

UNITED NATIONS DEVELOPMENT PROGRAMME

Economic Shocks and Human Development: A Review of Empirical Findings

A UNDP/ODS Working Paper

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United Nations Development Programme, New York
—November 2009—

Note: The views expressed in this paper are those of the authors and do not necessarily reflect those of UNDP. The authors thank Jorge Arbache, Nora Lustig, Ronald Mendoza, and colleagues at the Office of Development Studies, the Human Development Report Office, the Bureau for Development Policy, the Regional Bureau of Latin America and the Caribbean, and the Regional Bureau of Africa at UNDP for helpful comments. Nina Thelen provided excellent research assistance. Please send comments and suggestions to the following e-mail addresses: Pedro.Conceicao@undp.org, Namsuk.Kim@undp.org and Yanchun.Zhang@undp.org.

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1. Introduction

What is the likely impact of the current economic crisis on human development? Given that the impact is at present difficult to track in real time, we refer to the literature to explore how human development indicators (income, health and malnutrition, educational enrollment and attainment) have been affected in past economic shocks. We find that, typically, these indicators either deteriorate or improve at a slower pace in poor countries suffering growth slowdowns or recessions, while some (namely related to health and education) often improve in rich countries. After growth rebounds, the recovery in human development indicators is not as rapid and steep (if it occurs at all) as the deterioration that occurred during the economic downturn.

We also conduct a simple investigation of the relationship between human development indicators and economic fluctuations. We identify episodes of economic growth acceleration and deceleration. First, we compare the mean levels of human development indicators (three education-related and three health-related) during accelerations/decelerations and otherwise. We find that the average levels each of the human development indicators are better during episodes of growth accelerations than otherwise. These comparisons also show that the mean of each indicator is worse during growth decelerations than otherwise.

Then we run a simple panel regression model that accounts for the underlying country-specific evolution of these human development indicators. We find that health-related human development indicators are better during growth accelerations and worse during episodes of decelerations, compared to the underlying trend. The relationship between education indicators and episodes of growth accelerations or decelerations is ambiguous. We also find that least developed countries (LDCs) are especially heavily penalized when they fall into growth deceleration episodes. Their infant mortality and under-5 mortality rates are significantly higher during economic bad times. But these mortality rates are little changed (relative to the underlying trend) during episodes of growth accelerations. This suggests asymmetric effects of economic fluctuations on human development outcomes – the negative impact during bad times is worse than the positive impact in good times – a finding which is consistent with the literature.

2. Human Development Impacts of Economic Crises on Developing Countries – Findings from the Literature

The relationship between economic growth and human development indicators (such as poverty rates, health and education outcomes) can be analyzed both in terms of longer-term trends and shorter-term fluctuations. At the aggregate level and over the long-run, there is a strong positive (though not linear) correlation between gross domestic product (GDP) per capita and human development indicators. But the direction of causality may run both ways: economic growth helps to generate the resources needed for improved human development, and improved human development enables higher potential growth¹.

Here we focus instead on the effects of medium- or short-term growth fluctuations on human development outcomes (considering the changes in these indicators compared to their long-term trend). The impacts of economic fluctuations on human development outcomes vary across countries and periods, but the literature does suggest some rather robust stylized facts. First, economic crises affect rich and poor countries differently: improvements in health and education outcomes are common in rich countries, while for poor countries setbacks are the norm. Second, faster economic growth after economic crises has little or only a small positive impact on health and education in the North (relative to the trend), but the effect on health and education in poor countries is ambiguous. Even if an economic rebound brings improvements in human development outcomes, the magnitude of these improvements is typically smaller than the magnitude of the deteriorations that occurred during economic downturns.

2.1 Economic crises and poverty

Economic crises often increase transitory income poverty (and may also have a permanent effect on poverty if the crises deplete the assets and hurt the human capital of affected people, especially the poor). World Bank (2008a) estimates that a one percent decline in developing country growth rates traps an additional 20 million people into poverty. However, this is an average effect: the poverty elasticity of income varies across countries and time periods, depending, amongst other factors, on the distribution of income, social policies, and the sector/geographic incidence of changes in income. Therefore, it is useful to consider cases of past effects of economic crises on poverty rates.

In the cases reviewed by Lustig (2000) and Skoufias (2003) that are summarized in Table 1, the poverty rate increased during economic crises, in several cases quite sharply in a short period of

¹ There is a vast literature on this issue. For example, Lustig, Arias and Rigolini (2002) review the theoretical and empirical evidence on economic growth and poverty reduction and suggest the possibility of a dual causality: economic growth may help reduce poverty, and reducing poverty can also help boost economic growth. Pritchett and Summers (1996) suggest that higher income is an important determinant of improved health outcomes. Commission on Macroeconomics and Health (2001), Bloom and Canning (2005), and Weil (2007) show that improved health promotes economic growth. Krueger and Lindahl (2001), and Wasmer and others (2007) survey the literature and suggest the positive contribution of education to economic growth. Foster and Rosenzweig (1996) examine the Green Revolution period in India and observe a reverse causal relationship between education and growth (more-educated households are more willing to adopt high-yielding crop varieties and thus earn higher income).

time. For instance, in Argentina, the poverty headcount rate increased about 10 percentage points in each of the three crises listed in the table, in the most two recent crises within a period of just two years. During the Asian financial crisis of 1997-1998, the poverty rate almost tripled in two years in the Rep. of Korea and increased by almost ten percentage points also within two years in Indonesia.

Table 1. Economic Crises and Poverty Headcount Ratios in Selected Countries

| Country | Before crisis | Year of crisis |
|---------------|----------------|----------------|
| Argentina | 10.1 (1980) | 20.6 (1985) |
| Argentina | 25.2 (1987) | 34.6 (1989) |
| Argentina | 16.8 (1993) | 24.8 (1995) |
| Brazil | 27.9 (1989) | 28.9 (1990) |
| Costa Rica | 29.6 (1981) | 32.3 (1982) |
| Venezuela | 25.7 (1982) | 32.7 (1983) |
| Venezuela | 40.0 (1988) | 44.4 (1989) |
| Venezuela | 41.4 (1993) | 53.6 (1994) |
| Indonesia | 11.3 (1996) | 18.9 (1998) |
| Rep. of Korea | 2.6 (1997) | 7.3 (1998) |
| Malaysia | 8.2 (1997) | 10.4 (1998) |
| Thailand | 9.8 (1997) | 12.9 (1998) |

Note: The year of crisis is in the parenthesis.

Sources: Lustig (2000, p.4), Skoufias (2003, p.1088).

Lustig and Walton (1999) identify three main channels through which negative aggregate economic shocks transmit in the short-run to families and individuals, potentially aggravating poverty, reducing consumption and depleting savings. The first channel corresponds to reduced labor demand, which can result both in a drop in real wages and/or loss of employment. The second relates to changes in prices. Inflation erodes purchasing power with potentially dramatic consequences at the lower end of the income distribution, and, more generally, price volatility. However, changes in prices affect households differently. For example, the impact of changes in food prices depending on whether households are net food consumers or producers, as well as the direction of change. The third channel relates to reduction in public spending, which both contributes for further reductions in labor demand as well as the provision of public services.

