

Permanent effects of economic crises on household welfare: Evidence and projections from Argentina's downturns

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Abstract

The quantification of the impact of crises on household welfare and socioeconomic outcomes is a fundamental input for the design of ex ante safety nets and ex post alleviation programs. Economic downturns have direct effects through employment and household income, but whether these and other impacts are permanent rather than transitory is harder to establish. This study of Argentina estimates the relationship between GDP growth and severe crises on poverty, youth unemployment, and a series of human capital related outcomes, such as infant and maternal health, and school enrollment and progression. The identification strategy relies on provincial variation in GDP, and on a difference in differences estimation from the severe 1999-2002 crisis. The objective is twofold. On the one hand, the study documents the effects of past episodes. On the other hand, it extrapolates past results to provide bounds for the impact of the 2007-2009 financial crisis in Argentina. Besides the expected and well-documented relationship between crises and poverty levels, the main finding of this study is a strong effect on infant mortality and low weight at birth. Moreover, there is an asymmetry in these effects: the negative impact of downturns is greater than the positive evolution during recoveries. The results for education variables are more ambiguous, and even counter-cyclical in some cases. The document discusses the implications of these estimates for the current episode. Overall, these results provide evidence of permanent effects of economic crises through lower levels of human capital, worsening health outcomes and increased mortality.

Keywords: crisis, education, health, poverty, Latin America, Argentina

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1. Introduction

The international financial crisis of 2007-2009 represented a substantial downturn for the world economy. Past experience indicates that its overall impact on socioeconomic outcomes will be significantly negative, but it is imperative to quantify these effects to design policy interventions. This document contributes to the ongoing effort in this sense (Friedman and Schady, 2009), providing evidence from Argentina's downturns and projections for the 2007-2009 crisis.

There are several channels linking aggregate downturns to household welfare. Short term effects on income, which increase poverty and inequality levels, tend to track the evolution of the unemployment rate and other labor market outcomes (Gasparini and Cruces, 2008). Since poverty and unemployment levels tend to recover after crises, it is relatively more difficult to identify their long term impact on household welfare.

Besides the detrimental effect of job losses on long term unemployment, several early childhood development studies indicate that adverse events during the beginning of a child's life translate directly into deteriorated adult outcomes. Aggregate economic shocks can affect schooling levels, health outcomes, and deprivation levels among children, among others – see the health studies by Paxson and Schady (2005) and Baird et al. (2009), and the education analysis by Schady (2004, 2005, 2006). These impacts can further the process of intergenerational transmission of poverty, implying that even short-term downturns can have lasting consequences for human development levels. As a middle income country, the case of Argentina provides an opportunity to assess whether crises have negative impacts on schooling levels, since mechanisms limiting these effects may exist (Ferreira and Schady, 2009; Schady and Smitz, 2009).

This study estimates the relationship between GDP growth and severe crises on poverty, youth unemployment, and a series of human capital related outcomes, such as infant and maternal health, and school enrollment and progression. The objective is twofold; on the one hand, the effects of past episodes are documented while on the other hand, it extrapolates past results to provide bounds for the impact of the 2008-2009 financial crisis in Argentina.

The identification strategy relies on provincial variation in GDP, and on a difference in differences estimation from the severe 1999-2002 crisis. Since reliable data is available only until 2006, the ensuing analysis draws on medium term GDP

elasticities and on the evolution of these outcomes during the 1999-2001 recession and the 2001-2002 collapse. The identification strategy attempts to provide the best possible estimates given the constraints (discussed below) in data quality and availability for the crisis period in Argentina.

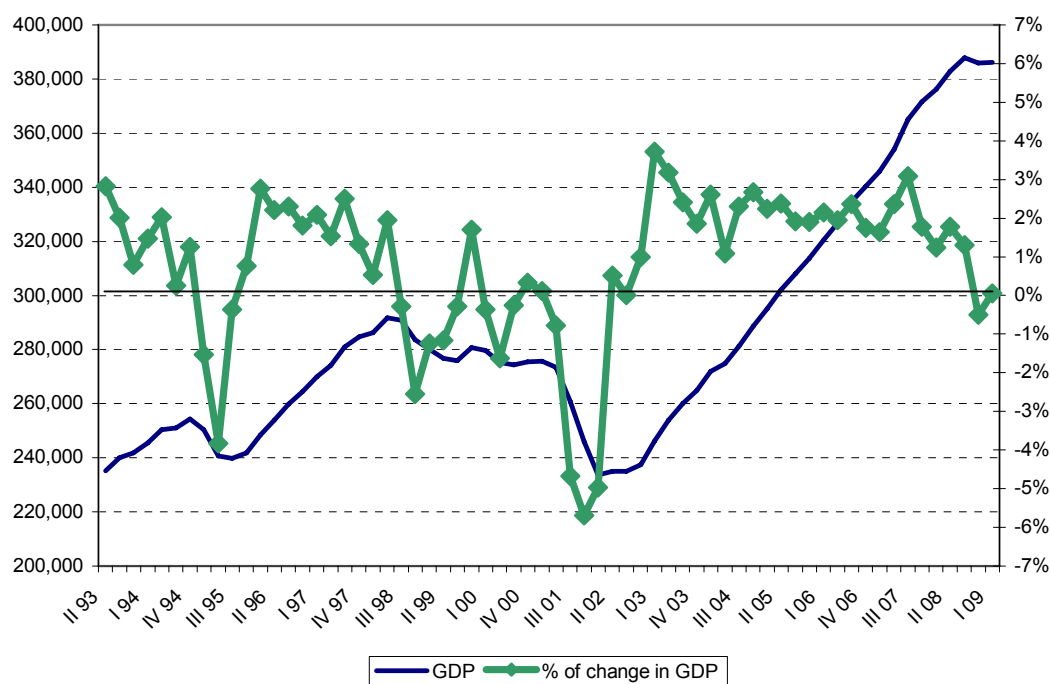
The rest of this paper is organized as follows: the next section presents a brief overview of the recent evolution of GDP and socioeconomic indicators for Argentina since the mid 1990s. The following section presents a descriptive approximation of the reaction of socioeconomic outcomes to shocks in aggregate output. Section 4 presents estimates from fixed effects regression at provincial level and then proceeds to simulate potential outcomes for the current crisis. Section 5 presents findings from a “worst-case” scenario, based on the impact of the 1999-2002 crisis on selected indicators, and provides some upper bound estimates of the effect of the current crisis. The last section presents a series of concluding remarks.

2. Argentina: crisis, recovery and socioeconomic outcomes²

a. Bust and boom: Argentina since the late 1990s

The evolution of GDP and socioeconomic indicators in Argentina since the early 1990s is shaped by macroeconomic trends mediated by economic policy and reforms. The 1990s were marked by a series of market oriented structural reforms, which resulted in some degree of macroeconomic stabilization (especially in terms of inflation), but also in increased exposure to international flows of capital and their reversals. Figure 1 shows the evolution of Gross Domestic Product (GDP) at constant 1993 prices and its growth rate for the period 1993-2009.³

Figure 1: Poverty headcount ratio and GDP growth



Source: Ministerio de Economía de la Nación (MECON)

² Some of the material in this section is based on Cruces and Gasparini (2008b).

³ The Figure corresponds to official national accounts, which have been questioned by academics, the private sector and international organizations since the intervention of the national statistical institute in early 2007. This fact and its implications are discussed in detail below.

The largest of such reversals prompted the “Tequila Crisis” in the mid 1990s. Growth resumed fairly strongly in the 1996-1998 period during the ensuing recovery. However, the continued exposure to international capital flows brought about by the currency board regime and the liberalization of the capital account hit the economy repeatedly at the end of the millennium. Policy inconsistencies (such as electoral spending and debt sustainability issues related to the transition to the fully-funded pension system), the exhaustion of the currency board mechanism, and an unfavorable international scenario deepened a recession which had started in 1999 and triggered a large crisis at the end of 2001. The economy entered a period of recession by 1999, which culminated in a major economic, banking and financial crisis in December 2001. The currency board system finally collapsed after restrictions were imposed on withdrawal of funds from the banking system, which triggered the currency’s devaluation.

The meltdown resulted in a large fall in output and employment: GDP fell 17 percent between 2000 and 2002, and unemployment rose to 19 percent. The recession and the ensuing crisis had a large impact on poverty. The combination of increasing prices (due to the devaluation) and falling nominal incomes (due to the sharp fall in economic activity) implied a jump in the official poverty rate from 38.3 percent in October 2001 to 53 percent in May 2002 (see Figure 2).

