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Aggregate Economic Shocks, Child Schooling, and Child Health

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Do aggregate income shocks, such as those caused by macroeconomic crises or droughts, reduce child human capital? The answer to this question has important implications for public policy. If shocks reduce investments in children, they may have a long-lasting impact on poverty and its intergenerational transmission. The authors develop a simple framework to analyze the effects of aggregate economic shocks on child schooling and health. They show that the expected effects are theoretically ambiguous because of a tension between income and substitution effects. They then review the recent empirical literature on the subject. In richer countries, like the United States, child health and education outcomes are counter-cyclical: they improve during recessions. In poorer countries, mostly in Africa and low-income Asia, the outcomes are procyclical: infant mortality rises and school enrollment and nutrition fall during recessions. In the middle-income countries of Latin America, the picture is more nuanced: health outcomes are generally procyclical and education outcomes counter-cyclical. Each of these findings is consistent with the simple conceptual framework. The authors discuss possible implications for expenditure allocation. JEL codes: I30, J13, O15

Investments in children's health and education have long-term consequences. In both the United States and the United Kingdom, low levels of cognitive development in childhood, measured by a child's performance in tests administered as early as 22 months of age, have been shown to be important predictors of adult wages (Currie and Thomas 1999; Case and Paxson 2008). In developing countries, long-term panels suggest that adverse experiences in early childhood result in worse outcomes in adulthood. A well-known study in Jamaica shows that children who were stunted (had height-for-age two standard deviations or more below that of a reference population) in early childhood were significantly more likely to have deficits in cognition and school achievement in adolescence

and to have poorer emotional and behavioral outcomes (Walker and others 2005, 2007). In Guatemala, children exposed to a nutritional intervention have better reading comprehension and perform better on tests of cognitive development in adulthood, and they earn higher wages (Hoddinott and others 2008; Maluccio and others 2008; see also Martorell 1999). Almost universally, dropping out of school earlier is associated with lower labor earnings in adulthood.

The persistence of the effects of early life investments in nutrition, health, and education has rightly attracted considerable academic and policy interest in their determinants. In this paper, we review the recent empirical evidence on one particular set of factors that affect investments in the human capital of children, namely aggregate economic shocks. Following the literature, we focus primarily on the effects of the macroeconomic cycle, understood as the sequence of aggregate economic expansions (booms) and contractions (recessions or crises). In some cases, the shocks were caused by policy errors or by exogenous variations in the price of a key export product. In other settings, the contraction resulted from natural phenomena, such as droughts. The common feature of the macroeconomic events we review was a substantial temporary reduction in overall production and income levels.[1]

There is now a large literature on the effects of such aggregate shocks on both schooling and health outcomes for children in countries that span the development spectrum: from Zimbabwe to the United States. Although early work on this topic often betrayed a general presumption that economic crises would have a negative impact on education and health outcomes, the actual empirical findings reveal no such simple regularity.[2] Some recessions have led to reductions in school enrollment, as in Costa Rica between 1981 and 1982, while others have led to substantial increases, as in the United States during the Great Depression. There is similar variation for child health outcomes: negative covariate shocks in Zimbabwe, associated with the 1982–84 drought, led to persistent losses in height-for-age for affected children, while infant and adult mortality are both procyclical in the United States.

We review the literature on the effects of aggregate shocks on child education and health in light of a simple conceptual framework which relates the disparate nature of these outcomes to the basic economic mechanisms at work. We organize our review of the evidence in terms of the predictions of our framework, and we find that it is helpful in understanding the diversity of experience across countries and periods. In concluding, we consider implications for the policy debate.

A Conceptual Framework

In this section, we outline a simple conceptual framework for understanding the likely impact of aggregate economic shocks on education and health outcomes.

The basic insight is that aggregate (as opposed to idiosyncratic) shocks have both income and substitution effects on households. The income effect arises from changes in the resources available to the household for investment in health-promoting goods and consumption. The substitution effect arises from changes in wage rates (for children and adults), which affect the opportunity cost of time spent in school (for children) or in health-promoting activities (for adults).

When there is a recession, the income effect works toward a deterioration of outcomes—less child schooling, higher infant mortality—especially if households are credit constrained. The substitution effect works in the opposite direction and results in improved education and health status. Which of these two effects dominates is an empirical matter and will vary from country to country and by the nature of the crisis. In addition, reductions in public expenditures on education and health can amplify any negative effects of a shock on households. A more detailed description of the framework, including diagrammatic illustrations, can be found in the working-paper version of this article (Ferreira and Schady 2008).

Schooling Outcomes

Consider a simple model of educational choice, with unitary households, in which agents live for two periods and derive utility from private consumption in each period. Schooling is an investment, useful only as a means for increasing earnings in the future—it does not generate utility directly. In the first period, agents must decide how to divide their time between schooling and work (child labor). If they work, they are paid an unskilled wage. The wage they are paid in the second period depends on how much human capital they chose to acquire in period 1.[3]

The key trade-off, therefore, is between child work—that increases first-period consumption—and schooling—that increases second-period consumption. The optimal schooling choice then depends on the following four factors: the child wage rate in period 1; other sources of income for the household; the expected returns to schooling in period 2; and the quality of the schools. It also depends on whether or not the family has access to a functioning credit market which would allow it to separate the investment and consumption decisions.

When a recession hits the economy, the shock negatively affects at least two parameters in this decision problem: the child wage rate and other sources of household income that determine period 1 consumption.

The effect on schooling depends, first of all, on whether the household has access to a functioning credit market. If it does, the household borrows to smooth out the income shock. There is therefore no income effect of the recession on schooling. But there is a substitution effect: the child wage rate is now lower, reducing the opportunity cost of studying. The implication is that, with

functioning credit markets and when schooling is seen as an investment rather than a consumption good, we should expect schooling to behave counter-cyclically: enrollment should rise in recessions and fall during expansions.

There are, however, three caveats to this prediction. First, if the recession were somehow to lower expected future returns to schooling, this would shift the demand curve downwards, leading to an offsetting effect on the quantity demanded. This would be the case, for instance, if a recession led to larger (proportional) declines in income for more skilled workers, and if a component of this shift were expected to be permanent. Second, if the recession reduced the contemporaneous quality of schooling, say through reduced public expenditures on materials or teacher salaries, we would also expect it to reduce demand for education. Third, if schooling is seen in part as a consumption good, not just an investment, then there would be an income effect arising from the impact of the recession on the full intertemporal budget constraint (as opposed to the effect on contemporaneous income).

In most developing countries, however, access to credit markets is by no means universal. If credit markets are missing, or function very badly, then first-period consumption is a shifter of the demand for schooling. As first-period consumption falls, so does the optimal schooling choice at every wage rate, because the marginal utility of period 1 consumption rises relative to that of period 2 consumption (which is what schooling buys). There are now two effects from the recession: an income effect and a substitution effect. The substitution effect pushes households along the demand curve for schooling (toward more schooling, as a result of the falling child wage), while the income effect shifts the entire demand curve inwards (toward less schooling, at any given child wage). When credit markets are missing or imperfect, the effect of a recession on the quantity of schooling demanded is therefore theoretically ambiguous.

Health and Nutrition Outcomes

The analogy between health outcomes and education outcomes, which are often discussed alongside one another, is not perfect. Nevertheless, there are important similarities. Child health can also be seen as an investment, which depends on inputs in period 1 and which generates higher earnings in period 2. In this case, inputs into the "production" of health status of children include the consumption of health-promoting goods. At their most basic, these consist of nutritious food-stuffs, but may also include protective clothing and apparel, such as shoes or mosquito nets, medicines, and hygiene products. It also depends on time-intensive activities conducted by parents, especially mothers. These include antenatal check-ups for pregnant women or preventive health care visits for children, breastfeeding, cooking healthy meals, or collecting clean water.

As with schooling, if households are not credit constrained, a recession will not have an income effect on child health. However, there is a substitution effect: during a recession, adult wages fall, and the opportunity cost of carrying out time-intensive activities decreases. More generally, if households are credit constrained, their ability to smooth out the income shock is limited, and there will be an income effect which results in a reduction in the consumption of health-promoting goods. As with schooling, this income effect will also be apparent if child health is seen, at least in part, as a consumption good rather than as an investment.

In the case of child health status, there are two additional effects of a recession that need to be considered. First, health-reducing goods such as smoking and drinking may also be normal, in which case consumption of them would decrease during recessions. Second, there may be changes in the composition of women giving birth. This is because decreases in women's wages, caused by an aggregate shock, also have income and substitution effects on fertility. The income effect would imply a reduction in the number of children that are desired. However, children are time intensive, so the substitution effect would result in women having more children during a crisis. The relative magnitude of the income and substitution effects on fertility is likely to vary across women and may be correlated with the characteristics that help determine child health. For example, higher-risk women may be more (less) likely to postpone birth during a recession and this, in turn, could lead to better (worse) health outcomes for young children during a crisis. This, too, is an empirical matter, and one which has been considered carefully in a handful of the papers we discuss below.

Predictions of Conceptual Framework

In addition to drawing attention to the theoretical ambiguity of the effect of aggregate shocks, our simple conceptual framework provides some testable predictions of which factors are likely to determine the net effects of aggregate economic shocks on child schooling and health outcomes. We highlight four such factors.

First, the degree of development of credit markets matters. In particular, we should expect smaller income effects in countries where access to consumer credit is more widespread and is better able to reach middle-income and poor households than in those where credit markets are undeveloped or inaccessible.

Second, if access to credit is limited, the initial level of income matters, and this may result in differences in the effects of a downturn across countries and across individuals within a given country. This is the case for both schooling and health, albeit for somewhat different reasons. In the case of health, the marginal impact of a dollar of consumption on child health will be higher in a very poor country (or for very poor people in any country), where it is used to buy more nutritious

food, than in richer countries (or for richer households), where it is used on less essential commodities. As a result, a given proportional reduction in income may lead to a larger deterioration in health status in poorer countries (or among poorer households).

In the case of schooling, the income effect of a downturn will in general also be larger in poorer countries or among poorer households. This is because when income (or consumption) is higher, the marginal utility of consumption is lower. As a result, households will be more willing to accept a given proportional income loss when their initial (prerecession) income levels are higher than when they are very low, perhaps at or not much above a "subsistence" level. It follows that poorer households will in general be more likely to take their children out of school and put them in the labor market during a recession than their better-off counterparts.[4]

In sum, we would expect that the same proportional reduction in income levels will have a larger negative impact on schooling and health in poorer countries. This would lead us to expect that rich countries, like the United States, would be more likely to have counter-cyclical health and schooling outcomes (that is, outcomes that *improve* during recessions) than poor countries, like those in Sub-Saharan Africa, where we would expect outcomes to be procyclical (that is, health and education status *worsen* during recessions). The impact of a recession on middle-income countries, such as those in much of Latin America or Eastern Europe, is less clear; it may also be different for health and education outcomes, as we discuss below.

Third, for a given initial level of income, the magnitude and expected duration of the crisis matter. Deeper and longer crises are more likely to lead to procyclical outcomes in schooling and health.

Fourth, controlling for other characteristics of the recession, any reductions in the quality of the available public education or health services reinforce the income effect. The precise mechanism through which this "quality effect" operates depends on the relative importance of the private and public sectors in the provision of these services. For households using the private sector, the quality effect is simply an aspect of the income effect: households can afford less and can adjust their demand either on the quantity or quality margin (or both)— say by visiting cheaper providers or cutting down on some medicines. Where the public sector is an important provider, however, there may really be a "quality effect" that is additional to the income effect for the individual household: if public spending on health or education is procyclical (as is often the case in developing countries), and if there is some link between expenditures and service quality, then cuts in public spending on these services may reduce the value to households of using schooling or health services.[5]

This would lead us to expect that recessions where public expenditures on education and health are more protected would be more likely to show a counter-cyclical pattern in education and health.

Empirical Evidence

In this section, we review the evidence on aggregate shocks and child human-capital outcomes in light of the conceptual framework discussed above and find that theory and evidence are quite consistent. We first focus on schooling and then on child health and nutrition.

Child Schooling

There are a number of papers that consider the impact of aggregate economic shocks on schooling outcomes in the developing world. Many of these focus on Latin America, including Binder (1999) and McKenzie (2003) on macroeconomic crises in Mexico; Schady (2004) on the economic crisis of the late 1980s in Peru; Duryea and Arends-Kuenning (2003) on economic fluctuations in Brazil; Funkhouser (1999) on a recession in Costa Rica in 1981–83; and Maluccio (2005) and Kruger (2007) on the effects of changes in coffee prices on schooling outcomes in coffee-growing areas in Nicaragua and Brazil, respectively. Outside Latin America, Thomas and others (2004) consider the impact of the 1998 crisis in Indonesia; Jensen (2000) analyzes the effect of the 1986–87 drought in Côte d'Ivoire; and World Bank (2007) focuses on the impact of deviations from long-term rainfall in Malawi.

Before reviewing the evidence from developing countries, it is instructive to briefly discuss studies that focus on the United States. A number of papers consider high-school enrollment and graduation rates during the Great Depression. Goldin (1999) shows that the biggest increase in high-school enrollment and graduation rates in the United States took place between 1928 and 1938 (see also Black and Sokoloff 2006). Further, as Goldin points out, "between 1928 and 1938, Delaware, New Jersey, New York, and Pennsylvania, all hard hit by the unemployment of the Great Depression, experienced increases in their graduation rates that were among the greatest (of any state) on a percentage point basis" (p. S79). This counter-cyclical pattern in investments in education appears more recently, too: various authors have shown that college enrollment rates in the United States increase during economic downturns and fall when the economy picks up. For example, Betts and McFarland (1995) show that a 1 percent increase in the unemployment rate of all adults is associated with a 4 percent increase in full-time attendance at community colleges, while Kane (1994) shows

that the enrollment of both blacks and whites in college is negatively associated with average weekly earnings in manufacturing.

Turning to Latin America, Binder (1999) analyzes the relationship between changes in per capita GDP and school retention rates (school enrollment at the close of the school year, divided by school enrollment at the beginning of the year), and continuation rates (the number of students beginning a given school level divided by those who graduated in the previous school year from the earlier school level) in Mexico. Over the period she analyzes, 1977–94, Mexico saw two sharp macroeconomic contractions: in 1982–83, when per capita GDP fell by 9 percent, and in 1986, when per capita GDP fell by 6 percent. Binder shows that school retention and continuation rates in Mexico over the period were generally counter-cyclical, with sharp positive spikes in outcomes corresponding to the periods when the economy was contracting.[6]

McKenzie (2003) studies the effect of the Mexican Peso crisis of 1995–96 on a variety of outcomes, including school enrollment rates. The Peso crisis was a sharp setback to aggregate living standards: GDP per capita fell by 8 percent and real wages contracted by 21.7 percent. McKenzie uses the Encuesta Nacional de Ingresos y Gastos de los Hogares household surveys for 1992, 1994, 1996, and 1998 to estimate the effects of the crisis on schooling.[7] He uses a differences-in-differences approach to test for changes in school enrollment leading up to and after the crisis. He shows that school enrollment grew by more between 1994 and 1996 (the crisis period) than either between 1992 and 1994 (before the crisis) or between 1996 and 1998 (after the crisis). Put differently, after accounting for underlying trends, enrollment rates were significantly higher in the crisis year, 1996, than they were in either the precrisis or postcrisis years. Table 1, reproduced from his paper, shows that the increase in the growth rate of enrollment between 1994 and 1996 (relative to changes over the 1992–94 period) is particularly apparent among boys aged 15–20. The same group also saw significant declines in enrollment between 1996 and 1998 (relative to changes over the 1994–96 period). Similar, if somewhat less clear, patterns are also apparent for girls in this age group.

The economic crisis in Peru in the late 1980s was particularly deep. As a result of macroeconomic mismanagement in 1985–87, GDP per capita fell by 10.5 percent in 1988, 13.4 percent in 1989, and 6.9 percent in 1990, for a cumulative drop of approximately 30 percent.[8] Inflation skyrocketed during the crisis, reaching almost 7,500 percent in 1990. Wages and household consumption collapsed. While there are no comparable data for the country as a whole, per capita consumption in Lima, as measured by household surveys, fell by approximately 50 percent between 1985 and 1990 (Glewwe and Hall 1994). The collapse in real wages was even more dramatic—estimates for Lima suggest that

Table 1. The Impact of the 1995 Mexican Peso Crisis on School Attendance

Age	Boys				Difference-in-difference p-value	
	1992	1994	1996	1998	(T96−T94)−(T94−T92)	(T98−T96)−(T96−T94)
5−6	0.73	0.80	0.86	0.85	0.817	0.006*
7−8	0.94	0.96	0.97	0.97	0.154	0.502
9−10	0.97	0.96	0.97	0.98	0.412	0.963
11−12	0.92	0.94	0.94	0.96	0.151	0.319
13−14	0.79	0.79	0.82	0.83	0.238	0.507
15−16	0.52	0.52	0.58	0.58	0.064**	0.048***
17−18	0.33	0.31	0.36	0.35	0.012***	0.038***
19−20	0.22	0.22	0.28	0.25	0.039***	0.010***
21−22	0.18	0.19	0.19	0.19	0.849	0.661
23−24	0.13	0.11	0.10	0.11	0.589	0.317
25−26	0.05	0.07	0.07	0.06	0.246	0.614
	Girls					
5−6	0.72	0.82	0.87	0.84	0.061**	0.001*
7−8	0.95	0.96	0.98	0.97	0.912	0.026***
9−10	0.96	0.97	0.97	0.97	0.178	0.734
11−12	0.90	0.91	0.92	0.93	0.483	0.493
13−14	0.72	0.73	0.76	0.78	0.640	0.829
15−16	0.48	0.49	0.54	0.51	0.452	0.033***
17−18	0.33	0.31	0.34	0.32	0.041***	0.046***
19−20	0.19	0.21	0.23	0.20	0.915	0.113
21−22	0.14	0.15	0.16	0.15	0.992	0.570
23−24	0.07	0.09	0.09	0.08	0.202	0.789
25−26	0.03	0.06	0.05	0.05	0.031***	0.842

Note: * significant at the 1 percent level; ** Significant at the 10 percent level; *** significant at the 5 percent level.

The difference-in-difference p-values correspond to tests of equality of the growth in school attendance between (T2−T1)−(T1−T0) for different years.

Source: McKenzie (2003).

real wages fell by 80 percent between 1987 and 1990 (Saavedra 1998; Saavedra and Maruyama 1998).

Schady (2004) uses comparable, nationally representative living standard measurement study (LSMS) household surveys for 1985/86, 1991, and 1997[9] to analyze the impact of this recession on schooling outcomes. Schady first shows that the probability of being enrolled in school was similar before, during, and after the crisis—if anything, enrollment rates in 1997 were lower than during the crisis year of 1991; the magnitude of the difference is small, approximately 1−2 percentage points, although it is statistically significant. More striking is the difference in the probability that children work, which is much lower during the crisis

Table 2. The Impact of the Peruvian Crisis of 1988–92 on the Number of Years of School Attained

	No controls	Including controls
Years of crisis exposure	0.050*	0.043*
Crisis exposure = 1	0.008	0.035
Crisis exposure = 2	−0.011	0.089
Crisis exposure = 3	0.204*	0.173**
Crisis exposure = 4	0.184*	0.234*
Crisis exposure = 5	0.224*	0.199**

Note: * significant at the 5 percent level; ** Significant at the 10 percent level.

The upper panel reports results from regressions in which the number of years of crisis exposures enters linearly. The lower panel includes five dummies corresponding to the number of years of crisis exposure, with the omitted category being children who were not school-aged during the crisis years, 1988–92. Controls include variables for child gender, parental education, household size, the number of children in a household in six age categories, and municipality fixed effects. The sample for the specifications with controls is limited to municipalities that were visited in the 1985/86, 1991, and 1997 rounds of the LSMS.

Source: Schady (2004).

than before or after. For older school-aged children, ages 12–17, this probability is between 16 and 22 percentage points lower in 1991 than in 1985/86 or 1997.

Schady (2004) also analyzes the impact of the crisis on the number of years of schooling attained. Table 2, reproduced from his paper, shows that children who were school-aged during the entire crisis period have completed, on average, about 0.25 *more* years of schooling at any given age than those who were not school-aged during the crisis (upper panel). Schooling is completed in whole years, rather than fractions, so a more intuitive description of this result is that every fourth child who was fully exposed to the crisis had completed one more year of schooling than a comparable child who was not exposed. A disaggregation of these results to account for differences by the number of years of exposure to the crisis suggests that the positive effects of the crisis on school attainment levels are only apparent for children with "high" levels of exposure—that is, children who were school-aged for at least three of the five crisis years (lower panel). Schady suggests that the increase in school attainment during the recession may have partly been a result of the decrease in child labor, which freed up time that children could expend in more "effort" at school.

Duryea and Arends-Kuenning (2003) study the effects of macroeconomic crises on schooling outcomes in urban Brazil. The period covered by their analysis includes two aggregate economic contractions: between 1981 and 1983 (when GDP per capita fell by 13 percent, following adoption by the government of an

austerity plan agreed upon with the International Monetary Fund) and between 1990 and 1992 (when GDP per capita fell by 8 percent, following a freeze in access to bank accounts intended to reduce inflation). Duryea and Arends-Kuenning first show that there is no evidence in the aggregate data that school enrollment rates changed appreciably for either boys or girls. They then exploit the variation across states in the timing and depth of the economic shocks. Specifically, they construct state-level measures of aggregate labor market conditions by calculating the mean wage of low-skilled men, which they define as the average wage of men with less than four years of schooling living in a given state. They show that an increase in unskilled wages is associated with a higher probability that a child is employed and with a lower probability that he or she is in school. This effect is somewhat more muted during crisis years, but the sign of the regression coefficient is the same—in crisis and noncrisis years, higher state-level wages for low-skilled workers are associated with a lower probability that a child will attend school. More recently, López Bóo (2008) also finds evidence of counter-cyclical schooling behavior during the 1998–2002 financial crisis in Argentina.

Funkhouser (1999) studies the effects of a sharp decline in living standards in Costa Rica, between 1981 and 1983. This recession, which followed the adoption of a fiscal austerity package, resulted in a contraction of GDP of 14 percent between 1981 and 1982, and a fall in real wages of approximately 50 percent between 1981 and 1983. Funkhouser shows that, unlike the pattern found in Mexico, Brazil, and Peru, there was a drop in school enrollment rates of approximately 6 percent between 1981 and 1982, with larger changes in rural areas, and an increase in the fraction of children working during the same period. However, when he compares the educational attainment of children who were exposed to the crisis and those who were not, at ages 18, 19, 20–22, and 23–25, there are no differences in attainment between the two groups. It thus appears that the drop in school enrollment rates was only temporary, and children who were exposed to the crisis made up schooling deficits later on.[10]

In Nicaragua, Maluccio (2005) investigates the effects of a sudden reduction in the price of coffee between 2000 and 2002. The data he uses were collected for an analysis of the impact of the Nicaraguan Pilot conditional cash transfer (CCT) program, known as the Red de Protección Social. These data are not nationally representative—rather, they cover households in select rural areas. Maluccio first uses household survey data to show that, between 2000 and 2002, per capita consumption for households in the control group—those that were randomly assigned not to receive transfers from the Red—fell by an average of 10 percent. The reduction in consumption in coffee-growing areas was larger, approximately 27 percent. Concurrent with these reductions in consumption levels, school enrollment of children aged 7–12 increased, and increased particularly in

coffee-growing areas. For example, among boys, school enrollment increased by 15 percentage points, which suggests that the opportunity cost of going to school fell sharply.

Kruger (2007) studies the effects of changes in the county-level value of coffee production in coffee-growing areas in Brazil. She finds that school enrollment tends to be negatively correlated with the value of coffee production. In regions where coffee is economically important, a decrease of 10 percent in the value of coffee production increases the probability of enrollment for low- and middle-income children by between 3 and 4 percent, while the school enrollment of high-income children is unaffected. Kruger concludes that the substitution effect dominates the income effect when there are temporary changes in local economic conditions in coffee-growing areas in Brazil.

In sum, in five countries in Latin America for which careful analysis has been done, there is little evidence that school enrollment systematically declined during aggregate economic contractions. Enrollment rose markedly during recessions in Mexico and Nicaragua, and marginally in Peru and Brazil. Only in Costa Rica did school enrollment behave procyclically. Nor does it appear that school attainment suffered: in Peru, children who were exposed to the crisis of the late 1980s had completed more years of schooling for their age than comparable children who were not exposed, while even in Costa Rica school attainment appears to have been unaffected by the economic contraction, despite the decline in enrollment at that time.

Much less is known about the effects of aggregate income shocks on the *quality* of education and about how, if at all, any possible changes in quality affected the labor market performance of cohorts who received their education during crisis years. In Peru, public recurrent expenditures on education dropped sharply between 1987 and 1990, by approximately 50 percent (Schady 2004). Recurrent expenditures are largely made up of teacher salaries, which were severely eroded by the hyperinflation of the late 1980s. The quality of instruction may have deteriorated during the crisis—for example, if there was a higher incidence of teacher absenteeism (although outside options for teachers would also have diminished in the economic downturn) or if teachers were less motivated. Understanding the impact of crises on the quality of education, as opposed to enrollment levels, is an important priority for future research.[11]

We now turn to evidence of the effects of shocks on schooling outcomes in countries outside Latin America, including Indonesia, Côte d'Ivoire, and Malawi. The economic crisis of 1998 in Indonesia was a sudden reversal of fortune for a country that had enjoyed high growth rates for decades. In 1998 GDP per capita contracted by 14 percent, and by a further 1 percent in 1999. Since then growth has resumed, although at rates generally lower than those enjoyed by the country in the decade or so before the crisis.

Table 3. The Impact of the 1998 Indonesian Crisis on School Enrollment

Age	Boys			Girls		
	1997	1998	Change	1997	1998	Change
7	86.0	86.8	0.8	88.4	87.6	−0.8
8	94.5	93.8	−0.7	94.9	94.5	−0.4
9	96.2	95.8	−0.4	96.7	96.0	−0.7
10	96.5	95.6	−0.9	96.7	96.2	−0.5
11	96.2	95.7	−0.5	96.8	96.4	−0.4
12	92.8	91.8	−1.0	92.6	92.6	0.0
13	86.4	85.2	−1.2	85.8	84.7	−1.1
14	78.8	78.5	−0.3	77.0	77.7	0.7
15	68.6	68.2	−0.4	67.6	69.2	1.6
16	60.6	61.0	0.4	58.9	60.4	1.5
17	49.2	52.5	3.3	48.8	50.7	1.9
18	39.6	40.5	0.9	35.5	36.1	0.6
19	26.4	27.7	1.3	21.0	22.3	1.3
	Richest quartile			Poorest Quartile		
	1997	1998	Change	1997	1998	Change
7	81.7	78.9	2.8	56.5	54.6	−1.9
8–9	98.8	99.2	−0.4	92.1	90.6	−1.5
10–11	98.9	99.2	−0.3	94.2	92.8	−1.4
12–13	96.5	96.2	0.3	83.5	82.2	−1.3
14–15	89.2	88.7	0.5	58.4	59.6	1.2
16–17	77.0	78.6	−1.6	33.5	33.9	0.4
18–19	50.7	54.1	−3.4	15.1	15.4	0.3

Source: Thomas and others (2004).

Thomas and others (2004) analyze the impact of the crisis on schooling outcomes. Table 3, based on their results, shows that there was a decrease in enrollment during the crisis, although the estimated changes are very small.[12] For no age group between 7 and 17 did school enrollment fall by more than 1.2 percent. Even among households in the lowest quartile of the distribution of per capita expenditures, changes in enrollment rates never exceed 2 percent; for most ages, changes were substantially smaller than this.

A different picture emerges from Jensen's (2000) analysis of the effects of drought on school enrollment in Côte d'Ivoire. Jensen uses panel data for 1986–87 to compare children in villages that were affected by drought and others that were not.[13] He shows that, between 1986 and 1987, school enrollment of boys grew by 5 percentage points in villages that were not affected by droughts, while the school enrollment of girls grew by 10 percentage points; in contrast, in villages that were affected by droughts, the school enrollment of boys fell by

14 percentage points, while that of girls fell by 11 percentage points. The implied negative difference-in-difference effects of the drought on school enrollment are quite large, on the order of 20 percentage points.[14] Similar negative effects of weather shocks on child schooling are reported elsewhere in Africa. In Malawi in 1994–95, a rainfall shock of 10 percent below the long-run average was associated with an increase of 23 percent in the fraction of students who missed two or more consecutive weeks of instruction in the last 12 months, with the largest effects concentrated among children in the poorest households (World Bank 2007).

How does the evidence just reviewed compare with the testable predictions of the framework described in the previous section? All else being equal, the theory would lead us to expect investments in schooling to behave counter-cyclically in richer countries and in those with better developed credit systems, but procyclically in poorer countries and in those where access to credit is severely limited. In addition, deeper, more prolonged crises are more likely to have negative effects on schooling than shorter ones. To summarize the pattern of effects across countries, table 4 reports per capita GDP levels at the time of the crisis, in PPP 2005 US dollars, the magnitude of the shock, and the effect it had on school enrollment.[15] (No comparable data are available on the development of the financial sector in these countries, although it is likely to be highly correlated with per capita income levels.)

Table 4 shows that Argentina, Brazil, and Mexico had the highest income levels at the time their economies went into recession. Consistent with the framework in the previous section, schooling outcomes in these countries were counter-cyclical—they behaved in a fashion similar to those in the United States. Insofar as there was an income effect of the recession on schooling, it was dominated by the substitution effect. On the other hand, Malawi and Côte d'Ivoire were the poorest countries in the table. Here, the income effect appears to have dominated the substitution effect, with school enrollment behaving in a procyclical manner.[16] Peru and Indonesia lie somewhere in the middle—the effects of their economic crises on school enrollment were generally small.

Costa Rica and Nicaragua are somewhat harder to explain. In Costa Rica, there was a reduction in school enrollment in spite of the fact that per capita income levels at the time of the crises were reasonably high (similar to Peru), although enrollment appears to have recovered quickly. Nicaragua saw an increase in school enrollment during the period of the coffee crisis in spite of the fact that it is a poor country, more closely comparable in its GDP levels to Côte d'Ivoire than to the other countries in the table. This may be explained, however, by the fact that the magnitude of the negative shock in Nicaragua was smaller than in Costa Rica or Peru, leading to a smaller negative income effect.

Table 4. The Impact of Various Macroeconomic Crises on School Enrollment

Country	Year of crisis	GDP in last year before crisis	Size of shock (in percent cumulative contraction in per capita GDP)	Size of shock (other outcomes)	Change in enrollment (sign)
Brazil	1981–83	7,630	13.3		+
	1990–92	7,691	8.4		
Mexico	1982–83	10,037	9.0	21.7 *percent* contraction in real wages	+
	1986	9,313	5.7		
	1995	9,809	7.9		
Argentina	1998–2002	10,974	21.7		+
Peru	1988–92	6,223	29.8	50 *percent* contraction in per capita consumption (Lima) 80 *percent* contraction in real wages (Lima) 7,500 *percent* inflation	+
Costa Rica	1980–82	6,158	14.3	50 *percent* contraction in real wages	−
Nicaragua	2000–02	2,357		27 *percent* contraction in per capita consumption (coffee-growing areas)	+
Indonesia	1998	3,087	14.3		−
Côte d'Ivoire	1986–87	2,147			−
Malawi	1994–95	653			−

Note: GDP levels are GDP per capita, PPP (constant 2005 international US$).
Source: World Bank (2008).

Child Health and Nutrition

We next turn to the effects of aggregate economic shocks on child health and nutrition. As with the evidence on schooling, there are a reasonable number of studies from developing countries to draw on. A handful of these refer to Latin America, including Paxson and Schady (2005) on Peru, Cutler and others (2002) on Mexico, Maluccio (2005) on Nicaragua, and Miller and Urdinola (2007) on Colombia. Other country-specific studies that consider the impact of aggregate economic shocks on health outcomes include Stillman and Thomas (2004) on Russia; Frankenberg, Thomas, and Beegle (1999), Rukumnuaykit (2003), and Strauss and others (2004) on Indonesia; and Bhalotra (forthcoming) on India. We also discuss findings from a recent study that uses demographic and health surveys (DHS)[17] to analyze the effect of positive and negative aggregate income shocks on infant mortality for 59 developing countries (Baird, Friedman,

and Schady 2007). Finally, we review the evidence of the effects of droughts on child nutritional status in Africa, including Hoddinott and Kinsey (2001) and Alderman, Hoddinott, and Kinsey (2006) on Zimbabwe; Yamano, Alderman, and Christiaensen (2005) on Ethiopia; Alderman, Hoogeveen, and Rossi (2009) on Tanzania; and Jensen (2000) on Côte d'Ivoire.

As with schooling, it is useful to begin by briefly reviewing the literature on the United States. A series of papers by Ruhm (2000, 2003, 2005, 2007) and Ruhm and Black (2002) argue that adult health status tends to improve during recessions in the United States. In part, this appears to be a result of increases in the fraction of adults who regularly exercise during recessions and decreases in the corresponding fractions who smoke, drink excessively, and eat unhealthy foods.[18] Turning to child health, Chay and Greenstone (2003) and Dehejia and Lleras-Muney (2004) both document counter-cyclical patterns in infant mortality, with more babies dying during economic expansions.