There is very strong evidence that these three channels, individually or in combination, are pervasive during aggregate economic shocks. For example, in Costa Rica's 1981-1983 economic crisis, with GDP contracting by 14 percent between 1981 and 1982, real wages fell approximately 50 percent between 1981 and 1983 (Funkhouser 1999). During the Mexican

1995-1996 crisis, the negative economic shock was accompanied by a very significant fall in real wages. Real hourly peso wages fell 12.6 percent in 1995 and a further 9.9 percent in 1996, before showing their first increase in 1998 (McKenzie 2003). Unemployment rose sharply and there was a shift of labor force into the “informal” sector (Martin 2000). Savings declined significantly in Mexico from 1994 to 1996 (Attanasio and Székely 1998).

Wages and household consumption were severely affected by Peru’s economic crisis in 1988-1990. GDP per capita fell by 10.5 percent, 13.4 percent and 6.9 percent each year during 1988-1990. Inflation reached almost 7,500 percent in 1990. The fall in output and rise in prices resulted in an 80 percent drop in real wages between 1987 and 1990 in Lima (Saavedra 1998). The negative labor income shock would not necessarily lead to a decrease in consumption if households had access to credit to smooth their expenditure. But household survey data show that per capita consumption plummeted almost 50 percent between 1985 and 1990 in Lima, suggesting that poor households did not have access to credit to cope with the shock (Glewwe and Hall 1994).

Fallon and Lucas (2002) examined seven countries that suffered economic crises during the 1990s (Indonesia, 1998; Republic of Korea, 1998; Malaysia, 1998; Thailand, 1997; Argentina, 1995; Mexico, 1995; Turkey, 1994) and found that the main effect on labor demand was reflected in a drop in real wages, rather than a reduction in employment. Even though unemployment also increased, these countries did not experience a significant decrease in employment, except in Korea. However, the composition of employment did change. For example, employment fell in construction but expanded in agriculture. There is mixed evidence on employment in nontradable sectors. The authors also find a switch from protected jobs (wage employment) to unprotected jobs (self employment) during the crises in Indonesia and Mexico.

Additional details related to the 1997-1998 Indonesian crisis suggest the potentially harmful effects of change in prices combined with reduced labor demand. Indonesia suffered an 80 percent hike in the consumer price index and a 120 percent of rice price inflation in 1998. Real wages fell by 40 percent in the formal sector and by 15-20 percent in the rural informal sector. The average household consumption fell by 23 percent from 1997 to 1998, and real per capita spending on non-foods declined by around 40 percent between 1997 and 1998 (Thomas, Beegle and Frankenberg 2003, 2004). Very poor urban dwellers were the most affected by the crisis because of changes in the relative price of basic foodstuffs (Levinsohn, Berry and Friedman 1999). The labor force participation rate was lower in 1999 than in 1997 despite the increase in women’s employment (Cameron 2000).

In spite of the wide range of estimates of the impact of the crisis on poverty in Indonesia, all studies point to an increase in the poverty rate after the crisis. Lanjouw and others (2001) estimate that the poverty rate increased by 11 percent from October 1997 to October 1998. Skoufias and Suryahadi (2000) find the poverty rate doubled from 12.4 percent in 1997 to 24.5 percent in 1998. Frankenberg, Thomas and Beegle (1999) estimate that the proportion of households below the poverty line rose by 25 percent from 1997 to 1999. They suggest that the rise in poverty could be around 80 percent if the estimate is adjusted for inflation².

² One reason for the debate on the poverty impact in Indonesia relates to the use of different poverty lines. The Government of Indonesia maintains a set of poverty lines (one urban and one rural) for each province.

While the effects of economic crises on the distribution of income vary, there are cases in which not only poverty but also inequality increases. A reason for increased inequality is that less skilled and poorer workers are often more likely to be laid off at the beginning of an economic downturn. Lack of education and transferrable skills implies that the group is likely to be the last to get employed after the economy bounces back. Therefore, less skilled and poorer workers tend to be unemployed for the longest duration during economic crises (Jeanneney and Kpodar 2008). Since labor income is the most important (and, for many, the only) income source for poorer workers, a prolonged crisis often leads to increases in inequality. Inequality in Latin American countries clearly increased during the 1980s economic crises (Fallon and Lucas 2002).

Aggregate shocks can have long term impacts, not only transitory effects on income. Based on a review of existing literature, Mendoza (2009) concluded that when income shocks affect capabilities, they not only lead to persistent poverty, but can actually result in the intergenerational transmission of poverty. The effects of economic shocks on capabilities linked to health, nutrition, and education – to be reviewed next – may be particularly harmful.

2.2 Economic crises, health and nutrition

There are several channels through which an economic shock, propagated through the mechanisms outlined above, may negatively affect health and nutrition outcomes in developing countries. The most direct channel works through the impact of reduced real income, which reduces the ability of households to pay for maintaining or improving health. When households are unable to buffer consumption from sharp income declines, private spending on food, medicine and health care drops. For example, the deterioration in the nutritional status of pregnant women and insufficient prenatal care could lead to a higher infant mortality rate (Baird, Friedman and Schady 2007; Ferreira and Schady 2008; Paxon and Schady 2005). The impact of the retreat in private spending can be aggravated by public spending cuts that lower the provision of publicly available health services (Ferreira and Schady 2008, Paxon and Schady 2005). In addition, strategies followed by families to cope with lower real income may also aggravate health outcomes (Cutler and others 2002). For example, some people may be forced to work longer hours or elder workers to delay retirement, which could have a negative impact on health. Or a caregiver (usually a female family member) may need to go back to the labor force, harming the health of the young and the aged at home. There is evidence suggesting that women enter the workforce in Mexico during times of economic stress to diversify household earnings and to protect against income losses (Parrado and Zenteno 2001).

The increase in poverty during economic shocks may result in a direct and irreversible loss of life. Banerjee and Duflo (2007) find a strong positive association between poverty and mortality rates. While they do not establish unequivocally a causal relationship from poverty to higher death rates – it might be the case that less healthy people become poor, and are therefore more likely to die – they assert that their analysis is strongly suggestive that the causality runs from

Independently, the World Bank maintains another set of poverty lines for Indonesia. Researchers mentioned above also set their own poverty lines. The reason is that in times of high inflation and large changes across sector and region, it is difficult to generate accurate poverty lines that reflect welfare changes at the household level.

poverty to death, or as they put it, that poverty kills. Drawing on data from Indonesia, Vietnam, and India, they find that the extreme poor (those living on less than PPP\$1 a day) and the poor (those living on less than PPP\$2 a day) have higher mortality rates than those living at higher levels of income (between PPP\$6 and PPP\$10 a day in the case of Indonesia and Vietnam; more than PPP\$2 a day in India). These differentials hold across age groups and for both rural and urban populations, even though the size of the differentials varies – in particular, the size is larger for the older segments of the poor population.

