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Macroeconomic Crisis, Primary Education and Aid Effectiveness

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Macroeconomic Crisis, Primary Education and Aid Effectiveness

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Summary

While the relationship between macroeconomic crisis, human capital investment and international aid is intensively discussed by the international community, rigorous macroeconomic evidence is still missing. Using system GMM on a sample of 109 developing countries over the period 1999-2012, our analysis indicates that macroeconomic crises have strong and significant impacts on primary school enrolment. Aid to education and public spending on education tend to strongly react to political crises and internal conflicts. Our study shows that aid to education is more effective during macroeconomic crises. During political crisis, our results indicate that while the aid absorptive capacity is lower, aid to education tends to be also more effective. Regarding gender issues, aid to education appears to be especially efficient for girls' access to education during political crises. The heterogeneous natures of internal conflict and natural disaster do not allow us to draw any clear conclusions.

Keywords: Crisis, Aid effectiveness, Sector-specific aid, Primary education

JEL Classification: G01, I2, F35, O11

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I. INTRODUCTION

Since 2000, education in times of crisis has been consolidated as an important issue with the idea of meeting "the needs of education systems affected by conflict, natural calamities and instability, and conduct educational programmes in ways that promote mutual understanding, peace and tolerance, and that help to prevent violence and conflict" (World Education Forum, 2000). The United Nations organisations and international NGOs that attended the 2000 World Education Forum formed the Inter-Agency Network on Education in Emergencies (INEE), which has grown into a network of organizations and individuals working in crisis countries. However, this principle of meeting the needs of education systems affected by conflict and instability remains a very difficult task. International organisation such as UNESCO shows that progress in getting all children into school is being held back by crises. International estimates show that the proportion of children who are out of school has become increasingly concentrated in countries affected by macroeconomic crises (UNESCO, 2014). On the specific issue of emergencies and protracted crisis, estimations show that there are at least 34 million out-of-school children and adolescents living in conflict countries (UNESCO, 2015). For the success of the 2030 Agenda for Sustainable Development, reducing impact of macroeconomic crisis appears as a central issue for human capital investment in general and particularly on primary education in developing countries.

The effect of macroeconomic crises on human capital investment can vary greatly across countries and times. From the demand side, the household's educational behaviour in time of crisis may depend on the relative effects of the accessibility of a school, of direct and indirect costs, of access to credit and household incomes, of the expected returns and of the opportunity cost and of parental education. From the educational supply side, a number of channels can be impacted by a crisis and in particular the ability to open and run schools, the funding of education and the governance of the education system. In the relationship between crises and education, the amount and the allocation of international aid to education as well as the behaviour of international development organisation could play a central role. While many reports and works of research try to address the issues of investment in education in emergency situations and the architecture of aid response (see ODI, 2015a for a review), most of the evidence collected is based on micro-surveys or national data. Rigorous macroeconomic evidence of the relationship between crisis, education and aid are still missing in the academic literature. There are a few reasons for this situation. Defining the different types of crisis and identifying the beginning and the end of different crises at a macro level is a first challenge. Finding enough data on education in countries experiencing crises and addressing endogeneity issues between crisis, education and aid also appear challenging.

In this paper, we are using the best available macro data to analyse the impacts of crises on primary education, on aid to education and on aid to education effectiveness. We develop an explicit methodology to define episodes of macroeconomic crisis, political crisis, internal conflicts and natural disasters. To address data availability and endogeneity issues, we use system GMM on a sample of 109 developing countries over the period 1999-2012 and focus on gross primary school enrolment and aid to education committed and disbursed. Our results indicate that macroeconomics crises have a strong and significant impact on primary school enrolment and that disbursements of aid to education and public spending on education tend to react strongly to

political crises and internal conflicts. Aid to education appears to be more effective during macroeconomic crises. For political crises, results are less clear but it appears that disbursements of aid to education tend to be also more effective. Our results have important implications for the geographic allocation of aid during crises and aid efficiency. Regarding its efficiency, the international community must consider aid to education as a priority especially in a time of major crisis. The remainder of the paper proceeds as follows. Section 2 provides a short literature review on the impact of crisis on education, the impact of crisis on aid and the impact of aid on education. Section 3 presents data issues and the empirical strategy in order to define crisis. Section 4 presents our econometric analysis, and section 5 concludes by proposing relevant policy implications.