The crisis was followed by an unprecedented period of growth, sparked by the strong devaluation of the currency and the presence of a large unused capacity. By mid-2003 the economy picked up. The average annual growth rate in the ensuing period was exceptionally high, at 8 percent between 2003 and 2007, while the unemployment rate plummeted from more than 20 percent to 8 percent. Poverty and inequality indicators fell continuously during the same period.

This strong macroeconomic performance determined the evolution of all socioeconomic indicators during the recovery period. The fast economic recovery was propitiated by the new structure of relative prices that emerged from the strong devaluation of the peso in 2002: the fall in real wages increased the competitiveness of Argentina’s products and deterred imports. It was also helped by the commodity prices boom, which boosted the economy’s terms of trade, and the increased liquidity in international capital markets. These exceptional conditions in the international markets were also a key factor in the recovery. New taxes and a default on the government’s

debt obligations allowed a fiscal surplus that helped stabilize the economy. Social unrest and the political instability of 2001-2002 were curbed by a new, strong traditional Peronist government (2002-2003), and with the widespread coverage of a large cash transfer program (Cruces and Gasparini, 2008). Figure 3 presents the evolution of public social expenditure over the period. The Kirchner administration (2003-2007) did not innovate much from the economic policies inherited from the interim 2002-2003 Duhalde presidency. However, the Kirchner administration emphasized the recovery of stronger labor institutions, supporting the bargaining power of unions and innovating in cash transfer programs.

The end of the period is marked by the international financial crisis of 2007-2008, with the development of a major international financial crisis that affected world growth, commodity prices, and other relevant factors for Argentina. However, it should be stressed that even before the onset of the international crisis some internal factors, such as full employment in some sectors and increasing inflation, had by then already started to slow growth.

b. Short term effects of crises on socioeconomic outcomes

Argentina has a long history of economic crises. The 1980s were marked by hyperinflation – Gasparini and Cruces (2008) review the evidence on the regressive nature of the inflation tax. Despite the fluctuations during the 1990s, the most notable episode was the 2001-2002 financial and economic meltdown, which was unusually virulent even by Argentine standards.

Its impact on some aspects of wellbeing has been widely documented. Using a specific survey implemented by the World Bank in the midst of the crisis (June and July 2002); Adúriz, Giovagnoli and Fiszbein (2003) report that almost half of the households suffered a fall in nominal income, and document a change in household roles with respect to the labor market, with higher employment among secondary workers as a strategy to complement the fall in income from unemployed (or working reduced-hours) primary workers. Other coping strategies reflected in the survey include relying on the help of family and friends, reducing consumption of non basic goods and switching to cheaper products.

As in other crises in Latin America, the extremely high level of unemployment implied that school enrollment did not fall significantly among younger children, and

only slightly among those aged 16 to 18. Gasparini and Cruces (2008) report small but positive increases in enrollment rates between 2001 and 2003 for virtually all age groups, from 3 to 23. This issue is analyzed in more detail below.

One key component of the crisis was a large bank deposit freeze and liquidity restriction, which in principle has an ambiguous direct distributional effect. Halac and Schmukler (2004) find that the probability of having savings was positively and significantly associated with measures of income, but among those with savings, the less educated and those with lower incomes had a larger probability of being affected by the bank deposit freeze.

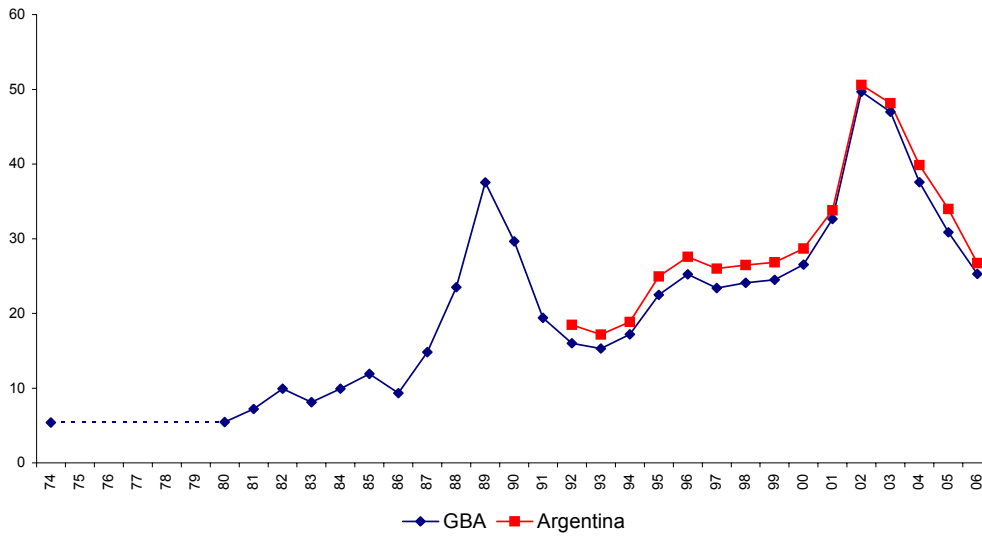
c. Evidence of hysteresis and long term effects of crises on socioeconomic outcomes

Understanding and accounting for crises is relevant, first and foremost, because of their large negative effect on household welfare. See for instance the discussion for Latin America and the Caribbean in Lustig (2000), and the comparative discussion of the impact of financial crises in the region and South-East Asia in Fallon and Lucas (2002). The available evidence clearly states that poor households in Argentina were more affected by crises than the non-poor (Cruces and Wodon, 2003). However, most of these factors tend to dissipate relatively quickly, through the increase in employment and income levels in the recovery periods.

While there is clear evidence of the short term effects of crises on poverty and employment (see Figure 2), their long term impact is harder to identify. The 2001-2002 crisis might have affected human capital accumulation in a permanent way through nutrition mechanisms, although there is no systematic evidence on the subject for Argentina (see Schady, 2005, for an analysis of the issue in Peru).

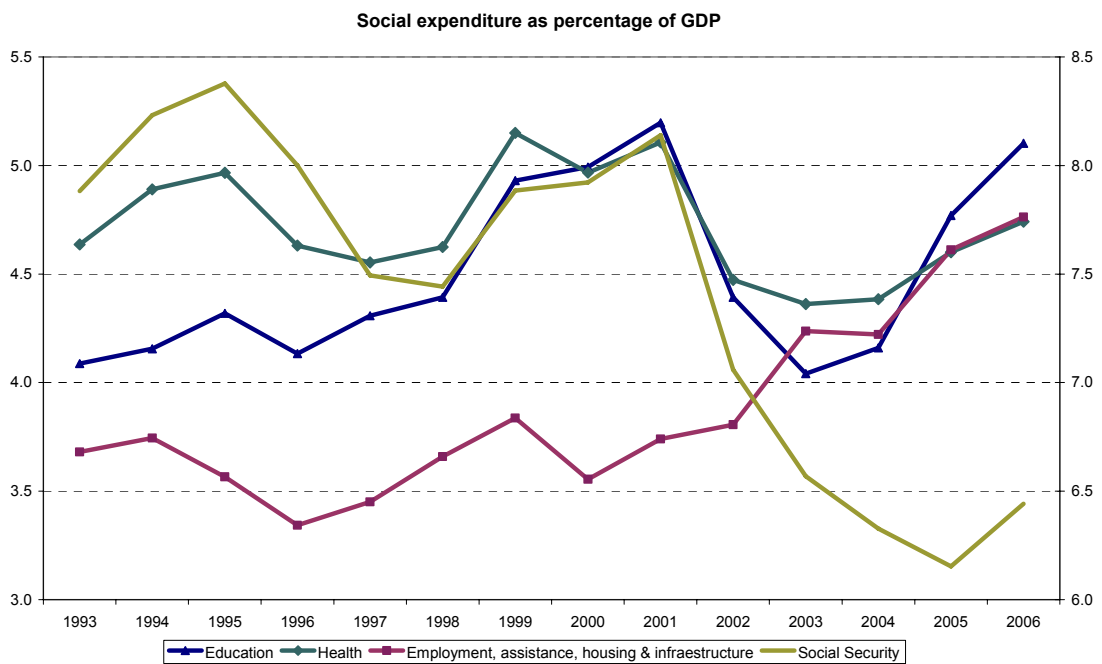
Schady (2006) and Ferreira and Schady (2008) review the literature on long term effects of downturns through human capital accumulation. The following sections assess whether the 1999-2001 recession and the 2001-2002 crisis in Argentina had an impact on enrollment levels, maternal and infant mortality and other outcomes related to household welfare.

Figure 2: Poverty headcount ratio
 Moderate official poverty line
 GBA and urban Argentina



Source: own calculations based on microdata from the *Encuesta Permanente de Hogares* (INDEC).