Table 2 reproduces some of the results for Vietnam and Indonesia. It compares the death rates (within 5 years) of the poor and the non-poor for different age groups. The death rate of poor children under 5 years of age is higher than that of non-poor children in the same age group in both Vietnam and Indonesia. The smallest gap in death rates between the poor and non-poor occurs for the age group between 5 and 15 years old. In Vietnam, the elderly poor have a death rate that is more than 3 percentage points, or about 30 percent, higher than the elderly non-poor. In the case of Indonesia, the differentials are much larger across all age groups, but in relative terms, poor children appear particularly vulnerable. If we interpret the ratio of death rates of the poor and non-poor as the difference in the likelihood of dying, poor children under 5 years old in Indonesia are almost four times more likely to die than non-poor children. If this association holds more broadly and is persistent over time, then an increase in poverty rates as a result of economic crisis will translate into a higher number of deaths – than with the lower poverty rates in the absence of the crisis – pushing both life expectancy down and child mortality rates up.

Table 2. Death Rates by Age for Poor and Non-Poor (within five years from 1993)

| Vietnam | | | | | |
|----------------|----------------------------|----------------------|-------------------|---------|--|
| | Death Rates within 5 Years | | Poor vs. Non-Poor | | |
| | (1) Less than \$2 | (2) Between \$6-\$10 | (1)-(2) | (1)/(2) | |
| Older than 50 | 13.1% | 9.8% | 3.3% | 1.3 | |
| Older than 45 | 11.2% | 8.0% | 3.2% | 1.4 | |
| Bet. 15 and 45 | 1.0% | 0.0% | 1.0% | - | |
| Bet. 5 and 15 | 0.6% | 0.0% | 0.6% | - | |
| Less than 5 | 1.2% | 0.0% | 1.2% | - | |

| Indonesia | | | | | |
|------------------|----------------------------|----------------------|-------------------|---------|--|
| | Death Rates within 5 Years | | Poor vs. Non-Poor | | |
| | (1) Less than \$2 | (2) Between \$6-\$10 | (1)-(2) | (1)/(2) | |
| Older than 50 | 15.8% | 7.3% | 8.5% | 2.2 | |
| Older than 45 | 14.1% | 6.9% | 7.2% | 2.0 | |
| Bet. 15 and 45 | 3.7% | 1.0% | 2.7% | 3.7 | |
| Bet. 5 and 15 | 3.0% | 1.1% | 1.9% | 2.7 | |
| Less than 5 | 3.8% | 1.0% | 2.8% | 3.8 | |

Source: Own elaboration based on data from Banerjee and Duflo (2007).

In a review of studies related to the effects of economic shocks on health, Ferreira and Schady (2008) conclude that economic crises tend to have negative effects on health and nutrition outcomes for children in poor countries but typically have positive effects for children in rich countries (see Table 3). The evidence for middle income countries is mixed. For some middle-income countries like Mexico, Peru and Russia, negative economic shocks affected child health and nutrition negatively. But for others such as Colombia, the impact was positive.

The literature suggests that recessions in the U.S. appear to be good for health, while economic good times tend to be less good for health (Edwards 2009, is a recent re-statement of this finding). This may be due to behavioral changes that have health improving outcomes: less smoking and drinking, less traffic accidents, and more exercise (Ruhm 2000, 2003, 2005, 2007). Dehejia and Lleras-Muney (2004) also find that infant mortality improves in the U.S. during recessions, which can be explained in part by an increase in the time that mothers spent engaging in exercise and prenatal care (there is also a possible selection effect in terms of the socioeconomic characteristics of those that chose to become mothers). There is also evidence, however, that difficult economic conditions may have long-term adverse health effects even in developed countries (van den Berg, Lindeboom and Portrait 2006; Case, Fertig and Paxson 2005), and that even industrial countries may exhibit deteriorating health outcomes when faced with large negative shocks (see the discussion on the transition economies below).

Table 3. Effect of a Negative Aggregate Economic Shock on Child Health and Nutrition Outcomes

| | |
|--------------------------------|--|
| Rich countries | Positive impact <ul style="list-style-type: none"> • United States |
| Middle-income countries | Ambiguous impact Examples of positive impact <ul style="list-style-type: none"> • Columbia Examples of negative impact <ul style="list-style-type: none"> • Peru • Mexico • Russia |
| Poor countries | Negative impact <ul style="list-style-type: none"> • Nicaragua • India • Cote d'Ivoire • Zimbabwe • Ethiopia • Tanzania • Cameroon |

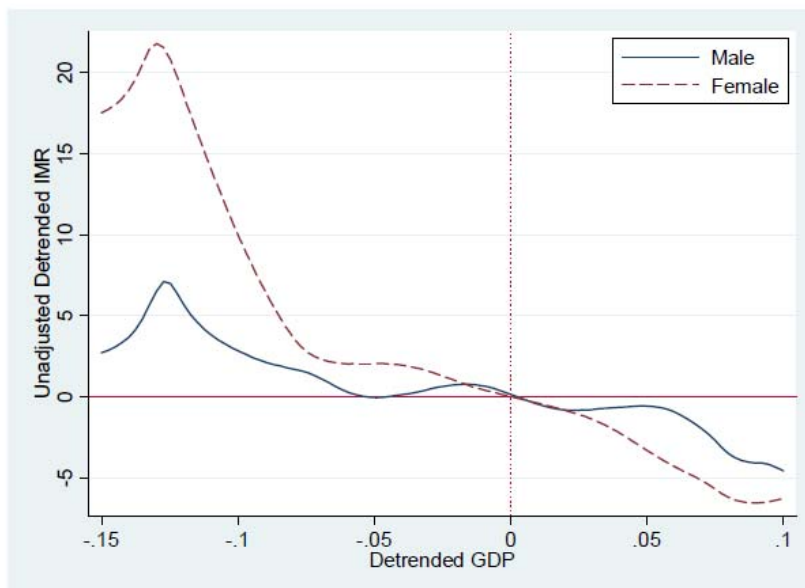
Source: Ferreira and Schady (2008, p.50).

Ferreira and Schady (2008) interpret these results with a theory that describes both the income and the substitution effects on health outcomes associated with a negative economic shock, and how the level of income may determine the net health impact of an economic shock. Economic shocks reduce the consumption of health services, which corresponds to a negative income effect, but there may be positive income effects, as well, if there is a reduction in the consumption of goods that are harmful to people's health such as cigarettes and alcohol. In poor countries, or for families with low income, the negative income effect is likely to overwhelm any potential positive income effect. The marginal effect on health of a dollar lost for the poor may affect spending on essential goods like more nutritious food or basic health services, while the loss for the rich will not affect this baseline spending, only perhaps less essential and potentially health harmful goods. Substitution effects may also explain how in rich countries economic recessions improve health, with more time dedicated to activities that improve people's health such as exercise, or more adult time dedicated to child-health improving activities.