II. LITERATURE REVIEW

A) The impact of crisis on education

The relationship between crisis and education is a major concern for developing but also for developed countries. Whereas some studies try to show effects of a low quality education, in terms of access, quality or equity, on the risk of crisis, most of the research focuses on the effects of crises on demand and supply of education. At the macroeconomic level, economic stability appears to be one of the most important determinants of human capital accumulation (ODI, 2010) Theoretical model has traditionally analysed educational choices and households' behaviours in time of crisis with a model of investment in human capital, in which parents maximize their inter-temporal utility (Ferreira *et al.*, 2009). Models emphasize some determinants that households consider when they make educational choices such as: direct and indirect costs of schooling; initial income available and credit access; opportunity cost of children's enrolment in school; parents expectation education returns. The ability to open and run schools appears as another potential effect of crisis on education. The contraction of private sector activity, of employment and of public expenditures can have a negative impact on access to education through the rise in education costs, the drop in household income and in the expected returns to education. However, the effect of opportunity costs can be reduced by the contraction of employment which can favour enrolment and could partly offset other negative effects, making the overall impact ambiguous. Indeed, the positive effect of economic crises on enrolment through opportunity costs has been evidenced in various Latin American countries, in particular during short-term crises (McKenzie, 2003; Schady, 2004. Ferreira *et al.*, 2009; López Bóo, 2012). However most of the international evidence shows a negative effect of crises on access, quality and equity in education (Cogneau *et al*; (2012) for Côte d'Ivoire; Duryea *et al.* (2007) for Brazil; Beegle *et al.* (2006) for Tanzania; De Janvry *et al.* (2006) for Mexico). The negative impact of a crisis on education is generally higher for the poorest households (Thomas *et al.*, 2004 for Indonesia; ODI, 2015), especially girls (Skoufias et al, 2006 for Mexico; Duryea et al, 2007 for Brazil). One critical channel of influence seems to be the negative effect of crises on education financing through national budget and household spending (ODI, 2010; OCDE, 2013). Since the 2011 Global Monitoring Report (UNESCO, 2011), *education in time of crisis* has been highlighted as a major concern for the international community (UNESCO, 2015; Save the Children, 2015;

ODI, 2015a), but rigorous macro evidence on countries experiencing different types of crisis are still missing.

B) The impact of crisis on aid

While many studies show a negative impact of a crisis in a donor country on the volume of aid (Allen *et al.*, 2011; Dang *et al.*, 2009), there is less evidence on the effect of crisis on the volume of aid received by a country. Dabla-Norris *et al.* (2010) find that bilateral aid flows are on average procyclical with respect to the business cycle in both donor and recipient countries. They found that aid seems to contract sharply during severe downturns in donor countries but to rise steeply when aid-receiving countries experience large adverse shocks. On the specific case of aid to education in situation of crisis, some reports (UNESCO, 2015) show that countries experiencing crisis are receiving less aid for education but there is neither dynamic evidence nor demonstrated causality.

C) The impact of aid on education

The specific literature on the effectiveness of aid for education is still recent but found a quite conclusive positive impact of aid on education (Glennie *et al.* 2014). Arndt *et al.* (2015) find that aid has a causal effect on average years of schooling. D'Aiglepierre and Wagner (2013) find that aid for primary education has a strong positive effect on primary school enrolments and gender equity. Dreher *et al.* (2008), Christensen, *et al.* (2011) and Birchler *et al.* (2013) show aid for education increases primary school enrolment but by a modest amount. McGillivray *et al.* (2011) find that aid improves primary education completion. Although there is strong evidence of aid to education effectiveness, there is no evidence on the specific context of this efficiency such as crises in aid recipient countries. As mentioned by Glennie *et al.* (2014), the critical question now is to have a better understanding of when foreign aid work and when it does not. Macroeconomic crises appear as a critical issue to answer this question.