Chay and Greenstone (2003) show that pollution falls during recessions. Using variation over time and across counties in pollution levels, they show that lower pollution levels, in turn, results in fewer infant deaths. Dehejia and Lleras-Muney (2004) use state-level data to show a decrease in the incidence of low and very low birth-weight babies and in infant mortality during recessions, especially among children born to black women. Part of the explanation for these patterns is that there are changes in the composition of women giving birth, with significant reductions in the fraction of black mothers who are high-school dropouts during recessions. This is consistent with black high-school dropouts being more credit constrained than more educated black women; black women with less education therefore choose to have children during economic expansions, when incomes are higher, despite a higher opportunity cost of childbirth. When they consider changes in behaviors that might explain the differences in infant mortality rates, Dehejia and Lleras-Muney (2004) find that (both black and white) mothers have more prenatal care visits during recessions. The authors conclude that child health improvements during recessions in the United States are driven both by changes in the composition of the pool of mothers and by behavioral "improvements".

In contrast with the literature from the United States, the evidence on developing countries—including middle-income countries, such as those in Latin America—suggests that child mortality is counter-cyclical, decreasing in booms and increasing in crises. Paxson and Schady (2005) analyze the effects of the crisis of the late 1980s in Peru on infant mortality using DHS data. They show that the crisis coincided with a large spike in infant mortality—from 50 to 75 per 1,000 children born. Using these estimates they calculate that the crisis resulted in approximately 18,000 "excess" deaths—deaths that would not have taken place without the economic crisis.[19]

Paxson and Schady (2005) make two other points. First, they show that the increase in mortality was not a result of possible changes in the composition of women giving birth.[20] Second, they show that the crisis came hand in hand with a dramatic collapse in public expenditures on health, which fell from approximately 80 Peruvian soles per capita in 1988 to 30 soles in 1990. Using the DHS data, Paxson and Schady also show declines in health service utilization by households during the crisis years, including a higher fraction of home births and fewer antenatal check-ups. They conclude that the health sector collapse may be part of the explanation for the spike in infant mortality. We return to this point below.

Cutler and others (2002) use vital registration data to analyze the effects of economic contractions on mortality in Mexico between 1980 and 1998.[21] They focus on three crisis periods, corresponding to 1982–84, 1985–89, and 1994–96. To quantify the impact of these crises on the mortality of vulnerable groups, in particular children (age 0–4) and the elderly (age 60+), they assume that the mortality of prime-age males, age 30–44, was unaffected by the crises. They then compare changes in mortality among children and the elderly before and during the crisis with the corresponding changes in mortality among prime-age males. Based on this difference-in-differences estimation strategy, they conclude that the three crisis periods resulted in increases in child mortality of 9.2 percent (1982–84 crisis), 10.3 percent (1985–89), and 6.9 percent (1994–96). Using a similar approach, they also report increases in the mortality of the elderly, ranging from 2 to 8 percent.[22]

Two papers look at the impact of sudden changes in the price of coffee on child health and mortality in coffee-growing areas. The first of these, by Maluccio (2005), discusses the impact of the sharp reduction in the price of coffee between 2000 and 2002 on child nutritional status in coffee-growing areas in Nicaragua. Maluccio shows that the coffee price shock, and the attendant reduction in living standards, came hand in hand with a decline in the height-for-age z-score of children aged 6 to 48 months of 0.15 points, although the coefficient is only borderline significant.[23]

The results for Mexico and Nicaragua, like those for Peru, suggest that the reduction in public and private expenditures on health-promoting goods dominates any positive effects of downturns in terms of more time for child care and lower consumption of health-reducing goods like cigarettes and tobacco in Latin America. This is not the case in the analysis by Miller and Urdinola (2007) of the impact of three sudden changes in the price of coffee on infant mortality in coffee-growing areas in Colombia.[24] Miller and Urdinola use population census data to analyze changes in the size of birth cohorts between the year immediately before a coffee price shock and the year of the shock itself. Implicitly, this assumes that the price shocks did not have an effect on the mortality of older children.

The analysis also exploits differences between coffee-growing municipalities and other municipalities. The estimation strategy is therefore difference-in-differences (across municipalities and over time). Based on this, Miller and Urdinola conclude that infant mortality is procyclical—increasing when there are positive price shocks (and therefore higher incomes in coffee-growing areas) and decreasing when shocks are negative. This pattern of results is similar to that found in the United States—see the discussion of Dehejia and Lleras-Muney (2004) above. However, the magnitude of the coefficients reported by Miller and Urdinola is very large, perhaps implausibly so.[25]

We turn next to evidence from developing countries outside Latin America. Stillman and Thomas (2004) analyze the impact of an economic contraction in Russia in 1998 on household expenditures on food, food intake, and measures of nutritional status—including Body Mass Index (BMI) for adults and height-for-age and weight-for-height for children. The 1998 crisis analyzed by Stillman and Thomas was particularly deep, involving a 30 percent contraction in GDP in the last two quarters of 1998, and an 18 percent decrease in per capita expenditures; however, the recovery was also quick—by 2000, income levels were back to their pre-crisis levels.

Stillman and Thomas (2004) use a rich data set that includes measures of expenditures as well as nutrient intake, as reported by households for 24-hour recall periods. They show that total *expenditures* on food dropped sharply during the crisis. When they consider the impact of the crisis on the *quantities* of various foodstuffs consumed, however, the results are more nuanced. For starches, meats, and dairy products, the crisis did not result in a decrease in the quantity consumed—rather, it seems, households switched from more expensive to less expensive sources of calories within these food categories. Only in the case of consumption of fruits and vegetables is there clear evidence of a sharp decrease during the crisis and of a rebound thereafter. Despite this resilience in total caloric intake, however, there is some evidence of a deterioration in the nutritional status for children—estimates of the effect of the transitory shock to income on the weight-for-height z-score suggest a decline of about 0.11 points. On the other hand, there is no evidence of a deterioration in height-for-age, a more long-run measure of child nutritional status.

A number of authors have studied the impact of the 1998 crisis in Indonesia on child health and nutrition, with mixed results. Strauss and others (2004) show that there is no evidence that weight-for-height, height-for-age, or blood hemoglobin levels were negatively affected by the crisis—see also Frankenberg, Thomas, and Beegle (1999). Of the child health outcomes they study, only mother-reported child health status appears to have worsened significantly. On the other hand, there is some evidence that infant mortality spiked up sharply, from about 30 per 1,000 in 1996 to 48 per 1,000 in 1998 (Rukumnuaykit

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2003; see also Simms and Rowson 2003, who argue that infant mortality increased between 1996 and 1999 in 22 of Indonesia's 26 provinces).[26]

An important issue with regard to the Indonesian crisis is that expenditures on health appear to have been protected from sharp cuts. This point is made in figure 1, which shows that although Government health expenditures contracted during the crisis, by about 20 percent, much of this shortfall was made up by donor assistance to the health sector, which increased sharply. This pattern of expenditures may help explain why, with the possible exception of infant mortality, child health outcomes do not appear to have suffered much. Figure 2 shows that, by contrast, public health expenditures in Peru fell by more than half, and there is no evidence that these shortfalls were made up from other sources, including donor assistance.

Health outcomes appear to have deteriorated during economic contractions in most other developing countries. In a study using DHS data for India, Bhalotra (forthcoming) analyzes the effects of aggregate income shocks on infant mortality. Methodologically, the approach is similar to that followed by Paxson and Schady (2005) in their analysis for Peru. However, Bhalotra arguably has better data and a more credible identification strategy because she exploits differences across states in GDP growth rates and in the magnitude and timing of deviations from GDP trends, rather than simply using national averages. She concludes that there is no clear pattern of effects in urban areas. In rural areas, however, infant mortality appears to be counter-cyclical—as in Peru, Mexico, and Indonesia. The magnitude of her estimates implies that a negative income shock of median size in the data is associated with an increase in mortality of approximately 0.14 percentage points, which is almost half the annual linear decline in rural mortality in India over the period she studies. Moreover, when she disaggregates her findings by gender, Bhalotra finds that boys are fully protected from income shocks—only the mortality of girls rises during aggregate shocks. Finally, Bhalotra shows that high-risk women were more likely to postpone childbearing during aggregate downturns in India, and she controls for this by using mother fixed effects. (These compositional changes are similar to those found by Dehejia and Lleras-Muney among black women in the United States.)

Pongou, Salomon, and Ezzati (2006) focus on the effects of the macroeconomic decline in Cameroon between 1991 and 1998. They show that this decline was associated with an increase in weight-for-age malnutrition, which increased by 9 percentage points for boys and 3 percentage points for girls. Increases in malnutrition were larger among children of mothers with no education than those with primary schooling, and larger for mothers with primary schooling than those with secondary schooling; they were also larger in rural areas than in urban areas, and among households with few assets.

Figure 1. Public Expenditures on Health During the Crisis: Indonesia
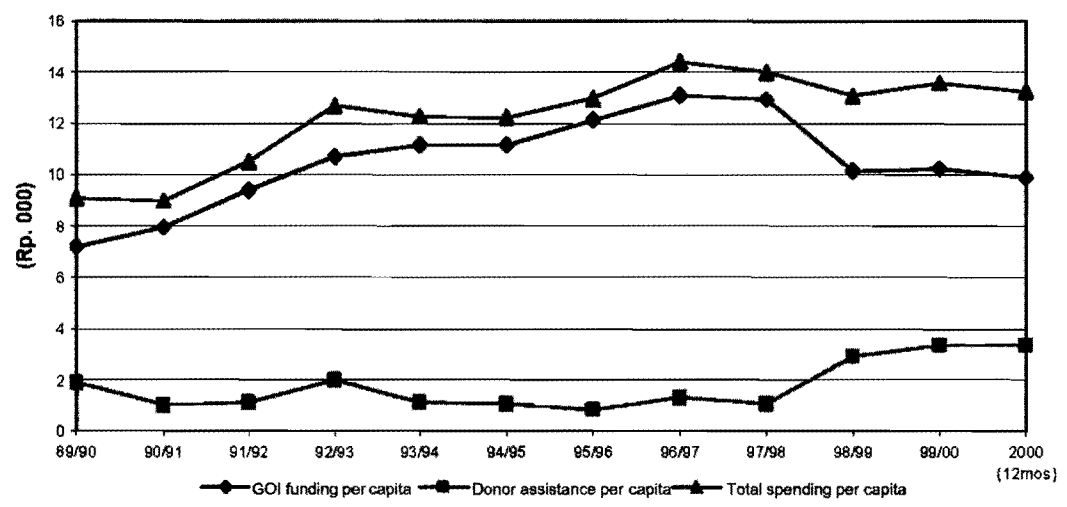
Source: Lieberman, Juwono, and Marzoeki (2001).

Figure 2. Public Expenditures on Health During the Crisis: Peru
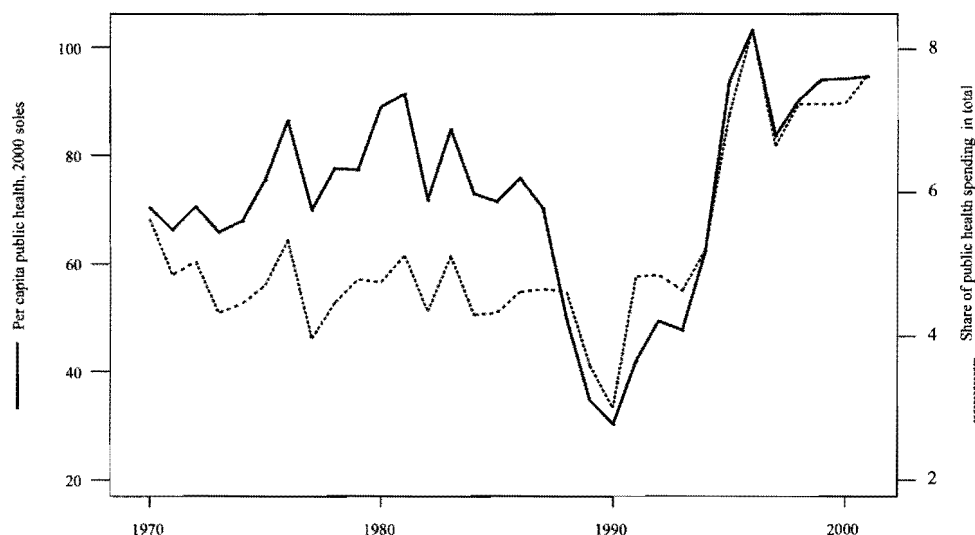
Source: Paxson and Schady (2005).

Finally, Baird, Friedman, and Schady (2007) use data from DHS covering 59 developing countries and approximately 1.7 million births. On the basis of these data they construct country-specific infant mortality series and merge these with data on per capita GDP. After flexibly removing country-specific trends in the infant mortality and GDP series, they show that income shocks have large negative effects on infant mortality: a 1 percent decrease in per capita GDP is associated with an increase in infant mortality of between 0.31 and 0.79 percent.

Baird, Friedman, and Schady (2007) present various extensions to this basic finding. First, they include mother fixed effects in their regressions and show that changes in infant mortality are apparent even after accounting for the changing composition of women giving birth—the estimates that include fixed effects are very close in magnitude to those that do not. Second, they merge their data with data on weather shocks (droughts and floods) and conflicts, and show that the association between changes in per capita GDP and changes in infant mortality is unaffected by the inclusion of these additional controls. This is important as weather shocks and conflict could have independent effects on mortality above and beyond their effects on aggregate incomes. Finally, they argue that there are important asymmetries in the relationship between GDP shocks and infant mortality. Figure 3, reproduced from their paper, presents the results of nonparametric regressions of the infant mortality rate on the logarithm of per capita GDP,

Figure 3. Income Shocks and Infant Mortality in the Developing World
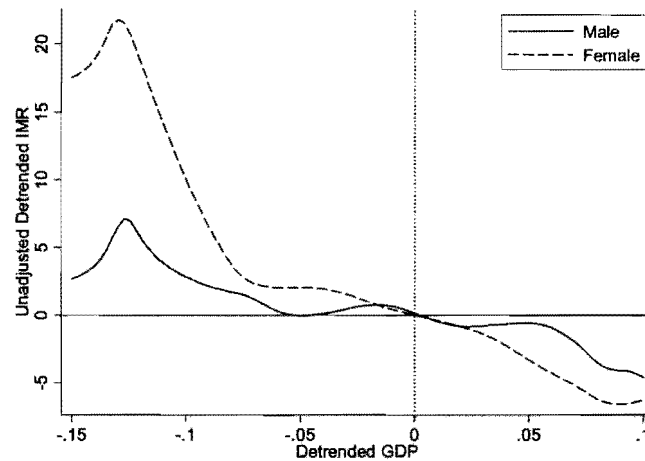
Notes: These are locally weighted least-squares regressions of the infant mortality rate (IMR), per 1,000 live births, on the logarithm of per capita GDP. Country-specific cubic trends have been removed from both series.
Source: Baird, Friedman, and Schady (2007).

separately for boys and girls, after country-specific cubic trends have been removed from both time series. The units on the vertical axis correspond to the number of infant deaths per 1,000 children born, while those on the horizontal axis correspond (approximately) to percentage changes in per capita GDP. The picture shows that positive income shocks tend to imply quantitatively small improvements in infant mortality, even when these shocks are large; moreover, these improvements in income affect the likelihood of survival for boys and girls in a similar way. On the other hand, negative income shocks have much larger effects on infant mortality, especially for girls, and especially for the largest shocks. Using the coefficients from the regressions in their paper, Baird, Friedman, and Schady report the results from some back-of the-envelope calculations. These suggest that more than 1 million excess deaths occurred in the developing world during 1980–2004 in countries experiencing economic contractions of 10 percent or greater, with the bulk of these deaths found among girls.

In many parts of the world, such as Africa, aggregate income fluctuations are often caused by weather shocks, and we discuss the findings from a substantial body of research that has studied the effect of droughts on child nutrition in Africa.[27] We begin by discussing two papers on Zimbabwe (Hoddinott and Kinsey 2001; Alderman, Hoddinott, and Kinsey 2006). Using five rounds of panel data,

Hoddinott and Kinsey show that children who were 12–24 months during a drought in 1995–96 grew by approximately 1 centimeter less than other children in this age range in nondrought years. When they control for a variety of child and household characteristics, the coefficient on drought exposure among young children increases, implying a deceleration in growth of approximately 1.7 centimeter. They also show that children in older age groups do not appear to experience a similar growth slowdown, consistent with the nutritional literature which suggests that children are particularly vulnerable to nutritional insults between weaning and the second birthday (Martorell 1999; Shrimpton and others 2001).

Alderman, Hoddinott, and Kinsey (2006) focus on the effects of a two-year drought in 1982–84 and on the civil war in Zimbabwe prior to 1980. They first show that children who were exposed to the drought had lower growth trajectories than other children—consistent with the results in Hoddinott and Kinsey (2001). Similar results also hold for exposure to the civil war, which resulted in significantly lower height-for-age. Alderman, Hoddinott, and Kinsey then show that children who were shorter as a result of exposure to the drought or civil war do not make up these growth deficits later on: they become shorter adolescents. Further, they start school later and attain fewer years of schooling.

Negative effects of droughts on child nutritional status are also reported elsewhere in Africa. Jensen (2000) shows that drought exposure is associated with an increase of 3.5 percentage points in the fraction of children with weight-for-age more than two standard deviations below the international norm (from a base of approximately 5 percent). Yamano, Alderman, and Christiaensen (2005) estimate that a 10 percentage point increase in the proportion of plots that are damaged by drought is associated with a decline in child growth rate of approximately 0.12 centimeter over a six-month period in Ethiopia. Alderman, Hoogeveen, and Rossi (2009) use a panel extending for more than 10 years in the Kegara region of Tanzania to show that children who experienced weather shocks in early childhood were more likely to have low height-for-age, start school late, and have completed fewer years of schooling in adolescence. They use various simulations to show that this, in turn, translates into substantial reductions in earnings in adulthood.

Finally, Dinkelman (2008) focuses on the effects of a severe drought in southern Africa in the early 1980s. Using a high-quality panel data set, the cape area panel study (CAPS),[28] she exploits variation in drought intensity related to birth timing and birth location to identify the effects of the drought on a variety of measures of education and health status. Based on this difference-in-difference identification strategy, Dinkelman finds that "drought babies" grow to be substantially shorter than other children and perform substantially worse on various measures of cognitive ability in adolescence. Unexpectedly, she finds that these negative effects of the drought are only apparent among boys, not girls. She

provides some evidence that the reason for these surprising differences by gender may be biological, namely, that male infants are weaker at birth and therefore more susceptible to the effects of nutritional deprivation.

Although much of the literature on the effects of droughts on investments in early childhood has focused on Africa, we close with a discussion of a recent paper by Maccini and Yang (forthcoming) that uses data from Indonesia. Maccini and Yang match health, education, and labor market outcomes for adults in a recent round of the Indonesian family life survey[29] with locality-specific rainfall for their birth year. Their results suggest substantial effects of rainfall in the first year of life on adult outcomes for women, but not for men. Women who were born in localities with higher rainfall have better self-reported health status, are taller, and have completed more years of schooling; these women had also accumulated more assets in adulthood. The coefficients for comparable regressions for men are never significant, suggesting that, in Indonesia, investments in boys are better protected from income fluctuations than investments in girls. These gender differences are reminiscent of the asymmetric effect of recessions on infant mortality reported by Baird, Friedman, and Schady (2007).[30]

To summarize, the picture on the effects of economic shocks on child health seems empirically clearer than that for schooling outcomes. In rich countries (effectively, in our sample of studies, for the United States), health status is counter-cyclical (that is mortality and morbidity fall during recessions). In developing countries, on the other hand, child health is procyclical (that is, infant mortality and malnutrition increase during recessions). The only exception to this pattern, among the studies we have surveyed, are the results in Miller and Urdinola (2007) on procyclical infant mortality in Colombia.

Conclusions And Policy Implications

The simple framework outlined in this paper suggests that the effect of aggregate economic shocks on child health and education outcomes is theoretically ambiguous—and therefore that we should expect it to vary across countries and episodes. But the framework also suggests some elements of *how* it should be expected to vary.

Richer countries, and those with deeper and better-functioning credit markets, are more likely to see improvements in both health and education during downturns. School enrollment increases because the income effect of a crisis is weaker for initially richer countries and for households with greater access to credit markets, leading to a dominance of the "pro-schooling" substitution effect. Health improves because the marginal product of public and private expenditures in health is lower in rich countries and households, relative to the health

contribution of additional parenting time (and, in some cases, because of lower consumption of goods with negative health consequences during downturns).

In the poorest countries, we would expect to see exactly the opposite pattern: education and health outcomes should be procyclical, with things getting worse in recessions. Middle-income countries should fall somewhere in-between, and the resolution of the (different) trade-offs in health and education are an empirical matter. The review of the literature carried out is supportive of the predictions for rich and poor countries—largely the United States at one extreme, and Africa and a few low-income Asian countries at the other. It is also informative of the empirical outcomes for middle-income countries, largely in Latin America. Table 5 provides a schematic summary of these findings.

As table 5 illustrates, recessions, droughts, and other economic downturns tend to have negative effects on both health and education outcomes for children in poor countries. This was apparent for school enrollment and child health in a variety of African countries. To some extent, the picture that emerges for Indonesia during the 1998 crisis is similar, although the magnitude of the negative effects is much smaller—perhaps because Indonesia was wealthier than the African countries that were analyzed, or perhaps because public expenditures on education and health were better protected in Indonesia. At the other end of the spectrum, economic downturns appear to be robustly associated with improvements in child health and education outcomes in the United States.

Between those two extremes in the income scale, there lies a middle-income range populated (not exclusively) by a number of Latin American countries. In this intermediate range, results are different for health and for education. In practice, with the exception of the results for Colombia, health outcomes in Latin America appear to be procyclical—worsening during recessions. This was also the case in Russia in 1998, at least with regard to child weight-for-height. In contrast, with the exception of the results for Costa Rica, education outcomes appear to be counter-cyclical in middle-income countries—improving during recessions.

There is also evidence that these effects are heterogeneous not only across but also within countries. This heterogeneity manifests itself along a number of dimensions. One of them is gender: a number of studies have found that negative economic shocks have worse effects for the mortality and health of girls (Bhalotra forthcoming on India and Baird, Friedman, and Schady 2007 on a large sample of developing countries), although this pattern is not apparent everywhere (see Dinkelman 2008 on South Africa). There is also heterogeneity by race, as in the Dehejia and Lleras-Muney (2004) study of the United States. A third dimension is geographic and occupational (or both), with children in coffee-growing areas in Nicaragua experiencing a greater increase in enrollment as a result of a negative price shock than those where other economic activities dominate (Maluccio 2005).

Table 5. The Expected Effect of a Negative Aggregate Economic Shock on Child Health and Education Outcomes

	Education outcomes	*Health and nutrition outcomes*
Rich countries	*Positive impact*	*Positive impact*
	• United States	• United States
Middle-income countries	Ambiguous impact *Examples of positive impact*	Ambiguous impact *Examples of positive impact*
	• Mexico • Brazil • Argentina • Peru	• Colombia *Examples of negative impact*
	Examples of negative impact	• Peru • Mexico • Russia
	• Costa Rica	
Poor countries	*Negative impact*	*Negative impact*
	• Indonesia • Côte d'Ivoire • Malawi • South Africa • (Nicaragua)	• Nicaragua • India • Côte d'Ivoire • Zimbabwe • Ethiopia • Tanzania • Cameroon • South Africa

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

Finally, there is evidence of heterogeneity by socioeconomic status. In Cameroon, households with fewer assets experienced a greater increase in malnutrition between 1991 and 1998 (Pongou, Salomon, and Ezzati 2006). In middle-income countries in Latin America, there appear to be larger increases in school enrollment during economic downturns among poorer households (Schady 2004; Kruger 2007). This is similar to evidence for the United States—for example, Kane (1994) shows that the college enrollment decisions of blacks, who are on average poorer than whites, tend to be more strongly counter-cyclical with respect to average earnings in manufacturing than those of whites. This is

consistent with the substitution effect being relatively more important for poorer households.

Does this analysis have any implications for policy? It is hard to extrapolate the lessons from this (or any other) literature review to any particular country that may be exposed to aggregate shocks in the future without a careful effort to understand the specific circumstances of the country in question. Nevertheless, to the extent that this paper reveals the empirical regularities summarized above, four general implications are worth highlighting.

First, education and child health outcomes do not respond to shocks in the same way everywhere. If an international institution sought to allocate a certain budget so as to minimize the decline in enrollment (or the increase in infant mortality) *across a number of countries* of very disparate income levels, then it might consider an allocation that is biased toward the poorest countries and those that have the least developed credit markets. The evidence suggests that human capital investments in these countries suffer most from aggregate shocks.

Second, in a developing country that suffers from a negative income shock, our analysis provides yet another reason (if one were needed) why a government *allocating resources to different population groups* might consider targeting these to the poor. These households are more likely to be credit constrained, and the disutility of reductions in consumption is likely to be larger. They are, therefore, most likely to engage in "destructive" behaviors (from the point of view of investments in child human capital), such as taking children out of school or curtailing expenditures on health-promoting inputs.

Third, in a middle-income country that suffers a negative aggregate shock, if a government or agency sought to allocate a given budget *between the education and health sectors* so as to protect the human capital of children, a presumption might be justified to favor health rather than education. The evidence suggests that in middle-income countries like those in Latin America recessions harm child education much less often than they harm child health.

Finally, the conceptual framework suggests that one way in which the effect of crises on outcomes can be mitigated (across all countries) is a protection of public expenditures in the supply of health and education services. Such expenditures make services more attractive by preserving quality. That simple framework and the review of the evidence in this paper are not sufficient to yield general policy recommendations on the composition of that expenditure, with one possible exception. That exception is the nature of public expenditure on education in middle-income (say, Latin American) countries, during moderate downturns.

The evidence suggests that, in these circumstances, the substitution effect of falling child wages tends to outweigh the income effects of the recession, leading to increased demand for schooling. In this light, reductions in the quality of education services would appear to represent a greater threat to enrollment,

attainment, and achievement than falling demand. The implication is that countries should carefully consider whether expenditures that protect the supply side of the educational system, such as by preserving the real salaries of teachers and continuing to invest in schools, are not more important than expenditures aimed at further buttressing demand, such as CCTs. Cash transfers might, of course, need to be increased for a variety of reasons during a recession. And it may be that an existing CCT scheme provides the most cost-effective means for a social protection system to respond rapidly to a crisis. But those, rather than a misperceived need to support the demand for schooling during downturns, should be the grounds on which a CCT is preferred over alternative expenditures.

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Notes

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1. We do not address the impact of idiosyncratic shocks, such as death, illness, or employment loss of the main breadwinner, on the accumulation of human capital of children, for two reasons. First, there is a large separate literature on this subject. Second, the economics of idiosyncratic shocks is substantively different in some important respects. As we discuss in detail below, the effect of *aggregate* shocks on child schooling and health is a function of income and substitution effects. The substitution effect results from reductions in the opportunity cost of time of children and adults during recessions; this is absent in the case of idiosyncratic shocks. As a result, even within the same country and time period, aggregate and idiosyncratic shocks can have quite different effects on the accumulation of human capital. For example, focusing on Brazil in the 1990s, Duryea and Arends-Kuenning (2003) find that aggregate economic shocks generally result in increases in school enrollment, while Duryea, Lam, and Levison (2007) find that idiosyncratic shocks such as unemployment of the household head generally result in lower school enrollment.

The economic consequences of "slow-onset" natural shocks, such as prolonged droughts, have much in common with those of recessions, and we discuss some examples here. On the other hand, "sudden-onset" natural disasters, such as earthquakes, severe floods, or hurricanes, are arguably different in a number of respects. They may cause sudden and widespread loss of life and destroy large amounts of existing physical and human capital. On the other hand, their effects on relative prices and income flows may or may not be as long lasting. These are different phenomena, and we do not consider them in this paper. Recent examples of the analysis of sudden-onset shocks include Poertner (2008) on the effects of hurricane shocks on educational attainment in Guatemala, and

del Ninno and Lundberg (2005) on the effects of the 1998 floods in Bangladesh on nutritional status.

2. An example of the presumption that recessions would hurt human capital accumulation rates can be found in the influential volume edited by Lustig (1995). Although she provided a careful and balanced review of the declines in infant mortality and illiteracy rates, as well as of the increases in completed years of schooling, during the recessions of the 1980s in Latin America she nevertheless concluded that "smaller earnings may have led households to postpone their entry into primary school... and young adults to join the workforce instead of continuing their education" (p. 13). The 2000/2001 World Development Report similarly states that "most social indicators either deteriorate or improve at a slower pace during a macroeconomic crisis" (World Bank 2001, p. 164).

3. The basic idea of investment in human capital as a time-allocation decision in an intertemporal utility maximization problem goes back to Becker (1965) and Ben-Porath (1967). The idea was extended in Becker (1991) and applied to a discussion of the efficiency of child labor by Baland and Robinson (2000). Our framework builds on these models.

4. On the other hand, the substitution effect may also be stronger for poorer households if better-off households enroll their children in school no matter what the wage rate. As we discuss below, there is some evidence for developed countries, like the United States, and middle-income countries, like Peru and Brazil, that suggests that the schooling choices of poorer households are more responsive to changes in the opportunity cost of going to school than their better-off counterparts.

5. The negative effect of public spending on private investment in health or education may be compounded by the fact that, in countries where public sector services are seen as inferior to private sector alternatives, a recession is likely to lead to increased demand for the public sector services, as fewer households are able to afford private fees. More customers are then likely to compete for services produced with fewer resources.

6. Binder also conducted an econometric analysis in which school retention and continuation rates in year t are regressed on log GDP levels in the same year, on percentage changes in GDP in the calendar year in which a school year was begun, on percentage changes in GDP in the year in which a school year was finished, and on a time trend. She interpreted the coefficient on log GDP, which tends to be positive and significant in most specifications, as the "income" effect and the coefficient on GDP changes, which tends to be negative and significant in most specifications, as the "price" effect. It should be clear that these definitions of "income" and "price" effect do not correspond to the notions of income and substitution effect which are more commonly used in the literature, and which we adopted in the previous section. In any case, there is no clear pattern whereby the coefficient on log GDP is larger or smaller than the coefficient on GDP changes in Binder's regressions.

7. General information on these surveys can be found at http://enigh.one.gob.do/.

8. Per capita GDP was essentially flat in 1991 and 1992, before beginning a recovery in 1993. Nevertheless, the crisis was so severe that it was not until 2005 that per capita GDP in Peru reached the pre-crisis, 1987 level—despite generally positive growth rates from 1993 onwards.

9. General information can be found at http://econ.worldbank.org/WBSITE/EXTERNAL/EXTDEC/EXTRESEARCH/EXTLSMS/0, contentMDK:21485765 ~ pagePK:64168445 ~ piPK: 64168309 ~ theSitePK:3358997,00.html#Peru

10. The lack of a crisis effect on school *attainment*, in spite of the decline in school *enrollment*, is somewhat puzzling. A number of authors (for example, de Janvry and others 2006) have suggested that, once children have dropped out of school, they are unlikely to re-enroll for the reasons that they have fallen behind their group of class peers and friends and that the opportunity cost of their time will have increased as they age. It is possible that the aggregate results for Costa Rica mask some underlying heterogeneity, with some children exposed to the crisis dropping out of school and completing fewer years of schooling, and others completing more, as appears to have been the case in Peru (Schady 2004).

11. One way to address this question would be to compare the performance of students on standardized tests in different years, but (to our knowledge) no such data are available from a developing

country spanning the years before, during, and after a major economic recession. Another approach would be to see whether the wage premium paid to adults for each additional year of schooling is lower for those who received their education during the crisis years. We attempted to do this with the Encuesta Nacional de Hogares surveys for Peru. Specifically, using surveys for 2002 and 2007, we traced out the earnings profiles of adults with no schooling, primary schooling, and secondary schooling by calendar year of birth. These graphs have the expected shape—the earnings profiles for workers with more schooling lie above those for workers with less schooling, and the difference between the earnings schedules increases with age. If school quality dropped appreciably during the crisis, we might expect to see a "dent" in the earnings profile of workers with primary school education, relative to those with no education, for cohorts that received their education during the crisis years. Children of primary school age, age 6–11 during the 1988–92 crisis, would have been 16–25 years of age in 2002, and 21–30 years of age in 2007. We see no clear evidence of any crisis patterns, although the estimates tend to be quite noisy, in spite of the reasonably large number of observations in these surveys (56,371 observations in 2002 and 65,549 in 2007). We thank Luis Barrantes for making these data available to us.

12. The authors report percentage changes in school *nonenrollment* rates. These appear to suggest quantitatively large, negative effects of the crisis. However, because enrollment rates before the crisis were high, a small increase in nonenrollment translates into a large percentage change. When reported as changes in enrollment, the effects appear quite small.

13. He defines villages as having suffered from a drought if rainfall was more than one standard deviation below the historical mean.