Baird, Friedman and Schady (2007) investigate the relationship between short-term fluctuations in aggregate income and infant mortality using a large dataset of 59 developing countries, which covers over 1.7 million births. The authors find that there is a large negative relationship between per capita GDP and infant mortality — on average, a decrease of one point in log per capita GDP is associated with an increase in mortality of between 18 and 44 infants per 1,000 births. They also find that the impact of economic fluctuations on infant mortality is highly asymmetric depending on whether the economic fluctuation is a contraction or an expansion. The negative impact of contractions on infant mortality rates tends to be bigger than the positive impact of expansions.

The effect of economic crises on health is also asymmetric in terms of gender effects. When an economic crisis hits, mothers forego meals more often than fathers, and in many countries boys get preference over girls in terms of eating regular meals and receiving medical treatment (Baird, Friedman and Schady 2007). As illustrated in Figure 1, Baird, Friedman and Schady (2007) show that the impact of economic fluctuations on infant mortality is asymmetric between male infants and female infants. The difference between the negative impact of economic contractions and the positive impact of economic expansions on infant mortality is much greater for girls than it is for boys. While boys and girls benefit equally from positive income shocks, girls suffer much more than boys from negative income shocks. Quantitatively, negative shocks to GDP per capita of about 6 percent on average increase average infant mortality by 7.4 deaths for 1,000 births for girls and 1.5 deaths for 1,000 births for boys (Baird, Friedman and Schady 2007, pp. 25-26). Schultz (1997) points out that an increase in child mortality will probably place additional burdens on women because of their roles as child bearers and care givers. For example, mothers will be disproportionately exposed to pregnancy-related health risks if parents choose to have additional births to cope with the increase in child mortality rates. Bhalotra (2009) also finds that rural infant mortality in India is countercyclical, the elasticity being about -0.33 during 1970-1997. Disaggregation reveals that it is only girls that are at risk; boys are protected from income shocks.

Figure 1. Relationship between Infant Mortality Rate and Detrended GDP



Note: Estimated with locally weighted least squares. GDP is measured in year 2000 international (PPP) dollars.

Source: Baird, Friedman, and Schady (2007).

Cutler and others (2002) find that during the Mexican 1995-1996 economic crisis, the mortality rate increased by 5 to 7 percent compared to the years prior to the crisis. This translates into about 20,000 additional deaths among the elderly and 7,000 additional deaths among children. For children aged 0 to 4, the mortality rate was approximately 7 percent above the expected level (for the previous two crisis periods, child mortality rate increased by 9.2 percent during 1982-1984 and by 10.3 percent during 1985-1989). World Bank (2001) reports that during the Mexican economic crisis, among children under age 1, the mortality rate from anemia increased from 6.3 deaths per 100,000 births in 1993 to 7.9 in 1995. Among children ages 1-4, the mortality rate from anemia rose from 1.7 per 100,000 births to 2.2 during the crisis period.

Cutler and others (2002) attribute the increase in Mexican mortality rates during the 1995-1996 economic crisis to reduced income and cuts in public spending on health care. They find that as the economic crisis hit Mexico, the unemployment rate among adult males went up from 3.6 percent in 1994 to 6.1 percent in 1995. The out-of-pocket health expenditures declined during the crisis from 3.9 percent of GDP in 1994 to 3.1 percent of GDP in 1995, and the declines are most significant for families with elderly members. Public health spending in Mexico rose steadily from a low 2.7 percent in 1987 to 3.8 percent of GDP in 1994. But between 1994 and 1996, public health spending dropped to 3.4 percent of GDP, and per capita public health spending fell by 15 percent. At the same time, there were important changes in per capita spending on the uninsured population through the PASSPA program³ (Programa de Apoyo a los Servicios de Salud para Población Abierta). Between 1994 and 1995, when public health spending declined in all regions, the sharpest fall was in the PASSPA states, 25 percent.

³ The PASSPA program was sponsored by World Bank to offer basic health services to the uninsured and rural populations in the poorest states of Mexico. The program is implemented by the Mexican Secretariat of Health.

Paxson and Schady (2005) find that during the Peruvian 1988-1990 economic crisis there was a sharp increase in the infant mortality rate from 50 per 1000 births in 1988 to 75 around 1990 which corresponds to more than 17,000 “excess” infant mortality incidents among children born in 1990. This infant mortality increase began in the second half of 1989 and peaked for children born in the first half of 1990. Children born during this period were more likely to die in the first month of life and also more likely to die in the first 6 and 12 months of life. For example, among children born in the first half of 1990 who survived at least 1 month, 20 per 1000 died between ages 1 and 6 months compared to 8 per 1000 for those born in the first half of 1988. Similarly, the mortality rate of those surviving to 6 months but died before 12 months also went up from 14 per 1000 to 25 per 1000 from 1988 to 1990.

Paxson and Schady (2005) suggest that a collapse in public health spending probably contributed to the large increase in infant mortality in Peru. Between 1985 and 1990, public health expenditure in Peru dropped by 58 percent, declining from 4.3 percent to 3 percent of the Peruvian government’s budget. The number of antenatal visits fell steadily from 1987 through 1991 and recovered only afterwards. Based on the authors’ estimates, women who gave birth in 1991 (many of whom would have been pregnant in 1990) had 0.28 fewer antenatal visits than those in 1987; women who gave birth in 1992 (many of whom would have been pregnant in 1991) had 0.38 fewer visits than those in 1996. This shows that there were significant declines in health care utilization during the crisis years. These declines occurred either because of reductions in public health spending or drops in household incomes. The authors find that households in Peru were able to sustain their consumption of food items but had to cut their non-food item spending such as medications and health care after the crisis hit.

In Indonesia, the impact of the 1997-1998 financial crisis on health and nutrition outcomes is not consensual. Some suggest that there was an increase in infant mortality rates. Rukumnuaykit (2003) finds that infant mortality spiked up from about 30 per 1,000 births in 1996 to 48 in 1998. Simms and Rowson (2003) find that the infant mortality rate increased in 22 of Indonesia’s 26 provinces between 1996 and 1999. But there is no evidence showing that child nutrition levels or health status significantly worsened during the crisis (Frankenberg, Thomas and Beegle 1999).

There is some evidence of poorer nutrition among Indonesian adults, especially among the poorest. Frankenberg, Thomas and Beegle (1999) report that the Body Mass Index (BMI) of adults aged 18 and older declined significantly during the crisis years, for both males and females and at all ages but the decline was most pronounced among older adults. There was a significant increase in the proportion of adults with a BMI below 18 (the cut-off below which respondents are considered to be unhealthy and both morbidity and mortality rates tend to increase). In 1997, 13.6 percent of panel respondents were in this category. By 1998, 15.4 percent of respondents have fallen below the cut-off. The decline in BMI is likely caused by two factors, increased energy output (possibly due to working harder) and reduced energy intake (possibly due to eating less).

The proportion of household income spent on health decreased significantly in Indonesia while health costs rose by at least as much as consumer price inflation. There was a sharp decline in the use of public healthcare. The percentage of children under five visiting community primary

health care centers (*posyandu*) fell from 46.7 percent to 27.7 percent, accompanied by a fall in the number of children receiving vitamin A supplements. Waiting time in health care centers increased and drugs became less available (Frankenberg, Thomas and Beegle 1999).