III. DATA ISSUES AND DESCRIPTIVE STATISTICS

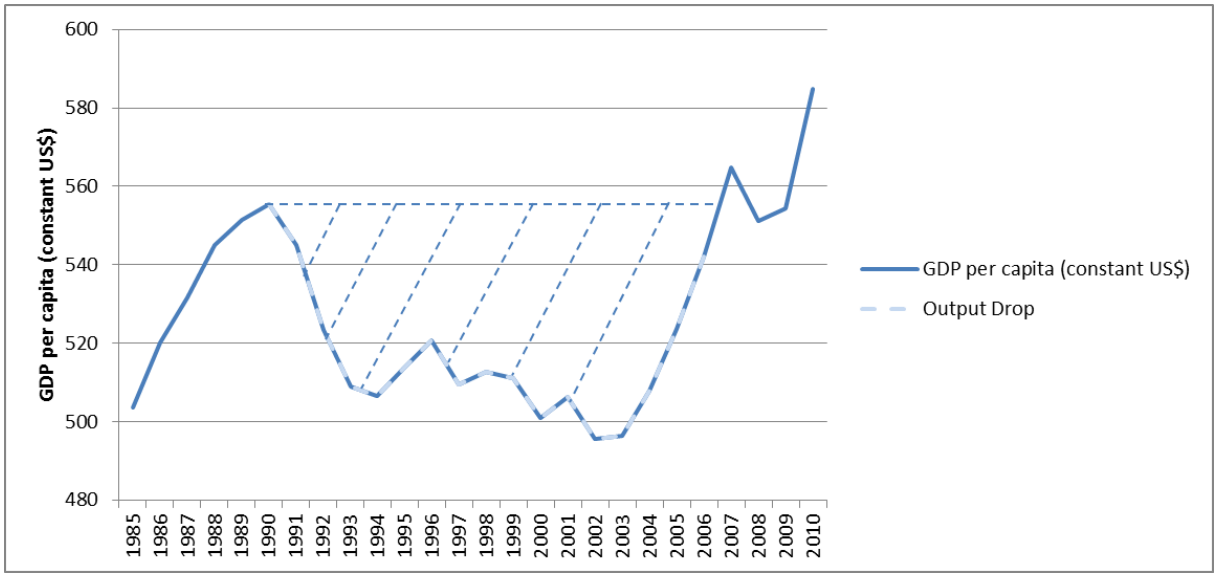
A) Measuring crisis

1) Macroeconomic crisis

In order to define an episode of macroeconomic crisis, we rely primarily on the work of Becker and Mauro (2006) where a macroeconomic crisis starts with a contraction of the constant GDP per capita and ends when the level of GDP per capita rises above its initial value. The following chart shows an example of crisis in the case of Kenya. Annual losses are calculated relative to the initial level of GDP and are accumulated on the entire episode of crisis (which corresponds to the shaded area of Figure 1). Two additional conditions are imposed to limit the influence of measurement errors and extremely punctual and insignificant events for this study. First, the minimum duration of the episode is three years. Secondly, the cumulative sum of the losses in

terms of GDP per capita must represent at least 5% of initial GDP per capita[1]. As shown in Figure 1 for Kenya, those two additional conditions exclude the small drop in GDP per capita that has occurred in 2008.

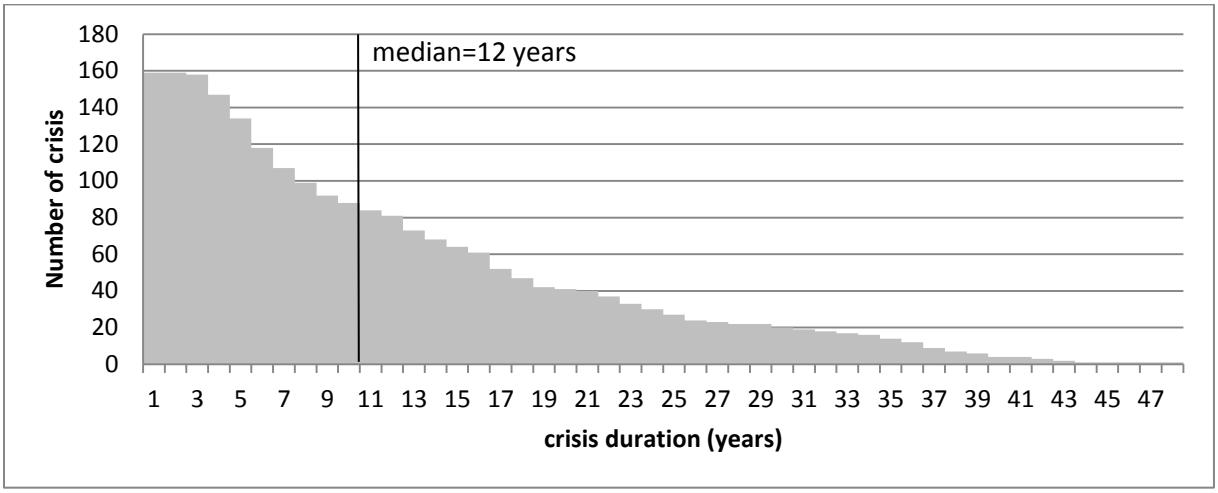
Figure 1: Identifying macroeconomic crisis from GDP per capita data



The Table A1 in Appendix presents details of crisis episodes detected using this filter over the 1960-2012 period on a panel of 145 developing countries. The GDP per capita data are from the World Development Indicators of the World Bank. Two types of crises are highlighted through this method and illustrated in Figure 2. First, crises whose conclusion was observed over the study period but also crises, including the longest ones, that extend beyond the last available observation. Thus for the 159 listed crises, the average duration is 14 years (the median being slightly lower and equal to 12 years). Niger displays the longest episode with a crisis of 48 years.