14. Although the results in Jensen (2000) are suggestive, the large, positive change in school enrollment rates in a single year in villages that were unaffected by the drought could be a source of concern. Moreover, because data are available for only two periods, Jensen cannot test whether the two groups of villages had different trends in outcomes, including enrollment, prior to the period he analyzes.

15. Note that the studies for Nicaragua (Maluccio 2005) and Côte d'Ivoire (Jensen 2000) refer to rural areas, where incomes are likely to be much lower than in urban areas, so the GDP values in the table for these two countries give a somewhat misleading picture of the welfare of households affected by the crises described in these papers.

16. The cycle of production in agricultural areas may have reinforced the negative income effect in Malawi and Côte d'Ivoire. Rainfall shocks often coincide with the harvest season and result in reductions in household income and consumption. This is the income effect of the shock on child schooling. By the time of the planting season, however, the demand for child labor once again increases, so there is no (pro-schooling) substitution effect. Indeed, if the shock to income is severe enough, the demand for child labor during the planting season may be higher as a result of the drought, as families try to eke out more output from the farm (even if the marginal product of additional child labor is low). We thank Harold Alderman for this point.

17. General information on these surveys can be found at http://www.measuredhs.com/.

18. More recent research suggests that improvements in health status during recessions do not affect all population groups and are not apparent for all health outcomes. For example, Charles and DeCicca (2008) show that mental health deteriorates and obesity increases during recessions, especially for those whose (prerecession) employment status is most marginal.

19. In the working-paper version of their paper, Paxson and Schady (2004) also provide evidence of a deterioration in height-for-age for young children during the crisis.

20. They use Oaxaca-style decompositions to show that changes in the composition of women giving birth along various observable characteristics, such as education and place of residence, are small, and that holding constant these characteristics has little effect on their estimates of infant mortality during the crisis.

21. The use of vital registration data is a source of concern. In most developing countries, including Mexico, under-reporting of deaths is common. Moreover, if, as seems plausible, the coverage of the vital registration system itself changes with aggregate economic conditions, the estimates may be

systematically biased. For example, if fewer deaths are reported or accurately recorded during bad economic times, the associations reported by Cutler and others (2002) would be downward biased.

22. Additional evidence for the 1994–96 crisis in Mexico reveals that private household expenditures on health care fell more than proportionately at the time (McKenzie 2006). This may be one of the mechanisms behind the pro-cyclical behavior of health indicators in Mexico and is direct evidence in support of the previously discussed income effect on health-producing goods. Interestingly, over the same period private expenditure on education actually rose as a share of total consumption, which is also consistent with a prevalence of the (pro-schooling) substitution effect over the income effect in education.

23. As with the analysis of changes in school enrollment patterns, these numbers refer to children in the control group, who were ineligible for transfers from the Red de Protección Social.

24. These three price shocks correspond to a frost which devastated the coffee crop in Brazil in 1975 and resulted in an increase in coffee prices in Colombia of more than 50 percent; a severe drought in Brazil in 1985, which also led to increases in the price of coffee in Colombia of more than 50 percent; and the collapse of the International Coffee Agreement among producer countries in 1990, which resulted in a decrease in coffee prices in Colombia by approximately one-third.

25. The infant mortality rate in Colombia in 1980 was approximately 37 per thousand children born (World Bank 2008). In the main table of results in Miller and Urdinola (2007, table 2), the authors report the effects of the three price-change events they study, at the median coffee-growing intensity and for a 500 peso price change. These imply a change in cohort size of between 0.40 and 2.89 percent or, equivalently, between 4 and 29 fewer (more) cohort members per thousand people born. This, in and of itself, is very large—for the larger estimate, it represents substantially more than half of infant mortality in Colombia in 1980. However, both the Brazilian frost and the Brazilian drought resulted in price increases of about 1,250 pesos. Taking the parameter estimates in table 2 in their paper at face value, and focusing on the Brazilian drought, this would mean decreases in infant mortality of between 40 per thousand and 70 per thousand for the median county in Colombia.

26. Even with regard to infant mortality, there is no conclusive agreement. World Bank (2000) concludes that "infant mortality rates seemed to have continued a downward trend (during the crisis)" (cited in Simms and Rowson, p. 1385).

27. The analogy between the effects of weather shocks and macroeconomic contractions on child health and nutrition is not perfect. Weather shocks may be particularly damaging for nutrition outcomes if, in addition to their income effect (and in a context of poorly integrated markets), they directly affect food availability or increase the relative price of food. Furthermore, weather shocks may change the disease environment—for example, a drought may reduce breeding grounds for mosquitoes carrying vector-borne diseases, such as malaria. These effects of the weather shock can themselves have consequences for child health, separate from the income effect.

28. General information about this survey can be found at http://www.caps.uct.ac.za.

29. General information about this survey can be found at http://www.rand.org/labor/FLS/IFLS.

30. One limitation of the analysis by Maccini and Yang is that they do not separate results for positive and negative rainfall shocks. It is possible that gender interacts in important ways with the direction of the rainfall shock—see the discussion of Baird, Friedman, and Schady (2007) above.

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The Regulation of Entry: A Survey

Simeon Djankov

Simplifying entry regulation has been a popular reform since the publication of Djankov and others (2002). The inclusion of business entry indicators in the World Bank's Doing Business project has led to an acceleration in reform: in 2003–08, 193 reforms took place in 116 countries. A large academic literature has followed: 201 academic articles have used the data compiled by Djankov and others (2002) and subsequently by the World Bank. The author identifies three theories as to why some countries impose burdensome entry requirements. He also surveys the literature on the effects of making business entry easier. JEL codes: D24, D92

In 1983, Hernando de Soto's research team followed all necessary bureaucratic procedures in setting up a one-employee garment factory in the outskirts of Lima. The factory was in a legal position to start operations 289 days and $1,231 later. The cost amounted to three years of wages—not the kind of money the average Peruvian entrepreneur has at his or her disposal. "When legality is a privilege available only to those with political and economic power, those excluded—the poor—have no alternative but illegality," writes Mario Vargas Llosa in the Foreword to de Soto's (1989) book.

Djankov and others (2002) further developed this view by recording the number of procedures, time, and cost needed to start a business in 85 countries. The main finding was that heavier regulation of entry is generally associated with greater corruption and a larger unofficial economy. Also, entry is regulated more heavily by less democratic governments, and such regulation does not seem to yield visible social benefits.

These findings have been used to motivate simplification of business start-up. Since the publication of Djankov and others (2002), 116 countries have made 193 reforms.[1] It is not only the World Bank that has been using these data.[2] The Millennium Challenge Corporation, a mechanism devised by the United States to channel aid to developing countries, uses these and similar indicators to identify

the countries that most deserve development aid. The entry regulation indicators created in Djankov and others (2002) are also used in The Heritage Foundation's *Index of Economic Freedom*, the World Economic Forum's *Global Competitiveness Report*, and the Fraser Institute's *Economic Freedom of the World* ranking. These in turn motivate governments to reform.

A large academic literature has sprung up too. As of December 2008, 201 papers published in refereed journals use the Djankov and others (2002) dataset.[3] These papers study the link between entry regulation on the one hand, and entrepreneurship, productivity, and corruption on the other. The evidence points to economically large and statistically significant effects, particularly linked to entry rates and productivity growth. The research on entry regulation and corruption is still nascent.

The paper proceeds as follows. First I survey the theoretical literature on the reasons why politicians and bureaucrats impose high entry barriers to business. I then survey the evidence on the economic and social benefits of such reforms, before I review the business entry reforms in 2003–08.

Why Is Entry Difficult in Some Countries?

Why do some countries maintain high entry barriers? Pigou's (1938) public interest theory of regulation holds that unregulated markets exhibit frequent failures, ranging from monopoly power to externalities. As applied to the regulation of entry, this view holds that the government screens new entrants to make sure that consumers buy high quality products from "desirable" sellers. Such regulation reduces market failures such as low quality products from fly-by-night operators and externalities such as pollution. The public interest theory predicts that stricter regulation of entry, as measured by a higher number of procedures in particular, should be associated with socially superior outcomes. A recent paper in this vein—that argues for high entry barriers—is Arrunada (2007).

The public choice theory (Tullock 1967; Stigler 1971; Peltzman 1976) sees the government as less benign and regulation as socially inefficient. It comes in two flavors.

The Capture Theory

In Stigler's (1971) theory of regulatory capture, "regulation is acquired by the industry and is designed and operated primarily for its benefit." Industry incumbents are able to acquire regulations that create rents for themselves, since they typically face lower information and organization costs than do the dispersed consumers. In this theory the regulation of entry keeps out the competitors and

raises incumbents' profits. Because stricter regulation raises barriers to entry, it should lead to greater market power and profits rather than benefits to consumers.

A variation is Acemoglu (2008), which develops a model of an "oligarchic" society. In this model, political power is in the hands of major producers who erect significant entry barriers against new entrepreneurs. An alternative model of democracy, where political power is more widely diffused, imposes redistributive taxes on producers but tends to avoid entry barriers. Acemoglu interprets the evidence in Djankov and others (2002), which shows that entry regulations is higher in less democratic countries, as supportive of his model. A similar model is developed in Morck and Yeung (2004), where a high level of trust within a small elite, in the context of a low level of trust in society at large, promotes political rent seeking, which exhibits high entry barriers and retards growth.

Another interpretation of the capture model is in Perotti and Volpin (2005). There, incumbent businesses seek a low level of effective investor protection to prevent potential entrants from raising capital. They succeed because they can promise larger contributions to ruling politicians than the entrants, due to the higher rents earned with less competition. Mitton (2008) tests the prediction of this model and finds that, consistent with Perotti and Volpin (2005), concentration of industrial activity is higher in countries with higher entry costs.

Caselli and Gennaioli (2008) offer a solution to the capture model by suggesting a sequence of reforms where financial reform precedes business entry reform. The effects of these two reforms depend on the market where control rights over incumbent firms are traded. In the absence of a market for control, both reforms increase the number and the average quality of firms, and are politically equivalent. When a market for control exists, financial reform induces less entry than deregulation, and endogenously compensates incumbents, thereby encountering less political opposition from them. Using this result, Caselli and Gennaioli show that financial reform may be used in the short run to open the way for future entry deregulation.

The Tollbooth Theory

A second strand of the public choice theory, which Djankov and others (2002) call the tollbooth view, holds that regulation is pursued for the benefit of politicians and bureaucrats. Politicians use regulation both to create rents and to extract them through campaign contributions, votes, and bribes. "An important reason why many of these permits and regulations exist is probably to give officials the power to deny them and to collect bribes in return for providing the permits" (Shleifer and Vishny 1993, p. 601). The capture and tollbooth theories are closely related, in that they both address rent creation and extraction through

the political process. The capture theory emphasizes the benefits to the industry, while the tollbooth theory stresses those to the politicians even when the industry is left worse off by regulation.

In principle, the collection of bribes in exchange for release from regulation can be efficient. In effect, the government can become an equity holder in a regulated firm. In practice, however, the creation of rents for the bureaucrats and politicians through regulation is often inefficient, in part because the regulators are disorganized, and in part because the policies they pursue to increase the rents from corruption are distortionary. The analogy to tollbooths on a highway is useful. Efficient regulation may call for one toll for the use of a road, or even no tolls if the operation of the road is most efficiently financed through general tax revenues. In a political equilibrium, however, each town through which the road passes might be able to erect its own tollbooth. Toll collectors may also block alternative routes so as to force the traffic onto the toll road. For both of these reasons, political toll collection is inefficient.

Guriev (2004) points to another feature of the tollbooth model. He develops a model of the emergence and interaction of red tape and corruption in a principal–bureaucrat–agent hierarchy. The principal is to provide the agent with a unit of a good that involves externalities so that market mechanisms fail to achieve first best. Red tape produces information but is costly to the agent and is administered by a corrupt bureaucrat. First, the bureaucrat may extort bribes from the agent in exchange for reducing the amount of red tape. Second, the bureaucrat may take bribes to conceal the information produced through red tape. Even though the former kind of corruption tends to reduce red tape, the model shows that the equilibrium level of red tape is above the social optimum.

Excessive entry regulation occurs because of the threat of ex post corruption even if there is no corruption in equilibrium. Corruption helps the bureaucrat internalize the costs of rigidities imposed on society. However, Guriev's (2004) model has two other important features. First, the bureaucrat's incentives are set by a rational benevolent principal. Second, and what is more important, the rigidities are endogenized. Indeed, if the official level of red tape is too high, (ex ante) corruption reduces it to a more reasonable level, which in turn depends on the incentives that the principal offers to the bureaucrat. The analysis shows that due to the threat of ex post corruption, the principal cannot provide incentives to bring the equilibrium level of red tape all the way down to the social optimum. Corruption results in excessive red tape.

A model similar to Guriev's is developed in Ahlin and Bose (2007). They argue that the efficiency in giving out business licenses depends on the proportion of honest registry officials. An increase in the number of honest officials has two opposing effects. The positive effect is that there are more officials who act in the public interest: they process applications quickly. But there is an indirect and

negative effect: a greater prevalence of honest officials lowers the willingness to pay of efficient applicants, making the remaining corrupt officials' behavior more inefficient. When the indirect effect dominates, social welfare is locally decreasing in the proportion of honest officials. Thus, replacing some subset of corrupt, bribe-maximizing bureaucrats with perfectly honest ones, or spending more resources on monitoring or on fostering organizational identity, can actually reduce efficiency.

The Evidence on Reforms

Since 2003, the World Bank's Doing Business report has been documenting the reforms in business entry regulation. To date, the database shows 193 reforms in 116 countries. Most of the reforms have taken place in Eastern Europe, followed by Africa (Figure 1). The country that has reformed the most is Saudi Arabia, followed by Madagascar, Yemen, Macedonia, Georgia and Azerbaijan.

About 60 countries have not reformed any aspect of business entry in the last five years. These are primarily poor African countries (for example, Burundi, Cameroon, Chad, Eritrea, Guinea) and some conflict-affected states (Haiti, Iraq, Sudan). These countries also have higher perceived levels of corruption than reform countries and less democracy, even adjusting for income per capita. Remarkably, every transition economy but Poland; every OECD high-income country but Sweden and the United States; and every Latin American country but Brazil and Venezuela have made entry regulation faster or cheaper or administratively simpler.

Figure 1. Business Entry Reforms, by Region, 2003–08

Region	Reforms
Europe & Central Asia	52
Sub-Saharan Africa	42
High income: OECD	29
Latin America & Caribbean	25
Middle East & North Africa	22
East Asia & Pacific	17
South Asia	6
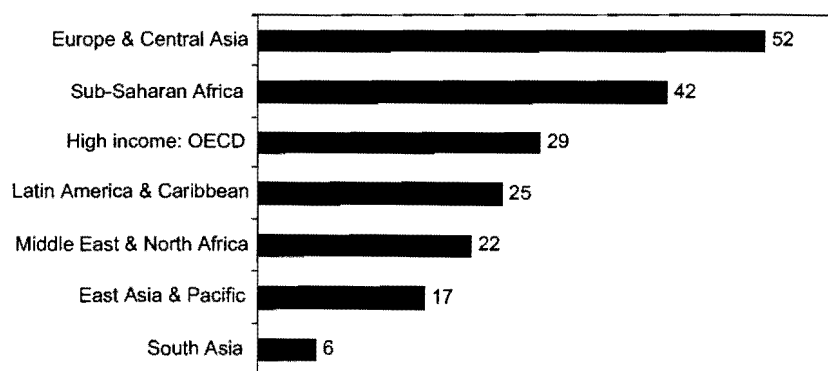
Source: World Bank (2008).

The five most popular types of reforms in 2003–08 are: standardizing incorporation documents, cutting the minimum capital requirement, moving registration out of the courts, making the use of notaries optional, and allowing online registration.

Standardizing Incorporation Documents

In El Salvador 70 percent of new business applications are rejected due to flawed or insufficient paperwork. In Kazakhstan, this figure is 65 percent. By contrast, the rejection rate is only 10 percent in Mauritius.

The difference here is due to the use of standard incorporation documents. With these, entrepreneurs ensure legality without the need of notaries or lawyers. And the workload eases at the registry, preventing errors and speeding up processing. In 2004 the Slovak business register issued such standardized forms on its website. If submitted incorporation documents are found to be incomplete, companies have 15 days to correct the errors and refile their application without paying additional fees. Only about a quarter of applications are returned for correction, and those are approved within two weeks. Previously, rejected applications took up to six months to resolve in a civil court procedure.

In Jamaica one document—the articles of incorporation—is now required to form a company, after a reform in 2005. It now takes 22 fewer days to start a business. After Estonia introduced standard documents in 2006, processing time at the registry fell from 15 days to 1. Another 65 countries have standard forms—including China, Egypt, Malaysia, Oman, South Africa, and now Bulgaria.

Cutting the Minimum Capital Requirement

An effective reform of business entry is to cut the capital requirement. Some countries justify the capital requirement as protecting creditors, as protecting the company against insolvency, and as protecting consumers against bad products. But this makes little sense. Lenders base their decisions on commercial risk, not whether a business meets a government-imposed capital requirement. And in many countries, for example in Bulgaria, minimum capital can be paid with in-kind contributions or withdrawn immediately after registration—hardly of value in insolvency. Recovery rates in bankruptcy are no higher in countries with capital requirements than in those without.

In a number of economies the capital requirement is still a major obstacle to starting a business: Guinea–Bissau, Ethiopia, Niger, Timor Leste, Togo, Oman, the Central African Republic, Djibouti, Mauritania, Eritrea, Guinea, Mali, Chad, Benin, and the United Arab Emirates. In these countries, an entrepreneur needs

to put up at least three times the average annual income to register—and often much more. Aside from Timor Leste, all are in Africa and the Middle East. Until 2007, Yemen came next, requiring 20 times the average annual income. However, in May 2008 the Yemeni government issued a law that reduces the requirement to a nominal value. Jordan did the same.

This is one area of reform where the majority of countries that imposed a significant burden have removed it in the past decade. It is often argued that the inclusion of the Djankov and others (2002) analysis in the World Bank's Doing Business project is the primary reason behind this trend (for example, in Arrunada [2007]).

Moving Registration out of the Courts

Company registration is an administrative process. Moving it out of the courts allows judges to focus on commercial disputes. A recent example is Italy, which until 1998 had the most cumbersome regulation of any European economy, with the process taking four months. Registration was taken out of the courts in 2004, cutting three months off the process. Further reforms in 2005 reduced the time to only 13 days.

Several Latin American countries, including Chile, Honduras, and Nicaragua, have taken registration out of the hands of judges. The benefits are large: entrepreneurs in countries where registration is a judicial process spend 14 more days to start a business (World Bank 2008).

Making the Use of Notaries Optional

Other reformers, including Bosnia and Herzegovina, Hungary, and Romania, eliminated the need for mandatory use of notaries. Romania made optional the use of notaries in business registration. Notaries perform a simple verification service—such as certifying that minimum capital has been deposited (as is now done in the Republic of Congo) or verifying the founder's signatures (as in Hungary)—which could easily be handled by the business registry official already involved in registration.

Where notaries are needed to authorize documents, this is frequently the most expensive part of the business registration. In Mexico, notary costs are $875, almost 80 percent of the total costs. In Turkey, notarization costs $780, 84 percent of the registration cost; in Guatemala, $850, 73 percent; in Slovenia, $920, 67 percent; and in Angola, $2,800, 51 percent.

Allowing Online Registration

In Denmark, an entrepreneur can start a business without leaving the house. Using the internet, the entrepreneur can obtain a digital signature, register with the business registry and tax authority, and submit the incorporation documents. All data are automatically validated—no public officials are involved. The entrepreneur receives a business identification number online and the company notice is published on the web.

Since 2003, 17 countries have introduced electronic registration, including Belgium, Ireland, Mauritius and Norway, and, since January 2009, Bulgaria. This has cut the average time to start a business in those countries from 40 days to 14. And with no contact between the entrepreneur and the public official, no bribes can change hands. Online start-up works best in countries with high internet penetration and laws allowing electronic signatures.

As a start, countries can introduce online name search and publication or computerize registration records. Since 2005 Germany, Macedonia, Mozambique, and Serbia have made the company establishment notice electronic, saving up to three months in waiting time. Online name checking is now available in Croatia, Moldova, Nigeria, and Vietnam. Such reforms are cheap. When Guatemala made registry records electronic, it took five months to scan nearly 2 million files, all at a cost of $100,000. The Serbian government spent $1.5 million to establish the business registry, hire and train its staff, purchase the necessary software, build the website, and digitize all previous records.

Survey of Empirical Studies

With so many reforms taking place around the world, it must be that politicians see high pay-offs in making business entry simpler. Indeed, the empirical evidence shows that easier regulation of start-ups increases entrepreneurship, raises productivity, and cuts corruption. In this section I will survey the main results in this new literature.

Entrepreneurship

Entrepreneurship is a critical part of the process of creative destruction, which Joseph Schumpeter argued is so important for the continued dynamism of the modern economy. Yet a number of countries put in place regulations that make it difficult to start a new firm.

Klapper, Laeven, and Rajan (2006) use a large database of European firms to study how business entry regulation drives the creation of new firms: their

sample has about 3.5 million annual observations over the years 1998–99, all from European countries. The annual entry rate varies from a high of 19.2 percent in Lithuania to a low of 3.5 percent in Italy. Overall, the entry rate is an average of about 15.7 percent of firms in Eastern European countries, and 11.9 percent for Western European countries.

The authors hypothesize that industries which naturally have low entry barriers are most affected by regulations on entry. Under the assumption that these barriers are low in the United States (entry costs there being 0.5 percent of per capita GNP compared to an average of 20 percent of per capita GNP in the sample of European countries), Klapper, Laeven, and Rajan take the rate of entry in an industry in the United States to be a proxy for the "natural" propensity for entry in that industry.

They find that entry regulations hamper entrepreneurship, especially in industries that would naturally have high entry. For example, the coefficient estimate suggests that the difference in entry rates between retail and pulp in the Czech Republic (with entry costs equal to 8 percent of per capita GNP) is 0.5 percentage points higher than the difference in entry rates between the same industries in Italy (with entry costs equal to 20 percent of per capita GNP). In other words, moving from Italy to the Czech Republic benefits the high-entry retail sector relatively more. As a comparison, the mean difference in entry rates between the retail and pulp industries across countries is 5 percent. This suggests that the effect of regulatory entry barriers accounts for about 10 percent of the mean difference.

Their findings offer an explanation for the low level of incorporation in countries like Italy. Across all industries, firms start out larger when young in Italy, but grow more slowly so that firms in, say, the United Kingdom are about twice as large by age 10.

Fisman and Sarria-Allende (2004) corroborate these findings using a larger sample of 57 countries. Similar to Klapper, Laeven, and Rajan, they interpret U.S. data as "industry representative" of an optimal economy and use U.S. turnover data as a proxy for natural barriers of entry. The outcome variables are derived from the United Nations' UNIDO database, which provides industry-level data on production, value-added, number of employees, number of establishments, and total wages bill. The average firm size, defined as the (log of the) ratio of industry value added to industry total number of establishments; and the (log of the) number of establishments in each industry are the main dependent variables.

The three main findings in Fisman and Sarria-Allende (2004) are summarized as follows. First, in industries with low "natural" entry barriers, countries with high entry regulation have few large firms, relative to less regulated economies. Second, operating margins are relatively high in low barrier industries in high entry regulation countries (relative to high "natural" barrier industries).

This suggests less competition in those industries. Third, in countries with high entry regulation, industries respond to growth opportunities through the expansion of existing firms, while in countries with low entry regulation, the response is primarily through the creation of new firms.

Ciccone and Papaioannou (2007) combine the time needed to comply with government entry procedures in 45 countries with the UNIDO industry-level data (also used Fisman and Sarria-Allende [2004]) on employment growth and growth in the number of establishments during the 1980s. Their main finding is that countries where it takes less time to register new businesses see more entry in industries that experienced expansionary global demand and technology shifts.

To check the robustness of this finding, Ciccone and Papaioannou (2007) augment the specification with an interaction between employment growth (also growth in establishments) and an index of the ineffectiveness of property rights, which comes from Djankov and others (2003a). The results show that the time to register new businesses remains a negative and significant determinant of entry, while property rights enforcement does not appear to matter for entry in industries with the potential to expand. Another possibility is that administrative entry delay simply captures the level of economic development. The authors introduce another interaction: with log GDP per capita. The entry-delays variable remains negative and significant in explaining employment and establishment growth, while there is no evidence that more developed countries see faster growth in industries facing expansionary demand and technology shifts.

Dreher and Gassebner (2007), using data for 43 countries in the Global Economic Monitor over the period 2003–05, find that more procedures required to start a business and larger minimum capital requirements are detrimental to entrepreneurship. In contrast, the days and the costs to start a business are not robust determinants of entrepreneurial activity.

The authors focus the analysis on the interaction between entry regulation and corruption. They show that corruption is beneficial in highly regulated economies. At the maximum level of regulation in their sample of countries, corruption significantly increases entrepreneurial activity. In particular, at zero costs of starting a business (as a percentage of GNP per capita), an increase in the index of corruption by one point reduces entrepreneurship by 0.31 percentage points. At the maximum level of 131.3 in the Djankov and others (2002) dataset, a corresponding increase in corruption increases entrepreneurship by 4.2 percentage points.

The results are similar when using the number of days and procedures to start a business. With a minimum of two days required, an increase in corruption by one point reduces entrepreneurship by 0.7 percentage points; at the maximum of 152 days, the increase in entrepreneurship amounts to 3 percentage points. The corresponding increase at the maximum number of procedures (17) is 1.7

percentage points. When regulation is too burdensome, the rational response is to avoid it by paying bribes. Where this is possible, entrepreneurs take advantage of it.

Using the original 85-country dataset, Djankov and others (2008) find that an extra procedure for business entry reduces the entry rate by 0.32 percentage points, so going from barely regulated to most regulated countries would reduce the entry rate by as much as 5 percentage points per year.

The most creative study linking business registration and entry regulation is Becht, Mayer, and Wagner (2008). These authors investigate the incorporation decision of firms in the European Union. In 1999, the European Court of Justice issued a ruling that new companies could register in other European Union jurisdictions without having any business activity there. The ruling was challenged by some governments, most notably Germany and the Netherlands, but was upheld on appeal in 2003. Becht, Mayer, and Wagner document a large increase in UK incorporations by companies from other EU countries, especially after 2003. In the period 2003–06, over 67,000 such incorporations took place, up 500 percent from the previous period.

The analysis also shows that countries with high registration fees and minimum capital requirements, as documented in Djankov and others (2002), experienced significant outflows of company registrations.[4] For example, nearly 17,000 German companies registered in the UK in 2006 alone. This included a hairdresser based in Munich and a restaurant based in Hamburg. In contrast, few French companies registered in the UK, as France quickly revised its laws to reduce the minimum capital requirement to one euro, and cut notary fees.

Country Studies on Entrepreneurship

Other researchers have done country-specific studies that use more detailed data on entry regulations and their effect: for example, Kaplan, Piedra, and Seira (2007) and Bruhn (2008) on Mexico, Monteiro and Assuncao (2006) on Brazil, and Yakovlev and Zhuravskaya (2007) on Russia. These studies uniformly conclude that simplified entry regulations lead to more new firms being established.

Kaplan, Piedra, and Seira (2007) and Bruhn (2008) study the same reform experiment: the creation of SARE in Mexico. SARE is a Federal level program that ensures that micro, small and medium firms, which carry no risk for health and environment, can register and open in two days after filing with the municipality's SARE office. It aims to achieve this objective by consolidating federal, state, and municipal procedures to register and operate a firm in one municipal office, capping the number of mandatory federal procedures at only two. SARE requires municipality governments to issue the operation license in at most two days assuming that industry eligibility and zoning requirements are satisfied.

The program effectively permits operation of the firm while postponing federal inspections and requirements for three months after registering with the Federal Tax Authority.

The Mexican federal government wanted to implement SARE first where it could have the greatest impact. It identified 60 major urban centers based on infrastructure, population, economic activity, and growth potential. These centers encompass 224 municipalities on which the government focused its efforts. But it cannot deny participation to any other municipality, and the mayors of some large cities (for example Mexico City) refused participation. Also, the program could not be implemented simultaneously in all locations because of limited resources. Hence cohorts of implementation took place in 2004, 2005, 2006, and 2007.

Both Kaplan, Piedra, and Seira (2007) and Bruhn (2008) take advantage of this peculiarity in the roll-out of the SARE program to create control groups and study the effect of the reform on job and firm creation. Kaplan, Piedra, and Seira find that new start-ups increased by about 4 percent in eligible industries. The effect on job creation by new registered firms is twice as big: an increase of 8 to 11 percent. This implies that the new firms being registered are larger— suggesting perhaps that these firms may have been operating informally—and that the effect of the new reform was simply to change their incentive to formalize. Bruhn (2008) uses a subsample of SARE districts to show that the reform increased the number of registered businesses by 5 percent in eligible industries, a result comparable to Kaplan, Piedra, and Seira. However, in contrast to Kaplan, Piedra, and Seira, Bruhn argues that the increase in the number of new businesses came primarily from former wage earners opening businesses. Informal (non-registered) business owners were not more likely to register their business after the reform. Bruhn's results also show that employment in eligible industries increased by 2.8 percent after the reform, a smaller effect than documented in Kaplan, Piedra, and Seira.

Bruhn's most interesting finding is on the effect from the new competition: she estimates that the SARE reform decreased the price level in eligible industries by 0.6 percent. The fact that the price decline was concentrated among low-risk industries in the non-tradable goods sector indicates that this was due to competition. Also, the income of incumbent businesses declined by 3.2 percent, again as a result of the increased competition from start-ups.

Yakovlev and Zhuravskaya (2007) investigate a similar reform experience in Russia. Between 2001 and 2004, Russia passed laws that drastically simplified procedures and reduced red tape associated with entry regulation—registration and licensing—and with regulation of existing business, that is, inspections. The laws introduced clear limits to regulatory burden in several specific areas of regulation. For example, the laws established that registering a business requires a trip

to just one government agency ("one-stop shop") and takes no more than a week; each inspecting agency (for example, fire, sanitary, labor, or certification inspection) comes to inspect a business no more frequently than once in two years; licenses are valid for no less than five years.

The Yakovlev–Zhuravskaya data come from annual surveys of 2,000 firms in 20 regions of Russia on the levels of regulatory burden. Firm-level panel data are collected to measure the dynamics of regulatory burden on existing firms and a repeated cross-section of newly registered firms is collected to measure changes in the regulation of entry.

The results indicate that the enactment of simplified regulation on average lead to a decrease in the level of regulatory start-up burden by 23 percentage points. In turn, this leads to a 9.3 percent higher employment by small businesses and an 8.9 percent increase in the number of small businesses per capita in the respective region. These positive effects are not at the expense of other goods: the analysis shows that regulatory simplification does not have an adverse effect on pollution or morbidity.

Monteiro and Assuncao (2006) is another application of reform analysis to the simplification in entry regulation, this time in Brazil. They document an increase in new businesses of 13 percentage points after the implementation of simplified entry regulation (combining company registry, tax, and social security registry requirements). The effect is more prominent for mid-size firms, consistent with Kaplan, Piedra, and Seira (2007) and the view that the reforms changed the incentives of previously informal businesses to become formal.

Productivity

Several types of studies have linked the cross-country evidence on entry regulations with productivity: some studies run cross-country analyses, as in Barseghyan (2008), Djankov and others (2008), and Alesina and others (2005). Others use within-country analysis, for example Chari (2007) on India. Another set of papers looks at the interaction between entry regulations and trade openness, for example Helpman, Melitz, and Rubinstein (2008) and Freund and Bolaky (2008).

Barseghyan (2008) looks at output per worker in 157 countries and total factor productivity in 97 countries. He finds that an increase in entry costs by 80 percent of income per capita, which is one half of their standard deviation in the sample, decreases total factor productivity and output per worker by 22 and 29 percent, respectively.[5] The magnitudes are large: one reason may be that an increase in entry costs decreases entry pressure, allowing existing firms with lower productivity to survive. This is consistent with Banerjee and Duflo (2005), who show that productivity differences arise because in countries with large

start-up costs the share of relatively unproductive or technologically backward firms is large.

To check for robustness, Barseghyan includes a measure of corruption and separately a measure of business regulation (both taken from the Heritage Foundation's index of economic freedom) as endogenous regressors. The results are qualitatively similar: entry regulation continues to have a significant negative impact on productivity and output, and the size of the coefficient estimates does not change. Also, the two measures turn out to be highly correlated. This could be because corruption within the bureaucracy is one of the variables that the Heritage Foundation takes into account when constructing its measure of business regulation.

Using industry-level data for OECD countries in 1975–98, Alesina and others (2005) find that business start-up reforms have had a significant positive impact on investment in the sectors of transport (airlines, road freight, and railways), communication (telecommunications and postal), and utilities (electricity and gas). In their sample, countries and sectors differ both in terms of the level of regulation and in terms of changes in regulation. No country except the United States has low regulation at the beginning of the sample in the three industries. The United States was the least-regulated economy at the beginning of the sample, was still so in 1998, and implemented strong deregulation policies over the period.