Figure 3: Social expenditure



Source: own calculations based on data from DGSC (2008)

3. Socioeconomic outcomes over the economic cycle

The first identification strategy to account for the effects of crises on socioeconomic outcomes relies on changes in aggregate output levels. The results in this section provide a baseline for the estimations below, and also introduce the primary outcomes of interest analyzed in this study.

The outcomes covered in the analysis are determined by the availability of reliable and periodic indicators. Fortunately, there is information on schooling, health, and poverty in relation to the Millennium Development Goals for 2015. Table 1 lists the outcomes of interest for the Argentine case that are directly measureable from various sources of information. The information to compute the indicators in Table 1 is drawn from a range of sources. For poverty and educational outcomes, the estimates correspond to micro data from the *Encuesta Permanente de Hogares* (EPH), a periodical household survey representative of urban areas which is carried out by the *Instituto Nacional de Estadísticas y Censos* (INDEC). Unfortunately, since mid-2007, the INDEC does not provide the microdata for the EPH, and thus the analysis in this paper only covers up to the second semester of 2006.

A major drawback of the EPH is that it does not provide information on health outcomes. Some periodical information is available at a more aggregated level (province) for mortality rates from INDEC (2009) and the *Dirección de Estadísticas e Información de Salud* (DEIS, 2009).

Table 1: Outcomes of interest and available indicators

Outcome group	Name	Definition
School attendance	School attendance 6 to 12 years old	Attendance rate for individuals aged 6 to 12
	School attendance 13 to 17 years old	Attendance rate for individuals aged 13 to 17
School delay	School delay 6 to 12 years old	School delay rate for individuals aged 6 to 12
	School delay 13 to 17 years old	School delay for individuals aged 13 to 17
Years of schooling	Years of education 6 to 13 years old	Years of schooling for individuals aged 6 to 12
	Years of education 13 to 17 years old	Years of schooling for individuals aged 13 to 17
	Years of education	Years of schooling
Schooling / Occupation	Not working nor attending school 13 to 17 years old	Rate of individuals aged 13 to 17 years old not working and not attending school
Child poverty	Child poverty 1.25 USD	Poverty headcount for children under 12 years old, using 1.25 USD PPP poverty line
	Child poverty 2.5 USD	Poverty headcount for children under 12 years old, using 2.5 USD PPP poverty line
	Child poverty 4 USD	Poverty headcount for children under 12 years old, using 4 USD PPP poverty line
Overall poverty	Poverty 1.25 USD	Poverty headcount for overall population using 1.25 USD PPP poverty line
	Poverty 2.5 USD	Poverty headcount for overall population using 2.5 USD PPP poverty line
	Poverty 4 USD	Poverty headcount for overall population using 4 USD PPP poverty line
Health outcomes	Maternal mortality	Maternal mortality for each 10,000 live births
	Infant mortality	Children up to 1 years old mortality for each 1,000 live births
	Low weight at birth	Children weighting less than 2500 grams at birth, for each 1,000 live births

Finally, the economic cycle is captured by Per Capita Gross Domestic Product (henceforth, GDPpc). The analysis in this section utilizes national GDP aggregates, and Section 4 exploits regional variation in output through a time-series of provincial GDP, computed for each of the 24 jurisdictions (23 provinces and one federal district) by the Argentine office of ECLAC (2009). Per capita figures are obtained by population estimates of each province and year (INDEC, 2009).

As mentioned in the introduction, an important limitation for the Argentine case is the lack of reliable and updated information after 2007. There are serious doubts over the reliability of data from the national statistics institute, INDEC, since most of its authorities were replaced during 2007. Moreover, the new authorities announced changes in the computation methodology of the consumer price index, which resulted in substantially lower levels of inflation, but they did not inform on this new methodology. This situation has implications for the analysis conducted in this document. On the one hand, there is no microdata from the EPH household survey since the beginning of the international liquidity crisis in August 2007. On the other hand, GDP growth figures are suspected of being manipulated since the end of 2008. The extrapolations for the 2007-2009 period will thus use a series of alternative figures for GDP growth.⁴

The lack of available information for the 2007-2009 crisis period implies that the focus is placed on how the socioeconomic indicators in Table 1 responded to previous episodes of aggregate shocks. The estimations for the 2007-2009 crisis rely on extrapolations from the period covering the 1995 financial crisis, the 1998 slump after the devaluation of Brazil, and the 2001-2002 crisis. The following table shows the evolution of GDP and these outcomes.

⁴ It should be noted that GDP figures in Argentina are estimated in real terms, so that the manipulation of the consumer price index since early 2007 does not have an effect on them. The consensus among experts seems to be that official GDP figures are reliable until the third trimester of 2008.

Table 2: National Per Capita GDP and socio-economic indicators

Year	Real GDPpc	School attendance 6 to 12 years old	School attendance 13 to 17 years old	School delay 6 to 12 years old	School delay 13 to 17 years old	Years of education 6 to 13 years old	Years of education 13 to 17 years old	Years of education	Not working nor attending school 13 to 17 years old
1993	6,973	98.2%	77.8%	1.8%	35.6%	3.15	8.07	7.76	0.14
1994	7,286	98.3%	79.7%	1.7%	34.4%	3.07	8.07	7.77	0.13
1995	6,992	98.7%	79.1%	6.1%	35.1%	2.75	7.84	7.44	0.15
1996	7,291	98.8%	78.8%	6.0%	35.9%	2.67	7.91	7.53	0.16
1997	7,792	98.9%	83.5%	5.4%	34.7%	2.63	7.86	7.56	0.12
1998	8,002	99.1%	87.1%	6.2%	29.8%	2.63	7.95	7.62	0.09
1999	7,648	99.3%	88.5%	6.0%	30.0%	2.68	7.97	7.74	0.08
2000	7,508	99.2%	91.3%	5.8%	28.2%	2.70	7.94	7.70	0.06
2001	7,105	98.6%	92.2%	6.4%	28.6%	2.66	7.96	7.82	0.06
2002	6,270	99.6%	92.9%	5.7%	24.7%	2.72	7.99	7.95	0.05
2003	6,761	98.7%	90.1%	1.3%	24.8%	3.01	8.24	8.32	0.08
2004	7,302	98.6%	89.9%	5.6%	24.8%	2.85	8.22	8.13	0.08
2005	7,897	99.0%	92.6%	6.2%	23.2%	2.85	8.22	8.23	0.06
2006	8,482	99.3%	92.2%	4.9%	24.9%	2.75	8.20	8.29	0.06

Year	Real GDPpc	Child poverty 1.25 USD	Child poverty 2.5 USD	Child poverty 4 USD	Poverty 1.25 USD	Poverty 2.5 USD	Poverty 4 USD	Maternal mortality	Infant mortality	Low weight at birth
1993	6,973	3.6%	12.4%	25.6%	2.1%	6.8%	15.2%	4.6	22.9	63.1
1994	7,286	3.1%	11.4%	28.2%	1.9%	6.6%	17.3%	3.9	22.0	63.3
1995	6,992	7.0%	17.3%	34.5%	3.8%	9.4%	20.6%	4.4	22.2	66.8
1996	7,291	7.7%	20.1%	37.6%	4.3%	11.0%	22.5%	4.7	20.9	.
1997	7,792	6.6%	17.8%	35.9%	3.7%	9.8%	21.4%	3.8	18.8	69.7
1998	8,002	7.1%	18.6%	36.5%	3.7%	10.1%	21.3%	3.8	19.1	68.0
1999	7,648	6.5%	18.6%	36.3%	3.7%	10.7%	22.0%	4.1	17.6	69.1
2000	7,508	7.8%	21.4%	39.7%	4.3%	12.6%	24.9%	3.5	16.6	70.3
2001	7,105	12.5%	27.7%	46.8%	7.3%	17.0%	30.6%	4.3	16.3	72.5
2002	6,270	20.5%	41.8%	60.1%	11.9%	27.0%	42.5%	4.6	16.8	76.5
2003	6,761	14.5%	34.1%	54.0%	9.4%	22.6%	37.4%	4.4	16.5	78.5
2004	7,302	12.1%	30.0%	48.7%	7.3%	18.3%	32.5%	4.0	14.4	74.6
2005	7,897	8.9%	23.1%	42.1%	5.1%	13.8%	27.0%	3.9	13.3	71.8
2006	8,482	8.1%	19.9%	36.7%	4.6%	11.5%	22.8%	4.8	12.9	.