[1] The results presented in this article are robust to different variations of the filtering parameters such as minimum spell duration of 4 years or the use of a threshold of 3%. These results are available upon request from the authors.

Figure 2: Macroeconomic crisis survival rate



According to Table 1, the longest but also the most numerous crises occurred in sub-Saharan Africa, where 62 crisis episodes were recorded from 1960-2012, with an average duration of 17 years, the typical example being illustrated by the case of Kenya presented above in Figure 1. Similarly, the most severe crises in relative terms occur in the poorest countries. However, in terms of numbers, crises seem fairly distributed between the three different income groups.

Table 1: Characteristics of macroeconomic crisis by regions and income groups

Regions	**Number of crisis**	**Average duration**	**Average depth of crisis (min GDP pcap / initial GDP pcap)**
East Asia & Pacific	22	11.23	17.26%
Europe & Central Asia	18	16.83	44.35%
Latin America & Caribbean	43	10.95	16.76%
Middle East and North Africa	11	13.45	23.77%
South Asia	3	10.00	10.66%
Sub-Saharan Africa	62	17.56	24.30%
Income groups			
Low income	49	17.80	25%
Lower middle income	61	13.38	23%
Upper middle income	49	12.24	21%

The following Table 2 details the unconditional probability of a crisis occurring on year *t* by regions and decades. Here again we observe that countries in sub-Saharan Africa have the highest probability of being in crisis but that this probability largely evolved over time. Thus, the probability of crisis has increased monotonically over decades to a maximum of 71% in the 90s before decreasing during the 2000s. Table 2 notably illustrates the widely documented lost decade in developing countries during the 90s and the rebound of a significant number of African countries during the 2000s supported by the boom in commodity prices.

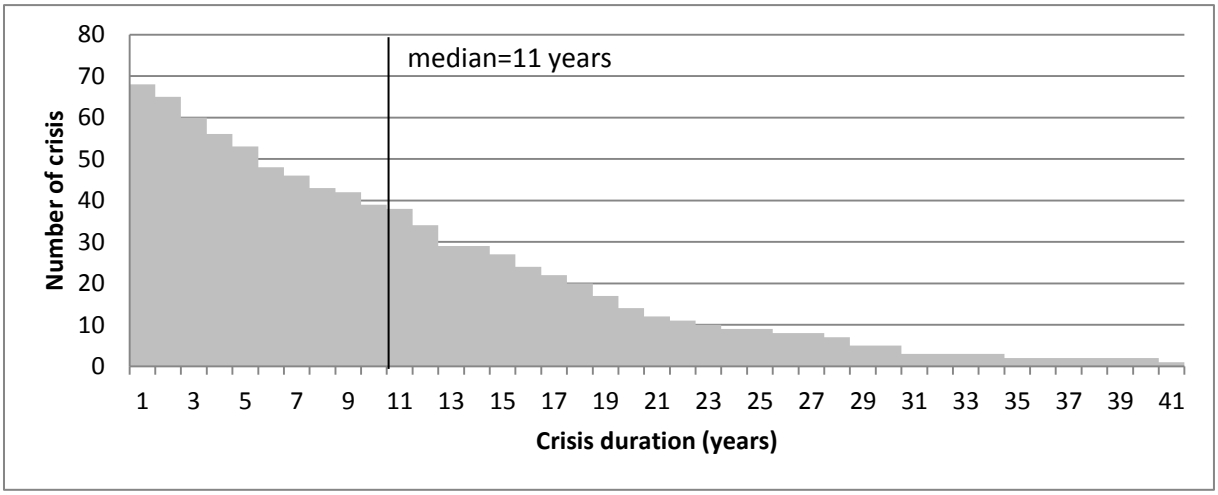
Table 2: Distribution of macroeconomic crisis by decades

Region/decades	60s	70s	80s	90s	2000s
Middle East and North Africa	5%	2%	25%	34%	30%
Sub-Saharan Africa	13%	23%	59%	71%	46%
East Asia & Pacific	3%	4%	18%	35%	31%
South Asia	6%	16%	13%	3%	0%
Latin America & Caribbean	3%	11%	53%	45%	29%
Europe & Central Asia	0%	1%	8%	77%	36%

2) Political crisis

Behind a drop in GDP per capita product can hide very different causes. Hence identifying the socio-political crises could help better characterizing the effects of different types of crisis on education but also on aid to education flows. To detect episodes of political crisis, we implement a strategy similar to the previous one still inspired by Becker and Mauro (2006). Using data from the Polity IV database (giving each country and each year a score between -10 (full autocracy) to 10 (perfect democracy), we identify the starting point of a crisis as a sudden drop of the score of at least 4 points[2]. The crisis episode then continues until the score equals or exceeds its pre-crisis level. Close to macroeconomic crises, the median duration here is between 11 and 12 years (Figure 3). Our methodology detects a set of 68 crises as detailed in Table A2 in appendix[3].