For example, the index measuring the level of regulation in the United States in the transport sector is equal to 4.25 (on a 0 to 10 scale) in 1975 and equal to 0.75 in 1998, a decrease of about 82 percent. Deregulation was particularly strong in the United Kingdom and New Zealand, which were highly regulated at the beginning of the sample but ranked among the most deregulated economies by 1998. For example, regulation decreased by 86 percent from 5.5 to 0.75 in the transport sector in New Zealand and by 78 percent (from 5.63 to 1.25) and 69 percent (from 5.08 to 1.58) in the utilities and communications sectors in the United Kingdom. On the contrary, countries such as Italy, France, and Greece were among the most regulated economies in 1975 and were still so in 1998.

Figure 2 plots the average of investment as a share of the capital stock in the utility, communications, and transport sectors in the United States and the United Kingdom (selected as the early and most decisive deregulators) and in the three largest continental European countries, Italy, France, and Germany (selected as late and timid deregulators). The pattern of the investment rate in one group of countries is the opposite of the other: while in the United States and the United Kingdom investment as a share of the capital stock increased from 3.7 percent in 1975 to 8.15 percent in 1998, in the large continental European countries the investment rate decreased by 5 percentage points from 9.4 to 4.4 percent.

Figure 2. Investment in Capital Stock in G7 Countries
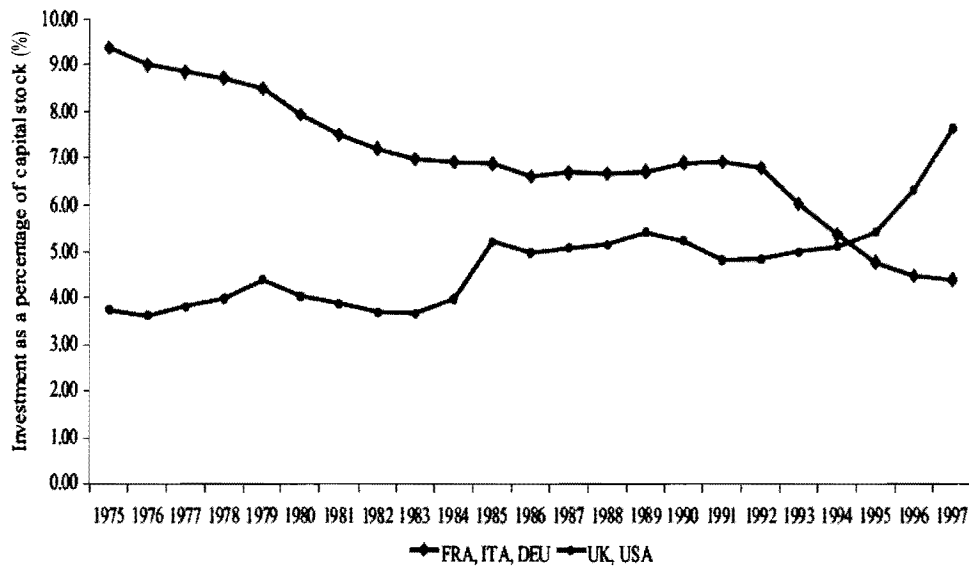
Source: Alesina and others (2005).

The investment rate increases by slightly less that one percentage point in the long run (0.863 of 1 percent). Since the investment rate is approximately equal to 6 percent on average, this would imply an increase to almost 7 percent. Note that if regulation decreases from its third-quartile value (5.6) to its first-quartile value (3.2), this change generates an increase in the investment rate of approximately two percentage points, which is quite large. This increase in investment in turn results in higher sectoral productivity.

Klapper, Laeven, and Rajan (2006) find that the average size of entering firms in Europe is significantly higher in high-entry industries in countries with high-entry costs. A one standard-deviation increase in entry costs raises the average size of entrants by 0.78 million euros in an industry that is one standard deviation higher in natural entry rate, a substantial magnitude when compared to the median size of entrants across industries of 0.87 million euros.

The coefficient estimate suggests that the difference in real growth rates of value added per worker between retail and pulp in the Czech Republic (which is at the 25th percentile in terms of entry costs) is 0.7 percentage points higher than the difference in real growth rates between the same industries in Italy (which is at the 75th percentile in terms of entry costs). In other words, moving from Italy to the Czech Republic benefits the growth rate of the high-entry retail sector relatively more. Since the average real growth rate in value added per worker is 1 percent, this is a sizeable magnitude.

Chari (2007) looks at the simplification of entry regulation in India in 1984–90 and finds that when entry costs were cut by approximately 65 percent, the resulting productivity increase was as much as about 28 percent over the six years covered by the data, of which 16 percent was directly contributed by the entry reforms (the remainder is due to reforms in licensing of already-established businesses). Cavalcanti, Magalhaes, and Tavares (2008) find similar results for Brazil: if entry procedures were cut in half and entry delays cut fivefold (to match the ease of entry in Chile), the analysis suggests a long-run income per capita increase of 25 percent.

Helpman and others (2008), Freund and Bolaky (2008), and Chang, Kaltani, and Loayza (forthcoming) study the effect of entry regulation when economies open up their product markets to international competition. Their finding is that with high fixed costs of entry, firms do not move easily toward the industries that most benefit from trade openness. This friction dulls the value of increased openness in terms of raising productivity and growth.

Another line of research investigates the link between entry regulation, higher education, and productivity. For example, Dulleck, Frijters, and Winter-Ebmer (2006) show that reducing the start-up costs for new firms results in higher take-up rates of education. In particular, decreasing the time necessary for a new firm to obtain legal status by one standard deviation would increase tertiary enrolment by 3.6 percentage points. It also gives rise to higher average productivity. This is because new firms (at least those with expansive potential) are often set up by high-skilled workers. Lower start-up costs therefore not only increase production but also lead to a higher proportion of individuals choosing high-skilled education.

Finally, some recent papers show that burdensome entry regulations inhibit innovation and thus reduce future productivity. For example, Aghion and others (2006) introduce entry into a Schumpeterian growth model with multiple sectors which differ by their distance to the technological frontier. They show that technologically advanced entry threat spurs innovation incentives in sectors close to the technological frontier, as successful innovation allows incumbents to prevent entry. In laggard sectors it discourages innovation, as increased entry threat reduces incumbents' expected rents from innovating. These empirical patterns hold using microlevel productivity growth and patent panel data for the United Kingdom. Buettner (2006) uses an endogenous R&D growth model with rising product qualities, and shows how market entry costs affect the incentives to innovate and raise productivity.

Several other papers explore the precise channel linking business entry regulation and growth. Busse and Groizard (2008), for example, study the effect of burdensome entry regulations on foreign direct investment, after showing that such investment shows up as a significant determinant of growth in

cross-country regressions. The study looks at a panel of 84 countries between 2002 and 2006, and finds that in the bottom quartile of countries in terms of ease of entry foreign direct investment loses its effect on growth. Other types of regulation also deter investment—for example labor law rigidities. But burdensome entry regulations have by far the biggest negative effect: equivalent to half a percentage point a year in foregone growth.

Corruption

Svensson (2005) uses cross-country data on the regulation of entry to find a correlation between the number of days to start a business and public perceptions of corruption. Kaufmann, Kraay, and Mastruzzi (2007) corroborate this finding in a larger sample. Treisman (2007) finds that the time necessary to register a business is the most significant in explaining corruption among an array of variables proxying for regulatory burdens.

Pinotti (2008), however, provides evidence from cross-country data suggesting that a large part of the effect of regulation on corruption can be attributed to omitted variation in trust and honesty. Pinotti uses data from the World Values Survey, which contains individual data along several dimensions (economic, social, cultural, and so on) for more than 200,000 people in 83 countries. A widely adopted measure of trust is the answer to the question: "Generally speaking, would you say that most people can be trusted or that you need to be very careful in dealing with people?" The author codes the answer as a binary variable TRUST equal to 1 if the answer was "most people can be trusted" and 0 otherwise.

According to Pinotti's estimates, a one standard-deviation increase in the percentage of trustful individuals within the population cuts the red tape by between 30 and 40 percent. However, the result may be due to reverse causality: introducing regulation could affect average honesty by increasing the incentives for predatory practices and corruption, which would in turn impact (negatively) on trust.

This research suggests that the link between regulation and corruption is still unexplored fully and that more rigorous empirical tests are needed to establish causation.

Conclusions

Business entry reforms have been the prevalent legal and administrative reform around the world in the past decade. This reform enthusiasm was partly triggered by de Soto's (1989) work, but mostly by the collapse of central planning in Eastern Europe. The publication of Djankov and others (2002) also contributed to

the popularity of business entry reforms. While the evidence so far uniformly shows benefits from simplified entry regulation, the time series is short and it could be that increased entry will also be accompanied by increased failure rates a few years later. These may reduce the social benefits of entry, something that current studies do not fully capture.

In terms of research, the 1990s work on institutions and their importance to growth by Mancur Olson, Douglass North, Robert Hall and Charles Jones led to a cohort of researchers interested in the mechanisms by which specific institutions affect business decisions. The work on legal origin by Andrei Shleifer and co-authors further opened the field of comparative economics by encouraging cross-country comparisons in various areas of law. Djankov and others (2002) follow these contributions.

In turn, the new data collection work in the World Bank's Doing Business project, which follows the methodology of Djankov and others (2002), can lead to a further development: a better understanding of the characteristics of governments who reform. Eifert (2008) is an early contribution in this direction. More will likely follow. These will connect the large empirical literature of the past few years to the original theories of regulation, something that has largely been absent in the current research.

Notes

1. World Bank (2008).

2. Djankov and others (2002) resulted in the World Bank's Doing Business project. Published annually, Doing Business tracks regulatory reforms in 181 economies and documents the fastest reformers. Eight other research papers constitute the basis of the Doing Business project: Botero and others (2004), Djankov and others (2003a, 2003b, 2008a, 2008b), Djankov, McLeish, and Ramalho (2006), Djankov, McLiesh, and Shleifer (2007), and Djankov, Freund, and Cong (forthcoming).

3. These numbers are calculated using the Scopus academic citation index (as of December 9, 2008).

4. The explanation is that most registrations take place via agents, and such agents are paid a fee to do the necessary procedures. Hence bureaucratic hassles and delays are incurred by the agent, and the main difference across countries is the size of the minimum capital requirement. As an example of how prevalent agency is, one agent, the Gabem Group, registered nearly 47,000 companies at a single address in West Sussex. Van Stel, Storey, and Thurik (2007) have a similar result using a 39-country sample consisting primarily of European Union economies. In their study, high minimum capital requirements are shown to reduce the business entry rate, while delays, costs, and the number of procedures do not.

5. Djankov, McLiesh, and Ramalho (2006) find a similar magnitude of the effects of reforms on output.

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How Relevant Is Targeting to the Success of an Antipoverty Program?

Martin Ravallion

Policy-oriented discussions often assume that "better targeting" implies larger impacts on poverty or more cost-effective interventions for fighting poverty. The literature on the economics of targeting warns against that assumption, but evidence has been scarce and the lessons from the literature have often been ignored by practitioners. This paper shows that standard measures of targeting performance are uninformative or even deceptive about the impacts on poverty, and cost-effectiveness in reducing poverty, of a large cash transfer program in China. The results suggest that in program design and evaluation, it would be better to focus directly on the program's outcomes for poor people than to rely on prevailing measures of targeting. JEL codes: I32, I38, O15

Like many developing countries, China is trying to develop an effective system of social protection based on cash transfers targeted to the poor. The largest such program that China has attempted—and almost certainly the largest such program in the developing world—is the "Minimum Livelihood Guarantee Scheme," popularly known as *Di Bao*. This has been the government's main response to the new challenges of social protection in urban areas. While economic reforms and structural changes in the Chinese economy have meant high rates of economic growth, it is believed that certain sub-groups have been adversely affected or have been unable to participate in the new economic opportunities due to long-term illness, disability, or their lack of skills. The collapse of the old safety net provided by guaranteed employment has clearly left some households vulnerable. Some of the "left behind" households started poor and some became poor, even though aggregate poverty rates have tended to fall over time. Urban areas have figured prominently in these concerns about the "new poor."

The *Di Bao* program aims to address this new social problem. The scheme became a national policy in 1999 and expanded rapidly; by 2003 participation had leveled off at 22 million people, representing 6 percent of urban residents. As is typically the case in developing countries (and many developed countries), the transfers made under the program are targeted to the income poor. There are many ways of implementing such targeting in practice, including a direct means test, a proxy-means test, and self-targeting mechanisms such as those based on work requirements.[1] *Di Bao* relies heavily on a direct means test, whereby potential recipients report their income and if this is below a stipulated "poverty line" for that locality then a transfer payment is made to bring that family up to the line. There are local-level checks on eligibility. Municipal authorities have considerable power over the program, including setting the *Di Bao* lines, funding (the center provides partial co-financing), and implementation.

Naturally, China's policy-makers and the community at large want to know whether such a large and ambitious public welfare program is in fact achieving its objective. Does it reach the intended beneficiaries and how much impact does it have on poverty? Various measures of the "targeting performance" have been widely used to help address that question. These measures are typically interpreted by both analysts and policy-makers as indicators of a program's performance in "directing benefits toward poorer members of the population" (Coady, Grosh, and Hoddinott 2004a, p. 81). Comparisons of such measures across different programs have informed public choices on which programs should be scaled up and which should be dropped.[2]

As in any situation in which measurement is used to inform policy, "the indicators need to be related to the overall policy problem, with an explicit formulation of the objective and constraints" (Atkinson 1995, p. 31). It is widely agreed that the objective of this class of public programs is to reduce poverty subject to the relevant resources and constraints, including those related to the information available and the behavior of relevant agents. Better targeting is not seen as being desirable in its own right, but rather as an instrument for reducing poverty.

Do the measures of targeting used in policy discussions provide useful indicators for this policy problem? The most widely used measures quantify some aspect of how well a given program concentrates its benefits on the poor, which is essentially what "targeting" has come to mean. An example is the share of transfers going to the poor. Cornia and Stewart (1995) have been influential in arguing that measurement practices and policy discussions have put too high a weight on avoiding one type of error—the Type 1 error of having ineligible non-poor participants—in order to address the Type 2 error of incomplete coverage of the poor.[3]

Cornia and Stewart did not present data linking these aspects of targeting performance to poverty outcomes (though they did point to this as an important direction for further research). However, the literature warns us against assuming

that better targeting, as assessed by standard measures, will necessarily enhance a program's total impact on poverty.[4] A number of factors cloud the relationship between targeting performance and total impact on poverty, including aspects of program design, implementation, and the context in which a program operates. Incentive issues have been a theme of one strand of the literature, pointing to the possibility that fine targeting will impose high marginal tax rates on recipients, possibly creating poverty traps.[5] The literature has also warned that fine targeting can undermine political support for an antipoverty program; concentrating gains on the poor may induce a lower overall transfer to the poor, with benefits spread too thin or covering too few people.[6]

It is also unclear how useful these measures are as indicators of cost-effectiveness and as an input to revising policy decisions. Here the focus is not on the total impact, but rather on the impact per unit of the resources devoted to a given program. (The total impact then depends on the allocation of resources across programs, weighted by their cost-effectiveness ratios.) Intuitively, the impact on poverty will depend on both the share of transfers going to the poor and the total transfer. Plainly a large uniform transfer (received by everyone, whether poor or not) can have more impact on poverty than a small well-targeted transfer. But will the latter type of program, with low leakage to the non-poor, necessarily be more cost-effective? The answer is far from obvious on *a priori* grounds. The factors noted above which cloud the relationship between targeting performance and a program's total impact on poverty will not, in general, vanish when total impact is normalized by total spending.

For example, finer targeting typically entails administrative costs, which are debits against the total budget in determining the government's total transfer payment. Then the share of transfers going to the poor does not even identify the transfer to the poor per unit of public spending. Less obviously, but no less importantly, targeting can generate hidden costs to participants, notably when there are restrictions such as work requirements, behavioral conditions, or sources of social stigma. Given the costs of targeting, it is not difficult to imagine cases in which the better targeted program (with the higher share of transfers going to the poor) is less cost-effective in reducing poverty: the literature already contains examples.[7] In short, avoiding leakage to the non-poor can reduce the amount actually going to the poor, with theoretically ambiguous implications for poverty and cost-effectiveness in fighting poverty.

Whether better targeting, as measured in practice, implies a greater impact on poverty or a more cost-effective intervention is ultimately an empirical question. Yet, beyond a few suggestive examples, we really know rather little about how well these popular targeting measures perform in practice.

This paper tries to help fill this gap in knowledge using a case study of China's *Di Bao* program. A number of factors—the decentralized nature of the program,

its scale, and the availability of a large data set representative at local level—combine to make this an unusual opportunity to put targeting measures to the test. The program's targeting performance and impacts on poverty are estimated under standard assumptions across each of the 35 major municipalities of China. The most popular targeting measures found in policy-oriented discussions are thus tested as indicators of program performance in reducing poverty.

Measuring Targeting Performance and Poverty Impacts

In principle, one might choose to measure "targeting performance" by a program's impact on poverty relative to an explicit comparison, such as an untargeted allocation of the same budget (as in Ravallion and Chao, 1989). Then the interpretation for poverty is unambiguous. That is not, however, the approach that has dominated the literature and practice. This discussion will focus on the main measures of targeting performance found in practice, on which much of our current knowledge about what does and does not work is based. More precise definitions of the measures can be found in table 1.[8]

Targeting Measures

The present discussion will focus on four main measures. The first three measures are based on the concentration curve $[C(p)]$, which gives the cumulative share of transfers to the poorest percentage of the population as ranked by, for example, household income per person; figure 1 gives a hypothetical concentration curve. If the transfers under a given program are uniform—in that each person receives the same amount—then the concentration curve is simply the 45 degree diagonal line.[9] Intuitively, an actual curve farther from the diagonal indicates better targeted transfers made by a given program.

The first of the four measures is the share of transfers going to the poorest percentage, defined as H. This is simply one point on the concentration curve, namely $S = C(H)$. In the empirical work discussed later, it will be natural to identify H as the target group for the program: that is, the set of people deemed to be has incomes below the municipal *Di Bao* poverty line. More precisely, we can set $H = H_0$, which is the pre-intervention headcount index of poverty—the proportion of the population living in households with pre-transfer income per person less than the poverty line. (The post-transfer headcount index is denoted as H_1.) For much of the present discussion we can just take H to be some reference group of poor or relatively poor people, without presuming that it is the precise target population for the program in question.

Table 1. Measures of Targeting and Poverty

Measure	Definition	Formula
Targeting measures		
Concentration curve ($C(p)$)	Share of total transfers going to the poorest percentage of the population (p) ranked by household income per person.	$C(p) = (1/\bar{t}) \int_0^p t(x)\,dx$
Share going to the poor (S)	Share of transfers going to those who are initially deemed poor (or other reference group based on income).	$S = C(H_0)$
Normalized share (NS)	Share going to the poor divided by proportion who are poor.	$NS = C(H_0)/H_0$
Concentration index (CI)	Area between the concentration curve (above) and the diagonal (along which everyone receives the same amount).	$CI = 2\int_0^1 C(p)\,dp - 1$
Coverage rate (CR)	Program participation rate for the poor.	$CR = N(D = 1, Y < Z)/N(Y < Z)$
Targeting differential (TD)	Difference between the coverage rate and the participation rate for the non-poor.	$TD = N(D = 1, Y < Z)/N(Y < Z) - N(D - 1, Y \geq Z)/N(Y \geq Z)$
Proportion of Type 1 errors ($T1$)	Proportion of ineligible non-poor who are assigned the program.	$T1 = N(D = 1, Y \geq Z)/N(Y \geq Z) = (1 - S)P/(1 - H_0)$
Proportion of Type 2 errors ($T2$)	Proportion of the poor who fail to receive the program.	$T2 \equiv N(D = 0, Y < Z)/N(Y < Z) = 1 - CR$
Poverty measures		
Headcount index (H)	The proportion of the population living in households with income per person less than the poverty line.	$H = F(Z)$
Poverty gap index (PG)	Mean distance below the poverty line as a proportion of the line where the mean is taken over the whole population, counting the non-poor as having zero gap.	$PG = \int_0^H (1 - y(p)/Z)\,dp$
Income-gap ratio (I)	Mean distance below the poverty line as a proportion of the line, amongst the poor alone.	$I = 1 - PG/H$

Table 1. *Continued*

Measure	Definition	Formula
Squared poverty gap index (SPG)	As for PG except that the proportionate poverty gaps are weighted by themselves.	$SPG = \int_0^H (1 - y(p)/Z)^2 \, dp$
Poverty impact	Pre-intervention poverty measure minus post-intervention measure	$H_0 - H_1$; $PG_0 - PG_1$; $SPG_0 - SPG_1$

Note: The table only refers to the measures used in this paper. The text contains further discussion of the pros and cons of each measure. Notation: $t(x)$ is the transfer to quantile x ranked by income per person and $\bar{t}$ is the mean transfer; H_0 is the pre-program headcount index of poverty (and similarly for PG and SPG); H_1 is the post-intervention headcount index (and similarly for PG and SPG); $N(D = 1, Y < Z)$ is the number of people who are both poor ($Y < Z$) and receiving the transfers; $N(Y < Z)$ is the number of poor; $N(D = 1, Y \geq Z)$ is the number of people who are both non-poor and receiving the transfers; $N(Y \geq Z)$ is the number of non-poor; $P = N(D = 1)/N$ is the participation rate; F is the cumulative distribution function (CDF) for incomes; Z is the poverty line; and $y(p)$ is the quantile function (inverse of CDF) giving income of the pth qantile.

Figure 1. Targeting Measures Based on the Concentration Curve
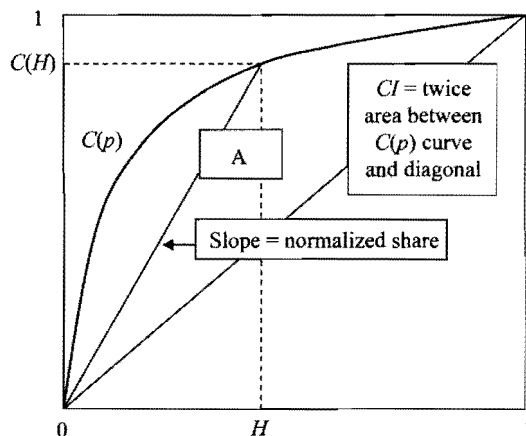
Note: see table 1 for notation.

The popularity of the concentration curve (S) is evident in the fact that the meta-studies by Grosh (1994, 1995) and Coady, Grosh, and Hoddinott (2004a, 2004b) found that this was the most readily available measure in their many primary sources.[10] The measure's popularity may well stem from its ease of interpretation. Against this advantage, the measure has some obvious drawbacks. For one thing, it tells us nothing about how transfers are distributed amongst the poor; two programs can have the same share of transfers going to the poor, but in one case the gains are heavily concentrated amongst the poorest whereas in the other they only reach those just below the poverty line. Another concern is that this measure does not directly reflect the overall size of the transfer program, which will clearly matter to impacts on poverty, as discussed in the introduction.[11]

The second measure is the normalized share (NS) obtained by dividing S by H (figure 1 shows NS). Coady, Grosh, and Hoddinott (2004a, 2004b) preferred to use this as their measure of targeting performance, arguing that this was more comparable than the ordinary share (S) because it measures performance relative to a "common reference outcome...that would result from neutral (as opposed to progressive or regressive) targeting" (p. 69).[12] By "neutral targeting" they mean a uniform transfer. If the transfer is uniform then clearly NS equals one. However, finding a value of NS "close" to unity does not imply that the allocation is "close" to being uniform. There are many ways one could get a value for NS near unity, with rather different interpretations. Similarly to S, the NS measure is insensitive to how transfers are distributed amongst the poor. The poor can receive their population share (H) of the transfers, but different people amongst the poor receive very different amounts. For example, the money could all go to

either the poorest person or the least poor person; either way NS would equal one. NS also approaches unity as H approaches 100 percent, no matter how the money is distributed. When the reference outcome is this ambiguous, the usefulness of the measure becomes theoretically questionable.

The third measure is the concentration index (CI), which is widely used in studies of fiscal incidence. This can be thought of as a "generalized S" in that, instead of focusing on one point on the concentration curve, CI measures the area between the curve and the diagonal (along which the transfer is uniform); in figure 1, CI is just twice the area marked A.[13] The index is bounded above by 1 (at which point the poorest person receives all payments) and below by -1 (the richest person receives all). This measure has the attraction that it reflects distribution amongst the poor and even over the whole range of incomes. A disadvantage is that it is not as easy to interpret as S or NS. The same CI can entail very different allocations of transfers. And, as with the previous measures, it tells us nothing directly about the scale of the transfers.

Although these measures are all based on the concentration curve, they can give quite different results. Of course, S and NS will always be in the same ratio to each other when the same value of H is used for all programs. However, these two measures can rank programs differently when H varies, both as in the case study presented later in this paper and presumably in many applications. To illustrate, consider a transfer scheme operating in two cities and giving all participants the same amount. In city A all the transfers go to the poorest 20 percent and the overall poverty rate is 50 percent; in city B the transfers go to the poorest 40 percent and the poverty rate is 10 percent. A far higher share of the transfers goes to the poor in A ($S = 100$ percent) versus in B ($S = 25$ percent). City A also has the higher concentration index ($CI = 0.8$ in A versus 0.6 in B). In contrast, it is in city B where the scheme is deemed to be better targeted according to the normalized share ($NS = 2.5$ for B versus 2 for A). More generally, the concentration curve for program A would lie entirely above that for program B and yet NS is higher for B, given its lower H.

The fourth measure is the targeting differential (TD), which is the difference between the program's participation rate for the poor—which one can call the coverage rate—and that for the non-poor (table 1).[14] Alternatively, one can normalize the targeting differential by the mean transfer over all recipients (TD^*). When the transfer is uniform, $TD = TD^*$. It turns out that the choice between TD and TD^* makes very little difference in this case study. Since TD is easier to interpret the present discussion shall focus on this measure.

To interpret the targeting differential, note that when only the poor get help from the program and all of them are covered, $TD = 1$, which is the measure's upper bound; when only the non-poor get the program and all of them are covered, $TD = -1$, its lower bound. (In the example of two cities above, $TD =$

0.67 for city B and 0.4 for A.) This measure is easy to interpret, and it automatically reflects both leakage to the non-poor and coverage of the poor.

How are these measures related to the incidence of Types 1 and 2 errors as discussed in the introduction? A Type 1 error can be defined as incorrectly classifying a person as poor, whereas a Type 2 error is incorrectly classifying a person as not poor. A Type 1 error entails a leakage of transfers to the non-poor, whereas a Type 2 error implies lower coverage of the poor. In measuring the proportions of Types 1 and 2 errors, one can normalize by the populations of the non-poor and poor (respectively);[15] see table 1 for more precise definitions. Standard targeting measures depend on the incidence of both types of errors. It should not be presumed that measures based on the concentration curve will be largely unaffected by Type 2 errors; indeed, all these measures can be thought of as functions of the proportions of these two types of targeting errors.[16] That is also true of the targeting differential, for which the relationship is particularly clear: *TD* is simply 1 minus the total proportions of Types 1 and 2 errors.[17] So this particular measure automatically gives equal weight to both types of errors. However, for the measures based on the concentration curve that weights are attached to these two errors of targeting is an empirical question.

Poverty Impacts

In testing the relevance of these targeting measures to this case study's poverty impacts, three poverty measures will be used: the headcount index, the poverty gap index (*PG*), and the squared poverty gap index (*SPG*; introduced by Foster, Greer, and Thorbecke 1984). The measures are defined in table 1. The pros and cons of each are well documented; for a review see Ravallion (1994). Briefly, *H* is the easiest to interpret and is the most popular measure, but is unaffected by income gains or losses to the poor unless they cross the poverty line. *PG* reflects mean income of the poor, but not inequality amongst the poor, which is the main advantage of *SPG*.

Impacts are measured by pre-transfer minus post-transfer poverty measures. Impacts on these measures are estimated on the same data and under the same assumptions about how the scheme works (including behavioral responses), as used in measuring targeting performance. In particular, it will be assumed that income in the absence of the program is observed income minus payments received under the *Di Bao* program. This assumes that there is no displacement of other income sources through behavioral responses, such as reduced work effort or lower private transfer receipts. This is the most common assumption in the literature on measuring targeting performance; indeed, it appears that virtually all of the primary studies used by Coady, Grosh, and Hoddinott (2004a, 2004b) made this assumption. The assumption is questionable, although the paper will offer some tests that suggest the data are at least consistent with the assumption.

In assessing cost-effectiveness, the poverty impacts are normalized by the cost of the program, though a more flexible econometric method of controlling for total spending will also be used. Given the costs of targeting, it is not difficult to imagine cases in which the better targeted program by any of the above measures is less cost-effective against poverty. Consider again the example of cities A and B above, in which the program in city A is better targeted according to both S and CI but not NS or TD. Suppose that the total cost to the government is the same, but that the finer targeting of city A's program (for which it will be recalled that all of the transfers go to the poorest 20 percent versus 40 percent in city B) entails extra costs to both the government and participants such that only 25 percent of participants in city A escape poverty, whereas in B all poor participants are able to do so. The headcount index falls by 5 points in A, but 10 points in B. B's program has a higher impact on poverty and is more cost-effective.

There is a special case in which one of these measures, namely the share S, is a perfect indicator of cost-effectiveness for PG. That special case is when the program has no impact on H and there are no fiscal costs besides the transfers. Then it can be readily shown that the impact on PG per unit public spending is simply S. Of course, this special case is unlikely to be of much practical interest, given that people in a neighborhood of the poverty line will presumably be transfer recipients and there will undoubtedly be other costs.

Under the same assumptions, it can be readily shown that the normalized share (NS) is a perfect indicator of cost-effectiveness in reducing the income-gap ratio, as given by the mean income gap of the poor as a proportion of the poverty line (table 1). This is (implicitly) the poverty measure relevant to comparisons of program performance based on the normalized share. However, as a poverty measure the income-gap ratio is known to have a number of undesirable properties; for example, if a poor person living above the mean for the poor escapes poverty then this measure perversely suggests higher poverty. PG does not have this property.

It should be noted that these measures of poverty impacts and cost-effectiveness can all be calculated from the same data required for the various measures of targeting performance described above. Of course, if one knows the impacts on poverty—which we agree to be the objective—then one does not need the targeting measures. However, since these targeting measures are widely used in assessing antipoverty programs and in comparative work, it is of interest to test their value as indicators for that policy problem.

Data on China's *Di Bao* Program

This case study uses China's Urban Household Short Survey (UHSS) for 2003–2004, as discussed in Chen, Ravallion, and Wang (2006). The UHSS was done by

the Urban Household Survey Division of the National Bureau of Statistics (NBS). The paper uses the UHSS sample for the 35 largest cities with a total sample of 76,000, varying from 450 in Shenzhen to 12,000 in Beijing. For these 35 cities, the definitions of geographic areas in the UHSS coincide with those for the *Di Bao* lines and the entire data set has been cleaned by NBS staff and made available for this research.

While the UHSS is a relatively short survey, its results allow us to measure a fairly wide range of household characteristics. The survey also included a question on household income and questions were added on *Di Bao* participation and income received from the program.

The UHSS data confirm one's expectation that China's cities vary in ways that could well be relevant to the outcomes of the *Di Bao* program. For example, across the 35 largest urban areas studied in this paper, the highest mean household income per person (the city of Shenzhen) is over four times than that of the lowest (Chongqing). The proportion living below the *Di Bao* poverty line varies from 2 percent (in Fuzhou) to 19 percent (Haikou). As noted in the last section, in measuring targeting and poverty impacts it is assumed that income in the absence of the program is observed income minus the reported payments received under the *Di Bao* program. While this is a common assumption, it is clearly questionable. Testing the assumption is difficult without panel data (and even then there can be severe identification problems). With only a single cross-sectional survey it is hard to be confident in the results, given the likelihood of omitted variables correlated with both program placement and the behaviors of interest.

However, there are some observations that are at least consistent with this assumption. The design of the *Di Bao* program intends that the benefits received will decrease as income rises, implying that participants face a positive marginal tax rate. Indeed, if the program works the way it is supposed to then it exactly fills the gap between current non-*Di Bao* income and the *Di Bao* line. Then participants will have no incentive to work (under the usual assumptions that leisure is a normal good and work yields no direct utility). Earned income net of transfers from *Di Bao* will fall to zero. The program will have created a poverty trap, whereby participants do not face an incentive to raise their own incomes, because of the loss of benefits under the program.