Source: Own calculations using data from the *Encuesta Permanente de Hogares* (INDEC), *Dirección de Estadísticas e Información de Salud* (Ministerio de Salud) and on national accounts (INDEC, 2009; MECON, 2009).

Notes:

- Per Capita GDP at 1993 prices

- Variables obtained from the EPH, are computed using 15 *aglomerados* to ensure comparability.

The evolution of the indicators presented in Table 2 shows some correlation between outcomes and aggregate shocks. For instance, poverty clearly increased after 1995 and 2001. With respect to health outcomes, observation of Table 2 indicates a modest rise in maternal and infant mortality. The effect on educational outcomes shows a more ambiguous pattern.

A useful instrument to complement this overview is to compute the income elasticity of each outcome, because this allows *ceteris paribus* predictions for each of the outcomes with respect to GDP changes. If we divide the yearly change in socio-economic variables by the percentage of change in Per Capita GDP, we can compute the semi-elasticities in the following manner:

$$\varepsilon_t = \frac{(index_t - index_{t-1})}{(GDPpc_t - GDPpc_{t-1}) / GDPpc_{t-1}} \quad (1)$$

Table 3: Semi-elasticities of national Per Capita GDP to the outcome of interest

Year	School attendance 6 to 12 years old	School attendance 13 to 17 years old	School delay 6 to 12 years old	School delay 13 to 17 years old	Years of education 6 to 13 years old	Years of education 13 to 17 years old	Years of education	Not working nor attending school 13 to 17 years old	
1994	0.028	0.411	-0.028	-0.274	-1.874	0.153	0.137	-0.148	
1995	-0.086	0.158	-1.099	-0.170	7.878	5.774	8.151	-0.473	
1996	0.039	-0.071	-0.024	0.196	-1.923	1.585	2.077	0.262	
1997	0.007	0.697	-0.088	-0.172	-0.576	-0.704	0.412	-0.607	
1998	0.072	1.310	0.281	-1.826	0.261	3.248	2.355	-1.160	
1999	-0.058	-0.327	0.033	-0.028	-1.087	-0.507	-2.730	0.228	
2000	0.057	-1.529	0.109	0.967	-1.034	1.453	2.068	0.853	
2001	0.111	-0.170	-0.113	-0.081	0.719	-0.373	-2.100	0.126	
2002	-0.078	-0.059	0.062	0.330	-0.466	-0.211	-1.166	0.016	
2003	-0.105	-0.364	-0.564	0.010	3.810	3.172	4.753	0.357	
2004	-0.021	-0.016	0.536	-0.006	-2.084	-0.254	-2.439	-0.055	
2005	0.057	0.332	0.074	-0.198	0.044	0.053	1.212	-0.226	
2006	0.035	-0.055	-0.175	0.229	-1.289	-0.307	0.777	-0.029	
Average	0.005	0.024	-0.077	-0.079	0.183	1.006	1.039	-0.066	
Partial elasticity from 1993 to 2006	0.050	0.665	0.142	-0.498	-1.824	0.604	2.417	-0.373	
Year	Child poverty 1.25 USD	Child poverty 2.5 USD	Child poverty 4 USD	Poverty 1.25 USD	Poverty 2.5 USD	Poverty 4 USD	Maternal mortality	Infant mortality	Low weight at birth
1994	-0.117	-0.212	0.583	-0.043	-0.058	0.466	-15.576	-20.026	4.918
1995	-0.979	-1.466	-1.552	-0.465	-0.717	-0.833	-12.391	-4.956	-87.440
1996	0.162	0.646	0.711	0.123	0.365	0.426	7.013	-30.388	.
1997	-0.161	-0.336	-0.246	-0.093	-0.170	-0.159	-13.101	-30.569	.
1998	0.174	0.318	0.226	-0.021	0.097	-0.024	0.000	11.138	-63.088
1999	0.131	0.007	0.032	-0.013	-0.145	-0.165	-6.773	33.867	-25.242
2000	-0.683	-1.524	-1.869	-0.338	-1.004	-1.589	32.820	54.700	-65.864
2001	-0.884	-1.180	-1.313	-0.560	-0.820	-1.061	-14.907	5.590	-40.295
2002	-0.682	-1.195	-1.129	-0.385	-0.851	-1.009	-2.554	-4.256	-34.218
2003	-0.766	-0.980	-0.770	-0.310	-0.555	-0.654	-3.126	-4.244	24.950
2004	-0.299	-0.509	-0.665	-0.261	-0.538	-0.607	-4.354	-25.809	-47.900
2005	-0.400	-0.846	-0.808	-0.272	-0.553	-0.671	-1.311	-13.508	-34.881
2006	-0.107	-0.438	-0.738	-0.066	-0.318	-0.571	12.141	-5.396	.
Average	-0.355	-0.594	-0.580	-0.208	-0.405	-0.496	-1.701	-2.604	-36.906
Partial elasticity from 1993 to 2006	0.206	0.348	0.510	0.115	0.216	0.353	0.924	-46.195	40.335

Source: Own calculations based on national accounts (INDEC, 2009; MECON, 2009).

The literature on the impact of aggregate shocks on socioeconomic outcomes shows that a number of effects are in play during a crisis (Ferreira and Schady, 2008). These depend on how households respond to income shocks, and on the importance of income and substitution effects. Ex ante, the prediction for school attendance and years of schooling is ambiguous, depending on the country's level of development, although for Argentina it is possible that the effect is positive. Conversely, values for school delay, children not working nor attending school, poverty and health outcomes seem likely to be affected negatively by falls in GDPpc.

The results in Table 3 show that not all values have the expected signs. Nonetheless, averages of the semi-elasticities do correspond with ex ante expected behavior. Educational outcomes seem to be positively related to income growth (pro-cyclical), while poverty and mortality fall during growth episodes (counter-cyclical).

However, these estimates only correspond to a first approximation of how socioeconomic outcomes are related to aggregate output. The estimates in Table 3 are indicative of these outcomes' behavior but contain two major limitations: first, the unconditional analysis does not consider sample characteristics that are not necessarily related to economic development; and second, they do not indicate whether these results are statistically significant.

The next section deals with these caveats by employing a conditional analysis to estimate semi-elasticities based on fixed effects panel regressions at provincial level.

4. Aggregate output elasticities of socioeconomic outcomes

This section presents estimations of the conditional relationship between changes in aggregate output and socioeconomic outcomes. The results provide consistent estimates of the response (semi-elasticities) of education, health and deprivation variables to the economic cycle. The estimates facilitate extrapolations to fill the gap in information for the 2006-2008 period, and allow simulation of the impact of the 2007-2009 financial crisis in Argentina.

The semi-elasticities are estimated by regressions models with provincial fixed-effects and weighted by provincial population for each outcome of interest. This approach exploits GDP and outcome variation across provinces. The estimated model is of the following form:

$$Y_{jt} - Y_{jt-1} = \alpha + \beta(\log GDPpc_{jt} - \log GDPpc_{jt-1}) + \theta' X_{jt} + \sigma' F_j + \varepsilon_{jt} \quad (2)$$

where Y_{jt} denotes the outcome of interest for province j in time t . X_{jt} are a series of time varying covariates (e.g. change in gender and age composition of the population, institutional reforms)⁵ for each province. The term F_j captures provincial fixed effects. The identification strategy for these estimates relies on differential effects by province of a given aggregate crisis or recovery episode, and therefore the estimation does not include time period fixed effects, which would capture most of the relevant variation. β is the parameter of interest, which consistently estimates the semi-elasticity of the selected outcome with respect to Per Capita GDP.

The data consists of a panel of provinces with information on Per Capita GDP, socioeconomic outcomes and a series of provincial characteristics for the period 1993-2006. The surveys used to calculate the indicators for 1993-2002 correspond to the October round of the EPH, and from 2003 onwards the second semester round is used. To ensure comparability across years, the same regions are used throughout the entire analysis. Table 4 shows the results of estimation of (2) using this information.

⁵ The “Ley Federal de Educación” (FEL) of 1993 extended compulsory education from 7 to 9 years in length. However, the reform was implemented in different provinces at different points in time. The regressions in this section control for this varying implementation pattern, which might affect enrollment levels over and above the effect of changes in aggregate output. See Princz (2008) and Lopez Boo (2009) for details of the reform and estimates of its effects.