Figure 3: Political crisis survival rate



[2] Here again, the results presented in this paper are robust to various alternative hypotheses and are available upon request.

[3] The cases of Bangladesh and Swaziland are particularly distinguished by their great length (respectively 40 and 41 years).

Table 3: Characteristics of political crisis by region and income group

Regions	**Number of crisis**	**Average duration**
East Asia & Pacific	9	8.66
Europe & Central Asia	9	8.66
Latin America & Caribbean	13	6.13
Middle East and North Africa	3	6.84
South Asia	5	13.82
Sub-Saharan Africa	29	12.14
Income groups		
Low income	34	11.26
Lower middle income	18	10.77
Upper middle income	16	8.51

As shown in Table 3, political crises are largely concentrated in low-income countries, particularly in sub-Saharan Africa. Those countries where needs for external financing are the greatest are also the very ones where the donor community has difficulties intervening conventionally. In this study, particular attention will be paid to the relationship between political crises, aid and education.

3) Internal conflicts

Even more than political crisis, the occurrence of armed internal conflicts in developing countries appears to be a major source of disruption of the educational system through the destruction of infrastructure, population displacement or sudden stops in public spending and aid flows. To characterize armed conflict we turn to the Uppsala Conflict Data Program Data (UCDP / PRIO) on victims of armed conflicts. This database records occurrence of conflicts as well as their numbers of victims when they exceed 25 battle-related deaths over the period 1989-2013. Figure A1 in the Appendix shows the trend in the number of conflicts between 1989 and 2013. There was a significant decrease in the number of conflicts between the beginning and the end of the period. However, in terms of number of victims, the situation is more nuanced particularly because of the Syrian conflict, which concentrates the majority of victims in recent years.

4) Natural disasters

Finally, we control for the occurrence of natural disasters capable of destroying part of the educational infrastructure and / or lead to significant population displacement. We use data on the number of people affected by natural disasters as defined by the CRED's EM-DAT database on international disasters to identify natural disaster occurrences as well as their intensity. Figure A2 shows the number of people affected by disasters between 1999 and 2012. Apart from a particularly severe year 2002, the number of people affected appears to be fairly constant over time.

B) Measuring education and aid in time of crisis

1) Education data in time of crisis

The data collected by UNESCO Institute for Statistics (UIS), supplied every year by ministries of education in each member country, are used as the primary source of international educational data. As UNESCO's statistical methodology was revised after 1999, the most recent and precise time-series concerning education are only available for the period starting in 1999 (Dreher, 2008). Measuring educational achievement appears to be a much more difficult task in countries experiencing severe crises. In many crisis situations, ministries of education are facing difficulties in collecting accurate data. Therefore we will focus here on the most basic coverage indicator answering the question of whether children are in school or not. The gross enrolment rates (GER) in primary school represent the number of children enrolled in primary education expressed as a percentage of the official age group for primary education (usually between age 6 and age 12). The GER appear as the most collected data in UIS data. While the net enrolment rate (NER) in primary school is more accurate, this data is missing in most of the periods identified as crisis[4]. Regarding the access to primary education during crisis, vulnerable populations such as girls are often presented as particularly disadvantaged. To address this specific issue, we also use the gender parity of the GER which is the girls' relative to boys' ratio for GER. Unfortunately, it is not yet possible to take into account other forms of equality or to address education quality issues in countries in time of crisis.

2) Aid data in time of crisis

Since the international aid data are collected by the Development Assistance Committee (DAC) of the OECD and relies primarily on declarations by DAC members, multilateral organizations and other donors, there are no specific difficulties of aid data in time of crisis. The aid data is collected through two reporting systems. The global DAC database includes a breakdown of committed and disbursed Official Development Assistance (ODA) flows by recipient countries, donor countries or sectors. Data from the Creditor Reporting System (CRS) contains detailed information on commitments and disbursements to individual projects and aid programmes. However, contrary to the CRS database, the aggregated DAC database does not provide sector-specific aid flows for individual recipient countries. It is the aggregation of the different projects of the CRS data that allows analysis in great detail of the distribution of aid by sector and by recipient country. CRS data cover only those activities undertaken by individual DAC member countries within the framework of their bilateral ODA, and aid activities funded by multilateral institutions as part of their regular budget. The CRS database provides a detailed overview of aid activities. We focus our study on aid for education engaged and disbursed. While it can be argued that disbursements data are superior for policy recommendations, the quality of those data is not always sufficient to conduct a robust macro-econometric analysis, mainly because of very low coverage ratio before 2002. Numerous concerns have been pointed out about measurement problems with long time series in aid and education data (see d'Aiglepierre and Wagner, 2013 for a complete discussion). Therefore we chose to focus our analysis on the period 1999-2012.