Still, in contrast with the experience of other countries that suffered economic crises, Indonesia did not experience as sharp a decline in child health and nutrition outcomes during the economic crisis. The possible explanation is that Indonesia was able to protect its expenditures on public health from dropping significantly with the help of donor assistance. In comparison, public health expenditures in Peru, as discussed earlier, fell by more than 58 percent during its crisis, and there is no evidence showing that other sources such as foreign assistance compensated for such a decrease.

According to Lieberman, Juwono and Marzoeki (2001), Indonesia relied heavily on foreign donors to make up its domestic shortfalls in public health spending during the crisis years. The donor share of Indonesian public health spending accounted for less than 10 percent in the mid 1990s but rose to 24 percent during 1998-2000. Donor-assisted health spending per capita increased four times in real terms between 1995 and 2000. During the crisis period, foreign donors' assistance on health spending increased by 278 percent in real terms (from 207.5 billion rupiah during 1997-1998 to 577.9 billion rupiah during 1998-1999) while real Indonesian domestic financial sources spent on public health dropped by 21 percent (from 2533.7 billion rupiah during 1997-1998 to 2014.4 billion rupiah during 1998-1999). Such a shortfall in public health expenditure (and also the decrease in household health expenditure as previously indicated) was largely compensated by the sharp increase in donor assistance to the health sector. The net result was a 5 percent decline in overall government health expenditure during 1998-1999. In the next fiscal year (1999-2000), donor-assisted health spending continued to increase by another 17 percent. It is reported that most of foreign assistance to the health sector went to government hospitals. Thus, during the crisis period, real spending per capita on public hospitals actually went up by 13 percent, while real spending per capita on primary care dropped by more than 10 percent.

Revisiting a relatively recent and familiar episode, the aftermath of the collapse of the Soviet Union and the transition process undertaken by many countries in Eastern Europe and Central Asia, also helps to reveal that collapses in economic growth often go along with a deterioration of living standards, increased mortality rates, and the consequent reduction in life expectancy (Sachs 1996).

Figure 2 shows the paths of income per capita and life expectancy at birth (for males) for nine transition economies. The general pattern is clear: the growth collapse that started in 1989-1999 was accompanied by sharp drops in life expectancy for all six countries except for Poland.

It is striking to observe that when economic growth resumed in the mid 1990s, the decreasing trend in life expectancy reversed, in some countries quite abruptly, but it is also important to note that (of the countries considered and excluding Poland) only the Kyrgyz Republic and Latvia recovered to the levels of life expectancy of 1989. This is suggestive of the asymmetric pattern that, as will be elaborated below, appears to characterize the relationship between economic

fluctuations and changes in human development indicators: income contractions have a stronger negative effect than the positive effect (if any, see Russia since 1998) of income expansions.

The case of the Russian Federation is particularly informative. From 1989 to 1994 life expectancy at birth for males dropped more than seven years, from 64 to 57 years – a rate of yearly collapse of more than one year of life expectancy. Then it rebounded strongly, increasing by four years to 61 in 1998. Latvia exhibits the same pattern, but while the increase in life expectancy persisted onwards in this country, there was another collapse in life expectancy in the Russian Federation after 1998, from which the country has yet to recover.

The 1998 collapse in life expectancy in the Russian Federation coincided with another economic crisis. As the income line shows, growth was picking up in 1997, but unlike the other countries in which economic growth persisted, in Russia income collapsed again during the 1998 financial and economic crisis that affected the country. Epidemiological studies suggest that the causes and the nature of the increase in mortality rates during 1989-1994 and during 1998-2001 are similar, and they correlate strongly with social and economic factors (Men, Brennan, Boffetta and Zaridze 2003).

Figure 2. Life Expectancy and Income in Transition Countries 1989-2006



Source: Own elaboration based on data from World Bank (2008b).

Note: Solid line represents life expectancy at birth for males in years (left hand scale); dashed line represents the logarithm of GDP per capita in constant local currency units (right hand scale). Countries are ordered by increasing income per capita in 1990 (in constant 2000 US dollars) from left to right, top to bottom.

The increase in mortality rates that went along with the two growth collapses in Russia cannot be attributed exclusively to the concomitant impoverishment of parts of the population. The largest contribution to increased mortality rates comes from middle-aged adults (35-69 years). Mortality increases relate to violent deaths (suicide, traffic accidents, homicides), and alcohol poisoning. All of these causes of death, with the possible exception of cardio vascular disease, are related to increases in alcohol consumption (Mesle 2002). Evidence does suggest that increased alcohol consumption was triggered in part by socioeconomic stress in difficult economic conditions, and also that stress had an independent effect in the increase in mortality rates (Walberg and others 1998).

2.3 Economic crises and education

The transmission channels from economic shocks to education outcomes are similar to those that relate to health outcomes, with the combined effects of reduced private and public spending on education, adding to the effects of coping strategies such as taking children out of school and putting them to work, may result in reduced school enrollment and completion rates. But as with health, the impact of economic shocks depends on the level of income, the depth of public education cuts, and the ability of households to smooth income shocks.

In a review of the effects of economic shocks on education, Ferreira and Schady (2008) show that school enrollment rates tends to decline in low-income countries but increase in high-income countries, while the impact of economic crisis on school enrollment or attainment rates in middle-income countries is ambiguous (see Table 3). However, the empirical evidence is, on the whole, much less robust than it is for health outcomes.

Table 3. Effect of a Negative Aggregate Economic Shock on Child Education Outcomes

| | |
|--------------------------------|---|
| Rich countries | Positive impact <ul style="list-style-type: none"> • United States |
| Middle-income countries | Ambiguous impact Examples of positive impact <ul style="list-style-type: none"> • Mexico • Brazil • Peru • Nicaragua Examples of negative impact <ul style="list-style-type: none"> • Costa Rica |
| Poor countries | Negative impact <ul style="list-style-type: none"> • Indonesia • Cote d'Ivoire • Malawi • (Nicaragua) |

Note: Parentheses indicate the reverse effect, for countries that deviate from the theoretical predictions.

Source: Ferreira and Schady (2008, p.50).

Ferreira and Schady (2008) interpret these empirical findings using a framework that, as in the case of health, suggests that the effects of economic shocks on education depend on income and substitution effects. Declining wages or lack of employment opportunities may make child labor

relatively less attractive, which may increase parents' incentive to send their children to school (Ferreira and Schady 2008). On the other hand, lower parental income increases the marginal value of additional income that children can bring home if they work. The net outcome of these effects will vary across economic agents, depending on the household's preference and surrounding factors (Ravallion 2008). For instance, a negative economic shock may induce changes in behavior that may lead to improvements in education in rich countries, because households in rich countries have more access to credit to absorb the income shock (small income effect), but the decreased child wage may lead to incentive to keep children at school (large substitution effect), as happened in U.S. during the Great Depression (Goldin 2001).