Table 4: Results of fixed effects models

Dependent Variable: Change for each socioeconomic indicator								
	School attendance 6 to 12 years old	School attendance 13 to 17 years old	School gap 6 to 12 years old	School gap 13 to 17 years old	Years of education 6 to 13 years old	Years of education 13 to 17 years old	Years of education	Not working nor attending school 13 to 17 years old
% change in GDPpc	-0.0096 (0.51)	-0.0022 (0.05)	-0.0610 (1.09)	0.0429 (0.66)	0.1484 (0.42)	0.1218 (0.45)	0.2057 (0.59)	-0.0257 (0.68)
Change in mean age	-0.0024 (1.75)*	-0.0064 (1.05)	-0.0060 (0.93)	0.0044 (0.51)	0.1197 (3.04)***	0.1198 (2.22)**	0.1386 (3.39)***	0.0022 (0.41)
Change in male rate	-0.0729 (0.77)	-0.6539 (1.96)*	0.3550 (0.89)	-0.0374 (0.06)	-0.7670 (0.31)	-0.1491 (0.05)	-2.4576 (0.90)	0.4393 (1.34)
Full Implementation of Fed. Ed. Law	0.0003 (0.13)	0.0402 (3.68)***	-0.0059 (0.83)	-0.0233 (2.39)**	0.0245 (0.50)	0.0694 (1.35)	0.0569 (1.20)	-0.0375 (3.59)***
Partial Implementation of Fed. Ed. Law	-0.0005 (0.13)	0.0286 (2.76)***	-0.0173 (1.78)*	-0.0256 (1.44)	0.0645 (1.01)	0.1075 (1.74)*	0.1094 (2.35)**	-0.0113 (1.00)
Constant	0.0013 (1.16)	0.0051 (1.68)*	0.0055 (1.44)	-0.0055 (1.24)	-0.0423 (1.68)*	-0.0170 (0.79)	0.0257 (0.97)	0.0000 (0.01)
Observations	234	234	234	234	234	234	234	234
R-squared	0.045	0.265	0.075	0.092	0.101	0.106	0.138	0.235

Dependent Variable: Change for each socioeconomic indicator									
	Child Poverty 1.25 USD	Child Poverty 2.5 USD	Child Poverty 4 USD	Poverty 1.25 USD	Poverty 2.5 USD	Poverty 4 USD	Maternal mortality	Infant mortality	Low weight at birth
% change in GDPpc	-0.4134 (8.00)***	-0.6721 (8.83)***	-0.6192 (7.85)***	-0.2415 (7.28)***	-0.4811 (7.87)***	-0.5644 (7.45)***	-3.8806 (2.43)**	-3.9379 (1.67)*	-20.5454 (3.95)***
Change in mean age	-0.0029 (0.37)	-0.0032 (0.34)	-0.0079 (0.85)	-0.0004 (0.10)	-0.0027 (0.42)	-0.0058 (0.72)	-0.0356 (0.14)	-0.0857 (0.29)	0.1570 (0.19)
Change in male rate	-0.2358 (0.52)	-0.3061 (0.48)	0.3158 (0.42)	-0.1241 (0.45)	-0.1121 (0.23)	0.3136 (0.49)	21.4117 (1.21)	-35.5322 (2.07)**	21.0847 (0.39)
Constant	0.0100 (2.52)**	0.0175 (3.26)***	0.0197 (3.33)***	0.0055 (2.34)**	0.0117 (3.06)***	0.0157 (3.22)***	0.0096 (0.08)	-0.7278 (4.17)***	0.6687 (1.85)*
Observations	234	234	234	234	234	234	234	234	191
R-squared	0.390	0.498	0.397	0.384	0.484	0.449	0.036	0.074	0.181

Notes:

- Robust t-statistics in parentheses

- * Significant at 10%; ** significant at 5%; *** significant at 1%

The results indicate that there is no significant relationship between the evolution of Per Capita GDP and a number of educational indicators, while there are strong and significant effects for a series of poverty measures. For instance, a 1% increase in Per Capita GDP reduces child poverty between 0.42 and 0.67 percentage points (PP), while it reduces overall poverty between 0.24 and 0.56 PP (depending on the chosen poverty line).

Additionally, the results indicate significant effects on health indicators. A 1% increase in Per Capita GDP reduces maternal mortality in 0.04 cases per 10,000 births, infant mortality in 0.04 cases for each 1000 births, and also reduces in 0.21 cases for each 1000 the number of children born with low weight (less than 2.5Kg).

Table 5: Simulations of the effect of the 2007-2009 crisis on poverty

Variable	Child Poverty 1.25 USD	Child Poverty 2.5 USD	Child Poverty 4 USD	Poverty 1.25 USD	Poverty 2.5 USD	Poverty 4 USD	Maternal mortality	Infant mortality	Low weight at birth
Level at 2006	8.1%	19.9%	36.7%	4.6%	11.5%	22.8%	4.8	12.9	70.3
Official GDPpc Growth from 2006q4 to 2008q2	10.8%								
Partial elasticity	-0.4134	-0.6721	-0.6192	-0.2415	-0.4811	-0.5644	-3.8806	-3.9379	-20.5454
Extrapolated level at 2008q2	3.6%	12.6%	30.0%	2.0%	6.3%	16.7%	4.4	12.5	68.1
Official GDPpc growth from 2008q2 to 2009q2	-1.7%								
World Economic Outlook (WEO) forecast for 2009	-3.5%								
Intermediate scenario	-5.0%								
Average of private sector expectations from 2008q2 to 2009q2	-7.4%								
Extreme Scenario	-10.0%								
Extrapolated level to Official GDPpc growth at 2009q2	4.3%	13.8%	31.0%	2.4%	7.1%	17.7%	4.4	12.5	68.4
Extrapolated level WEO GDPpc growth in 2009	5.1%	15.0%	32.1%	2.9%	8.0%	18.7%	4.5	12.6	68.8
Extrapolated level to Intermediate scenario GDPpc growth	5.7%	16.0%	33.1%	3.2%	8.7%	19.5%	4.6	12.7	69.1
Extrapolated level to private GDPpc growth at 2009q2	6.7%	17.6%	34.6%	3.8%	9.8%	20.9%	4.7	12.8	69.6
Extrapolated level to Extreme scenario GDPpc growth	7.7%	19.3%	36.2%	4.4%	11.1%	22.4%	4.8	12.9	70.1

*for Children born under 2,5Kg in weight the last available data is from 2005 (71.8). The value for 2006 is obtained using the partial elasticity and the GDPpc growth between 2005 and 2006 (7.4%).

Taking the results from Table 4, and under the assumption that these semi-elasticities are stable in the ensuing period, the next table shows the result of a number of extrapolation exercises for the 2007-2009 episode. The first row presents the last observation for poverty and other indicators. According to INDEC, the Per Capita GDP grew 10.8 percent from the end of 2006 to the second quarter of 2008. Using the estimated elasticities, the fourth row presents an extrapolated level of the variable of interest. In the case of child poverty (using the 2.5 dollars PPP international poverty line) its level at the second quarter of 2008 would be 12.6 percent.

From the second quarter of 2008 to the same period of 2009, official data shows that Per Capita GDP fell by 1.7 percentage points. This is taken as a baseline scenario for the simulations. In addition to the official government estimate, the exercises also consider four alternatives: (i) the World Economic Outlook (IMF) estimation of Per Capita GDP fell between 2008 and 2009, (ii) a decrease of 5 percent, (iii) an average of private sector and academic estimates between the second quarter of 2008 and 2009,⁶ and (iv) an extreme case of a 10 percent fall in output.

⁶ This average of private estimations indicates that GDP fell 6.4% from 2008q2 to 2009q2. This value results in -7.4% in terms of Per Capita GDP. The report is based on a newspaper survey of private sector analysts (Clarín, September 19, 2009) – the Argentina Central Bank discontinued its own official survey of private sector expectations in 2008.

Table 5 shows an expected increase in poverty due to the crisis, even in the most moderate scenario. For instance, for child poverty, the official scenario indicates an increase in deprivation by 1.1 percentage point, with increasing values for more severe scenarios: 2.4 for the first, 3.4 for the second, 5 for the third, and 6.7 percentage points for the fourth extreme projection. It is interesting to note that poverty does not reach the levels reported in 2006 (before the crisis) for all poverty lines.

However, a weakness of the previous estimates is that they assume a symmetrical relationship between the evolution of GDP and the outcomes of interest for both growth and downturn episodes. A consequence of this assumption is a possible overestimation of the effect for the growth period and an underestimation for recessions. As an illustrative example, Figure 4 plots the relationship between changes in GDP and the percentage change in the poverty headcount (based on the 2 dollars PPP international poverty line). Poverty seems to increase markedly during downturns. In growth periods poverty falls but at a slower rate compared to the response during recession, indicating an asymmetrical response of deprivation measures to the economic cycle.

Figure 4. GDP and poverty rate changes.