[4] Using the NER instead of the GER would lead to a reduction of our sample of more than 50%.

IV. ECONOMETRIC ANALYSIS

A) Methodology:

The methodology of the paper follows three steps to disentangle the complex relationships between primary school enrolment, crisis and aid to education. In a first step, we assess the impact of the four type of crisis exposed in the previous section using the following equation:

$$School_{it} = \alpha School_{it-1} + \beta Crises_{it} + \pi ODA\ to\ education_{it} + \delta Z_{it} + \tau_t + \epsilon_{it} \quad (1)$$

Where $School_{it}$ is the logarithm of the gross primary school enrolment rate at year t for country i, $School_{it-1}$ is the logarithm of the lagged gross primary school enrolment rate, $Crises_{it}$ is a vector containing four crisis variables (a dummy for macroeconomic crisis and a dummy for political crisis computed following Backer and Mauro (2006), a dummy for internal conflict using UCDP / PRIO data, and the number of people affected by natural disasters form the EM-DAT database) , $ODA\ to\ education_{it}$ is total ODA to education per capita either committed or disbursed, Z_{it} is a vector of variables containing the usual control variables used notably in Dreher *et al.* (2008) and d'Aiglepierre and Wagner (2013). This vector includes GDP per capita in logarithm, GDP per capita squared, the share of population between 0 and 14 years old, and public spending on education as a share of GDP. τ_t represents a vector a time variables. ODA to education data are retrieved from the OECD-CRS database. All other variables come from the World Bank's World Development Indicators database.

In a second step we assess the impact of crisis on ODA to education commitments and disbursements using the following two equations:

$$ODA\ commitments_{it} = \alpha ODA\ commitments_{it-1} + \beta Crises_{it} + \delta Z_{it} + \tau_t + \epsilon_{it} \quad (2)$$
$$ODA\ disbursements_{it} = \alpha ODA\ disbursements_{it-1} + \beta Crises_{it} + \delta Z_{it} + \tau_t + \epsilon_{it} \quad (3)$$

As for equation (1), Z_{it} stands for the vector of control variables that includes GDP per capita in logarithm, GDP per capita squared, the share of population between 0 and 14 years old, public spending on education as a share of GDP, and total ODA per capita.

Finally in a third step, we estimate the effectiveness of ODA to education during crisis using the following equation:

$$School_{it} = \alpha School_{it-1} + \beta Crises_{it} + \pi ODA\ to\ education_{it} + \sigma(Crises_{it}\ x\ ODA\ to\ education_{it}) + \delta Z_{it} + \tau_t + \epsilon_{it} \quad (4)$$

where *Crises x ODA to education* is the product between the vector of crisis variables and ODA to education per capita (commitments or disbursements).
Dependant variables and lagged dependant are always in logarithm. We use yearly data from 1999 to 2012. The four equations are estimated using system GMM techniques. First it allows us to control for the likely endogeneity of aid and public spending. Second it also allows us to control

for the high level of persistence in the data captured by the lagged dependant. We control for endogeneity by using lags of the right-hand side variables as instruments. More specifically, we assume that, public spending, aid, and the interaction term of aid with crises are endogenous. These variables are instrumented using their own lags and difference in lags from *t-2* onward.

B) The impact of crisis on education

As we have seen in the literature review, crisis can have strong but sometime ambiguous impacts on education in developing countries. In order to assess the overall sign and magnitude of the effect of various types of crises on education, we estimate Equation 1 on a sample of 109 developing countries over the period 1999-2012.

Table 4: The impact of crisis on primary school enrolment, 1999-2012, System GMM estimators