The negative aggregate income shock is likely to have negative impact on education in poor countries and for poor households for several reasons (Ferreira and Schady 2008). First, if the initial level of income is low, the marginal utility from consumption is high. Poor households will have more incentive to send children to earn additional income to compensate the loss of income incurred by the aggregate shock. Second, when households do not have access to credit to smooth consumption during the economic downturn, the income effect is likely to dominate the substitution effect. Third, if the crisis is severe and long, poor households tend to deplete their resources to smooth their expenditure. These factors would lead one to expect pro-cyclical schooling outcomes (less education during recession).

Empirical evidence is consistent with the theoretical predication for the pro-cyclical schooling in low-income countries and for the poorest populations. Frankenberg, Thomas and Beegle (1999) find significant declines in enrollment of young children among the poorest of Indonesians after the 1997 financial crisis. The percentage of 7-12 year olds who were not enrolled doubled from 6 percent in 1997 to 12 percent in 1998. The percentage of 13-19 year olds who were not enrolled increased as well, especially in urban areas from 33 percent in 1997 to 38 percent in 1998. By 1998, children from the poorest households are about five times more likely to be out of school than their counterparts at the top of the expenditure distribution.

Children from poorer households are also more likely to drop out of school during the crisis years. World Bank (2001) reports that the drop-out rate for Indonesian children in the poorest fourth of the population rose from 1.3 percent in 1997 to 7.5 percent in 1998 for those ages 7-12 and from 14.2 percent to 25.5 percent for those ages 13-19. The share of children in the poorest fourth of the population not enrolled in school rose from 4.9 percent in 1997 to 10.7 percent in 1998 for those ages 7-12 and from 42.5 percent to 58.4 percent for those ages 13-19.

The worsening education outcomes for the poorest Indonesians during the 1997-1998 economic crisis could be attributed to fewer financial resources made available for education. Indonesians had reduced their expenditure on non-food items to cope with the financial crisis. Thomas, Beegle and Frankenberg (2004) find that both real education expenditures and the share of the household budget spent on schooling declined between 1997 and 1998 in Indonesia. Education expenditure per age-eligible child (5-20 years old) declined by 2700 rupiah in the urban areas and by 1500 rupiah in the rural areas. Average education spending on an enrolled child fell by over 3000 rupiah in urban areas and over 2000 rupiah in rural areas. The share of the household budget allocated to education dropped by over 10 percent in urban areas and nearly 30 percent in rural areas. The authors find that the reduction in education spending is concentrated among the

poorest populations, and when faced with a negative income shock, poor households in both urban and rural areas tend to invest less in schooling, especially for their younger children (10–14-year-olds), and there has been a tendency to protect education spending in poor households with older children (15–19 years old).

There is evidence showing the impact of economic crises on educational outcomes is gender-specific as well. In low-income countries both girls and boys may drop out of school during an economic crisis. But according to World Bank (2009), in poor countries with pre-existing low female schooling, girls are especially vulnerable to being pulled out of school. Gubert and Robilliard (2007) find that in Madagascar, where school enrolment rates for girls are low, girls are more likely to drop out of school than boys when families are hit by a negative household income shock. Duryea, Lam and Levison (2007) find that in Brazil girls are more likely to be pulled out of school when there is a negative income shock. They estimate the probability of a 16-year-old girl dropping out of school and entering the employment is as much as 50 percent higher compared to when there is no negative income shock.

In middle-income countries, the effect is ambiguous. In Costa Rica, school enrollment rates dropped approximately 6 percent between 1981 and 1982 during the economic crisis, with larger drops in rural areas. The drop in schooling was associated with an increase in the fraction of children working during the same period. However, children who were exposed to the Peruvian economic crisis of the late 1980s had completed more years of schooling for their age than comparable children who were not exposed (Ferreira and Schady 2008). In Mexico, gross primary enrollment increased by 0.44 percent in 1994, but fell by 0.09 percent in 1995 according to World Bank (2001).

3. Relationship between Human Development Indicators and Economic Fluctuations – An Empirical Study

In this section, we report on the findings of a study on the relationship between economic fluctuations (episodes of growth accelerations or decelerations) and human development outcomes (for details see Conceição and Kim 2009). We ask the extent to which levels of human development indicators during episodes of growth accelerations (decelerations) are higher (lower) than in other periods.

We first compare the average levels of six human development indicators (three health related and three education related) during episodes of growth accelerations and decelerations, and then we build a simple panel regression model to explore the relationship between human development outcomes and episodes of economic fluctuations after accounting for the time trend that underlies the evolution of these indicators. We conduct our empirical analysis using both the full sample and the subsamples of developed countries, developing countries and least developed countries (LDCs).

3.1 Human Development Indicators during Episodes of Growth Accelerations and Decelerations

To explore the impact of growth fluctuations on human development indicators, a replication and expansion of Arbache and Page (2007) is undertaken. Arbache and Page (2007) explore associations between episodes of growth accelerations and decelerations, on the one hand, and levels of human development indicators on the other (see Appendix 1 for the formal definition of growth accelerations and decelerations).

Based on the literature that identifies episodes of growth accelerations and growth decelerations (see Hausmann, Pritchett, and Rodrik 2005; Hausmann, Rodriguez and Wagner 2006; Imam and Salinas 2008), Arbache and Page (2007) identify those episodes for African economies and find that episodes of growth decelerations are correlated with the worsening of human development indicators and that episodes of growth accelerations are correlated with small improvements in human development indicators. Thus, the effects are asymmetric: the negative impact of economic decelerations on human development outcomes is greater than the positive impact of economic accelerations.

Table 4 provides information that allows for the comparison of the average levels of several human development indicators during economic good times and bad times. Column 1 in the table lists the human development indicators studied in our exercise. We look at six human development indicators: life expectancy, literacy rate, infant mortality rate, under 5 mortality rate, primary school enrollment rate, and secondary school enrollment rate.

Columns 2 and 3 show the sample means of these six human development indicators during episodes of growth accelerations (column 2) and episodes classified “otherwise” (column 3). To compare whether the improvements in human development indicators during economic good times compared to other episodes are statistically significant, we also conduct a t-test on the difference between the mean of each human development indicator during episodes of growth

accelerations and the mean during episodes “otherwise”. The t-test results are included in column 4. Column 5, 6 and 7 report the results for episodes of growth decelerations compared to episodes otherwise.

Table 4. Difference between Sample Means, All Countries, 1983-2006

| <i>Column 1</i> | Growth accelerations | | | Growth decelerations | | |
|--|-----------------------------|------------------|-----------------|-----------------------------|------------------|-----------------|
| | <i>Column 2</i> | <i>Column 3</i> | <i>Column 4</i> | <i>Column 5</i> | <i>Column 6</i> | <i>Column 7</i> |
| | During (A) | Otherwise (A) | T test | During (D) | Otherwise (D) | T test |
| Life expectancy (years) | 69.4 (0.26) | 63.5 (0.2) | ** | 62.3 (.54) | 65.3 (.17) | ** |
| Literacy (% of adult) | 78.4 (1.81) | 74.6 (2.12) | | 66.7 (4.6) | 77.9 (1.4) | ** |
| Infant mortality (per 1,000 live birth) | 27.5 (1.12) | 51.9 (1.12) | ** | 55.6 (3.1) | 43.9 (.92) | ** |
| Under 5 mortality (per 1,000) | 43.6 (2.13) | 83.9 (2.05) | ** | 94.6 (5.84) | 70.8 (1.7) | ** |
| Primary school enrollment (net, %) | 100 (0.57) | 98.2 (.79) | ** | 96.3 (2.3) | 99.9 (.48) | * |
| Secondary school enrollment (net, %) | 71.8 (1.08) | 69.6 (1.3) | | 52.4 (3.04) | 72.2 (.86) | ** |

Note: Data are obtained from World Bank (2008b); * significant at 5 percent; ** significant at 1 percent; Standard error in parentheses; each indicator is a population weighted sample mean; Number of countries varies across indicators: 200 for life expectancy, 138 for literacy, 191 for mortality, and 188 for school enrollment.