The extent to which this is a real problem in practice is unclear. Benefits are unlikely to be withdrawn quickly. There are reports that local authorities allow *Di Bao* benefits to continue for some period after the participant finds a job (O'Keefe 2004). Observations from field work also indicate that a notion of "imputed income" was used in a number of provinces. This was a notional level of income that reflected the potential income given the household labor force; this was apparently done with the aim of minimizing work disincentives.[18]

Chen, Ravallion, and Wang (2006) studied how the *Di Bao* payment per capita varied with the *Di Bao* gap, given by the difference between the relevant poverty line and income net of the program's transfer (both per capita). If the program exactly filled these gaps when positive then *Di Bao* payments would rise with a slope of unity, but would be zero for those with income above the *Di Bao* line. Chen, Ravallion, and Wang found a marked tendency for mean transfer payments (conditional on the *Di Bao* gap) to rise with the *Di Bao* gap, though the conditional expected value as measured by a non-parametric regression has a slope appreciably less than unity. The regression line starts to be noticeably positive at per capita incomes that are about 2,000 Yuan above the *Di Bao* line and then peaks at a mean of around 300 Yuan per capita, at a *Di Bao* gap of around 4,000 Yuan. (The conditional mean is, of course, positive throughout, but very close to zero below 2,000 Yuan.) Thus the average benefit withdrawal rate—the amount by which mean transfer payments change with an extra Yuan of income—is around -0.05; on average, a 100 Yuan increase in income entails a drop of only 5 Yuan in transfer payments.

An alternative method of estimating the average benefit withdrawal rate is to regress the per capita *Di Bao* payment received on income per person minus the *Di Bao* receipts, with a complete set of dummy variables for municipalities (to capture the differences in the generosity of the program). The implied benefit withdrawal rate is very low, at -0.0012 (t-ratio $= -17.51$, $n = 76,808$).[19]

There is almost certainly attenuation bias in these estimates due to income measurement errors. There is the usual source of measurement error in reporting incomes using only one question, amplified by the fact that income net of transfer payments will probably underestimate income in the absence of the program if there are behavioral responses. To address this concern, one can use an instrumental variables estimator, in which a set of household-level characteristics (including demographics, education attainments, occupation, and housing conditions) are used as instrumental variables for income in estimating the benefit withdrawal rate; Chen, Ravallion, and Wang (2006) provide details on the variables used in the first-stage regressions. Note that this only works for the unconditional regression coefficient of *Di Bao* payments on pre-transfer income, so the instrumental variables are automatically excluded from the main regression of interest; the conditional benefit withdrawal rate is unidentified. The instrumental variables estimate of the unconditional benefit withdrawal rate is -0.0021 (t-ratio $= -28.33$), again very low. These calculations were repeated separately for each municipality, using the instrumental variables estimator for the full sample in each municipality. The estimates were significantly negative for all municipalities and ranged from -0.0102 to -0.0001.

While each of these tests requires an assumption that can be questioned, they all suggest that the benefit withdrawal rate for *Di Bao* is very small. It would thus

Table 2. Leakage and Coverage of the *Di Bao* Program

Percent of population	Net income below Di Bao poverty line		Total
	Yes	No	
Receiving *Di Bao*	2.22	1.69	3.91
Not receiving *Di Bao*	5.48	90.60	96.09
Total	7.71	92.29	100.00

Note: $n = 76,443$ for the 35 municipalities.

appear unlikely that the program would provide any serious disincentive for earning income, thus supporting our assumption that income in the absence of the program is simply observed income minus the transfer payments received. At the same time, such a low benefit withdrawal rate raises concerns about how well the program reaches the poorest and how well it adapts to changes in household needs. For a stylized version of this type of transfer program, Kanbur, Keen, and Tuomala (1995) find that an optimal benefit withdrawal rate around one-half is consistent with evidence on the relevant income elasticity of labor supply.

Targeting Performance and Poverty Impacts of the *Di Bao* Program

On calculating all these measures on the same data set and under the same assumptions, one can test the assumption commonly made in policy discussions that better targeting allows a greater impact on poverty and/or a more cost-effective antipoverty program. One can also revisit some of the findings from past research on the factors relevant to targeting success. The discussion begins with the aggregate results and then turns to the city-level analysis.

Aggregate Results

Across the 35 cities, 7.7 percent of the total population had a net income (observed income minus *Di Bao* receipts) below the *Di Bao* line (table 2). The program's total participation is equivalent to about half of the eligible population. About 40 percent of program recipients are ineligible according to these data ($0.43 = 1.69/3.91$). The proportion of these Type 1 errors amongst the non-poor is clearly very low at 0.018 ($1.69/92.29$). But there is a high proportion of Type 2 errors, with almost three-quarters of those who are eligible not being covered by the program ($0.71 = 5.48/7.71$, i.e., a coverage rate of 29 percent).[20] Nonetheless, targeting performance

Table 3. Impacts on Aggregate Poverty Measures for Urban China

	Poverty measures (percent)	
	Before Di Bao (income net of receipts)	After Di Bao (income including receipts)
(a) Population (participants + non-participants)		
Headcount index (percent)	7.71	7.26
Poverty gap index (percent)	2.28	2.06
Squared poverty gap index (×100)	1.02	0.88
(b) Participants only		
Headcount index (percent)	56.85	45.49
Poverty gap index (percent)	19.92	14.23
Squared poverty gap index (×100)	10.21	6.44

appears to be excellent by international standards, as judged by the three measures based on the concentration curve; one finds that $S = 64$ percent, $NS = 8.3$ and $CI = 0.78$.[21] Coady, Grosh, and Hoddinott (2004a, 2004b) provide estimates of NS for 85 programs. Argentina's *Trabajar* program has an $NS = 4.0$, making it the best performer by this measure amongst all programs surveyed by Coady, Grosh, and Hoddinott.[22] The median NS is 1.25. By this measure, *Di Bao* is a clear outlier in targeting performance internationally.

Turning to the fourth measure of targeting performance we find that while 29 percent of the poor receive a transfer under the program, this is only true of about 2 percent of the non-poor. Thus the targeting differential (TD) is 0.27. The mean transfer payment across all those with net income below the *Di Bao* line is 87.61 Yuan per person per year, while the corresponding mean for those with income above the line is 4.15. The overall mean *Di Bao* payment across all recipients is 270.33, so when the targeting differential is normalized by the mean transfer one obtains $TD^* = 0.31$.

These calculations indicate that, while the program is good at concentrating benefits on the poor, it still falls well short of the perfect targeting ($TD = 1$) that would cover all of the poor and only the poor as implied by the program's design. Another way to see this is to calculate the total receipts for those with net income below the *Di Bao* line. One then finds that only 12.1 percent of the aggregate *Di Bao* gap is filled by the program. The program is a long way off reaching its own aim of bringing everyone up to the *Di Bao* poverty line.

The weak coverage of the program—in terms of both coverage of those living below the *Di Bao* line and coverage of the *Di Bao* gap—is naturally limiting its impact on poverty, despite excellent targeting in the sense of avoiding leakage to the non-poor. Table 3 gives various poverty measures before and after the transfers received from the program.[23]

The program is having a sizeable impact on poverty amongst the participants (table 3). The proportion of the participant population falling below the *Di Bao* line is 45 percent with *Di Bao* transfers, but it would have been 57 percent without them. However, the impact on poverty in the population as a whole is much less. The proportion falling below the *Di Bao* lines falls from 7.7 percent to 7.3 percent after the transfers made under the program. Proportionate impacts are slightly higher for *PG* than for the headcount index (and slightly higher again for the squared poverty gap); this indicates that the program has increased the mean income of those below the *Di Bao* line and reduced inequality amongst them.

Targeting and Poverty across Cities of China

Given the scheme's decentralized financing and implementation, and the differences observed across China's cities, heterogeneity in outcomes across municipalities is to be expected. There will, of course, be differences in local resources and administrative capabilities, but there will also be less obvious differences in the local political economy. Here the aim is to describe the differences in program performance across municipalities, and to use these differences to assess how well prevailing targeting measures perform in predicting impacts on poverty.

There is considerable variation in targeting performance across municipalities.[24] *S* varies from 31 percent to 98 percent; *NS* varies from 2.8 to 18.8; *CI* varies from 0.64 to 0.93; and *TD* varies from 0.06 to 0.53. (All cities except one, Kunming, have *NS* higher than the best performing program surveyed by Coady, Grosh, and Hoddinott 2004a, 2004b.)

Recall that *TD* automatically gives equal weights to the Types 1 and 2 error proportions. The weights for the three measures based on the concentration curve depend on the analytic properties of these measures and how the design features and setting influence the overall program participation rates (as discussed above). A simple way of summarizing this potentially complex relationship is to regress each measure of targeting performance on the proportions of Types 1 and 2 errors. Table 4 gives the regressions. The proportion of Type 2 errors has only a small and statistically insignificant effect on the three targeting measures based on the concentration curve (*S*, *NS*, or *CI*). In contrast, the proportion of Type 1 errors has a strong and significant effect for the share and the normalized share; the coefficient is also significant at the 3 percent level for the share if the proportion of Type 2 errors is dropped.[25]

The normalizations used in defining the proportion of Types 1 and 2 errors clearly affect the results. If one normalizes by total populations of the municipality the results change noticeably.[26] As can be seen in table 4, the three measures based on the concentration curve all attach negative weights to Type 1 errors per capita, but now we find that *NS* also puts a negative weight on Type 2 errors (as

does CI, although it is not significant). And we find that S puts a positive weight on Type 2 errors, while TD puts a positive weight on Type 1 errors. Only for the concentration index do we find that the weights attached to the two errors of targeting are robust to the normalization. These findings lead to questioning of the generalizations found in the literature about the relative importance of Types 1 and 2 errors to standard measures of targeting.

However, the most important point for the present analysis is that none of the measures based on the concentration index have strong correlations with the coverage rate of the poor. The simple correlation coefficients with the coverage rate are -0.28, -0.30, and -0.40 for S, NS and CI respectively. In contrast, the targeting differential has a correlation of 0.98 with the coverage rate.

There are some clear covariates of the heterogeneity in targeting performance, echoing past findings in the literature. There is a high correlation between Di Bao spending and targeting performance as measured by TD ($r = 0.73$), though the correlation with targeting performance is appreciably weaker for the other measures. Indeed, the other targeting measures tend to be negatively correlated with program spending, though only significantly so for CI ($r = -0.52$). This pattern in the data is consistent with evidence for antipoverty programs in other settings indicating that TD tends to improve as programs expand and to deteriorate in fiscal contractions (Ravallion 2004). It appears that the early benefits at a low level of spending tend to be captured more by the non-poor, while the poor both benefit more when the program expands and are the first to bear the costs of contractions. The differences in program scale, as measured by participation rates, are also highly positively correlated with coverage rates for the poor ($r = 0.80$).

The impact of higher initial poverty on targeting performance has also been discussed in the literature.[27] The present results confirm the Coady, Grosh, and Hoddinott (2004a, 2004b) finding that the normalized share is higher in richer cities. The correlation coefficient between the normalized share and the pre-program headcount index is -0.81. However, this is entirely due to the normalization; if one uses the ordinary share (S) the correlation is positive and significant ($r = 0.55$).[28] (One wonders whether the Coady, Grosh, and Hoddinott results would be robust to using S, or NS with a uniform H across all programs.)

Impacts on poverty also vary across cities (see the working paper version, Ravallion 2007, for details). Subtracting the post-Di Bao poverty rate from the pre-Di Bao rate, the impact on the headcount index varies from 0.0 to 1.5 percentage points. Table 5 provides the correlation coefficients between the targeting measures and the program's impacts on both the headcount index and poverty gap index. The results for SPG were very similar to PG and are omitted for brevity. Correlations are given for both the levels impact (pre-Di Bao poverty measure

Table 4. Targeting Measures Regressed on Types 1 and 2 errors

	Share (S)		Norrmalized share (NS)		Concentration index (CI)			Targeting differential (TD)
Constant	0.560	0.542	9.689	16.355	0.902	0.871	1	0.288
	(2.43; 0.02)	(10.97; 0.00)	(1.89; 0.07)	(13.54; 0.00)	(11.79; 0.00)	(27.71; 0.00)		(8.65; 0.00)
Proportion of Type 1 errors	−0.938	n.a.	−0.390	n.a.	−1.354	n.a.	−1	n.a.
	(−1.04; 0.30)		(−2.21; 0.03)		(−4.59; 0.00)			
Proportion of Type 2 errors	0.138	n.a.	0.015	n.a.	−0.052	n.a.	−1	n.a.
	(0.42; 0.67)		(0.21; 0.84)		(−0.49; 0.63)			
Type 1 errors per capita	n.a.	−1.044	n.a.	−0.672	n.a.	−1.382	n.a.	2.165
		(−1.81 0.08)		(−6.88; 0.00)		(−6.77; 0.00)		(3.34; 0.00)
Type 2 errors per capita	n.a.	2.728	n.a.	−0.903	n.a.	−0.153	n.a.	−1.000
		(4.76; 0.00)		(−5.16; 0.00)		(−0.35; 0.73)		(−2.72; 0.01)
R^2	0.097	0.412	0.141	0.639	0.369	0.365	1	0.449

n.a. = not applicable.

Note: t-ratios and probability values in parentheses, based on White standard errors; $n = 35$.

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Table 5. Is Targeting Performance Correlated With Poverty Impacts?

Correlation coefficients	Impact on poverty measure		Proportionate impact on poverty (normalized by pre-transfer value)		Cost-effectiveness ratio (impact on poverty per unit spending)	
	Headcount index	Poverty gap index	Headcount index	Poverty gap index	Headcount index	Poverty gap index
Program spending per capita	0.80*	0.86*	0.66*	0.69*	0.04	−0.17
(a) Measures of targeting performance						
Share of spending going to the poor (S)	0.03	0.07	−0.26	−0.33	0.32	0.65*
Share going to the poor normalized by headcount index (NS)	−0.44*	−0.53*	0.04	0.12	−0.21	−0.42*
Concentration index (CI)	−0.40	−0.40	−0.19	−0.17	0.04	0.26
Targeting differential (TD)	0.61*	0.65*	0.63*	0.74*	0.13	−0.01
(b) Types 1 and 2 errors						
Proportion of Type 1 errors (T1)	0.63*	0.72*	0.44*	0.51*	−0.06	−0.11
Proportion of Type 2 errors (T2)	−0.66*	−0.71*	−0.63*	−0.75*	−0.09	0.03

*Indicates significance at 1 percent level.

Note: n = 35.

minus post-*Di Bao* measure) and the proportionate impact (normalized by the pre-*Di Bao* poverty measure).

Amongst the four measures of targeting performance, by far the strongest indicator of the impact on poverty is the targeting differential (*TD*). Strikingly, there is no sign of a positive correlation between the impacts on poverty and any of the three more popular measures, *S*, *NS*, and *CI*. For *S* the correlation coefficient with the impacts on the level of the headcount index is only 0.03, while for *CI* and *NS* the correlation coefficients with poverty impacts turn out to be negative. This switches for proportionate impacts, which are negatively correlated with *S* but virtually orthogonal to *NS*. Figure 2 plots the impacts on the level of the headcount index against the *NS* measures. We see clearly that municipalities with a higher normalized share going to the poor tended to have lower impacts on poverty. The targeting differential does not have this perverse property, as can be seen from figure 3, though even *TD* is far from being a good predictor of poverty impacts.

In table 5, the correlations are pair-wise. Instead, table 6 gives regressions of the poverty impacts (columns 1 and 3) on all four measures jointly. (The table also includes regressions that control for spending, which will be discussed below.) The targeting differential remains the strongest predictor of poverty

Figure 2. Relationship between the Normalized Share of Benefits Going to the Poor and the Impact on Poverty of the *Di Bao* Program
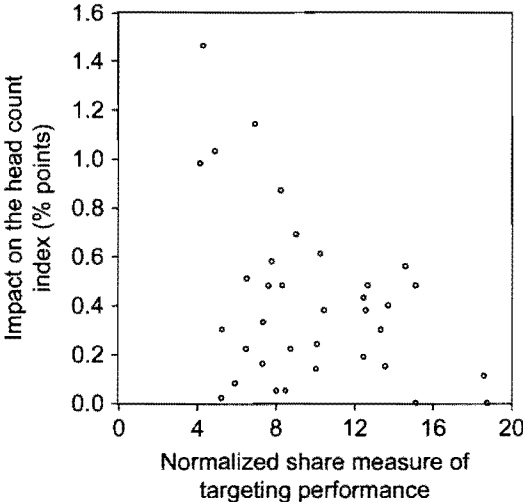
Figure 3. Relationship between the Targeting Differential and the Di Bao Program's Impact on Poverty
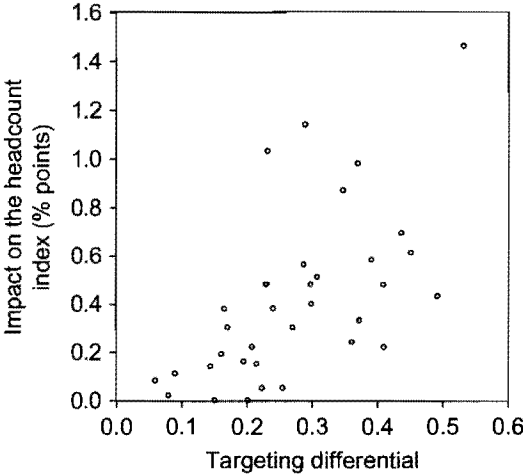
impacts. The share (S) now emerges as a positive predictor, though still not significant at the 1 percent level, and NS is no longer a significant negative indicator at given values of the other targeting measures. CI remains a negative predictor of poverty impacts.

Table 6. Which Targeting Measure Best Predicts Poverty Impacts and Cost-effectiveness?

| | Impact on headcount index | | Impact on poverty gap index | | |
	(1)	(2)	(3)	(4)	(5)
Constant	1.092 (1.59; 0.12)	0.401 (0.86; 0.40)	0.540 (1.78; 0.09)	0.017 (0.10; 0.92)	0.001 (0.00; 0.99)
Share of spending going to the poor (S)	0.722 (2.53; 0.02)	0.608 (2.56; 0.02)	0.413 (2.08; 0.05)	0.343 (2.49; 0.02)	0.338 (2.65; 0.01)
Normalized share going to the poor (NS)	−1.056 (−0.92; 0.37)	−0.306 (−0.46; 0.65)	−1.033 (−2.13; 0.04)	−0.706 (−1.77; 0.08)	−0.692 (−1.85; 0.07)
Concentration index (CI)	−1.800 (−2.02; 0.05)	−1.181 (−1.87; 0.07)	−0.881 (−1.80; 0.08)	−0.188 (−0.62; 0.54)	−0.183 (−0.67; 0.51)
Targeting differential (TD)	1.613 (4.61; 0.00)	−0.072 (−0.15; 0.88)	0.932 (5.92; 0.00)	0.177 (0.97; 0.34)	0.176 (1.04; 0.31)
Program cost	n.a.	1.099 (3.11; 0.00)	n.a.	0.125 (0.51; 0.62)	0.179 (4.65; 0.00)
Program cost squared	n.a.	−0.441 (−2.44; 0.02)	n.a.	0.044 (0.24; 0.81)	n.a.
Program cost cubed	n.a.	0.064 (2.51; 0.02)	n.a.	−0.007 (−0.25; 0.80)	n.a.
R^2	0.540	0.764	0.643	0.849	0.847

n.a. = Not applicable.

Note: t-ratios and probability values in parentheses, based on White standard errors; $n = 35$.

Table 5 also gives the correlation coefficients for the incidence of Types 1 and 2 errors. Strikingly, one finds that the proportion of Type 1 errors is positively correlated with poverty impacts; cities that did a better job excluding the non-poor tended to do less well in reducing poverty. It is only the incidence of Type 2 errors that is negatively correlated with impacts.[29] The same pattern is found in the partial correlations by regressing poverty impacts on both the proportions of Types 1 and 2 errors; the regression coefficients on the Type 1 error proportions were significantly positive at the 1 percent level for the impacts on both H and PG, whereas for Type 2 they were significantly negative.

It is now evident that the main reason why the three targeting measures based on the concentration curve perform so badly as indicators of poverty impact is that they are not even positively correlated with the program's coverage of the poor, which is highly correlated with poverty impacts (as can be seen from the correlation coefficients for Type 2 errors in table 5).

What about cost-effectiveness? Cities with higher *Di Bao* spending tend to have higher impacts on poverty; the correlation coefficients between *Di Bao* payments per capita and the impacts of H and PG are 0.80 and 0.86, respectively (table 5). The simplest way to test how well the targeting measures predict poverty impacts at given levels of spending is by normalizing poverty impacts by *Di Bao* spending to give the cost-effectiveness ratio.[30] Table 5 gives the correlation coefficients.

The share going to the poor now emerges as having a positive correlation with cost-effectiveness and being statistically significantly for PG. Figure 4 plots the data points in this case; a positive relationship is evident, with a regression

Figure 4. Cost-Effectiveness: Relationship between the Share Going to the Poor and Reduction of the Poverty Gap
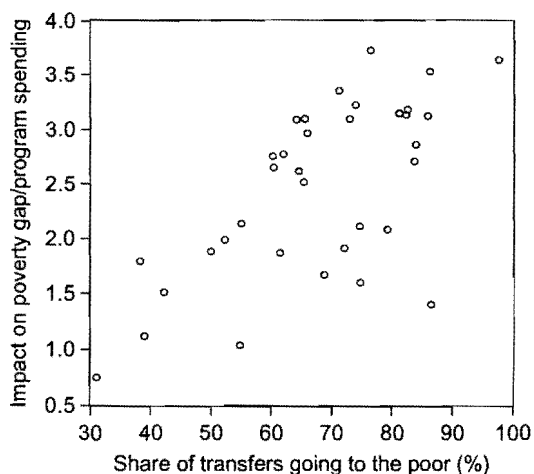
coefficient of 0.033 ($t = 5.61$, based on a White standard error). Even so $R^2 = 0.42$, so that the majority of the variance in cost-effectiveness in reducing the poverty gap index is left unexplained.

This is the exception though. None of the measures show significant correlations with cost-effectiveness in reducing the headcount index. The normalized share still has the perverse negative correlation found for the total poverty impacts.[31] The reason why the normalized share, NS, emerges as a perverse indicator (even though S is uncorrelated with impact and positively correlated with cost-effectiveness) is that there is a positive correlation between the pre-program headcount index and the program's impact on poverty; the correlation coefficients are 0.36 and 0.51 for H and PG, respectively. The incidence of the two types of errors shows little or no correlation with the cost-effectiveness ratios. (There is no sign of scale effects on those ratios, with correlation coefficients not significantly different to zero; see table 5.)

A more flexible way of seeing whether the targeting measures reveal poverty impacts from given spending is to use a regression of poverty impacts on the targeting measures, with controls for spending. To allow for nonlinearity in a reasonably flexible way, a cubic function of program spending per capita was used. Testing each targeting measure one by one, only S turns out to be a significant (positive) predictor of impacts on poverty from given program spending; the correlation was significant at the 4 percent level for H and 1 percent level for PG. The results using the four measures together are given in table 6 (columns 2 and 4; for PG the higher order terms can be dropped, giving column 5). Again, one finds that only S is a significant predictor of impacts on poverty from given program spending, though now this holds not only for PG at the 2 percent level, but also for H.

Conclusions

The three most popular measures of targeting performance found in practice are the share of transfers going to the poorest H percent, the share normalized by H, and the concentration index. Despite their popularity in analytic work and policy discussions on antipoverty programs, there has been little or no research into the performance of these measures in providing useful indicators for either the poverty impacts of such programs or their cost-effectiveness in reducing poverty. At the same time, the literature on the economics of targeting has repeatedly warned against assuming that a better targeted program—as judged by any of these measures—will have a greater impact on poverty.

This paper has provided some evidence. The results indicate that none of these measures reveal much about the success of China's *Di Bao* program in achieving

its objective of eliminating extreme urban poverty. The cities of China that are better at targeting this program, as assessed by these measures, are generally not the ones where the scheme came closest to attaining its objective. More encouragingly, one finds that a fourth measure proposed in recent literature—the targeting differential—does have a statistically significant positive correlation with the program's poverty impacts, although this is a relatively new measure which has not yet been widely used. But even this measure is far from being a perfect indicator of poverty impacts.

All these targeting measures are quite uninformative about the program's cost-effectiveness, shown as poverty impact from given program spending. The one exception is that the share going to the poor is a statistically significant predictor of cost-effectiveness in reducing the poverty gap index. But even then about 60 percent of the variance in the cost-effectiveness ratio is left unexplained. All other measures perform poorly or even perversely as indicators of cost-effectiveness.

These findings echo some of the warnings in the literature against relying on standard measures of targeting performance for informing policy choices on anti-poverty programs. The paper's findings also cast doubt on the generalizations found in the literature about what type of program works best (and should presumably be promoted) based on cross-program comparisons of targeting measures. The external validity of these programmatic comparisons is highly questionable when the targeting measures have such a poor fit with poverty impacts. It is also unlikely that past findings on the socio-economic factors influencing targeting performance at the country level are robust to seemingly arbitrary differences in the measures used.

One question is left unanswered: Why have the literature's warnings carried so little weight in practice? Possibly the more "theoretical" objections to these targeting measures have fallen on deaf ears for lack of clear evidence on how the measures perform in practice. The results of this case study will then help. One can also conjecture that the preference for targeting measures that put a high weight on avoiding leakage to the non-poor stems from fiscal pressures, given that reducing leakage helps cut public spending while expanding coverage does the opposite. While no doubt such thinking has had influence at times, it is surely misguided. For if the problem was to minimize public spending (unconditionally) then why would governments bother with such programs in the first place? Evidently there is a demand for these policies, as part of a comprehensive antipoverty strategy. A more credible characterization of the policy problem would then give positive weight to both avoiding leakage and expanding coverage of the poor.

From that perspective, measures of targeting performance that penalize both errors of targeting make more sense, again echoing recommendations found in the literature. However, that conclusion would still miss the point. Even the

targeting measure found here to be the best predictor of poverty impacts is a long way from being a perfect indicator. If there is a single message from this study it is that analysts and policy-makers would be better advised to focus on the estimable outcome measures most directly relevant to their policy problem. In the present context, impacts on poverty can be assessed with the same data and under the same assumptions as required by prevailing measures of targeting performance.

Funding

Notes

1. Overviews of the various methods found in practice can be found in Besley and Kanbur (1993), van de Walle (1998), Coady, Grosh, and Hoddinott (2004a, 2004b) and Ravallion (2006).

2. Early empirical studies by Mateus (1983) and Grosh (1992) were influential in arguing the case for finer targeting. The meta-studies of Grosh (1994) and Coady, Grosh, and Hoddinott (2004a, 2004b) have provided the most comprehensive comparative data on program performance drawn from targeting measures.

3. The distinction between these two errors goes back to Weisbrod (1970) who called them "vertical-" and "horizontal-target efficiency." Cornia and Stewart (1995) used the terms "E-mistakes" and "F-mistakes"; Smolensky, Reilly, and Evenhouse (1995) called them "errors of inclusion" and "errors of exclusion." The literature on social welfare policy in developed countries has also suggested that coverage of the poor is given little weight by standard measures of targeting. See, for example, the results of Duclos (1995) on the implications of incomplete enrollment in Britain's welfare benefits for measures of targeting. However, the relationship between these problems and overall impacts on poverty has received little attention.

4. For an overview of the arguments and evidence see van de Walle (1998).

5. Besley and Kanbur (1993) pointed to this problem and other issues raised by targeting. Also see Smolensky, Reilly, and Evenhouse (1995). Kanbur, Keen, and Tuomala (1995) study the incentive issues in fine targeting, including characterizing an optimal scheme for poverty reduction which takes account of labor supply responses.

6. For theoretical analyses see De Donder and Hindriks (1998) and Gelbach and Pritchett (2000).

7. Ravallion and Datt (1995) and Murgai and Ravallion (2005) provide examples for workfare programs in India.

8. Table 1 relates only to the measures used in this study. For a more comprehensive discussion of these and other measures, including their analytic properties, see the excellent volume by Lambert (2001).

9. This case is sometimes called an "un-targeted transfer" in the literature, although it is far from clear that the absence of any effort at targeting would yield a uniform transfer.

10. Coady, Grosh, and Hoddinott (2004a, 2004b) provide the shares going to the poorest 10 percent, 20 percent, and 40 percent for 85 of the antipoverty programs in their study (though with missing data in some cases).

11. The literature has pointed to the possibility that the share going to the poor can vary with the scale of a program, through the political economy of program capture (see Lanjouw and Ravallion 1999).

12. Coady, Grosh, and Hoddinott (2004a, 2004b) used $H = 40\%$ when it was available (which was the case for about half the programs in their study) and the next lowest available number (20 percent or 10 percent) when the value for $H = 40\%$ was not available. In the earlier comparative study of targeting performance by Grosh (1994), the value of H was set at 40 percent in all programs studied, in which case the first two measures will of course rank identically.

13. To assure that all measures go in the same direction, I multiply the usual definition of CI by -1.

14. This measure was proposed by Ravallion (2000). Also see Galasso and Ravallion (2005) on the properties of this measure, and the discussion in Stifel and Alderman (2005).

15. One might prefer to normalize by population size; similar formulae for this case are easily derived, but the essential point remains.

16. Consider, for example, the share (S). It is readily verified that $S = 1 - [T1(1 - H)/P]$ where P is the overall program participation rate ($T1$ is as defined in Table 1). Alternatively $S = 1 - T1^*$ where $T1^*$ is the proportion of participants who are Type 1 errors. But one can equally well write S as a function of Type 2 errors, namely $S = (1 - T2)H/P$ ($T2$ is as defined in Table 1) or $S = (H/P) - T2^*$. Nor is P likely to be independent of $T1$ and $T2$; for example, higher coverage of the poor (lower $T2$) may tend to come with larger programs. Thus S can be taken to depend on both $T1$ and $T2$.

17. More precisely, $TD = 1 - (T1 + T2)$ using the notation in Table 1.

18. This is based on a personal communication with Philip O'Keefe at the World Bank, drawing on his field-work discussions with local administrators.

19. This does not allow for censoring. Using a Tobit regression, the estimate is -0.004 (t-ratio $= -76.23$). Estimating the Tobits separately for each municipality, I obtained statistically significant benefit withdrawal rates in all cases, but all were very low and none were higher (in absolute value) than -0.001.

20. Ravallion (2008) proposes a method of testing robustness of such calculations to income measurement errors and implements the method for the same program. The results indicate that, if anything, the survey-based incomes probably understate the coverage of the eligible population.

21. To calculate CI from the micro data I used the regression-based method of Jenkins (1988).

22. Trabajar is a combination of a workfare program and social fund, whereby participants are offered low-wage work to do things of value to poor communities (see Jalan and Ravallion 2003). Coady, Grosh, and Hoddinott (2004a, 2004b) calculate the normalized share from Trabajar from Jalan and Ravallion (2003) who estimate that 80 percent of Trabajar participants come from the poorest 20 percent of the Argentine population ranked by income net of Trabajar receipts (which are roughly constant across recipients). The corresponding normalized share for the poorest decile is much higher, at about 6.0, though still less than for the Di Bao program.

23. To test robustness to the location of the poverty line, Chen, Ravallion, and Wang (2006) give the empirical cumulative distribution functions of income—with households ranked by income normalized by the relevant Di Bao line—with and without transfer receipts for both participants and the full 35-city sample. The qualitative results in Table 3 are robust to the choice of poverty line.

24. The working paper version gives detailed results by city (see Ravallion 2007).

25. The regression coefficient on Type 2 errors is then -1.361 (t-ratio $= -2.28$; prob $= 0.03$).

26. Thus the regressors become $H_0 T1$ and $(1 - H_0)T2$.

27. For a theoretical analysis using TD as the measure of targeting, see Ravallion (1999).

28. Using mean income instead, one obtains $r = 0.57$ for NS and -0.34 for S.

29. Expressing the incidence of targeting errors on a per capita basis gives virtually identical correlations for Type 1 errors. However, the per capita incidence of Type 2 errors is uncorrelated with poverty impacts. This stems from the strong positive correlation between (pre-*Di Bao*) H and poverty impacts (and the positive correlation between H and Type 2 errors per capita); when using a regression to control for H a significant negative correlation emerges between the poverty impacts and Type 2 errors.

30. Data were not available on administrative costs of the program at municipal levels, so the spending variable is solely based on transfer payments. The correlation coefficients will only be unaffected if the administrative cost share is the same across different cities.

31. The normalized share is significantly correlated with cost-effectiveness in reducing the income-gap ratio ($r = 0.53$), although it is necessary to recall that this is a flawed measure of poverty.

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Land Registration, Governance, and Development: Evidence and Implications for Policy

Klaus Deininger and Gershon Feder

The developmental impact of institutions to establish and maintain secure property rights to land has been a subject of much debate. The authors review the literature on the impact of land administration interventions in specific contexts, highlighting the dependence of outcomes on the governance environment, the effectiveness of the state apparatus, and the distribution of socio-economic power. There is evidence, albeit not uniform, of enhancement of tenure security through land registration with benefits manifesting themselves in higher levels of investment and productivity and a reduced need to defend land rights. Land registration has also been shown to increase activity in land rental markets, leading to higher efficiency overall. Evidence of improved access to credit, due to formalization of land rights, is scant. Even in situations where land registration had positive benefits, the literature contains little rigorous analysis of cost-effectiveness and long-term sustainability of impacts. The authors conclude that formalization of land rights should not be viewed as a panacea and that interventions should be decided only after a careful diagnosis of the policy, social, and governance environment. If intervention is justified, the performance of land administration systems needs to be benchmarked in terms of coverage, cost-effectiveness, and quality of service provision. JEL codes: O10, Q15, P14

Development economists have long highlighted the central role of institutions for economic growth and the distribution of its gains among the population (North 1971; Greif 1993). The impacts of different institutional structures related to land rights and their interactions with the distribution of power, as well as overall productivity in society, have been discussed extensively in the literature (Binswanger, Deininger, and Feder 1995; Conning and Robinson 2007). A key reason for the

continued focus on property rights to land is the fact that in most economies land and real estate are a key part of households' and firms' wealth. The extent to which such assets are used as collateral to access credit that can be used for investment and other economic pursuits varies widely (Besley and Ghatak 2008). This led some thinkers to suggest that a key reason for low growth in developing countries is their relatively undeveloped system of property rights and, in particular, the limited share of land to which owners have title documents. This, it is claimed, restricts the ability of entrepreneurs and in particular poor individuals to transform "dead assets" into "live capital" through collateralized borrowing (de Soto 2000).