	Gross primary school enrolment					**Ratio of female to male in primary**	
	1	2	3	4	5	6	7
Lagged dependent	0.727***	0.719***	0.727***	0.728***	0.718***	0.716***	0.687***
(in logarithm)	(0.163)	(0.171)	(0.169)	(0.165)	(0.170)	(0.139)	(0.148)
Total ODA to Education	0.002	0.002	0.002	0.002	0.002	0.001	0.002
(per capita)	(0.002)	(0.002)	(0.002)	(0.002)	(0.002)	(0.002)	(0.002)
GDP per capita	0.027	0.037	0.033	0.034	0.030	0.016	0.019
(in logarithm)	(0.093)	(0.100)	(0.097)	(0.097)	(0.097)	(0.034)	(0.036)
GDP per capita squared	-0.002	-0.002	-0.002	-0.002	-0.002	-0.001	-0.001
(in logarithm)	(0.006)	(0.006)	(0.006)	(0.006)	(0.006)	(0.002)	(0.002)
0-14 population	-0.000	-0.000	-0.000	-0.000	-0.000	-0.001	-0.001
(over total population)	(0.001)	(0.001)	(0.001)	(0.001)	(0.001)	(0.001)	(0.001)
Public spending on education	0.000	-0.001	-0.000	-0.000	-0.001	0.003	0.003
(over GDP)	(0.003)	(0.003)	(0.003)	(0.003)	(0.003)	(0.003)	(0.003)
GDP per capita crisis	-0.016*				-0.016*	0.001	-0.000
	(0.010)				(0.010)	(0.005)	(0.005)
Political crisis		-0.023			-0.021	0.006	0.007
		(0.021)			(0.020)	(0.011)	(0.010)
Internal conflict			-0.010		-0.009		-0.010
			(0.011)		(0.011)		(0.007)
Population affected by natural disaster				-0.012	-0.009		-0.000
(over total population)				(0.011)	(0.011)		(0.010)
Observations	820	820	820	820	820	810	810
Countries	109	109	109	109	109	109	109
AR1 (p-value)	0.003	0.004	0.004	0.003	0.004	0.001	0.001
AR2 (p-value)	0.574	0.539	0.645	0.563	0.583	0.227	0.433
Hansen test (p-value)	0.832	0.802	0.785	0.775	0.793	0.097	0.111

Notes: Robust standard errors in parentheses, + p<0.15, * p<0.10, ** p<0.05, *** p<0.01. Each specification includes year dummies and a constant.
Sources: Authors' calculations based on World Bank data.

Table 4 gives the results of the estimation of equation (1) using the four definitions of crisis sequentially. While always negative, as expected, the coefficients associated with crises tend to be nonsignificant. However, as displayed in columns 1 and 5, GDP per capita crises seem to have a significant impact on primary school enrolment, implying that a macroeconomic crisis reduces access to primary education by 1.5% per year. This effect is far from marginal. The median duration of this type of crisis is 12 years. The result that other types of crisis do not appear significant can be explained by the fact that their effect is more elusive due the heterogeneous nature of political crises, internal conflicts or natural disasters. Furthermore, it is also possible that the channels through which these crises impact primary education are mainly indirect and go through a reduction of education financing. This particular aspect is explored in further details in

the next section. Finally, crises do not seem to significantly influence the ratio of female to male in primary school.

C) The impact of crisis on aid to education

As evidenced earlier, the effect of crises on aid are mixed. It is even more the case for specific sectors like education. To shed some light on this question we estimate Equations (2) and (3) with system-GMM in Table 5. First, we find no significant effect of economic downturn on ODA to education using either commitments or disbursements. While total amount of aid received by a country during a crisis may vary, it seems that aid amounts allocated to education are not influenced by receiving countries' economic conditions. While less robust, population affected by natural disaster seems to have a negative effect on aid to education. This negative relationship doesn't hold when using disbursements instead of commitments. As we will see later, we were unable to find any robust relationships between education and aid when it comes to the highly heterogeneous and specific nature of conflicts and natural disasters. However, conclusions are more nuanced when it comes to political crises and internal conflicts. While their effects on commitment are more often not insignificant, it is not the case for disbursements. Disbursements tend to strongly react to the occurrence of a political crisis or an internal conflict. Hence, a political crisis leads to a sharp reduction of disbursements of ODA to education of 17% per year on average. This figure is even greater for internal conflicts, with an elasticity of 23%. It is a well-documented fact that international donors tend to put their activities on hold during acute political crises such as military coups or unlawful elections. As previously shown in Dreher *et al.* (2008) or d'Aiglepierre and Wagner (2013), aid to education has a positive impact on primary school enrolment. A sharp contraction of disbursements in countries experiencing political turmoil could have a detrimental impact on primary education if aid were to remain effective even during political crises. A similar detrimental impact of political crises can be found for public spending on education over GDP. As shown in Table A3 in the appendix, the occurrence of a political crisis reduces public spending on education by 9% per year. Combining the two effects, it appears rather clearly that most of the impact of political crises on primary education is indirect and goes through a strong reduction in aid flows and public spending.