From Table 4, we see that the average levels of all six human development indicators are better during episodes of growth accelerations (“during (A)”) than those during episodes otherwise (“otherwise (A)”) but are worse during episodes of growth decelerations (“during (D)”) than those during episodes otherwise (“otherwise (D)”).

The t-test results reported in column 4 suggest that the differences between the average levels of human development indicators during economic good times and the average levels of human development indicators during episodes classified as “otherwise” are positive and statistically significant for all human development indicators except for literacy rate and secondary school enrollment rate. The t-test results in column 7, on the contrary, show that the average levels of all human development indicators are statistically significant and worse during episodes of growth decelerations than during episodes classified as “otherwise”.

But when we breakdown the entire dataset into two subgroups -- developed and developing countries, the results (not reported here in detail) show that five out of six human development indicators in developing countries are statistically better during growth accelerations, but only two of them are statistically worse during decelerations. For developed countries, three health related indicators improve (statistically significant) during growth accelerations, but deteriorate little (statistically insignificant) during growth decelerations. The three education indicators do not show any statistically significant difference during episodes of growth accelerations or decelerations.

These results have to be interpreted carefully. The evolution of the frequency of episodes of both growth accelerations and decelerations in the period under analysis is such that accelerations have become more frequent, while decelerations are less frequent. Thus, the comparison of means might just be capturing this effect, rather than a distinct difference across accelerations and decelerations in terms of average levels of human development indicators.

Therefore, the analysis is complemented with a panel regression that simultaneously controls for both country-specific effects (the country-specific evolution of health and education indicators) and the time-trend effect (the long-term trend that underlies the evolution of each of these indicators). The coefficient estimates captures the “correlation” of the human development indicators level that are not specific to the time trend or each country’s characteristics. Obviously, these results do not allow for drawing any causal inferences, but the coefficient estimates shed light on how much on average past episodes of good and bad times correlate with differences in the levels of human development indicators relative to the trend, that is, accounting for (unspecified) time-specific effects.

3.2 A Regression Analysis of Human Development Indicators and episodes of Growth Accelerations and Decelerations

To find the historical relationship between human development indicators and growth fluctuations, we run the following regression using the panel data from 1983 to 2006:

$$(1) \quad HD_{i,t} = \beta_0 + \beta_1 ACC_{i,t} + \beta_2 DEC_{i,t} + \beta_3 TIME_t + \varepsilon_{i,t}$$

$$\text{for } i = 1, \dots, N, \quad t = 1, \dots, T$$

$HD_{i,t}$ is the level of a human development indicator for country i at time t , $ACC_{i,t}$ is a dummy variable for episodes of growth accelerations, $DEC_{i,t}$ is a dummy variable for episodes of growth decelerations, and $TIME_t$ is a cubic time trend (β_3 is a vector of coefficients and $TIME_t$ a vector with a linear, quadratic and cubic time variable; the “product” of the two vectors refers to the internal product)⁴.

This is a purely illustrative exercise, and no attempt is made in terms of inferring the causal impact of growth episodes on human development indicators. Rather, the estimates of the coefficients are interpreted as indicating the past relationship between levels of human development indicators and episodes of growth accelerations and decelerations, after accounting for trend effects.

⁴ Since many of the human development indicators are serially correlated, the best possible specification would be to take the first or second difference of the dependent variable. But this method is not feasible because the data is sporadic - human development indicators are not available for every year even for high-income countries. As an alternative, we use a time trend as a regressor. Since a time trend would not necessarily make the dependent variable stationary, in our specification, the error term might be serially correlated within group. We tested the existence of correlation with the robust covariation matrix estimation, and found little changes in our estimates.

The OLS estimates of the coefficients are presented in Table 5. As would be expected, the use of a pooled panel estimator leaves much variation unexplained, but the coefficients on accelerations and decelerations do capture the mean relationship between good and bad times and human development indicators.

Overall, health related indicators show a statistically significant relationship with episodes of growth accelerations and decelerations. Compared to its underlying time trend, life expectancy is about 1.7 years higher during episodes of growth accelerations and 4.7 years lower during episodes of growth decelerations; infant mortality is reduced by 8.2 per 1000 births during episodes of growth accelerations and increases by 19.2 per 1000 births during episodes of growth decelerations; under-5 mortality is 12 per 1000 births lower during economic good times but 36 per 1000 births higher during economic bad times. These coefficients estimates are all statistically significant.

On the other hand, the estimates of the coefficients relating to the relationship between education outcomes and episodes of growth accelerations or decelerations are not precise. During episodes of growth accelerations, only the primary school enrollment is found to improve (significant at the 5 percent level) compared to its time trend. During episodes of growth decelerations, the literacy rate and the second school enrollment rate are worse, significant at 5 percent and 1 percent significant levels respectively, but there is no statistically significant deterioration in the primary school enrollment rate when economic growth decelerates.

Table 5 also presents the pooled regression results for subgroups of developing countries and LDCs.⁵ For developing countries, health indicators, life expectancy, infant mortality, and under-5 mortality rate, are positively related to episodes of growth accelerations and negatively related to episodes of growth decelerations. The relationship between school enrollment rates and economic fluctuations is not statistically significant for developing countries⁶.

LDCs are heavily penalized when they fall into growth decelerations in terms of infant mortality or under-5 mortality rates. But infant and under-5 mortality rates do not improve statistically during episodes of growth accelerations. This implies the asymmetric effects that economic fluctuations could have on human development outcomes. For LDCs, some human development indicators deteriorate (statistically) during economic bad times while they do not improve (statistically) during economic good times.

⁵ Developed countries do not show a statistically significant relationship between human development indicators and episodes of growth accelerations or decelerations.

⁶ Note that literacy rate is not analyzed in this breakdown because the number of observations decreases substantially for developing countries.