While the motivation from the credit angle is innovative, attention to the government's role in helping to guarantee property rights is hardly a recent phenomenon. From the earliest days of recorded human history, awareness of the social and economic benefits from secure and well-defined land rights and of publicly recorded transactions led many societies to develop customs and laws to define land rights, set up registries to record such rights (often to obtain tax revenue), and establish courts and police to enforce them (Powelson 1988).[1] The notion that a lack of formal property rights to land may limit the scope for investment and development prompted bilateral and multilateral institutions to sponsor programs that would either systematically register land or improve the functioning of institutions of land administration.[2]

A review of the literature indicates that such interventions did not always live up to expectations. One important insight is that a simplistic and undifferentiated call for "formalization" that lacks awareness of the complexity and long history of existing institutional arrangements is inappropriate and can make matters worse (Bromley 2009). Land titling has also been portrayed as an example of naïve top-down approaches which, rather than responding to real grassroots needs, prescribe "solutions" without a thorough diagnosis (Easterly 2008). While such criticisms may be valid in specific cases, they offer little guidance on how to identify and address situations where there is apparent demand for greater clarity in the definition and exercise of property rights to land. For example, a social as well as economic need for such interventions is apparent in the context of the rapid recent food and commodity price hikes that have lead to demand for land by outside investors, such that failure to define property rights or the inability to enforce them effectively could leave traditional land users in a precarious situation.

In this paper, we examine the theories identifying channels through which land rights can affect socio-economic outcomes, point to realities which often prevent such effects from materializing, summarize quantitative evidence on the actual impact of land registration interventions to assess the validity of theoretical arguments, and derive conclusions that can help guide applied work in this area.

First we discuss arguments for public involvement in the definition of, and dissemination of information on, property rights in land and how these would, under ideal conditions, affect economic and social outcomes. Then we review real-life situations—such as high inequality in pre-existing power structures and poor governance, imperfections in markets for credit and insurance, high transaction costs, or low land values due to relative land abundance—that may undermine the effectiveness or sustainability of such interventions in specific settings. We then present evidence on the impact (or lack thereof) of land policy interventions on administrative efficiency, tenure security, land-related investment, land values, land market participation, and credit access. We conclude by highlighting the implications for policymakers and the emerging challenges.

The Role of the State in Establishing Property Rights Institutions

To ensure property rights security and realize the benefits from it, governments need to perform three functions that build on each other, namely (i) unambiguous definition and enforcement of property rights; (ii) provision of reliable information to reduce the transaction cost associated with decisions relating to land markets; and (iii) cost-effective management of land-related externalities.

Definition and Enforcement of Property Rights

Property rights are social conventions, backed by the enforcement power of the state (at various levels) or the community, allowing individuals or groups to lay "a claim to a benefit or income stream that the state will agree to protect through the assignment of duty to others who may covet, or somehow interfere with, the benefit stream" (Sjaastad and Bromley 2000). How land rights are defined and distributed is a key element of the social fabric, the power structure, and the scope for economic development in a society.

With ill-defined or incomplete property rights, those holding land need to spend resources to defend their rights. As such expenditures (guards and fences) often have little direct social or productive value, they lead to dissipation of rents and divert resources from more productive uses (Allen and Lueck 1992). The privately optimal amount of spending on protection can be excessive from a social point of view (Feder and Feeny 1991; Malik and Schwab 1991; De Meza and Gould 1992). Enforcement of property rights by the state realizes economies of scale and has benefits that are nonrival (that is, one person's enjoyment does not reduce others' benefits), although some of them allow exclusion of others,

characteristics generally associated with a club good (Shavell 2003; Lueck and Miceli 2006). If property rights are secure, well-defined, and publicly enforced, landowners need to spend less time and resources guarding them.

By reducing the risk of expropriation, secure property rights assure land users of the ability to enjoy the fruits of their labor, thus encouraging them to make long-term land-related investments and manage land sustainably (Besley 1995). Also, ability to verify boundaries at low-cost and legal measures to minimize land-related conflicts reduces transaction costs in a number of ways. Systems to document and verify landownership are public interventions to enhance tenure security. The magnitude of net private and social gains will depend on the extent to which a land registration system induces higher levels of tenure security, and the nature, magnitude, and opportunity cost of the resources thus freed up, compared to the cost of the apparatus needed for administration and enforcement of property rights.[3]

Information Access

On the basis of well-defined land rights, low-cost access to reliable information on individuals' landownership reduces transaction cost and uncertainty that hinder the exchange of land in markets for rental or sale and the use of land as collateral for credit. Informational asymmetries are less problematic when transactions take place mostly among members of the community who typically are familiar with each other's land rights even in the absence of formal land records, although conduct of land transactions in the presence of witnesses illustrates the importance of publicity to prevent fraudulent or opportunistic behavior. If land transactions extend beyond community members, it becomes more difficult to ascertain who holds legitimate rights and the benefits from formal arrangements increase correspondingly.

If there are differences in the ability of potential transaction partners to make use of land, the ability to transfer land, either through rental or sale, will increase productivity of land use. For example, being able to rent land allows labor to move from agriculture to nonagriculture in the context of economic development. In sales markets, reliable information on landownership can eliminate the risk of future land loss that would be reflected in land prices and the volume of efficiency-enhancing transfers of land.

Provision of credit is risky because uncertainty and asymmetric information lead to credit rationing in equilibrium and reduced lending volumes compared to a world of perfect information (Stiglitz and Weiss 1981). The use of collateral is a universal practice to reduce the extent of credit rationing and improve welfare. Its immobility and relative indestructibility make land ideal collateral. However, the ability of banks to use it for this purpose on a large scale is contingent on a

formal and low-cost way to identify unambiguously landownership. In the absence of other obstacles to the operation of financial markets, and if land rights can be exercised, a reliable land registry can thus help to increase credit access. As this will allow borrowers to obtain funding for projects, the true risk of which is less than what lenders would assume without collateral, this would increase the level of investment and improve economic efficiency. In such situations, formalizing land tenure can encourage financial market development and use of financial instruments that draw on the abstract representation of property by formal titles (de Soto 2000).

Management of Externalities

Even in the most individualistic societies, only part of the land is privately owned, and even on such land the rights enjoyed by individual landowners are limited by the need to restrict behavior that negatively affects the broader public interest. One option to accomplish this is for individuals to form user groups or to establish voluntarily norms governing the ability of owners to exercise their rights. Alternatively, authorities can use land information to restrict individual land-use decisions to avoid environmentally or socially harmful outcomes and internalize externalities, for example, through zoning regulations or planning laws. In either case, rules partially restrict individuals' rights (for example, through easements and rights of way), define landowners' obligations to contribute to social objectives (for example, environmental amenities and green space), or set limits on the extent of negative externalities they are allowed to emit. None of these can be enforced without comprehensive and spatially referenced information on landownership and institutional arrangements with clearly assigned responsibilities that cover individual, communal, and state lands so as to facilitate their effective management (Kaganova and McKelar 2006).

As infrastructure and services (water, roads, sewers, electricity) can be provided more cost-effectively if layouts are prepared ahead of time, the planning of land use will be of particular importance if land-use changes from agricultural to residential (or from rural to urban) with economic development. In many parts of the developing world, lack of clear property rights, land information, and institutional or political obstacles limit governments' ability to exercise effectively their functions. This reduces the scope for making land with the necessary services available to individuals in urban areas, who then are driven into informality. Land rights and institutions, including rules regulating governments' powers to exercise eminent domain and impose land-use restrictions, contribute to tenure insecurity and reduce investment incentives in many parts of the world. Clarifying responsibilities and procedures for such actions, and establishing transparent and agile processes for appeal, can increase tenure security, land-related

investment, and market transactions. Land taxation cannot only provide resources for local governments to deliver public services but also discourage speculation and generate incentives for effective land use (Bird 2004).

Potential Real-Life Complications and Their Implications

While the above discussion highlights the channels through which land registration systems can generate positive outcomes, such positive impacts are not always observed in practice. A key reason is that ground realities are often quite different from the ideal conditions that implicitly underlie these models in terms of power and governance, relative land abundance and state presence, the cost-effectiveness and sustainability of land administration systems, and obstacles to the functioning of credit markets that are widely observed in developing countries. Appreciating the nature and implications of these is essential for being able to diagnose problems in this area and to assess the adequacy of proposed solutions.

Deficient Governance Frameworks

Conceptual models of land and property rights institutions often abstract from the fact that, in many instances, the distribution of landownership is not the result of the operation of "perfect" markets but reflect power structures. This implies that land registration may be viewed as an attempt to cement existing unequal arrangements rather than to overcome them. Moreover, "good governance"—that is a consistent legal and institutional framework, broad access to information, and competent and impartial institutions (for example, courts and an honest bureaucracy) to enforce rights—is critical for making property rights effective and ensuring that positive impacts from land administration interventions can be realized.

However, many developing countries are characterized by serious deficiencies in governance. In such contexts, the state's monopoly on the exercise of legitimate power, which is a precondition for the functioning of advanced societies and securing property rights, may be abused to appropriate property or to assist in the unfair acquisition of land by elites, thus undermining the security of property rights in a number of respects. The tendency to monopolize land access for other ends was particularly strong in colonial contexts (Binswanger, Deininger, and Feder 1995; Conning and Robinson 2007) and was continued thereafter, especially in situations where land access was highly unequal (Baland and Robinson 2003). This could confine direct benefits from land administration to the better off or imply that land rights remain weak as it would be costly and difficult to enforce them consistently. Politically motivated awards of state land to political leaders or their cronies are an important concern in many countries

(World Bank 2003; Leuprecht 2004; Government of Kenya 2004). State monopolies over land management in some African countries resulted in high levels of mismanagement and corruption (Mabogunje 1992; Durand-Lasserve and Royston 2002).

Without institutions to enforce property rights effectively, the rights presumably protected by the land registry may exist only on paper and have little practical value. A land registration system can be rendered ineffective by the absence of a judiciary that is accessible and impartial for allowing actions by the state to be challenged effectively, by ineffective government institutions with overlapping mandates that may issue conflicting documents regarding the same plot, and by unclear and contradictory policies that make enforcement unpredictable and costly. In such situations, it would be difficult to rely on state-issued documents and uncertainty of property rights, the elimination of which was the goal of setting up a registry system in the first place. Often, it will be weaker and poorer segments of society which suffer the negative consequences of land titling in situations of ineffective or dishonest government, for example because of the better connections between the wealthy and government officials and the lack of self-enforcing institutions to constrain self-interested but socially undesirable behavior by such elites.

The disadvantages of an inadequate institutional framework can be exacerbated by the high cost of acquiring information on the legal regime or how rights can be enforced. The iniquities and opportunities for abuse that can be created by unequal access to information have been well documented for cases where land rights are adjudicated (Jansen and Roquas 1998; Feder and Nishio 1999). Evidence shows that if first-time registration is introduced, unscrupulous individuals who are well connected and well informed may try to play the system either by speculatively acquiring land in anticipation of formalization-induced price increases or by registering spurious claims to communal or individual land that did not actually belong to them. Lack of access to information can also prevent those who would normally be empowered by certain legislation—often women or members of previously disadvantaged groups—from exercising their rights. Consequently, the inherent opportunities to improve equity—and often also efficiency of land use—may not be fully utilized. In Uganda, for example, laws to augment security of customary rights had the desired impact only when individuals knew about them; but such awareness was very limited (Deininger, Ayalew, and Yamano 2008).

Variation in Land Scarcity

Particularly if land is relatively abundant and state capacity and outreach are weak or limited, informal mechanisms to secure land tenure may be more

accessible and less costly to enforce than a formal land administration system. In such cases, decisions on how to respond to demand for formalization will need to be based on careful comparison of the different options available, in particular the governance and transparency of traditional institutions and the political economy and scope for gradual, incentive compatible, and differentiated arrangements to bring about institutional change in response to local needs.

Defining property rights to land, or writing contracts regarding its exchange, is costly, with a major cost element related to the physical survey and verification of boundaries in the field. Therefore, in traditionally settled areas, at low levels of population density, boundaries may be defined only loosely and the first plots to be registered will be those that are subject to transfers, which may involve usufruct rather than full ownership and be confined to community members. In such situations, much of the content of land rights may be defined informally by unwritten "custom". Changing economic and social conditions that make land more valuable and increase the benefits to be obtained from land transfers imply that the value of attributes that have previously been left undelineated may increase sufficiently to offset the transaction costs associated with more precise delineation of land rights.

Numerous examples show that supply-driven establishment of land administration institutions that are intended to—though with limited state presence often not able to—replace traditional actors will at best create a parallel system with the consequence that, instead of complementing each other, "traditional" and "modern" systems compete with each other as was the case in Kenya (Atwood 1990). This will increase transaction costs and give the better off or better informed an opportunity to resort to "institutional shopping", by, for example, pursuing conflicts in parallel through a variety of channels (Firmin-Sellers 2000) and increase conflict (Berry 1997; Fred-Mensah 1999). Doing so could eliminate some of the positive aspects of traditional land administration systems, for example their accessibility and the fact that, under relative land abundance, households may make investments to secure land rights rather than the other way round, implying that—even if it were possible—titling may have little impact on bringing forth new investment (Sjaastad and Bromley 1997; Brasselle, Gaspart, and Platteau 2002). For example, in Côte d'Ivoire there is a long tradition of migrants planting trees to establish property rights over all or part of the land (Colin and Ayouz 2006).

If traditional institutions work relatively well, introducing a system to systematically register land may lead to speculative land acquisition on a large scale and set off a "race for the prize" that can polarize the landownership structure (Benjaminsen and Sjaastad 2002; Peters 2004) as powerful individuals use their informational and other advantages to grab land. For example, with weak governance, land sales by chiefs who reinterpret their trusteeship role as ownership and

pocket receipts are common and risk undermining traditional social safety nets (Lavigne-Delville 2000). Similarly, "formalized" tenure often eliminated or weakened secondary or communal land rights, for example the right to temporary use of arable land for grazing by pastoralists after the harvest or collection of fuel wood by the poor. Unless measures to recognize, and if necessary record, such rights are taken they may—intentionally or unintentionally—be curtailed in the process of land right formalization, with negative social consequences (Meinzen-Dick and Mwangi 2009). Also, if land is not the scarcest factor, land registration will be effective only if it is combined with establishment of secure rights to other resources (for example water) that may limit the ability to make productive use of the land. Especially in high-risk environments, individualization of communal land rights that neglects the safety net function provided by flexible patterns of access to land may reduce poor people's options for risk management and insurance and leave everybody worse off (Baland and Francois 2005).

Even if mechanisms for the allocation of rights are established, land transfers pose specific issues because at low levels of development land is not only a productive asset but also performs important functions as a social safety net and old age insurance. Many communities have adopted rules for limiting land alienation to outsiders in an effort to reduce myopic land sales by individuals who would squander the proceeds and then rely on community support for sustenance in a way that creates negative social externalities (Andolfatto 2002). As long as such rules are the product of a conscious choice by the group, and the group has clear and transparent mechanisms for changing the land tenure regime, they are less likely to be harmful. As traditional social ties loosen, or the efficiency loss from the sales restriction becomes too high, groups are likely to move toward a gradual individualization and sell to outsiders. The recent constitutional reform of the land rights system in Mexico provides an example where the fact that the transition toward individual rights can only be made by a 75 percent majority of the whole group provides a safeguard against land grabs. The fact that less than 15 percent of *ejidos*—mostly those in peri-urban areas where land had de facto already been individualized—made use of this opportunity suggests that, even at relatively high levels of per capita income, the spatial reach of insurance mechanisms to replace the safety net function of (communal) landownership remains more limited than is often thought (Zepeda 2000).

While the specific manifestation of land abundance will depend on the conditions at hand, secular trends such as population growth, urbanization, and increased land demand for nonagricultural purposes—including by outsiders—need to be confronted everywhere. Increasing land scarcity can reinforce pre-existing inequalities along lines of gender, ethnicity, or wealth and set in motion a spiral of conflict, resource degradation, and social strife. These can spread beyond the narrow realm of land and have very negative social and economic

consequences. For example, in much of West Africa, where the descendants of migrants can be easily identified as "outsiders", increased land values provide a strong incentive for "locals" to renege on earlier sales contracts. In the case of Côte d'Ivoire, land access is interlinked with questions of nationality and the ability of only nationals to own land, which can give rise to conflicts that extend far beyond the area of land (Lavigne-Delville and others 2002). In Rwanda, where extreme land scarcity coincided with accumulation of land by individuals with access to nonagricultural incomes, this has led to land conflict being one of the principal reasons that finally fed into the outbreak of civil war in 1994 (Andre and Platteau 1998).

A number of jurisdictions have recently made provisions for registering communal land (Alden-Wily 2003) and provide opportunities for delimiting community boundaries while leaving registration and management of individual plots to community institutions with the possibility of making the transition to more formal or individualized systems as the need arises.[4] This is more cost effective than individual titling and allows the covering of much larger areas very quickly and can help reduce neglect of community rights through alienation by outside investors (Alden-Wily 2008), historically a major reason for land-related conflict and strife. If it is combined with mechanisms, and possibly training, for communities to negotiate directly with investors, for example through joint ventures, this can help to decentralize decisions on outside investment and reduce red tape. Recognition of the role of land-use change in accumulation of greenhouse gases (Stern 2008) has sparked a debate about the desirability of establishing mechanisms for compensating land users for positive externalities from certain land-use decisions (for example leaving land forested). Unless property rights by local land users are recognized and recorded in some form, it will be difficult to ensure that such transfers reach those making actual land-use decisions and thus fully affect incentives in the desired way.

While it is important to recognize and build on the advantages of traditional land institutions in terms of cost and accessibility, they should not be idealized in an uncritical fashion. If accountability is weak, increasing pressure on land can quickly erode the advantages of such institutions and so corrupt them, giving rise to conflict (Chimhowu and Woodhouse 2006). For example, land sales by chiefs who reinterpret their trusteeship role as ownership and pocket the receipts are common and risk undermining traditional social safety nets (Lavigne-Delville 2000). Customary systems are well suited to resolving conflicts within a community but face much greater difficulty in reducing conflict across groups, ethnicity, and type of land use such as pastoralists and sedentary agriculturalists (van den Brink, Bromley, and Chavas 1995). Finally, under traditional systems, women are often severely disadvantaged and access to institutions for land administration biased by gender and wealth (Henrysson and Joireman 2007). It is argued that,

in such contexts, empowering traditional councils without giving minimum standards of accountability to communities, or giving a voice to communities, can actually reduce tenure security as well as gender equality (Claassens 2003; PLAAS and NLC 2003).

The challenge is to find arrangements that combine the advantages of different approaches and to respond to needs flexibly rather than aiming for wholesale replacement. This will require attention to technical, social, and governance issues. Mechanisms to ensure gender equality, transparency, and accountability are critical. Given the limited number of proven models, it will be important to analyze carefully existing arrangements and the scope for improvement on a case by case basis and to analyze the impact of changes in land administration systems based on a proper counterfactual that does not mistakenly attribute (positive or negative) developments that would have happened even without such a step to changes in the land system.

Cost of Service Provision

A factor with potentially far-reaching impacts on the distribution and sustainability of benefits from land-related interventions is the cost-effectiveness of providing land administration services. Two key factors, in addition to the running costs of registries, are the precision requirements for boundary definitions and the registration methodology applied, with deeds and title systems being most common. A *deeds* registration system is a public repository where documents for providing evidence of land transactions are lodged, numbered, dated, indexed, and archived. Recording will give public notice of the transaction, serve as evidence for it, and may assign priority to recorded rights in the sense that, in most contexts, registered deeds take priority over unregistered ones, or any deeds registered subsequently. At the same time, registration of a deed does not guarantee the legal validity of the underlying transaction. By contrast, under registration of *titles*, the register itself serves as the primary evidence of ownership as commonly identified by three attributes, namely (i) the mirror principle indicating that the situation in the registry is an exact reflection of reality; (ii) the curtain principle, implying that anybody interested in inquiring about the title status of a given property will not have to engage in a lengthy search of documents but can rely on the evidence from the title registry being definitive; and (iii) the assurance principle according to which the government will indemnify for damages incurred as a consequence of errors in the registry.[5]

A deeds system is generally cheaper to operate but provides a less comprehensive service as the residual risk of verifying ownership information remains with the transacting parties who incur the cost of due diligence. By contrast, to be able to assume responsibility for the accuracy of information in the registry, the state

will have to assume responsibility, implying higher set-up as well as operating costs.[6] As landowners fail to register transactions if the cost of doing so is too high compared to the benefit (that is, the reduction in residual risk) then a title registration system will be socially optimal if land values are high, whereas for lower land values a deeds system is more appropriate (Arrunada 2003). Most land registration projects funded by multilateral agencies recommend adoption of a title registration system—and in some cases even the conversion from a system based on deeds towards one based on title—although this has rarely been substantiated by rigorous analysis of the associated costs and benefits and, possibly as a result, has not always led to the desired outcome.[7] While a number of well-functioning systems with high land values (Hong Kong, Britain, Scotland, various Canadian provinces) have successfully made the transition from a deeds to a titling system, though often over a long period of time, attempts to shift from a deeds system to one of title registration in developing countries do not have a good record. A project in Sri Lanka failed to put in place the legal, regulatory, and institutional framework for systematic adjudication of land parcels and instead accomplished only a very limited surveying and titling of parcels without conflict, and with only limited economic benefits (World Bank 2007). Measures such as standardization of deeds, parcel-based indexing, compulsory registration, and a requirement for registrars to perform basic checks on deeds and the persons presenting them before accepting them for registration all offer opportunities to strengthen deeds systems. With access to computerized information about the chain of deeds and other instruments pertaining to a given parcel, differences between the deeds and title registration systems have narrowed significantly. From an applied perspective, deeds systems are also more robust and better systems, as in the Netherlands or South Africa, which offer most if not all of the features of well-run titling systems. Even in titling systems, a regulatory framework that fails to disclose relevant rights or encumbrances in the registry can undermine the integrity and usefulness of land registration. In practice, failure to register potentially long-standing rights may allow these to be ignored, causing very negative social impacts.[8]

Resource requirements for first-time registration can also be vastly increased by the fact that the cost of mapping increases exponentially with precision. A widespread confusion between tenure security and precision of measurement, together with lobbying by survey professionals, have often led countries to impose survey standards that exceeded the available implementation capacity and imposed costs that bore no reasonable relationship to land values. Consequently, in many projects with bilateral or multilateral support, costs of first-time registration were very high, sometimes significantly above US$100 per parcel, with average costs between US$20 and 60 per parcel (Burns 2007).[9] This can constrain coverage, outreach, and speed of program implementation, and, even if subsidies support

first-time registration, can reduce sustainability of such investment if landowners fail to register subsequent transactions.

As most of the benefits from land registries accrue to users, it will be desirable for registries to recover their cost through user fees—although in many countries fees from urban areas with higher frequency and value of transactions are used to cross-subsidize rural areas. In addition to operational inefficiencies, costs are normally increased by three factors, namely (i) unreasonably high precision requirements for surveys; (ii) a need to involve lawyers in transactions; and (iii) stamp duties levied on land transfers. In practice, the costs associated with registering property are by no means trivial; despite reforms to reduce them, the mean in 173 countries included in the World Bank's 2008 "Doing Business" amounts to 6.6 percent of the property values and 81 days of waiting time. The cost of registering property is highly bimodal; while it is 2 percent or less of property value in 32 cases, it amounts to 5 or 10 percent and more of property values in 92 and 41 of the cases (53 and 24 percent), respectively (World Bank 2007).[10] Informal "fees" can further increase these costs, with possibly far-reaching consequences for the ability of users to access information and their confidence in the land registry. For example, in India, the costs of registering even inheritances are exorbitant and a recent study estimated bribes paid annually on land administration to amount to $700 million (Transparency International India 2005), three-quarters of India's total public spending on science, technology, and the environment. To the extent that the costs exceed the benefits (in terms of increased security) which users obtain from registering, high cost can lead to a re-emergence of informal practices up to a point where "deformalization" will undermine the sustainability of a land registry system that was established at high cost (Barnes and Griffith-Charles 2007). The large improvements achieved in Eastern Europe—by making registries financially independent and their information publicly available on the internet, which involves private surveyors, reducing staff, and increasing salaries—highlight the scope for improving efficiency and governance of land registries (Dabrundashvili 2006).

As it will be critical for both the feasibility and continued viability of property rights institutions, the cost of running the land registry system requires upfront attention at the design stage, especially in resource-constrained environments such as Africa. Failure to account for the cost of the proposed institutions is one of the reasons for the failure to implement the provisions of Uganda's 1998 Land Act (Hunt 2004), with the consequence that a decade after its passage not a single certificate was issued. By contrast, in Ethiopia, a low-cost method of certification with high levels of community participation that involved field measurement but not creation of a graphical record managed to register more than 20 million plots at a cost of less than US$1 per parcel in less than three years. While a system for updating has not been implemented yet, a modest fee (of US$0.65),

in line with the users' willingness to pay, would be enough to finance a partly computerized system that could be self-financing. Options for adding at least a cadastral index map at a cost that is sustainable are being explored (Deininger and others 2008).[11]

Credit Market Imperfections

The discussion thus far has abstracted from imperfections in markets for credit and insurance that may limit the potential of land registration for expanding credit to cover poor farmers in rural areas or to informal (undocumented) land-owners in urban areas (many of them illegal squatters in poor slums)—which has been advertised as one of the main advantages of land registration interventions (de Soto 2000). Such imperfections, the effects of which can be exacerbated by socially or politically motivated restrictions on the ability to foreclose or the fact that land-related interventions can reduce the transaction cost of borrowing but are unlikely to increase the availability of "good" and bankable projects, will imply that, in many of the contexts affecting poor or rural populations, the pre-conditions for the operation of credit markets, in particular the banks' ability to foreclose readily and dispose of land in liquid land markets, will not be met. In such situations, expecting large credit-related benefits from land registration efforts may be unrealistic. Highlighting access to credit, rather than other benefits related to investment incentives or transferability, as the main benefit from land registration, may thus be unrealistic and risk serious subsequent disappointment.

In rural areas of developing countries, covariance of risk, that is the depen-dence of outcomes on weather and natural phenomena (for example pest attacks), introduces risks that are spatially correlated across large numbers of would-be borrowers and that limit the ability of the lenders to diversify, thus increasing the risk of rural lending. As this implies that a bad outcome will lead to default by many borrowers at once, flooding the land market with foreclosed properties, the value of which may be much diminished, reduces the value of land as collateral. While there are ways to deal with this (for example, spatial diversification of loan portfolios) in the formal market, it does increase transaction costs.[12] This, together with the transaction costs of collateral registration, may often exceed the benefit that these generate for the relatively small loans under-taken for seasonal (short term) purposes. In many instances, the ability to use land as collateral for credit may thus be limited to larger landowners (Carter and Olinto 2003).[13]

Urban credit markets are typically more developed than rural ones and entail higher participation of private (nonstate) lending institutions. Residential credit often relies on collateralized long-term loans to finance housing acquisition, and documented landownership is important to facilitate such transactions.

However, use of residential property, in contrast to commercial land, to finance business investments is less common and likely to be constrained, as it will be difficult for banks to repossess low quality dwellings in poor neighborhoods and the gains from selling it will be limited. In both rural and urban areas, credit market effects will also be limited by the availability of promising "bankable" projects as well as the scope for "risk rationing", that is the fact that potential credit-worthy borrowers are unwilling to use titles for fear of losing them in case their project is unsuccessful (Boucher, Carter, and Guirkinger 2008).

Impacts of Land Administration Interventions

This section provides a review of the extent to which empirical evidence on program impacts supports the notion that, if conditions are right, well-implemented land registration programs can help improve governance and administrative efficiency, reduce the need to expend resources to enforce land rights and enhance gender equality, increase land-related investment, and enhance operation of land markets as well as credit access. We find that positive impacts are not uniformly observed, in particular that evidence on land-related interventions having improved credit access is less strong and suggests that direct positive impacts on the poor were rather limited.

Improved Institutional Performance and Governance

Land registration interventions and associated legal reforms are likely to be more effective in a context of good governance, implying that legal and policy changes can independently improve tenure security. The case of land rights reform in China, where land property rights have traditionally been insecure and where increased pressure on land in peri-urban areas gave rise to a series of well-publicized conflicts, provides a good example. The ability of officials to apply eminent domain principles with little public scrutiny, and to rely on readjustment (land reallocation) to acquire large tracts of land without any cash outlay, further imply extensive use of land taking not only as a source of income by local government but reportedly also for individual enrichment and corruption. The 2003 Rural Land Contracting Law includes measures to change the cost of acquiring land by increasing the security of individual land-use rights and enhancing the ability of individuals to lodge appeals against violation of such rights. Data from a representative nationwide survey suggest that legal reform had a significant and quantitatively important impact on increasing the security of property rights in terms of reducing the probability of "illegal" land reallocation and increasing the amount of payments received by those who were affected by legitimate land takings. Legal reform had a significant impact

only where the village leadership was elected, suggesting that, for legal reform to be effective, ways of holding the state to account are needed, an interpretation that is supported by the fact that the knowledge of village leaders of the law had an independent impact on reducing the probability of illegal reallocation. Availability of land-use certificates did not significantly reduce the risk of an unauthorized land reallocation, suggesting that such certificates will only be useful within an appropriate institutional framework (Deininger and Jin 2009).

A natural experiment where title was given to some but not to other urban squatters who had started out in exactly the same conditions in Buenos Aires allows assessment of the impact of land registration not only on economic outcomes but also on attitudes and beliefs. Some 14 years after the intervention had occurred, those who, by chance, had benefited had significantly more individualistic and materialistic attitudes, a result that is very robust.[14] The effect is not negligible, being equivalent to an additional 4.4 years of education by the household head. Despite their much inferior socio-economic situation, the beliefs of beneficiaries are virtually indistinguishable from the population average. By comparison, attitudes by those who did not get regularized are consistent with what one would expect based on their socio-economic characteristics (Di Tella, Galiani, and Schargrodsky 2007).

Land registration can also have an affect on the local government's ability to generate resources, its governance, and the efficiency of its service provision. In the Indian state of Karnataka, computerization of textual records is estimated to have saved users $16 million in bribes annually (Lobo and Balakrishnan 2002). Using this as a basis to automate registration and the associated valuation allowed cuts in stamp duty from 14 to 8 percent and quadrupled tax revenue from $120 to $480 million, thus illustrating the scope for land registries to be self-financing.[15] In Mexico, before reforms wee initiated in 1992, the *ejido* sector was subject to numerous restrictions on land rights and the rural economy was characterized by clientelism, inefficient land use, and low levels of investment, and peri-urban areas were subject to chaotic informal settlement (Gordillo, de Janvry, and Sadoulet 1998). In qualitative interviews, beneficiaries of a program to establish land rights that were both more secure and better administered highlighted that the two most important aspects of the reforms were their impact on reducing conflicts and on increasing transparency, with the associated reduction of political influence in the *ejido* (World Bank 2002). Based on promising results from earlier pilots, Ethiopia embarked on large-scale and highly participatory registration of land holdings by six million households in 2003–05. Although land remains state-owned and many restrictions on land transfers continue to exist, more than 80 percent of respondents in a nationwide survey indicated that certification (i) increased the chance of getting compensation in the case where land was acquired for nonagricultural uses; (ii) helped to reduce conflicts; and (iii) especially in

regions where a woman's photograph was included on the land certificate, improved the bargaining power of females (Deininger and others 2008).

Lower Private Spending on Defending Property Rights

In Peru, a large land titling effort was carried out in rural and urban areas. Estimates indicate that, in urban areas, having received a title resulted in a significantly increased perception of tenure security. Furthermore, there was a large labor supply response as recipients of titles increased their participation in the formal labor market, because they were no longer required to invest in a multitude of informal activities required to maintain tenure security (Field 2007). The magnitude of these effects is large and grows over time with labor supply estimated to have increased to 45 hours (equivalent to 50 percent of the total) after four years, in marked contrast to other welfare programs that generally reduce labor-force participation. As adults have an advantage over children in protective activity, a reduction in the need for home protection could also reduce the demand for child labor. Moreover, to the extent that changes in tenure security can bring about an independent reduction in the productive value of children (for example, due to better old age insurance or credit access or due to increased bargaining power by females as compared to males), they could also prompt a reduction in child bearing.

