experienced in the womb and in infancy such as pandemics (Almond, 2006), toxic exposures (Nilson, 2009; Reyes, 2007) and weather shocks (Maccini & Yang, 2009) affect adult outcomes, but the evidence that economic downturns generate long-term consequences on health is less consistent (Almond & Currie, 2010, p. 1367). For example, Van Den Berg, Lindeboom, and Portrait, 2006 find that adult survival declined for those born during an economic downturn in the Netherlands but Cutler, Miller, and Norton (2007) results show no changes in adult morbidity for those born during the Dustbowl era. For this reason, it is very important to accumulate more evidence, particularly in Latin America, a region that historically suffered frequent and severe macroeconomic shocks, and understand how economic downturns affect the health of infants.

Second, this paper is able to provide measures of both, the health shock experienced early in life and its long-term consequences. Some papers in the literature only document how the economic conditions at birth correlates with adult outcomes (Cutler *et al.*, 2007; Van Den Berg *et al.*, 2006) but they do not provide any measure of how economic shocks affect early-life health in the first place. Then, it is not surprising that these studies contradict each other since countries may differ on how economic conditions translate into infant health (e.g., different policies, parents' behavior, etc.). In contrast, other papers study how economic downturns impact infant health without explicit evidence on the long-term effects. For example, Dehejia and Lleras-Muney (2004), Baird, Friedman, and Schady (2011) and Paxson and Schady (2005) analyze the impact of macroeconomic fluctuations on infant mortality. Bozzoli and Quintana-Domeque (2014) and Cruces, Gluzmann, and Calva (2011) examine how the late 1990s Argentinian economic crisis increased the prevalence of low birth weight. Miller and Urdinola (2010) examine how fluctuation in coffee prices affects child survival in Colom-

bia. All these studies analyze only the short-term impact of macro shocks.

Third, this paper methodologically departs from others in the literature. To my knowledge this is the first paper on this topic that uses a partial identification approach to disentangle the long-term effect of early-life health shocks from selection for survival effects. Few papers in this literature deal with this problem (exceptions are Meng & Qian (2009) and Bozzoli, Deaton, & Quintana-Domeque (2009)), and they generally impose additional assumptions. Moreover, the empirical strategy in this paper relies on variations in infant health across birth cohorts and across mother's education to connect results from a series of cross-section data in a meaningful way. Combining estimates from different samples overcomes one of the most frequent obstacles to evaluating the long-term impacts of early-life health: the lack of longitudinal data (Almond & Currie, 2010, p. 1336).¹

This paper is closely related to Hidrobo (2014) and Almond, Edlund, Li, and Zhang (2007). Hidrobo studies how a crisis in Ecuador affected health and cognitive outcomes of children three to five years after the crisis. Hidrobo's findings are consistent with results found here for teenagers. Using a similar empirical strategy, Almond *et al.* (2007) show how children born during a Chinese famine perform worse on a variety of adult outcomes.

This paper is organized as follows. In Section 2, I briefly discuss the background of the Peruvian crisis in late 1980s. In Section 3, I present the identification and estimation strategy. In Section 4, I describe the different surveys used, and present descriptive statistics. In Section 5, I analyze the heterogenous impact of the Peruvian crisis on infant health. These results refer to the short-term impact of the crisis. I also analyze the potential mechanisms through which the crisis affected infant health. In Section 6, I use pooled cross sections to show if those who experience severe health shocks during the crisis performed worse in the school in teenage years. I also estimate the bias caused by a selection for survival effect using a partial identification approach. In Section 7, I show results for an alternative definition of crisis. In Section 8, I show that the observed long-term effects are not driven by a permanent decline in the standards of living households. Finally, in Section 9 I conclude.

2. THE PERUVIAN CRISIS

The 1980s were a difficult period for Latin America, and Perú was no exception. At the beginning of the decade, the *debt crisis* created strong external pressures on the economy. The increase in international interest rates made the already onerous debt service difficult to afford and took a larger portion of public sector revenues. Concurrently, the value of export goods declined, which hurt the balance of payments even more. In response to this situation, Perú implemented a series of heterodox stabilization policies in 1985. The most notable policy was the suspension of foreign debt payments and the use of these resources to stimulate the economy. As Glewwe and Hall (1994) indicate, the plan was successful in the short run and boosted consumer demand, but unsustainable due to strong inflationary pressures and severe fiscal deficits. In September 1988, the government was not able to continue on that path and announced a series of new policies that inevitably involved a sharp contraction of government expenditure. Figure 1 shows real expenditures of the Peruvian central government from 1980 to 2000. After the peak in 1987 (pre-crisis), government expenditures fell 43% in four years.

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