Table 5. Pooled Regression of Human Development Indicators, 1983-2006

| | Life expectancy | Infant mortality | Under-5-mortality | Primary school enrollment | Secondary school enrollment | Literacy |
|---|----------------------|---------------------|---------------------|---------------------------|-----------------------------|--------------------|
| All countries | | | | | | |
| ACC | 1.653 (3.88)** | -8.193 (3.74)** | -12.077 (2.94)** | 1.984 (2.01)* | -1.680 (0.99) | 1.133 (0.38) |
| DEC | -4.679 (7.73)** | 19.239 (5.84)** | 36.916 (5.99)** | -0.450 (0.23) | -16.549 (4.90)** | -10.529 (2.29)* |
| Constant | 65.538 (248.16)** | 41.438 (29.00)** | 65.901 (25.00)** | 102.689 (2.61)** | 156.399 (2.52)* | 84.646 (4.65)** |
| Observations | 4394 | 2870 | 2466 | 1465 | 1418 | 250 |
| R-squared | 0.14 | 0.13 | 0.13 | 0.02 | 0.04 | 0.03 |
| Developing countries | | | | | | |
| ACC | 2.033 (3.82)** | -9.174 (3.28)** | -14.402 (2.84)** | 3.565 (2.58)** | 4.782 (2.40)* | |
| DEC | -3.090 (4.33)** | 11.668 (2.95)** | 21.631 (3.03)** | 4.038 (1.71) | -0.807 (0.22) | |
| Constant | 61.834 (36.92)** | 66.300 (8.54)** | 107.703 (7.17)** | 110.060 (2.02)* | 92.269 (1.31) | |
| Observations | 1581 | 925 | 817 | 1021 | 899 | |
| R-squared | 0.04 | 0.06 | 0.06 | 0.03 | 0.04 | |
| Number of country | 138 | 131 | 131 | 125 | 108 | |
| Least Developed Countries (LDCs) | | | | | | |
| ACC | -0.295 (0.37) | 3.930 (0.92) | 7.630 (0.96) | 2.287 (0.72) | -1.204 (0.51) | |
| DEC | -3.277 (3.39)** | 16.003 (2.86)** | 33.542 (3.24)** | 9.683 (1.91) | 0.049 (0.01) | |
| Constant | 49.528 (19.46)** | 115.894 (9.40)** | 186.028 (8.18)** | 68.237 (0.54) | 5.163 (0.06) | |
| Observations | 479 | 276 | 276 | 341 | 277 | |
| R-squared | 0.07 | 0.14 | 0.13 | 0.08 | 0.08 | |
| Number of country | 48 | 46 | 46 | 41 | 34 | |

Note: Absolute value of t statistics in parentheses; * significant at 5 percent; ** significant at 1 percent; Number of countries varies across indicators, 200 for life expectancy, 138 for literacy, 191 for mortality, and 188 for school enrollment; Literacy is not analyzed for developing countries and LDCs because the number of observations is small; Coefficients estimates for cubic time trend are available from the authors.

To check the robustness of our panel regression results, we run fixed effect regressions with country-specific time trends (Table 6). The fixed effect and pooled regressions yield similar results. Compared to the pooled regressions with a common time trend, fixed effects regressions with a country-specific time trend control for the cross-country variation in economic fluctuations and human development outcomes. The increased R-squared suggests that the within-group variation is accounted for the country-specific time trend. The results are consistent with what we find in the pooled panel regressions.

Table 6. Fixed Effect Regression of Human Development Indicators, All Countries, 1983-2006

| | Life expectancy | Infant mortality | Under-5-mortality | Primary school enrollment | Secondary school enrollment | Literacy |
|---------------------|---------------------|---------------------|---------------------|---------------------------|-----------------------------|--------------------|
| ACC | 2.84 7.77)** | -14.72 (-7.62)** | -25.26 (-6.67)** | -.15 (-.38) | -.55 (-4.56) | 1.36 (.78) |
| DEC | -1.86 (-4.07)** | 11.88 (4.75)** | 24.01 (5.06)** | 2.93 (2.31)* | 2.36 (1.77) | -17.37 (-5.91)* |
| Constant | 64.37 (348.69)** | 45.62 (43.3)** | 72.45 (36.58)** | 111.83 (22.77)** | 60.52 (14.24)** | 79.71 (24.77) |
| Observations | 4394 | 2870 | 2466 | 1465 | 1418 | 250 |
| R-squared | 0.67 | 0.68 | 0.68 | 0.98 | 0.99 | 0.86 |

Note: Absolute value of t statistics in parentheses. * significant at 5 percent; ** significant at 1 percent.

4. Conclusion

The main findings are summarized in Figure 3. Negative growth shocks affect rich and poor countries differently. In rich countries, negative economic shocks are associated with improvements in health and educational outcomes while in poor countries they lead to setbacks (the impact is ambiguous for middle-income countries). Human development indicators either deteriorate or improve at a slower pace during an economic crisis in poor developing countries.

Figure 3. Impact on Health and Education Outcomes in Poor and Rich Countries Depending on Growth Performance

| | | |
|----------------|--------------------|--------------|
| Rich Countries | + | 0 or + |
| | -- | ? |
| Poor Countries | | |
| | Bad | Good |
| | Growth Performance | |

Note: Illustrative.

If the pattern found in our empirical analysis persists, given that all countries are likely to face recessions at the same time during this global economic downturn, not only will developing countries face setbacks in human development outcomes, but the long-running trend of convergence in many human development indicators across countries may slow down or even reverse.

There is no simple way to describe the human development impacts of the current economic crisis. However, the literature on past economic crises and our empirical findings suggest that the current economic crisis poses grave risks to human development outcomes, but that it might also open a unique window of opportunity to introduce welfare improving policies. If policy measures to mitigate the shock are well targeted for poor population, they are likely to minimize the negative impact on the human development outcomes, and contribute to both the recovery and longer term growth.

Appendix 1. Criteria to Determine Growth Accelerations and Decelerations

Growth refers to annual changes in real GDP per capita in 2005 PPP from 1980 to 2009. Data from 1980 to 2006 are obtained from World Bank (2008b) and we use IMF's regional growth projection for 2007-2009 (IMF 2009).

- A growth accelerations is a period that satisfies the following four conditions:
 - Condition 1 – The forward four-year moving average growth minus the backward four-year moving average growth > 0 for a given year; i.e., the forward moving average window (t, t+1, t+2, t+3) must be higher than the backward window (t, t-1, t-2, t-3) and above 0;
 - Condition 2 – The forward four-year moving average growth exceeds the country's average growth, meaning that the pace of growth during accelerations is higher than the country's trend;
 - Condition 3 – The forward four-year moving average GDP per capita exceeds the backward four-year moving average;
 - Condition 4 – A growth accelerations episode requires at least three years in a row satisfying conditions 1-3. An episode includes the three subsequent years after the last year that satisfies conditions 1-3.

- A growth decelerations is a period that satisfies the following four conditions:
 - Condition 1 – The forward four-year moving average growth minus the backward four-year moving average growth < 0 for a given year;
 - Condition 2 – The forward four-year moving average growth is below the country's average growth;
 - Condition 3 – The forward four-year moving average GDP per capita is below the backward four-year moving average;
 - Condition 4 – A growth decelerations episode requires at least three years in a row satisfying conditions 1-3. An episode includes the three subsequent years after the last year that satisfies conditions 1-3.

- If neither of two sets of conditions applies, a period is considered as a "neutral" period.

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