The fact that, in the same program, a requirement was imposed for titles to be issued jointly in the names of husband and spouse provides an opportunity to test for gender-specific effects. If the titling program led to a redistribution of household assets in favor of females that shifted intrahousehold bargaining power, one would expect outcomes more favorable to them.[16] This is consistent with a 22 percent reduction of fertility for squatters who received a property title and the fact that females who received joint title experienced twice the reduction in the probability of having a child than those where the title is in one name only (Field 2003). A study in Nepal finds positive association between higher levels of women's land rights and their socio-economic empowerment, as well as the health of their children, and concludes that the impact of landownership is comparable in magnitude to that of education and employment (Allendorf 2007). This is in line with evidence from India where access to land allows women to choose self-employment on their land, thereby escaping gender discrimination in the wage labor market (Deininger, Jin, and Nagarajan 2006), something that is supported by qualitative evidence on the importance of land for the social status of women (Panda and Agarwal 2005). In Punjab, joint titling made women more assertive of their rights, increased attachment to their homes, and enabled them to use formal means (courts) rather than informal ones to assert ownership claims against hypothetical sales by their husbands (Datta 2006). In Gujarat,

landownership was found to be a key determinant of women's empowerment that increased a self-stated propensity to invest in land (Baruah 2007). The magnitude of the investment effects associated with insecure land rights for women, as well as the complexity of the underlying relationship, is illustrated for Ghana (Goldstein and Udry 2006). All of this points toward potentially important gendered impacts of land titling that sometimes materialize in rather unexpected ways.

In the long term, an additional channel through which land registration could affect household size is through the scope for members of the extended family to separate their inheritance, move out, and start independent enterprises. Indeed, in Buenos Aires, similar findings of reduced family size—via lower presence of extended family members—and lower fertility, as well as improved educational outcomes by children of titled vs untitled squatters, are found (Galiani and Schargrodsky 2005). While there were no differences in the number of children born before treatment, untitled households are much larger ones—due to the presence of members of the extended family—and there are larger numbers of children after titling, an effect that disappears for the late treatment group. If household resources for education are fixed, the lower number of children could provide opportunities for investment in human capital. Indeed, children of titled squatters had levels of school attendance that were 0.4 days per week above those of the control group and a level of school achievement that was higher by 0.42 years. This is roughly equivalent to the estimated impact of Progresa in Mexico, suggesting that land registration can have potentially large effects. (Progresa is a Mexican government program (whose name was changed later to Oportunidades) which makes cash grants to poor families on the condition that recipients abide by certain requirements regarding preventive health, nutrition and child school enrollment.)

Also, teenage pregnancy rates and children's short-term nutritional indicators (weight for height but not height for age) are better on titled as compared to untitled parcels, which suggests that titling allows families to improve investment in human capital (Galiani and Schargrodsky 2004).

Investment in Land Improvements and Increased Land Values

The hypothesis of positive tenure security effects on economic incentives is hardly controversial and has been quantitatively demonstrated by numerous recent studies, for example in China (Jacoby, Li, and Rozelle 2002), Latin America (Kazianga and Masters 2006; Bandiera 2007), Africa (Deininger and Jin 2006; Goldstein and Udry 2006), and Eastern Europe (Rozelle and Swinnen 2004). What is debated is whether, and under what circumstances, land registration programs can effectively enhance tenure security, especially in relatively

land-abundant settings, and how they need to be best designed. Existing evidence as to the potential gains from titles is not uniform. A study in a rice growing area in Madagascar suggests that formal title had no effect on plot-specific investment and little impact on productivity. Land values are estimated to increase by at most 6 percentage points due to titling, implying that the cost of land titling will have to be very low for such a measure to be justified economically (Jacoby and Minten 2007). Within-household analysis of new investments on owned as compared to merely occupied (*mailo*) plots by owner-cum-occupants in Uganda, by contrast, points to significant and quantitatively large investment effects of full ownership: shifting from *mailo* occupancy to ownership is predicted to double the likelihood of soil conservation and increase that of tree investment fivefold. Tenant registration is estimated to have no investment effect while measures to strengthen occupancy rights attenuate—but fail to eliminate fully—investment disincentives originating in overlapping rights (Deininger and Ali 2008). In Ghana, tenure insecurity is shown to lead to reduced investment in the form of fallowing, estimated to reduce output by about one-third and to lead to very large aggregate efficiency losses (Pande and Udry 2005). While this supports the importance of secure land tenure as a precondition for growth, it suggests that the magnitude of possible impacts can vary widely and that interventions aiming to increase tenure security need to be context specific to be effective.

In urban areas, an important indicator for effectiveness of titling programs would be housing investment. Indeed, in Buenos Aires, regularized squatters have a 40 percent higher probability of having good walls and a similar increase in the probability of having good overall housing quality. Apparently, the shift from use to ownership rights increased the incentive to invest but failed to make households richer or increase the transferability of their assets (Galiani and Schargrodsky 2005). In Peru, evidence on improvements in housing between 1994/95 and 1999/2000 suggests that, for titled households, rates of house renovation increased more than two-thirds above baseline levels, though most of the increase was financed out of pocket rather than through credit (Field 2005).

Applying the same methodology to rural households in Peru, and distinguishing households with different initial levels of tenure security, land titling was found to have contributed to significantly increased investment, particularly for initially insecure households for whom the propensity to invest in land almost quadrupled. This is consistent with findings for a smaller region in Peru where registration increased the probability of investment by 6.6 percent (Antle and others 2003). As the vast majority (97 percent) of such investments was financed out of pocket, a big credit impact is improbable (Fort 2007) and the fact that the titling density within a district significantly affected infrastructure investment points toward external effects. Use of a linear probability model of export crop adoption in a small panel suggests that receipt of title had a highly significant and positive effect on its own and—less

robustly—made households more responsive to price changes, leading the authors to the conclusion that market liberalization helps only if conducted in an appropriate institutional environment (Field, Field, and Torero 2006).

If adjustments are made for effects of risk and imperfections in capital markets, the difference between the price of registered and unregistered land can provide a measure of the social welfare gains of land registration (Feder and Feeny 1991). In Nicaragua, full registration of a plot after the 1990 revolution had a significant investment-enhancing impact, increasing the propensity to invest by between 8 and 9 percent. By contrast, award of agrarian reform title without registration had insignificant effects. Moreover, with about 29 percent, marginal returns to land-attached investment are much higher than those from investment in mobile capital, pointing toward scope for gains in economic efficiency by shifting resources from the latter towards the former and suggesting that such higher levels of tenure security can promote a more appropriate balance in the investment mix between moveable and fixed capital. Land values for plots with registered title are higher by 30 percent (Deininger and Chamorro 2004). Reduced form regressions lead to similar conclusions regarding the superiority of full as compared to only "reform" title and enhanced land values, investment in perennials, and higher crop yields (Broegaard 2005). The presence of an investment incentive effect that is independent from credit is also highlighted by evidence from a land settlement program in Guatemala that was started in 1986. A 1993 resurvey suggests that, while all of the sample households had benefited from credit provided under the program, those who had exogenously received a title to their property took greater care of their parcels and, most likely as a result of past and recurrent investment, had higher yields than those who did not (Schweigert 2007).

In addition to awarding about 11 million land use certificates (LUCs) through land registration efforts in the 1993–2000 period, legal changes in Vietnam during the same period also expanded users' rights to include transfer, inheritance, exchange, lease, and mortgage (Do and Iyer 2008). While the magnitude of new registration was comparable to the Ethiopian case, it is much larger and more rapid than what was achieved by other interventions such as the 8.7 million titles distributed in Thailand since the 1980s, the 1.8 million titles in Indonesia from 1996, and the 1.2 million urban and 1.5 million rural titles in Peru between 1992 and 2005. A difference in difference estimation strategy at district level for this case suggests that provinces where certification made more progress have devoted more of their land to perennials and have expanded nonfarm activities. In a province where everybody had an LUC, the proportion of land under perennials is predicted to be 7.5 points higher. As restrictions on crop choice that require households to keep land in rice remained in effect, this is likely to be a lower bound on the true effect. Of equal interest is the fact that the supply of labor to nonagricultural employment is estimated to increase by 11–12

weeks compared to the situation without LUC, an outcome that is more pronounced for the poor than the rich. Much of this effect is through diversification of the income portfolio within households rather than specialization by households in different types of activities. There is, however, no evidence of either a credit effect or a measurable impact of titling on income or expenditure, consistent with the notion that, without complementary changes in banking and rules for land transactions, titling alone is unlikely to set off big changes in economic structure.

Although little time had passed for certification to have a long-term effect, a significant impact emerged not only on households' perceived tenure security (an 18 percentage point reduction in the share of those expecting an administrative change to their land holding over the next five years) but also on land-related investment (a 29 point increase in the likelihood of having made repairs or new investments in the last 12 months) and a 9 percentage point increase in the propensity of renting out land (Deininger, Ali, and Alemu 2008).

In Thailand landownership titles induced higher investment in farming capital (attached investments and other capital), and titled land had significantly higher market values and higher productivity per unit. Output was 14–25 percent higher on titled land than on untitled land of equal quality (Feder and others 1988). A comparison of housing prices between nonsquatter, formal residential areas and the informal areas of the city of Davao in the Philippines revealed that prices were 58 percent higher in the formal area than in the informal one and that rents were 18 percent higher; in Jakarta, registered land was up to 73 percent more valuable than similar land held by a weak claim (Friedman, Jimenez, and Mayo 1998).

Self-assessed land values provide an upper bound on the gain in utility from property registration. In Ecuadorian slums, title increases the expected market value of a plot by 23 percent (based on responses by the same household for hypothetical changes), an effect that increases to more than 50 percent in situations where, because the settlement was recently invaded and has no organizer who could provide political protection, tenure security is very low. Comparing the hypothetical benefits to the cost of such a program suggests a positive return even though one has to take into account the tendency for private people to overvalue the gains from title. Particularly large benefits to households with women only are interpreted as indicating that there is a need for interventions to incorporate gender concerns (Lanjouw and Levy 2002).

Land Market Functioning

In China, land rental contributed to diversification of the rural economy (Deininger and Jin 2009) and productivity. However, if land rights are not

sufficiently secure, landowners may be averse to renting out because they fear that land may be taken away from them (Yang 1997; Holden and Yohannes 2002) or that tenants may not give it back upon expiry of the contract. This reduces the level of transactions below the optimum and can lead to significant losses in allocative efficiency (Benjamin and Brandt 2002). Within-household regressions and cross-sectional estimates in Vietnam suggest that having long-term use rights secured through registration will increase the tendency to rent out to nonrelatives but does not affect the propensity to rent out to relatives, consistent with the notion that land registration can substitute for informal enforcement through social capital. Moreover, and in line with the expectation that in the case of informal transactions with friends and relatives the smaller number of potential partners reduces the scope for efficiency-enhancing transactions, rental transactions among nonrelatives but not among relatives are shown to contribute to a significant increase in efficiency (Deininger and Jin 2008).

In the Dominican Republic, insecure property rights not only reduce the level of activity on the land rental market, but also induce market segmentation. Landlords who have reasons to fear losing their land restrict renting to narrow local circles of confidence. This segmentation further reduces rental activity by limiting opportunities to find suitable tenants. Simulations show that improved security of property rights through title registration can lead to efficiency and equity gains; improving tenure security would increase total area rented by the poor by 63 percent (Macours, de Janvry, and Sadoulet 2004). In Nicaragua producers who have a title are significantly more likely to rent out their land, providing an opportunity for more effective producers to increase their cultivated area (Deininger, Zegarra, and Lavadenz 2003). On the other hand, descriptive statistics from Peru suggest that perceived rights to rent, sell, or exclude others—in contrast to rights to use, invest, and inherit—are not significantly different between titled and nontitled households (Fort 2007).In Tigray, Ethiopia, land certification contributed to higher levels of land-rental market participation, especially by female-headed households (Holden, Deininger, and Ghebru 2008) and considerably enhancing opportunities for women to benefit from land rental (Bezabih and Holden 2006). As it makes it easier to liquidate and recoup the full value of investments in case of unexpected shocks (Ayalew, Dercon, and Gautam 2005; Deininger and Jin 2006), transferability is likely to increase investment incentives. Renting out allows landowners to take up nonfarm jobs without losing their assets or closing off the possibility of returning to farming and allows tenants to increase incomes by cultivating larger areas (Carter and Yao 2002; Kung 2002; Deininger 2003). Registered documents to prove ownership can help remove the perceived risk of engaging in transactions by lowering enforcement costs in cases of dispute, thus allowing more rental transactions, possibly at a lower rental price.

Studies on the potential impacts of land registration on sales markets have mostly been based on descriptive comparisons of the situation before and after interventions. In Eastern Europe, registration of land rights was generally followed by considerable and often rapid growth in land market transactions and, in the case of urban land and real estate, mortgages, but construction of a counterfactual is difficult, and therefore the evidence is only suggestive. In Vietnam, allowing land sales has led to increased activity and sales markets and even landlessness, but this has not increased poverty; to the contrary, it has overall been a benign or even positive factor in the process of poverty reduction (Ravallion and van de Walle 2008). In St Lucia, sales market activity and the number of registered mortgages increased immediately after introducing the system (and remained high in peri-urban areas). However, the marginal increase in formal land market activity after introduction of the title system was not sustained over time (Barnes and Griffith-Charles 2007), pointing toward rather limited impacts. Descriptive evidence suggests that titling of frontier land in Guatemala, while helping to reduce conflict and reduce the perceived danger of the land invasion, has little effect on investment and credit access and fails to prevent informal sales, implying that the registry is becoming outdated (Gould 2006).

Access to Credit

Early study of the impact of titling in Thailand, where informal credit markets had already operated and land markets functioned relatively well before the intervention, point toward significant impacts on credit access (Feder and others 1988). In Paraguay, a significant credit supply effect was demonstrated but accrued only to medium and large landowners, whereas producers with less than 20 hectares remained rationed out of the credit market, something that could set in motion longer-term dynamics in terms of equity that may not be desirable (Carter and Olinto 2003), parallel to what was found in Guatemala (Mushinski 1999). However, if land markets are illiquid or nonexistent, or if the cost of registering mortgages or foreclosing on them is very high, one would not expect land registration to have an immediate impact on credit access. For example, in Peru, land registration increased the likelihood of obtaining a loan (by between 9 and 10 percentage points) only for credit through a state bank but not the private sector. One explanation is that, due to the political nature of the application process, the likelihood of foreclosure is actually lower (or transaction costs higher) for those with titles. In fact, there is some reason to believe that the politicized nature of the titling process may actually have reduced rather than increased the ability of banks to foreclose. This is in line with evidence suggesting that, even after land registration, more than one-third of households remained completely

rationed out of formal credit markets (Field and Torero 2006). While interest rates charged by the private sector are lower (by about nine points) for titled as compared to untitled households, this appears to be due to signaling rather than the ability to collateralize debt with collateral, similar to what is found in Indonesia where land registration was contingent on demand and significant payment by owners so that possession of a title could be used as a proxy for entrepreneurial drive (Dower and Potamites 2005). Evidence from rural areas in Peru points in the same direction (Field, Field, and Torero 2006; Fort 2007). In Buenos Aires, despite significant effects on house-related investment and other variables, no credit effect is found, implying that, even with titles, households will be unable fully to ensure their consumption or use their talents more efficiently in entrepreneurial activity, suggesting that growth implications of titling programs may be overstated (Galiani and Schargrodsky 2005), consistent with what is found by a recent comprehensive descriptive review of urban titling (Payne, Durand-Lasserve, and Rakodi 2008).

Policy Implications and Challenges Ahead

Our review allows a number of conclusions. First, realization and nature of benefits from land registration depend on the broader socio-economic and governance environment and the nature of interventions. Bad governance and an ineffective or predatory state will hinder benefits from such interventions, or even cause negative outcomes. However, there is ample evidence of positive tenure-security effects of land registration in situations where overall conditions are favorable. These effects manifest themselves in higher levels of investment, less need for activities to protect land rights, and—especially if female rights are enhanced or made more visible—empowerment of women. Second, while there is evidence of land registration helping to activate land rental markets, the relationship between land tenure and off-farm labor market participation is under-researched, especially in rural areas of developing countries where occupational diversification will acquire increased importance as a driver of growth in the immediate future. Third, although land registration helps to improve credit access in some settings, positive credit effects are contingent on other factors such as liquidity of land markets and the presence of credit-worthy projects that may not hold in practice. Even if credit effects materialize, evidence on potentially very skewed incidence of such effects suggests that attention to their distribution will be warranted. Fourth, evidence on the cost-effectiveness, sustainability, and longer-term impact of land administration interventions is limited and few quantitative studies have explored how land registration effects can be enhanced by complementary interventions (for example business training) and how they

interact with the broader social and economic environment. Finally, although one would expect impacts of systematic land registration to be more pronounced in urban environs where such interventions may be highly complementary to infrastructure investments (Gulyani and Talukdar 2008), quantitative studies have focused on rural areas and examined land regularization almost exclusively in terms of allocation of individual rights, neglecting group rights and state land management.

This suggests that, instead of using "formalization" as a panacea, interventions to improve property rights will have to be preceded by a careful diagnosis of the policy and governance environment. The need to adapt flexibly to local conditions and the absence of standard approaches require careful monitoring to learn from experience—possibly drawing on experimental methods and standard administrative data. At the same time, there are a number of clear implications to guide policymakers and practitioners.

First, the positive impact of low-cost and participatory measures to increase tenure security suggests that, even where credit markets are underdeveloped and the provision of individual titles in a rather slow and costly process will not be viable economically, a number of measures are available to make land rights more secure. These include a legal framework that recognizes traditional rights by individuals and groups, dissemination of information, institutional reform, and registration of rights—possibly first at the group rather than the individual level—in a way that can be subsequently upgraded according to clear rules, with information maintained in a coherent format to avoid parallel systems. Safeguards, such as systematic rather than sporadic registration, information campaigns on laws, procedures, and ways of redress, as well as public review of allocations before finalization, will be essential.

Second, the technical complexity of some of the underlying functions should not conceal the importance of land administration institutions delivering services (that is, information useful to clients) in a cost-effective way. There is no reason why standard indicators of outreach and effectiveness of service delivery should not be applicable to land administration. Benchmarks such as coverage, registered transactions as a share of parcels, and cost per transaction will be important to guide policy choices as a diagnostic tool to identify areas for improvement and to generate political support for measures to improve outcomes.

Third, good governance is of overriding importance to ensure that clear property rights and institutions to administer them contribute to the desired socioeconomic outcomes instead of providing a means to enable elites and officials to usurp the rights of the poor and socially weak groups. This requires clear delineation of institutional responsibilities within the land administration system, an audit of regulatory requirements to ensure that these are justified and that compliance is within the reach of target groups, transparent management and access

to information, effective avenues to flag problems, and availability of accessible and accountable institutions to resolve conflicts and ensure enforcement.

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Notes

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1. Documented evidence on the operation of property rights institutions is available from as early as 2350 BC from Egypt, the Assyrian empire in Mesopotamia (c.1200–750 BC), and its successor the Babylonian and Sassanian (500 BC–AD 651) empires (Powelson 1988).

2. Activities related to the demarcation and survey of land boundaries, registration and record keeping, adjudication of rights, resolution of conflicts, and land management are normally referred to as "land administration" (UNECE 1996). In 2005, the World Bank was supervising a portfolio of more than 1 billion US dollars' worth of land administration projects.

3. While much of the literature relies on a unitary household model, women's ability to own land is often constrained by social practice. Even if constitutions outlaw gender discrimination, females can often access land only through male relatives, and their ability to inherit land or hold on to it in the case of widowhood or divorce is limited. This can affect their intrahousehold bargaining power, the allocation of household spending among alternative uses, the efficiency of land use (Udry 1996), and the participation in nonfarm opportunities (Quisumbing and Maluccio 2003). Legal changes and land registration programs that take into account local realities and enforcement capacity can contribute to women's social and economic empowerment (Deininger and Castagnini 2006; Joireman 2008).

4. For a discussion of institutional options see Fitzpatrick (2005) and for a detailed example of legislative arrangements to put this in practice see Government of Mexico (2000).

5. To illustrate this: if, under title registration, A fraudulently sells a piece of land (which actually belongs to C) to B who purchases in good faith, B becomes the rightful owner and any claims by C are extinguished as soon as the sale is registered. The only recourse open to C would be to demand compensation, but not restitution of the property, from the state which in turn has the option to sue A. The need to ensure that the responsibility taken up by the state can be met is one of the reasons why title registration systems are normally associated with a guarantee fund to facilitate payment of such compensation. By contrast, under a deeds system, it is B's responsibility to investigate the veracity of A's ownership claims and C will be able to demand restitution of the property from B, implying that B will incur the loss.

6. The specific historical circumstances of the United States, which operates under a deeds system, have given rise to a system of "title insurance" where private companies, rather than the state, have developed a comprehensive record of all land transactions that enables them to examine the legal validity of transactions and insure against defects. Given the long time it took to assemble the required information this is not an option for developing countries (Arrunada and Garoupa 2005).

7. In St Lucia, households received provisional documents that were supposed to be replaced by full titles after 12 years, but 75 percent of titles were never collected by their owners (Griffith-Charles 2004). In Ghana, where a new title registration system has been introduced, less than 1,000 titles were issued per year and the rate at which titles entered the system was below that of new transactions to be registered, implying a widening gap between the registry and reality and increasing levels of informality (Nettle 2006).

8. An illustrative example relates to tenants on *mailo* (merely occupied) land in Uganda. Although these tenants had in many cases been on the land for more than a generation, their presence was not indicated on landlords' titles. Banks who lent against such titles discovered that the presence of tenants with far-reaching rights on the land they had accepted as collateral made liquidation impossible, making it difficult even for owners of unencumbered land to use it as collateral, thereby undermining the value of existing titles and making the state guarantee (which extends to ownership only) worthless from their point of view (Deininger and Ali 2008).

9. In the Philippines at the start of the 20th century, an explicit policy to survey the country and establish a title registration system failed in large part as a result of the high cost of surveying. Public support to a nationwide program to establish land titles would have amounted to between 57 and 230 percent of the colonial government's entire revenue (Maurer and Iyer 2008), thus highlighting the importance of ways to keep down costs.

10. The World Bank's 'Doing Business' survey has rightly identified the cost of registering property as a key impediment to private sector activity by including this as one of the indicator variables in its global survey. As these figures are based on expert opinion for an unencumbered property in the capital city, they should be used only with proper care (Arrunada 2007) and are likely to constitute a lower bound for the cost of registration faced by the average landholder. For example, a field-based study in St Lucia found transaction costs for what was considered a "typical" transaction by the local population to be almost three times the 7 percent given in the Doing Business survey (Griffith-Charles 2004).

11. Of households who do not have one, 95 percent would like to get a certificate; 99 percent of those with a certificate would be willing to pay an average of 12 Birr ($1.50) to replace it if it were lost; and 90 percent (most of them willing to pay) would like to add a sketch map (Deininger and others 2008).

12. Policy-induced restrictions on the transferability of land can further increase the transaction cost associated with use of formal land records as a means to improve credit access, as is the case in Tanzania.

13. To reduce transaction costs, informal and even formal, lenders sometimes invoke a procedure that is not fully formal, whereby they demand physical possession of the title document. This does not entail formal recording of collateral encumbrances, but it prevents the borrower from selling the land under favorable (formal) terms to others without respecting first the obligations to the creditor (Siamwalla 1990).

14. Among others, they were more likely to believe that people can succeed economically on their own, that money is important to be happy, and that others can be trusted. No significant differences emerge regarding the belief that those who put in effort will do better economically.

15. In Thailand a program of land titling provided the basis for a substantial increase in the total amount of land revenue collected, from US$300 million in 1984 to US$1.2 billion in 1995 (Burns 2007).

16. A similar nutritional effect, though only on children's weight but not height, is found in another study using the same data (Vogl 2007).

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Instructional Time Loss in Developing Countries: Concepts, Measurement, and Implications
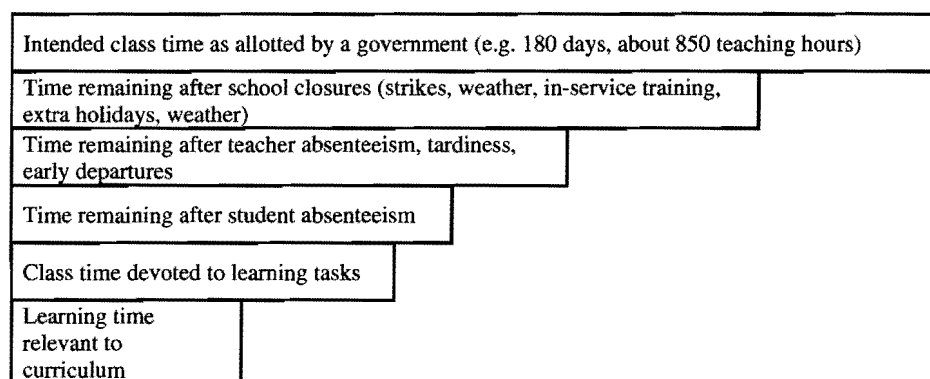
Helen Abadzi

Students in developing countries are often taught for only a fraction of the intended number of school hours. Time is often wasted due to informal school closures, teacher absenteeism, delays, early departures, and poor use of classroom time. Since the 1970s, attempts have been made in several countries to measure the use of instructional time in schools and its impact on student achievement. Studies have been of variable quality and have used different definitions and methods. However, they have consistently shown that significant amounts of time are lost and that the amount of time spent engaged in learning tasks is related to student performance. The large losses in many countries raise issues of governance, monitoring, and validity of economic analyses. It is important to take instructional time wastage into account when considering public sector expenditures on education, teacher salary rates, unit costs, and the rates of return from graduates. Refining time-loss measurement methods and disseminating policy implications may improve the efficiency of educational systems worldwide. JEL codes: I21, I22, I28, L23

To promote the Millennium Development Goals and universal primary school completion by 2015, the international donor community has helped governments of developing countries pay for buildings, salaries, textbooks, and other inputs that would provide quality education. The implicit (though rarely stated) expectation was that this financing would purchase time and opportunities for students to interact with teachers in schools and engage in learning activities.

However, the numbers of instructional hours mandated by various governments are rarely implemented in many countries. Staff of donor agencies, during field visits, sometimes find schools closed, or that they start late or finish early, or that teaching lasts for a net of only 2–3 hours a day. When teachers are present,

Figure 1. Instructional Time-Loss Model

Intended class time as allotted by a government (e.g. 180 days, about 850 teaching hours)
Time remaining after school closures (strikes, weather, in-service training, extra holidays, weather)
Time remaining after teacher absenteeism, tardiness, early departures
Time remaining after student absenteeism
Class time devoted to learning tasks
Learning time relevant to curriculum

they may be engaged in other activities or let students play outside until visitors come. Precious class time may be spent in handing out textbooks, doing small chores, or copying from the blackboard. Teachers may interact only with the few students who perform and neglect the rest (see the time loss model in figure 1). In some of the classes observed, students may be unable to read and remain illiterate up to advanced primary grades (OED 2002, 2004, 2005; IEG 2008).

Surprisingly, little information has been available in most countries regarding the proportion of the intended instructional time that is actually used to engage students in learning and its relationship to student performance. Without this important mediator variable, policy advice has been hampered. Low performance may be attributed to reasons that are vague and not easily changeable, such as poverty, malnutrition, lack of incentives, or limited community involvement. Thus, there is a need to explore further the studies conducted on instructional time and understand why this topic has remained relatively obscure in the international economic literature.

The search for studies, results, and policy guidance has been challenging. Many studies have been conducted since the 1970s on some aspects of instructional time, and it would be desirable to compare and contrast their findings. However, study results are typically not comparable. There has been little agreement on what to measure and how to measure it. Many observation instruments and questionnaires have been used, some of which are more precise than others. Indicators for describing time loss range from numbers of completed book chapters to student self-reports and visual observations. Some indicators appear only once in the literature, and contexts are rarely the same. Sampling designs have been unclear or non-existent, and publications tend to give little detail on this issue. Often convenience samples were used, sometimes encompassing just a few

schools or a single district. Studies linking student achievement to time loss have been correlational and often short term.

Despite methodological weaknesses, most studies point to substantial time loss, systemic inefficiency, and large-scale wastage of donor funds. The rationale linking student achievement with engagement in learning activities is fairly clear. Neuroscientific research shows why learners need prolonged and repeated exposure to stimuli along with feedback for error correction (Quartarola 1984; Rabenstein and others 2005; see Abadzi 2006 for a review of neuropsychological issues, including feedback and memory consolidation). Time wastage means that many countries have cohorts of poor students who simply do not get instruction sufficient for learning basic skills. This article attempts to summarize critically the existing research, point to measurement challenges in this area, and outline the reasons why valid and reliable measurement of instructional time is critical for governance and systemic efficiency. It also includes a study that attempted to develop internationally comparable instructional time measurements that can offer implementable policy advice to governments.

Conceptualization of Instructional Time

Considerations of time use started in the United States in the 1960s. In that period, some studies concluded that school was essentially a "black box" between inputs and outputs (Coleman and others 1966; Jencks 1972). The concept of instructional time use (sometimes called "opportunity to learn") gained more pro-minence in the 1970s, as mathematical learning models tried to show that optimal learning performance could be achieved by giving students sufficient time to learn (Carroll 1963; Atkinson 1972). In the 1970s and 1980s, many time usage studies were conducted, mainly in the United States. Research focused pri-marily on how time was used in the classroom, with particular concern placed on disciplinary disruptions. School-level time losses were not studied because in the United States and other high-income countries the school year is implemented as planned, and substitute teachers are used to cover for absent teachers. These earlier studies were published in peer-reviewed journals, but they tended to be rather weak. Observational instruments tended to rely on judgments, samples were small, and studies focused on specific states or school districts. Consequently, results have varied widely, showing that time spent on learning tasks ranged from 38 to 96 percent of available time (Smyth 1985; Anderson, Ryan, and Shapiro 1989; Fisher and others 1978). Nevertheless, school districts improved time management as a result of these studies, and administrators gradually lost interest in this measure. Few studies have taken place in the United States since the 1990s.

Figure 2. Instructional Time Indicators in Basic Education of Some Middle Eastern Countries
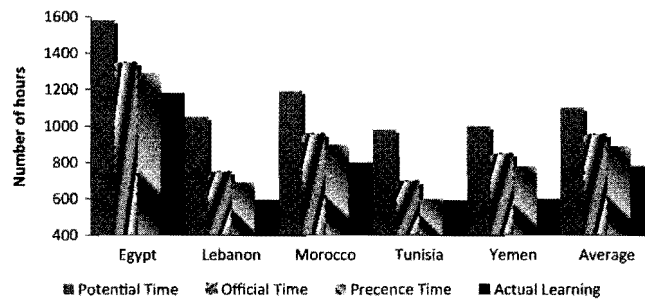
By contrast, studies in the international arena started in the 1990s. In lower income countries, sources of time loss tend to be multiple. Money for substitute teachers is rarely available, strikes and bureaucratic issues may delay school openings, matriculation periods may be long, infrastructure and climatic problems may lead to school closures. In crowded schools, time may be reduced so that all students can get some space. Concerns of governance and efficiency have grown as donor funding has increased, and demands for accountability have become stronger. For these reasons, studies were mainly commissioned by donor agencies and have usually not been published in peer-reviewed journals. (Notable exceptions are the teacher absenteeism studies conducted by the World Bank, such as Chaudhury and others 2004a, 2004b, 2004c.) Donor-financed studies measure different sets of variables and have varying degrees of methodological sophistication. Some were designed in detail, while others relied on self-reports and had poor controls or data reliability. Below are some examples of methods used and the results obtained from international studies:

- *Analyses of internationally reported data.* The UNESCO International Bureau of Education collects curricular data and occasionally reports on time use (Amadio 1997, 1998). Some peer-reviewed studies have analyzed this information. For example, Millot and Lane (2002; figure 2) found in several Middle Eastern countries considerable gaps amongst time as officially decreed and number of hours teachers actually taught.
- *Ethnographic observations.* This type of study may be a viable means of focusing on specific localities and extracting information for broader use. For example, a donor-commissioned study in eight low-income schools in Bangladesh found that they were open for 19 to 55 percent fewer days than had been scheduled in the school calendar. One month of contact time with students at the beginning and at the end of the school year was sacrificed to administrative and non-teaching activities. Rural schools allowed travel time for non-resident

teachers and gave a 1.5-hour break to students attending Koranic school, but did not stay open later than scheduled. Inside the classroom, time was not used well, either. Teaching activities occupied on average 63 percent of the time in the classes observed; lecturing occupied about 83 percent of that time. There was also a high level of absenteeism amongst students: only 43–67 percent of them were in attendance on the days of surprise visits. Teachers estimated that only about 50 percent of the children were very regular in their attendance. The study found that the problems were more prominent in isolated areas. However, schools were more likely to comply with schedules if they received regular visits by the authorities (Tietjen, Rahman, and Spaulding 2004).