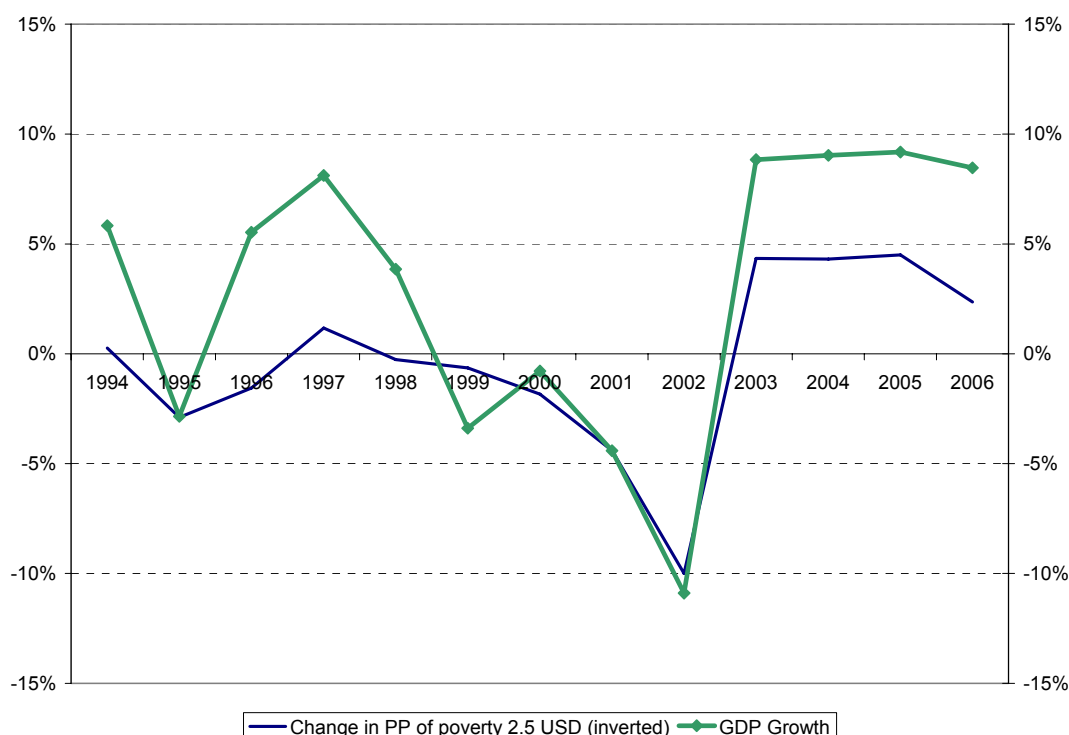


Table 6: Results of heterogeneous fixed effects models.

Dependent Variable: Change for each socioeconomic indicator								
	School attendance 6 to 12 years old	School attendance 13 to 17 years old	School gap 6 to 12 years old	School gap 13 to 17 years old	Years of education 6 to 12 years old	Years of education 13 to 17 years old	Years of education	Not working nor attending school 13 to 17 years old
% change in GDPpc (Positives)	0.0224 (0.90)	-0.0125 (0.13)	-0.2098 (2.21)**	-0.0989 (1.01)	0.7570 (1.27)	0.5666 (0.91)	1.5805 (2.43)**	-0.0529 (0.60)
% change in GDPpc (Negatives)	-0.0372 (1.01)	0.0067 (0.10)	0.0681 (0.97)	0.1660 (1.51)	-0.3797 (0.59)	-0.2641 (0.93)	-0.9873 (3.07)***	-0.0021 (0.03)
Change in mean age	-0.0027 (1.89)*	-0.0063 (1.07)	-0.0048 (0.80)	0.0056 (0.63)	0.1147 (2.94)***	0.1162 (2.13)**	0.1274 (3.29)***	0.0024 (0.47)
Change in male rate	-0.1067 (1.08)	-0.6430 (1.88)*	0.5127 (1.35)	0.1130 (0.18)	-1.4122 (0.59)	-0.6206 (0.23)	-3.9151 (1.58)	0.4681 (1.40)
Full Implementation of Federal Education Law	0.0006 (0.32)	0.0401 (3.64)***	-0.0075 (1.14)	-0.0248 (2.57)**	0.0309 (0.61)	0.0741 (1.42)	0.0714 (1.50)	-0.0378 (3.60)***
Partial Implementation of Federal Education Law	0.0000 (0.01)	0.0284 (2.67)***	-0.0197 (2.05)**	-0.0279 (1.56)	0.0744 (1.18)	0.1147 (1.82)*	0.1316 (2.80)***	-0.0118 (1.02)
Constant	-0.0006 (0.43)	0.0057 (1.06)	0.0144 (2.98)***	0.0030 (0.56)	-0.0787 (1.94)*	-0.0435 (1.46)	-0.0564 (1.52)	0.0016 (0.31)
Observations	234	234	234	234	234	234	234	234
R-squared	0.066	0.266	0.107	0.109	0.113	0.112	0.197	0.237

Dependent Variable: Change for each socioeconomic indicator									
	Child Poverty 1.25 USD	Child Poverty 2.5 USD	Child Poverty 4 USD	Poverty 1.25 USD	Poverty 2.5 USD	Poverty 4 USD	Maternal mortality	Infant mortality	Low weight at birth
% change in GDPpc (Positives)	-0.3845 (2.84)***	-0.5590 (3.11)***	-0.5255 (2.67)***	-0.2463 (3.11)***	-0.3787 (2.98)***	-0.4586 (2.70)***	-8.9628 (2.47)**	5.4439 (1.22)	-11.3543 (1.13)
% change in GDPpc (Negatives)	-0.4384 (6.57)***	-0.7700 (6.41)***	-0.7003 (5.99)***	-0.2374 (4.39)***	-0.5698 (4.84)***	-0.6560 (4.67)***	0.5205 (0.14)	-12.0624 (5.88)***	-25.0293 (2.71)***
Change in mean age	-0.0031 (0.38)	-0.0042 (0.42)	-0.0087 (0.87)	-0.0004 (0.09)	-0.0036 (0.52)	-0.0067 (0.78)	0.0094 (0.04)	-0.1687 (0.63)	0.1597 (0.22)
Change in male rate	-0.2661 (0.53)	-0.4249 (0.62)	0.2174 (0.28)	-0.1191 (0.40)	-0.2197 (0.44)	0.2025 (0.31)	26.7483 (1.52)	-45.3836 (2.62)***	26.6478 (0.59)
Constant	0.0083 (1.28)	0.0109 (1.19)	0.0142 (1.40)	0.0058 (1.50)	0.0058 (0.87)	0.0096 (1.10)	0.3048 (1.30)	-1.2728 (4.87)***	-0.0050 (0.01)
Observations	234	234	234	234	234	234	234	234	191
R-squared	0.390	0.501	0.399	0.384	0.490	0.453	0.045	0.116	0.198

otes:

- Robust t-statistics in parentheses

- * Significant at 10%; ** significant at 5%; *** significant at 1%

To account for this heterogeneity in responses to GDP changes, Table 6 repeats the estimation of the fixed effects models, differentiating between growth and recession periods.

The results show differential correlations between socioeconomic indicators and Per Capita GDP during growth and recession periods. For instance, the results for poverty indicate that in periods of economic growth, the effect is generally lower and less significant. A 1% fall in Per Capita GDP increases poverty significantly - between 0.44 and 0.77 percentage points for children and 0.24 and 0.66 percentage points for overall poverty depending on the selected poverty line. Most of the other indicators show no significant changes during growth, with the exception of years of education and maternal mortality rates. An increase of 1% in Per Capita GDP lowers maternal mortality by 0.9 per 10000 cases.

Table 7: Simulations of the effect of the 2007-2009 crisis on poverty – asymmetrical effects.