- *Proportions of syllabi taught.* An unpublished study undertaken in a Senegalese province by the inspectors of the Académie de Diourbel found a teacher absenteeism rate of about 30 percent, with strikes initiated by both students and teachers (Diouf 2005). In the final grade of secondary school, up to the final examinations, almost 5 weeks of class time were lost between October and March. With a teacher absenteeism rate of 32 percent, the deficit amounted to 112 hours or about 14 weeks. In the philosophy course, only 4 of the 23 chapters were covered, in physics only 7 of the 17 chapters, and in chemistry only 7 of the 11 chapters.

- *Multiple visits to randomly sampled schools.* Methodologically sophisticated studies have been financed by some donors, notably the United States Agency for International Development (USAID). These attempt to measure multiple levels of time loss (figure 1). Studies in Ghana and the Dominican Republic used random samples and repeated visits a few weeks apart. In the Dominican Republic, a team visited schools on three different occasions and noted the extent to which classes were operating. Overall, schools used 65 percent of the intended time in teaching, but afternoon shifts spent less time (58 percent) than morning shifts (73 percent) (EDUCA 2005).

Sources of Instructional Time Loss

To explain the concept and highlight issues more systematically, study results are presented below in accordance with the time-loss model (see figure 1). The degree to which studies were subject to peer review is indicated where possible. It is likely that reports commissioned by various agencies received less peer review than those published in peer-reviewed journals.

Time Loss at the School Level

Schools in some poorer countries systematically seem to open later or close earlier than the official timetables. For example, some schools in Bangladesh close the

month before examinations so that students can prepare on their own. An unpublished study commissioned by the World Bank showed that in Burkina Faso over 16 percent of the official allocated time may be lost due to examinations and extended breaks during the day (Dia 2003). In the Dominican Republic, schools sampled by a USAID-financed study were imparting instruction for only 77 percent of the allocated time; the cancellation reasons included meetings with parents and district officials, teacher training, and strikes (EDUCA 2005). Strikes also accounted for closures in Honduras, where schools were reportedly open for only 114 days of the official 200 in 2001 (OED 2004). In Mali, an unpublished survey financed by the World Bank found that schools functioned for only 70 percent of the official time (Kim 1999), partly due to the delayed appointment of teachers and supervision weaknesses. In Nepal, donor-financed surveys showed schools operating on average for 3 hours a day, a fact that halved the available teaching time from over 1,000 hours to just 540 hours (Watkins 2000, p. 112). But overall, data on the incidence and rationale for school closures are sparse. More detailed research is needed to capture and quantify the various patterns of losses in order to inform policymakers.

Time Loss Due to Teacher Absenteeism

Teacher absenteeism has been the subject of well-designed and vetted studies. Several were conducted by World Bank staff (Chaudhury and others 2004b, 2004c; Patrinos and Kagia 2007), who reported absenteeism in primary schools, ranging from 11 percent in Peru to 27 percent in Uganda (table 1). Absenteeism has been studied in considerable detail in South Asia, where loss rates are high and improvements limited (Kremer and others 2005). Surveys of heath service providers, where available, suggest a broader effect of low-quality services to the poor.

Even when they are not absent, teachers may come to school late. This is an important and little-understood source of time loss, but data on this issue are limited (table 1). Teachers may also avoid teaching. For example, the PROBE study in India (De and Dreze 1999) found that in only 53 percent of the schools visited by the research staff were all teachers actually teaching in their classrooms; in 21 percent of the surveyed schools teachers were mainly "minding the class." In the remaining 26 percent they were talking with other teachers, sitting/standing outside the room, were in the head teacher's room, or were observed in other non-teaching activities.

Though correlation studies do not prove causality, published studies suggest that teacher absenteeism is related to lower student test scores in primary schools (Suryadarma and others 2004; Chaudhury and others 2004a). One study found that a 5 percent increase in the absenteeism rate of teachers who stayed with the

Table 1. Rates of Teacher Absenteeism, Delay, and Failure to Teach (percent)

Country	Teacher absence	Teacher delay	Teacher in school but not in class	Absenteeism in primary health centers
Bangladesh (Chaudhury and others 2004c)	16	—	—	35
Dominican Republic (EDUCA 2005)	8	—	—	—
Ecuador (Chaudhury and others 2004c)	14	—	—	—
Ghana (EARC 2003)	19	29		
India, national sample (Chaudhury and others 2004b)	25	—	—	40
India, rural north (De and Dreze 1999)	33	—	47	—
India, west Bengal (Sen 2002)	20	—	—	—
India, Udaipur non-formal education centers (Duflo and Hanna 2005)	36	—	—	—
Indonesia (Chaudhury and others 2004c)	19	—	—	40
Indonesia (Suryadharma and others 2004)	21	—	47	—
Kenya, regional study (Glewwe, Kremer, and Moulin 1999)	28	—	12	—
Kenya, regional study (Vermeersch and Kremer 2004)	30	—	—	—
Pakistan (Ali and Reed 1994)	18	—	—	—
Pakistan, Northwest Frontier Province and Punjab (Sathar and others 2005)	14	—	—	—
Papua New Guinea (Chaudhury and others 2004c)	15	—	—	—
Peru (Chaudhury and others 2004c)	11	—	—	23
Uganda (Chaudhury and others 2004c)	27	—	—	37
Zambia (Das and others 2005)	17	—	—	—

— Not available.

Note: The Chaudhury and others 2004c study included health facility surveys, which are included for comparison.

same class for two years reduced student gains by 4–8 percent during the year; the size and precision of these estimates was the same for both math and English (Das and others 2005). In an Indonesian study, higher teacher absenteeism was related to lower fourth-grade student achievement on math (but not dictation) after controlling for household characteristics, teacher quality, and school conditions (study cited in Lewis and Lockheed 2006, p. 67). Some authors suggest that teacher absenteeism may encourage similar behavior among students in countries such as Mali and Somalia (Lockheed and Verspoor 1992; EARC 2003). Absenteeism may also perversely affect students' rates of promotion to the next

grade. A vetted study in the Northwest Frontier Province of Pakistan (King, Orazem, and Paterno 1999) found that higher rates of teacher absenteeism increased student promotion rates for a given level of test scores but reduced student continuation rates. A likely explanation is that absent teachers make less accurate progress assessments and promote students who do not know enough and subsequently do not wish to continue their studies. Nevertheless, these well-designed studies do not focus on the amount and quality of time lost. Students of absent teachers may be unoccupied or attend other teachers' classes, and these two treatments are likely to have different learning outcomes. So, the effects of teacher absenteeism on student achievement need to be clarified through robust research designs.

The reasons for teacher absenteeism have been investigated to some extent (Rogers and others 2004). Some absenteeism is unavoidable, but absence rates are lower in countries with a higher per capita income. Higher absence rates are predicted by factors at the community level (remoteness, parents' education level), teacher level (teacher's professional or age-related seniority), and management level (physical infrastructure, multigrade teaching, inspection frequency). Increasing accountability to parents may result in lower absenteeism rates. For example, schools in Honduras, where communities are authorized by the government to pay teachers, had lower absenteeism rates than other rural schools. A completion report on a World Bank project reported that regular rural schools were open for 154 days a year, but community-managed schools operated for 180 of the 200 official days (World Bank 2008). This outcome is encouraging, but longitudinal research in more countries is needed to establish cause–effect relationships and conditions that inhibit or promote teacher absenteeism.

Time Loss Due to Wastage of Classroom Time (Time on Task)

Ideally, students should be engaged in learning during the entire time they are in class, particularly with activities that are more conducive to long-term memory consolidation of needed material and formation of useful linkages among pieces of information (Abadzi 2006). Schools in higher-income countries, that have trained teachers and a multitude of materials, may succeed in keeping most students suitably engaged most of the time. It is probably impossible to have 100 percent student compliance and time use, but some systems can become fairly efficient. For example, a published longitudinal study of eight elementary schools in Chicago found that 85 percent of the daily allocated time was dedicated to instruction (Smith 2000). (Other studies of the 1990s may not have been published in peer-reviewed journals.) Similarly, class-time use in Tunisia was measured at 86.7 percent (table 3).

In many countries, however, time in classrooms is not well used. The loss may be due to inadequate teacher knowledge and material resources. UNESCO reports

suggest that poorly trained teachers may not know which activities result in efficient time use or why this concept matters (Attar 2001; Njie 2001). In countries such as the Gambia and Burkina Faso, textbooks are often scarce, and much class time may be lost writing out lessons and problems on the board (Dia 2003). The importance of time loss involved in copying was illustrated by a comparison of instructional time in three Latin American countries: few Brazilian schools used prepared activities, so students spent significantly more time copying math problems from the blackboard than did Chileans and Cubans. The test scores tended to reflect these differences (Carnoy, Gove, and Marshall 2004). However, it is not sufficient for students to have books: they must also know how to read and understand the texts in order to learn. In a Kenyan program where an NGO provided textbooks to all students, instructional time in classrooms improved, but a vetted study showed that test scores remained stagnant (Glewwe, Kremer, and Moulin 1999).

Students should not just be engaged in any learning activity, but should spend their time in activities that *teach the prescribed curriculum*. Students who do this are most likely to score well in achievement tests, so time spent on the curriculum may be a more useful predictor of learning outcomes than engagement in any learning activity (Vocknell 2006). Empirical information suggests considerable deviation in lower income countries. For example, in Ghana, a large portion of rural schoolteachers did not follow the prescribed weekly timetable (EARC 2003). Various possible reasons exist, including the likelihood that students may be too far behind in the official syllabus, or that teachers have a poor sense of the time needed to teach specific topics. However, little systematic information exists regarding the amount of time schools actually spent presenting new material and progressing with the specified curriculum. Curriculum measurement methods have been complex and dependent on local standards (for example, studies of students' notebooks; Ben Jaafar 2006). More research is needed to develop relatively simple means of measuring distance from expected curricular coverage.

Countries have increased their emphasis on quality and on instructional delivery in recent years, and an emerging issue is the neglect of lower scoring students. Teachers may engage the class in the required learning activities but interact with only the few students who can do the work. Many of the neglected students eventually drop out. The situation has been documented in World Bank evaluation reports (for example in Niger and Mozambique; OED 2005; IEG 2008), and there is published information on Jamaica (Lockheed and Harris 2005) and Albania (Sultana 2006). A published Greek study also found that the less-knowledgeable students spent more time "off task" (Matsagouras 1987). In Jamaica, the teachers of the higher primary grades concentrated on the few students who could pass the school leaving examinations. Albanian teachers directed questions 4.7 times more often to the better students than the failing ones, while the latter were uninvolved and asked no questions. This phenomenon,

called "hidden dropout" in Albania, illustrates the complexities involved in measuring instructional time. It is not sufficient to document that instruction is going on; the percentage of students involved in it must be also measured.

Some studies have used quick assessments of whether or not a class is engaged in instruction (for example EDUCA 2005), but the reliability of this method and its relationship to learning outcomes have not been established. To estimate the percentage of students actually involved in instruction, targeted research may be justified using more sophisticated methods, such as instruments that register students' activities (for example experience sampling methods; Yair 2000).

Relationships between Instructional Time, Poverty, and Achievement

The bulk of educational research linking student achievement to engagement in learning outcomes is from the United States and dates from the 1970s to the early 1990s. The research has been published, but it has been mainly *ex post facto*, rather than experimental, and with poor controls. Analyses pre-date the use of hierarchical linear modeling and may have thus incorrectly estimated the variance accounted for by class or school effects. Nevertheless, the studies have consistently reported a positive relationship between instructional time and student achievement (Bloom 1971; Wiley and Harnishfeger 1974; Rosenshine 1979; Gettinger 1984, 1989; Fisher and Berliner 1985; Walberg 1988; Wang 1998; Lavy 2001). Such measurements are important given concerns about teacher attention to those who are better off (Lockheed and Harris 2005; Sultana 2006).

For example, an extensive review of U.S. studies concluded that, other things being equal, the amount learned is generally proportional to the time spent in learning (Fredrick and Walberg 1980). Two comprehensive reviews of research on learning effects demonstrated the positive influence of time on learning and the increasing precision in defining it: an earlier review of 35 studies showed positive effects had been found in 30 (86 percent) of the cases; while a later review of more than 100 studies showed positive influences in 88 percent of cases (Walberg and Fredrick 1991). Variables measuring curricular exposure are strong predictors of test scores, and correlations between content exposure and learning are typically higher than correlations between specific teacher behaviors and learning (Rosenshine 1979; Wang 1998). These positive relationships have been fairly consistent in studies employing different analytical perspectives, measurement strategies, and units of analysis (Huyvaert 1998).

Some published U.S. studies are quite pertinent to the World Bank's poverty alleviation mission. They suggest that the schools of the poor may make less time available to their students. Students from low-income families spend more time

learning to read, with classroom interruptions and disruptions a salient problem (Stevens 1993). One longitudinal study in the United States found that high socioeconomic status students were engaged in writing, reading, and academic discussion for 5 percent more time per day than poorer students (Greenwood 1991). The study estimated that such students would need to attend school for one and a half months during the summer break in order to attain an equivalent amount of engaged learning time. Wastage adds up over the years and creates risks for poorer students. One educator named this problem the "pedagogy of poverty" (Stevens 1993).

Studies linking time, achievement, and poverty outside the United States have been relatively few, but trends have been similar. In a published review of 14 studies concerned with instructional time in developing countries, 12 studies showed a positive relationship between instructional time and achievement (Fuller 1987). More instructional time spent on general science was associated with higher academic achievement in Iran, India, and Thailand (Heyneman and Loxley 1983). In rural India student achievement was higher in schools with more instructional time; schools teaching the highest number of hours reported 66 more hours per year than schools with lower achievement (World Bank 1997). Increased student reading time had a positive effect on student achievement in Chile and India. School-based instructional time was found to be especially significant for children who got little school academic engagement after school hours (see Suryadi, Green, and Windman 1981 cited in Lockheed and Verspoor 1992). Instructional time was found to be one of three major areas (in addition to teacher quality and textbook availability) in which consistent achievement effects were obtained (Fuller and Clarke 1994). But studies have not captured all of the important dimensions of time loss and gain in lower income countries, so the magnitude and significance of the relationship between instructional time and educational achievement may seem uncertain (Anderson 1976; Karweit 1976, 1983). For example, in Pakistan it was found that teaching time by itself was a poor predictor of student achievement and that the effective use of time was a more accurate predictor (Reimers 1993).

"Full-time" Schools

The association between instructional time and achievement led some educators to favor additional hours and a longer school year for poor students. Some countries (notably Uruguay) have "full-time" schools that keep students for about 8 hours and offer many enrichment activities. A World Bank study showed that low-income students in Uruguayan full-time schools were 10 percent more likely to get passing scores in grade three over those attending regular schools (Cerdan-Infantes and Vermeersch 2007). (Full-time schools in Uruguay cost 60 percent

more than regular schools and offer students extracurricular activities rather than extra instruction [OED 2005]). However, the effect is modest and suggests that merely increasing the time students are in school may have limited effects without an increase in the time students are actually engaged in learning (Karweit 1983).

Tutoring

To make up for instructional time lost to strikes, absenteeism, and lack of feedback parents have resorted to private tutoring. This is a major phenomenon worldwide that has grown dramatically in recent times and has affected the priorities of those who tutor. Families with the necessary resources are able to secure not only greater quantities but also better quality of private tutoring. According to a UNESCO publication, tutored children are able to perform better in school, whereas children of low-income families become disadvantaged (Bray 2006). This is one more way that the better-off get more instructional time than the poorer students. However, studies on tutoring have been hard to conduct, given the social reticence and the private nature of the instruction, so little hard information is available.

The Effects of Split-shift Schooling

In poorer countries, instructional time may also be lost due to the inefficiencies involved in large classes that in some cases exceed 100 students. To deal with large classes, countries like Senegal, Guinea, Bangladesh, Ghana, or Niger split a class into two and divide the time available between these two. Thus, a school day of five periods may be reduced to three for each class. This schedule is known as a split shift (or erroneously called double shift) and may result in a 19–30 percent loss of time (table 2). Some donor-financed studies have reported that this policy did not significantly impact on student performance (Bray 2000; World Bank and IADB 2000, p. 46), but this finding may be due to an already low quality of education (Linden 2001). For example, in Guinea students from split-

Table 2. Instructional Hours in African Countries Using "Split-shift" Schooling, per Year

Type	Burkina Faso	Cote d'Ivoire	Guinea	Mali	Senegal	Average
Standard classes	858	754	747	888	675	784.4
Split-shift classes	603	580	585	645	547	592.0
Difference (%)	29.7	23.0	21.6	23.7	18.9	24.5

Note: Amounts averaged for all grades.
Source: Kim 1999.

shift classes scored 3.6 percentage points lower in French and 5.6 points lower in math (Barrier and others 1998). An additional consequence may be higher teacher absenteeism, since this scheme is more demanding and repeating the same information to multiple classes may be tiring (Linden 2001; Suryadarma and others 2004). A World Bank-financed study in Guinea and Burkina Faso suggests that the split-shift arrangement particularly reduces time even further in the afternoon shift, and ought to have a negative impact on achievement (Dia 2003). The original plans in some countries called for the "off-shift" students to be occupied with schoolwork outside the class. However, it has often been impossible to organize teaching during off-shift hours, and children typically just go home. It seems that reductions in instructional time broadly affect vulnerable groups. In Egypt, girls attending multiple-shift schools with fewer instructional hours were five to six times more likely to drop out before completing lower secondary education than girls attending a single-shift school (Lloyd and others 2003).

A Pilot of Internationally Comparable Time-loss Measurements

Measuring time on task entails considerable complexity. Classroom-related variables are many, prioritization is difficult, and events constantly change. Many observation instruments have been developed. Some attempt to record behaviors precisely, while others demand inferences and judgments that are to some extent subjective. There are trade-offs to these approaches. The "low inference" instruments offer well-reasoned calculations of time loss and clear categories of behaviors to be observed, but the training of observers takes longer. For example, the Stallings Classroom Snapshot offers reliable quantitative data that include the percentage of students who appear to be "off task" through visual estimations. The instrument has been administered in six countries, and usable data have been obtained (see below). The information obtained is useful for the training of supervisors, and feedback to teachers on their use of time has been found effective for modifying their behavior (Stallings and Kaskowitz 1974; Stallings 1975, 1980, 1985a, 1985b; Stallings, Needles, and Stayrook 1979). However, the instrument requires about 5 days of training, observations to be made during an entire class hour, and complex estimations for producing several composite variables before data analysis.

A grant partnership program between the World Bank and the government of the Netherlands offered the opportunity to develop a holistic measure of instructional time loss and study its feasibility. The study assessed instructional time loss in four countries: Ghana, Morocco, Tunisia, and the Brazilian state of Pernambuco. Previously, qualitative evaluations referring to instructional time

use had been conducted in two countries (Tunisia in 1998 and Morocco in 2001), while Ghana had been the focus of a 2004 World Bank impact evaluation. To pilot the use of instructional time data as a baseline for later project evaluation, the Brazilian state of Pernambuco was also included in the study.

A Low-cost Time Estimation Methodology

The aim was to develop an inexpensive measurement method that measured: (a) the number of days when schools were closed; (b) the time lost due to teacher absenteeism, tardiness, or early departures; (c) time use in classrooms; and (d) student absenteeism (which, however, overlaps with the other measures). A method was needed that would give stable estimates inexpensively, be administered within a few weeks, and capture time loss from multiple sources. Rather than making multiple school visits (as in absenteeism studies), estimates were obtained by triangulation.

Teams of three enumerators made a single unannounced visit to about 200 randomly sampled schools. In about 3 hours per school, the enumerators obtained information from the following stakeholders and sources: (a) direct observations of the operation of the school; (b) estimations by principals, teachers, students, and some parents regarding unplanned school closures, absenteeism, delays, and early departures; and (c) classroom observations of time use. Stakeholders were asked to estimate various sources of time loss for the current school year up to the date of the survey and on some variables for the previous school year. Questions to staff addressed the number of days of unplanned school closures; the number of days when teachers had been absent for any reason; teacher delays and early departures; the means to keep students occupied during teacher absences; and suggestions about improving time use. Opinions of cognitive psychologists were obtained regarding the time span during which recollection was likely to be accurate—the researchers experimented with time frames of 1 week, 1 month, and events since the beginning of the school year (see Abadzi 2007 for methodological details). Classroom-level observations were obtained through a specially adapted version of the Classroom Snapshot (Stallings 2006; Knight 2006). Training for the use of this instrument was conducted over 5 days and included attaining high standards of interrater reliability.

Following data processing, spreadsheets were produced to compare the frequencies of similar survey answers among the principals, teachers, students, and parents of each country (and ultimately across countries). Observed time loss was projected in the entire school year, taking holidays into account. Assumptions were made that time wastage was equally distributed throughout the year, that variations would be randomly distributed, and that surveys were equally likely to be filled at any working day of the week. Overall, information from the different

informants at the school level was consistent. Time-loss estimates from multiple sources were averaged. A readministration of the surveys of 40 schools in Pernambuco, one and a half years after the first observation, gave some assurance of stability: the amount of time students were engaged in learning was calculated at 61.6 percent compared with 63 percent in the original sample.

In Tunisia, the country with the most efficient use of time, students were engaged in learning about 78 percent of the available time. In Ghana, however, students were engaged for only 39 percent of the time, and in Pernambuco 63 percent of the time. Morocco had indicators somewhat lower than those of Tunisia (using 71 percent of time for learning), but school closures may have been underreported. Translated into the number of days effectively available for learning, losses were palpable. For example, only 76.3 days were devoted to learning tasks of the 197 officially available to Ghanaian students, whereas 148.1 of the 190 days officially available were devoted to learning tasks for Tunisian students. In effect, Tunisian students get twice as much of the intended classroom time as Ghanaian students. The time-loss estimates presented in table 3 demonstrate the measurements that can be obtained through this method. These include the percentage of students appearing "off task" and an efficiency measure given students' off-task rate.

The study provided important lessons for creating a reliable and tightly structured package of surveys that scholars and governments can use relatively quickly and inexpensively. For example, school closures were underestimated because insufficient detail was obtained about various closure events. Parents turned out to have relatively little knowledge of school events (aside from their children's absenteeism and homework patterns) and could be dropped as a source of information in subsequent studies. Subsequently instruments were revised extensively and used in assessments of three other countries.

These measures, particularly when refined further, ought to be very useful for monitoring and evaluation purposes. Some consideration of designs would be necessary. If interventions in a country resulted in better educational management, the amount of time used for instruction should increase over a baseline and approximate to 100 percent, the amount that governments expect schools will devote to teaching. However, instructional time use is rarely mentioned explicitly during improvements are planned; baselines are either unavailable or pertain to a single variable (for example absenteeism). Without a baseline it is hard to determine the amount of increase, but a criterion-referenced approach could be taken. Curriculum developers in a country can be asked to estimate how many class hours students would need to master objectives of specific subjects in various grades and also to estimate the number of objectives likely to be missed if the available time were reduced in steps. In some subjects, the loss would be limited to that subject (for example social studies), but in others, like math, losses in

grade one would impact on learning in higher grades and result in cumulative losses. It is possible to estimate and model these losses for evaluation purposes.

Economic Implications of Instructional Time Use

Why should economically oriented organizations spend resources to measure a concept that seems to be mainly educational? The research suggests that instructional time loss has significant economic implications. Government revenues pay for teachers' salaries, buildings, teacher training, and materials, and it is expected that 100 percent of this investment will be used for student learning. In fact, an hour of class in a particular school can be seen as a budgetary fraction corresponding to the amount of time schools officially operate (about 180 days, 4–5 hours per day at the primary level). It is possible to estimate the cost of time wastage down to the minute. Probably no schools use 100 percent of their time productively, but losses of the magnitude shown in the various studies suggest that schooling costs more than it ought to or achieves less for what it costs. So, data on instructional time loss have economic and monitoring implications. These include the following.

Internal Efficiency Indicators

The studies presented above suggest that, other things being equal, repetition and dropout rates are likely to be higher in a country which uses about 40 percent of instructional time for learning than in another which uses about 80 percent (for example Ghana versus Tunisia; table 3). For example, differential instructional time use may account to some extent for the large internal efficiency differences found between the Dominican Republic and Tunisia (per capita GDP US $3,316 and US $2,860 in 2005, respectively). Instructional time use was found to be 65 percent in the Dominican Republic and 78 percent in Tunisia (World Band 2008). The former had a dropout rate of 38.9 percent in 2005 whereas the latter had one of 5.6 percent. Also, survival to grade five was 97 percent for Tunisia but only 68 percent for the Dominican Republic. The changes in the indicators of these and other countries over time do not have clear reasons. Dropout could be due to external factors (for example the number of job opportunities or the effects of AIDS) or to limited instruction, but without time-loss measurements it is impossible to know.

Teacher Salaries

Systematic and extensive teacher absenteeism creates distortions. If wages are calculated based on the number of hours worked, teaching in some countries may

Table 3. Instructional Time Use in the Four Countries of the Study

	Pernambuco (Brazil)	Ghana	Morocco	Tunisia
Days of school year	200	197	204	190
Days schools closed	4.79	3.17	1.38	5.15
Number of days schools open	195.21	193.83	202.62	184.85
Teacher absence (days)	12.76	43.01	13.36	11.55
Teacher delays (days)	5.50	39.75	6.94	1.27
Early class dismissals (days)	2.31	2.43	6.68	1.22
No. of days schools operated for teaching	174.65	108.6	175.6	170.8
Percent of year available for teaching	87.3	55.1	86.1	89.9
Engagement rate in interactive or passive classroom tasks (%)	72.1	70.2	82.6	86.7
School days devoted to learning	125.9	76.3	145.1	148.1
Percent of school year engaged in learning tasks	63.0	38.7	71.1	77.9
Student off-task rate (%)	19.3	21.1	9.2	9.9
Instructional efficiency given off-task rate (%)	50.8	30.5	64.6	70.2
Student absence (days)	7.82	9.04	4.30	3.35
Student delays (occasions)	5.64	10.61	5.19	2.63

really be a part-time job, with higher hourly earnings than those formally calculated. Sometimes salaries are very low and efforts are made to raise them to acceptable levels, such as the frequently used benchmark of three times the per capita GDP. But before increasing salaries across the board, it is useful to ascertain how much teachers are paid for the work they actually do. (Dialog with teacher unions may focus on increasing instructional time.) An example to consider would be teacher salaries in Indonesia. The average estimated amount for civil service teachers is about US $2,400 per year, which is about 1.7 times the per capita GDP of Indonesia. Absenteeism is estimated at 19 percent (Chaudhury and others 2004c). At US $2,400 and 23.5 hours of work per week, the hourly wage would be roughly US $2.8, but, considering the number of hours actually worked, the wage would rise to about US $3.4, and about US $456 could be considered a "bonus." If teachers work at the same salary rate during the time they are absent, they could earn this extra amount and raise their very low salary to a more tolerable 2.1 times the per capita GDP. Some vetted studies have investigated teachers' activities during their absence, while others have estimated losses from absenteeism (Akhmadi and Suryadarma 2004; Patrinos and Kagia 2007). In countries of very low teacher pay, it would be possible to estimate the amounts of salary increase that would reduce absenteeism to acceptable levels (for example less than 10 percent).

Unit Costs and Rates of Return

Rates of return to spending are made on actual spending, which is inclusive of instructional time effects. When time is wasted, however, governments assume that students get services that are not in fact provided. Perhaps unit costs per successful graduate should be used rather than unit costs per student, because they would more accurately reflect the real cost of providing services to students. Graduates' rates of return are calculated with the implicit expectation that students will be taught and will actually learn basic skills. Projections such as the amount of marginal earnings of an additional year of schooling may be unrealistic if students are served for only half the year or if they are illiterate and cannot benefit from the instruction. For example, Ghanaian students often need six years to become literate, but with an average time use of 39 percent this may not be surprising. In six years, they spend about as much time in classroom learning as students of higher-income countries spend in two years.

Effects on Education Expenditures

Some countries may devote a smaller percentage of their GDP to education but use time better, so they may use funds more efficiently than countries which spend more and waste more. Expenditures, measured as a share of GDP or of total public expenditures, do not show these differences. However, expenditures as a share of GDP are used to estimate financing needs for specific countries, and if the figures are considered low, efforts are made to increase them. Nevertheless, poor instructional time use will reduce the magnitude of expected effects. If a country doubles its education budget but still continues to use only half of the available instructional time, the extra financing will have a smaller impact than assumed. For example, Mozambique increased the per capita GDP spent in education from 4.3 percent in 2004 to 5 percent in 2005. However, the poor time use observed in schools in 2007 (IEG 2008) raises doubts regarding the effects of this 0.6 percent increase on students' learning outcomes. Policy dialog aimed at increasing instructional time would be advisable before deciding to increase education expenditures.

Continuing Social Inequity

Primary education is generally considered to be more pro-poor than other levels of education, so it has more schools serving the poor than other levels of education. Since time may be used less well in the schools of the poor, *assumptions about the pro-poor poverty alleviation effect of education may be unrealistic*, and the equity effect may be lower than expected. This would affect benefit-incidence

analyses and Lorenz curves. Additional public investment at that level may fail to mitigate poverty, unless it improves instructional delivery.

Conclusions and Implications

Despite methodological weaknesses, studies have consistently suggested that in many lower income countries or socioeconomic groups the time and opportunity to learn are limited, and this limitation is linked to student achievement. Thus, time is a mediator variable that has escaped scrutiny and measurement thus far. Without it, low performance may be attributed to reasons that are not easily actionable: poverty, malnutrition, lack of incentives, or poor community involvement.

The research suggests that it is not enough to provide the ingredients of instruction and assume that they will be used in class. Students must get sufficient time to master the instructional objectives intended in specific subjects. Inputs like teaching aids must be employed within the time frame available to students, or they may not promote student learning. The time devoted to learning the material prescribed by the curriculum may be the crux of educational "quality." The quantity–quality trade-off that is often mentioned in relationship to rapid expansion of education in developing countries may be mitigated if measures are taken to give students the instructional time that governments pay for, even as class sizes increase.

A focus on the instructional time concept opens many doors for improvement. There could be alternative ways of increasing education inputs and outputs if policy or managerial interventions were designed to increase instructional time for existing schools. Such interventions may be institutionally harder, though they would be cheaper in government outlays. Policy dialog is needed to help countries address their sources of "leakage" at the school level, teacher level, and classroom level and plan actions toward eliminating them. Earlier U.S. research showed that teachers use time better after they receive feedback, which supervisors can provide if they are attentive to this concept (Stallings, Needles, and Stayrook 1979). The important ingredient is large-scale "buy-in," particularly among busy policymakers who may consider this issue trivial.

The future of the Education for All initiative may depend on how seriously governments and donors take instructional time wastage. The international organizations financing education must ensure that the time governments buy for their students is actually spent in obtaining learning outcomes.

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Notes

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ICICI Centre for Elementary Education

The ICICI Centre for Elementary Education (ICEE) is a non-profit research organisation working towards the universalisation of elementary education in India. ICEE was founded through the initiative of ICICI Foundation for Inclusive Growth (www.icicifoundation.org) as a part of its effort to contribute to human development in the country. It builds on the Elementary Education practice of the Social Initiatives Group of ICICI Bank. ICEE is headquartered in Pune and has projects and partnerships in the states of Rajasthan, Madhya Pradesh, Maharashtra and Chhattisgarh among others.

Given the government's critical role in education, ICEE works towards Universal Elementary Education through collaborations with the government school system at various levels, often in partnership with NGOs. Through its action and applied research agenda, ICEE's focus is on investigating and advocating strategies and models of change in educational outcomes within Government schools. For more details on ICEE's work, please visit www.icee.org.in

The Centre has a multidisciplinary team comprising sociologists, economists, social workers, educationists and rural managers. It welcomes persons from the aforementioned backgrounds, as well as related disciplines such as Development Studies and Anthropology, to work in a structure and culture that encourages collaborative and interdisciplinary work.

ICEE President

Applications are invited from candidates interested in public systems reform for the post of President, to head the ICEE. ICEE seeks individuals interested in playing a leadership role in a growing institution, with a deep interest in education research, influencing policy and directing practice. This is an opportunity to play an important strategic role in a young, diverse, research and policy organisation.

Key Responsibilities

Research and Strategy Development
- Defining the strategy of the Centre in a variety of dynamic contexts.
- Providing academic leadership in authoring policy documents, position papers and reports, and responsibility for ICEE's publications as a whole.

Organisational Development
- Identifying, recruiting and mentoring high quality researchers that are committed to globally-publishable quality academic work (particularly in government linked action-research settings).
- Overseeing finance and audit-related tasks for ICEE, reporting and compliance with funders (primarily ICICI Bank), and maintaining project MIS as required.
- All project and partnership-related planning tasks, team management within the ICEE, and reviews and appraisals.

Partnership Management
- Working with the government to influence policies and practice.
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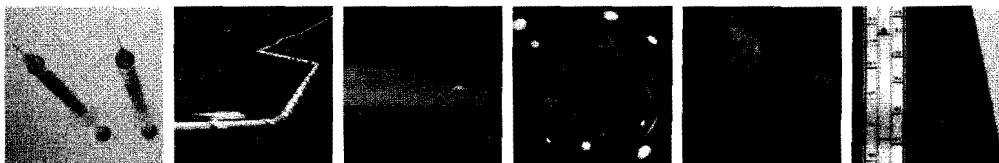
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