Variable	Child Poverty 1.25 USD	Child Poverty 2.5 USD	Child Poverty 4 USD	Poverty 1.25 USD	Poverty 2.5 USD	Poverty 4 USD	Maternal mortality	Infant mortality	Low weight at birth
Level at 2006	8.1%	19.9%	36.7%	4.6%	11.5%	22.8%	4.8	12.9	70.3
Official GDPpc Growth from 2006q4 to 2008q2	10.8%								
Partial elasticity +	-0.3845	-0.5590	-0.5255	-0.2463	-0.3787	-0.4586	-9.0	5.4	-11.4
-	-0.4384	-0.7700	-0.7003	-0.2374	-0.5698	-0.6560	0.5	-12.1	-25.0
Extrapolated level at 2008q2	3.9%	13.8%	31.0%	2.0%	7.4%	17.9%	3.8	13.5	69.0
Official GDPpc growth from 2008q2 to 2009q2	-1.7%								
World Economic Outlook (WEO) forecast for 2009	-3.5%								
Intermediate scenario	-5.0%								
Average of private sector expectations from 2008q2 to 2009q2	-7.4%								
Extreme Scenario	-10.0%								
Extrapolated level to Official GDPpc growth at 2009q2	4.7%	15.2%	32.2%	2.4%	8.4%	19.0%	3.8	13.7	69.5
Extrapolated level WEO GDPpc growth in 2009	5.5%	16.5%	33.4%	2.8%	9.4%	20.2%	3.8	13.9	69.9
Extrapolated level to Intermediate scenario GDPpc growth	6.1%	17.7%	34.5%	3.2%	10.2%	21.1%	3.8	14.1	70.3
Extrapolated level to private GDPpc growth at 2009q2	7.2%	19.5%	36.2%	3.7%	11.6%	22.7%	3.8	14.4	70.9
Extrapolated level to Extreme scenario GDPpc growth	8.3%	21.5%	38.0%	4.3%	13.1%	24.4%	3.8	14.7	71.6

Most notably, downturns are strongly correlated with the worsening of indicators besides poverty. Infant mortality and low weight at birth (children born under 2.5Kg) increase by 0.12 and 0.25 per 1000 cases respectively, for each percent reduction in Per Capita GDP, and they do not fall significantly with increases in Per Capita GDP.

Table 7 presents the extrapolations and simulations accounting for this heterogeneity. In this case, the original extrapolation of poverty rates shows a more modest reduction. The results for the same scenarios with these corrected extrapolations yield higher effects on poverty than the previous estimation. The impact of the crisis on child poverty (using the 2.5 USD poverty line) ranges from 1.3 PP to 7.6 percentage points. Results for health indicators are also higher than those in Table 5: infant mortality and low weight at birth increase by 1.2 and 2.5 per 1000 cases respectively in the extreme scenario.

Summing up, the results from the provincial panel estimation indicate the presence of strong and significant effects of the economic cycle for child and overall poverty and for health outcomes, but no effect for educational outcomes in Argentina.

The results for poverty are the less surprising and have been extensively documented before (Cruces and Wodon, 2003; Gasparini and Cruces, 2008). The effects

on health outcomes, however, have not been covered comprehensively for Argentina before. The estimates in this section indicate that some health outcomes are counter-cyclical, and these are in line with previous findings for India (Bhalotra, 2009) and other developing countries (Baird et al., 2009), whereas Dehejia and Lleras-Muney (2004) find for the United States that similar outcomes are pro-cyclical.

The results indicate that, in general, individuals allocate more time to schooling during economic downturns, raising their years of education and reducing the schooling gap. There are some plausible explanations for this effect. First, because outcomes involve inter-temporal decisions, a short run income change has opposing income and substitution effects (Ferreira and Schady, 2009). Second, outcomes are clearly dependent on long run behavior. Third, the level of development of credit markets has direct effects on the coping mechanisms of households with respect to periods of economic downturn. Finally, changes in educational systems over the same period may add significant levels of noise to the presented estimates.⁷

⁷ As previously stated, in the mid-1990s, Argentina reformed its educational system. Primary schooling (which is compulsory) increased from 7 to 9 years. The secondary system in turn, was decreased from 5 years to 3. However, the most important characteristic of this policy change is that implementation of the new system was gradual across provinces and in some cases was not implemented. The regressions attempt to control for these effects. See Princz (2008) and Lopez Boo (2009) for details of the reform and estimates of its effects.

5. Upper bounds for the effects of a crisis: evidence from a “worst-case” scenario

The analysis in the previous section indicated a correlation between the evolution of the economy and the outcomes of interest. With this evidence in mind, this section takes an alternative approach to estimate the effect of economic crises on socioeconomic outcomes. The methodology compares the evolution of outcomes during the severe 1999-2002 recession and crisis for Argentina with their evolution during a stable growth period. The use of the unprecedented 1999-2002 crisis provides a “worst case scenario” to find an upper bound of the impact of a fall in aggregate output on socioeconomic outcomes.

The period 1999-2002 represents the longest downturn in the period under analysis. While using the GDP definition of crisis⁸ the whole period is a long downturn, it can be divided into a 1999-2001 recession and the 2001-2002 meltdown. In comparison, the period 1995-1998 is stable, and constitutes the reference or baseline for the comparison. The number of years is the same for both the crisis and the normal episodes.

A simple exercise consists in comparing the evolution of socioeconomic outcomes for both periods. However, as mentioned before, the response time may not be the same for all variables, and other differences have to be accounted for. With the purpose of finding an upper bound for the impact of the crisis, the period considered as crisis is defined in a flexible manner, using 1999-2002 and 2000-2003 depending on the observed evolution of the outcome of interest.

The econometric specification for the estimates is:

$$Y_{jt} = \alpha + \beta T + \gamma D + \delta T * D + \theta' X_{jt} + \sigma' F_j + \varepsilon_{jt} \quad (3)$$

where Y_{jt} once again denotes the outcome of interest for province j in time t . The main difference with (2) is the inclusion of T and D ; the first being a dummy variable that is equal to 1 during the crisis period (1999-2002, or equivalently 2000-2003), while D identifies the last year in each period (crisis and reference). Finally, ε_{jt} is an idiosyncratic shock uncorrelated with the regressors. The parameter of interest is now δ , which captures the difference in outcomes attributable to the crisis.

⁸ This means periods in which Per Capita GDP falls.

Table 8: Comparison of 1999-2002 crisis with previous episode (“worst case scenario” estimation).

Dependent Variable	School attendance 6 to 12 years old	School attendance 6 to 12 years old in the first income quintil	School attendance 13 to 17 years old	School attendance 13 to 17 years old in the first income quintil	Not working nor attending school 13 to 17 years old	Not working nor attending school 13 to 17 years old in the first income quintil
T = 0	1995-1998	1995-1998	1995-1998	1995-1998	1995-1998	1995-1998
T = 1	2000-2003	2000-2003	2001-2004	2001-2004	2001-2004	2001-2004
T	-0.0006 (0.11)	-0.0130 (1.06)	0.0668 (3.35)***	0.1071 (2.59)**	-0.0504 (2.92)***	-0.0688 (1.85)*
D	0.0009 (0.25)	-0.0042 (0.57)	0.0351 (2.89)***	0.0538 (1.95)*	-0.0324 (3.03)***	-0.0524 (2.44)**
T*D	-0.0063 (1.77)*	-0.0054 (0.72)	-0.0555 (2.95)***	-0.0762 (2.01)**	0.0481 (3.04)***	0.0659 (1.88)*
Male	0.0021 (1.37)	0.0028 (0.79)	-0.0007 (0.13)	-0.0065 (0.47)	0.0079 (1.89)*	0.0165 (1.09)
Age	-0.0509 (0.26)	-0.5798 (1.18)	-0.0447 (0.07)	0.6415 (0.48)	0.3420 (0.65)	1.1951 (0.89)
Full Imp.	0.0033 (1.18)	0.0101 (1.71)*	0.0336 (3.49)***	0.0393 (1.96)*	-0.0231 (2.89)***	-0.0436 (2.56)**
Partial Imp.	0.0012 (0.38)	0.0055 (0.70)	0.0060 (0.64)	-0.0063 (0.32)	-0.0032 (0.40)	-0.0085 (0.48)
Fed. Ed. Law	0.9468 (7.53)***	1.1721 (3.85)***	0.8413 (2.07)**	0.5883 (0.66)	-0.2619 (0.84)	-0.8385 (0.85)
Constant						
Observations	83	83	83	83	83	83
R-squared	0.571	0.406	0.891	0.756	0.858	0.687

Dependent Variable	Child Poverty 1.25 USD	Child Poverty 2.5 USD	Child Poverty 4 USD	Poverty 1.25 USD	Poverty 2.5 USD	Poverty 4 USD	Maternal mortality	Infant mortality	Low weight at birth
T = 0	1995-1998	1995-1998	1995-1998	1995-1998	1995-1998	1995-1998	1995-1998	1995-1998	1995-1998
T = 1	1999-2002	1999-2002	1999-2002	1999-2002	1999-2002	1999-2002	2000-2003	2000-2003	2000-2003
T	0.0022 (0.27)	0.0200 (2.21)**	0.0290 (2.64)**	0.0032 (0.69)	0.0154 (1.91)*	0.0203 (1.81)*	-0.9154 (2.54)**	-5.7879 (9.20)***	2.9555 (4.54)***
D	0.0044 (0.59)	0.0186 (2.17)**	0.0260 (3.29)***	0.0019 (0.41)	0.0096 (1.23)	0.0114 (1.15)	-0.4010 (1.01)	-2.8899 (6.40)***	1.0690 (1.18)
T*D	0.1444 (9.52)***	0.2190 (12.96)***	0.2087 (12.44)***	0.0859 (8.79)***	0.1622 (9.59)***	0.1985 (8.94)***	1.1415 (1.91)*	2.8392 (3.91)***	7.3725 (5.74)***
Male	-0.0038 (0.59)	-0.0136 (1.93)*	-0.0273 (4.18)***	-0.0011 (0.26)	-0.0047 (0.73)	-0.0167 (2.36)**	-0.0167 (0.54)	0.1713 (0.74)	-0.4419 (0.83)
Age	-0.4159 (0.66)	-1.4382 (1.66)	-1.4376 (1.97)*	-0.4576 (0.97)	-0.9851 (1.14)	-1.2951 (1.30)	-16.9448 (0.47)	-47.6794 (1.42)	-141.7191 (2.01)**
Constant	0.3929 (0.98)	1.3088 (2.66)**	1.9211 (4.39)***	0.2961 (1.07)	0.7346 (1.55)	1.3873 (2.71)***	6.6720 (0.30)	38.9513 (2.07)**	148.8161 (3.77)***
Observations	80	80	80	80	80	80	83	83	81
R-squared	0.917	0.968	0.981	0.916	0.952	0.966	0.811	0.924	0.895

- Robust t statistics in parentheses

- * Significant at 10%; ** significant at 5%; *** significant at 1%

Outcome variables include educational, health and deprivation indicators as in the previous section. Additionally, for schooling outcomes, effects are calculated for those who are in the first quintile in order to assess distributive impact on the lower part of the income distribution. The estimates are presented in Table 8.

The results indicate that in a worst-case scenario, school attendance may actually drop after a crisis, with a larger decrease for those in low income households. The reduction is higher for older children, with secondary school attendance falling by 5.6

percentage points for those aged 13-17, while dropping 7.6 percentage points for those located in the first quintile. Moreover, there is an increase in the number of children aged 13-18 who do not work nor study (4.8 and 6.6 percentage points increases in the poorest quintile), indicating that those who dropped out of school did not manage to find work. Contrary to the evidence in the previous section, in a worst case scenario estimate educational outcomes seem to be pro-cyclical to GDP. No results were found for years of education or the schooling gap with either definition of the crisis period.

The results for health outcomes and poverty measures are also significant. Child poverty is 22 percentage points higher after the crisis compared with a normal period, overall poverty is 16 percentage points higher, maternal and infant mortality are 1.2 per 10000 and 2.8 per 1000 cases higher respectively, and low weight at birth increases by 7.4 for each 1000 cases compared with a normal period.

Since the 2007-2009 crisis is clearly not as severe as the 1999-2002 in Argentina, the effects estimated in Table 8 can be extrapolated to provide an upper bound for the 2007-2009 episode. The implicit elasticities for socioeconomic outcomes from the results in Table 8 are presented in Table 9.

The worst case scenario estimates are consistent with those from provincial fixed effect regressions presented in the previous section. The results for most of the indicators are consistent with the estimates in the previous section, both qualitatively and quantitatively. The panel estimates of section 4 present conditional semi-elasticities based on 13 years of data. If the estimation is consistent, it would allow to extrapolate (*ceteris paribus*) the impact of changes in GDPpc for each outcome. The estimates in this section present the impact of the 1999-2002 crisis on the outcomes when compared to their evolution over the previous period. This difference in difference type of estimation only uses four data points – the beginning and the end of each period. This implies that the estimates are useful only to interpolate situations of severe crisis, and in this sense they provide an upper bound for the current episode.

The comparison between the two sets of results is informative. In the first place, elasticities that are statistically significant for the whole period are also significant and very similar in size in the difference in difference estimations, as witnessed by the implicit semi elasticities presented in table 9 for child and total poverty, infant and maternal mortality and low weight at birth. In the second place, some of the elasticities which are not significant in section 4's regressions are statistically significant and of

substantial magnitude in the difference in differences estimates for the crisis episodes, notably the estimates for school outcomes and youth unemployment. Finally, even if the difference in differences results in this section cannot be extrapolated for any level of GDPpc change, they might provide an indication of the size of the results for other countries hit more severely than Argentina by the 2007-2009 international crisis.

Table 9. Extrapolations from worst case scenario and provincial fixed effect regressions for the 2007-2009 episode.

Variable	Diff in Diff Effect	GDPpc Growth 1995-1998	GDPpc fall 1999-2002	Implicit semi-elasticity upper bound (worst case scenario)	Semi-elasticity from fixed effect provincial regressions
School attendance 6 to 12 years old	-0.0063	14.4%	21.6%	0.02	-0.01
School attendance 6 to 12 years old in the first income quintil	-0.0054			0.02	-0.01
School attendance 13 to 17 years old	-0.0555			0.15	0.00
School attendance 13 to 17 years old in the first income quintil	-0.0762			0.21	-0.03
Not working nor attending school 13 to 17 years old	0.0481			-0.13	-0.03
Not working nor attending school 13 to 17 years old in the first income quintil	0.0659			-0.18	0.00
Child Poverty 1.25 USD	0.1444			-0.40	-0.41
Child Poverty 2.5 USD	0.219			-0.61	-0.67
Child Poverty 4 USD	0.2087			-0.58	-0.62
Poverty 1.25 USD	0.0859			-0.24	-0.24
Poverty 2.5 USD	0.1622			-0.45	-0.48
Poverty 4 USD	0.1985			-0.55	-0.56
Maternal mortality	1.1415			-3.17	-3.88
Infant mortality	2.8392			-7.89	-3.94
Low weight at birth	7.3725	-20.48	-20.55		

6. Concluding remarks

The quantification of the impact of crises on household welfare and socioeconomic outcomes is a fundamental input for the design of ex ante safety nets and ex post alleviation programs. Economic downturns have direct effects through employment and household income, but whether these and other impacts are permanent rather than transitory is harder to establish. This paper presented estimates for the effects of an economic downturn on socioeconomic outcomes in Argentina. The outcomes included poverty, youth unemployment, and a series of human capital related outcomes, such as infant and maternal health, and school enrollment and progression.

Given the lack of reliable information for the 2007-2009 period in Argentina, this study extrapolated results from the impact of past episodes. The identification strategy relied on provincial variation in GDP, and on a difference in differences estimation from the severe 1999-2002 crisis. The study therefore not only provided estimates for the impact of the 2007-2009 crisis, but also documented the effects of past episodes.⁹

Besides the expected and well-documented relationship between crises and poverty levels, the main finding of this study is a strong effect on infant mortality and low weight at birth.¹⁰ Moreover, in line with recent international evidence (Baird et al., 2009), the results indicate an asymmetry in these effects: the negative impact of downturns is greater than the positive evolution during recoveries. The results for education variables are more ambiguous, and even counter-cyclical in some cases, although the worst case scenario estimation (which extrapolates from the 1999-2002 severe crisis) indicates that there might still be some impacts. These results are in line with recent theoretical developments on the relationship between crises and socioeconomic outcomes (Ferreira and Schady, 2009), which account for the possibility that downturns might not affect schooling even in the context of worsening health outcomes.

These results strongly support the notion that governments must take a proactive stance during aggregate crisis, not only strengthening income transfer safety nets, but

⁹ As noted by Schady and Smitz (2009), only very large contractions have an impact on infant mortality in middle-income countries, and this imposes a limit on the extrapolation from the 2001-2002 to the 2007-2009 crisis. The authors are indebted to Norbert Schady for making this point.

¹⁰ The administrative data sources employed in this paper do not allow to establish whether these effects are confounded by changes in the composition of women giving birth, as discussed by Dehejia and Lleras-Muney (2004), Bhalotra (2009) and Baird et al. (2009).

also expanding the level of public social expenditure. During the 2001-2002 meltdown, for instance, the Argentine government increased real expenditure on cash transfers, but real expenditure on health and education fell substantially (Figure 3). While this document does not provide a causal link between public expenditure and socioeconomic outcomes, the evidence on increasing infant and maternal mortality and low weight at birth during downturns suggests that public policy should cover all fronts of social intervention.

Overall, these results provide evidence of permanent effects of economic crises through lower levels of human capital, worsening health outcomes and increased mortality. The next step in the analysis should establish whether changing levels of public expenditure affected these outcomes in the past. These factors need to be included for creation of policies to mitigate the effect of economic downturns on household welfare.

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