D) The impact of aid on education in a time of crisis

Growth downturns and political turmoil have strong impacts on primary education either directly or indirectly through a sharp reduction of financial flows directed to education, and while aid does not appear to be procyclical with respect to GDP per capita growth, ODA to education disbursements decrease strongly during times of political distress. What does this behaviour tell us about the effectiveness of aid to education and more particularly about the effectiveness of aid to education during crises? This section provides evidence that ODA to education has a positive impact on primary education and that this impact is stronger during crises. Table 6 and 7 provides results from the estimation of Equation (4) using alternative specifications and samples. From those results, it appears quite clearly that ODA to education is more effective during growth downturns as the interactive variable ODA to *Education x GDP per capita crisis* turns out to be positive and significant in most of the columns of Tables 6 and 7. Furthermore, this result appears to be fairly robust according to Table 7 and notably when it comes to the poorest countries and Sub-Saharan Africa.

This particular result that aid helps dampen the adverse effects of shocks at the macroeconomic level has been well established and documented by the literature. This hypothesis has been developed and tested by different ways in several papers (Guillaumont and Chauvet, 2001; Chauvet and Guillaumont, 2004, 2008; Guillaumont and Le Goff, 2010; Guillaumont and Wagner, 2012). Following the debate opened by Burnside and Dollar (2000), it appears clearly that aid effectiveness is conditional on specific features of the receiving countries (an interactive term between the aid variable and the feature of interest being expected to capture this conditional effect). Structural vulnerability seems here to be an essential factor of this conditional effectiveness (Guillaumont 2009, 2013). Various measures of vulnerability have been used in the estimation of this conditional impact of aid on growth (composite indices, such as the Economic Vulnerability Index, or only instability of exports of goods and services), with different specifications, control variables, instrumentation, etc. In all cases, while the structural vulnerability variable has a negative effect on economic growth, it increases aid effectiveness (positive effect of the interactive variable aid x vulnerability): aid is more effective in more vulnerable countries. In other words, aid dampens the negative effect of vulnerability on growth. Other studies relying on cross-country regressions, but using different methodology come to similar conclusions. Collier and Goderis (2009), using an error correction model, evidence that aid mitigates the impact of negative commodity export price shocks on short-term growth and suggest that donors could increase aid effectiveness by redirecting aid toward countries with a high incidence of commodity price shocks. Guillaumont Jeanneney and Tapsoba (2012) show that ODA stabilizes resources available for the financing of consumption, investment and trade: "stabilizing aid" is effective in aid dependent and vulnerable countries. To our knowledge, it is the first time that the dampening effect of aid is evidenced at the sector level. It is an important result in favour of a faster response of donors to worsening economic conditions in developing countries.

Table 5: The impact of crisis on ODA to education, 1999-2012, System GMM

	ODA to education Commitments						**ODA to education** Disbursements					
	1	2	3	4	5	6	7	8	9	10	11	12
Lagged ODA to education per capita	-0.089	-0.088	-0.097	0.624	0.573	0.029	0.539***	0.514***	0.492***	0.424***	0.519***	0.551***
(in logarithm)	(0.170)	(0.168)	(0.181)	(0.458)	(0.441)	(0.276)	(0.111)	(0.115)	(0.122)	(0.108)	(0.119)	(0.140)
Total ODA per capita	0.416**	0.426**	0.358*	-0.040	0.100	0.122	0.013	0.008	0.013	0.112	-0.007	0.035
(minus education, in logarithm)	(0.207)	(0.208)	(0.212)	(0.271)	(0.251)	(0.197)	(0.113)	(0.118)	(0.119)	(0.099)	(0.121)	(0.083)
GDP per capita	2.797**	2.848**	3.451***	1.594	1.084	3.435**	1.850***	2.040***	2.104***	1.915***	1.988***	1.349*
(in logarithm)	(1.396)	(1.412)	(1.269)	(1.700)	(1.686)	(1.575)	(0.706)	(0.760)	(0.765)	(0.709)	(0.741)	(0.803)
GDP per capita squared	-0.187*	-0.189*	-0.231**	-0.111	-0.075	-0.229**	-0.128**	-0.141***	-0.145***	-0.130**	-0.140***	-0.090*
(in logarithm)	(0.099)	(0.100)	(0.091)	(0.114)	(0.116)	(0.107)	(0.050)	(0.054)	(0.053)	(0.050)	(0.052)	(0.054)
0-14 population	0.034**	0.034**	0.036**	0.011	0.010	0.040*	0.018**	0.018**	0.021**	0.022**	0.018*	0.020*
(over total population)	(0.016)	(0.016)	(0.016)	(0.020)	(0.017)	(0.022)	(0.009)	(0.009)	(0.010)	(0.009)	(0.009)	(0.012)
Public spending on education	0.215**	0.211**	0.076*	0.043	0.112		0.004	-0.006	-0.014	0.046	-0.017	
(over GDP)	(0.101)	(0.106)	(0.042)	(0.040)	(0.097)		(0.060)	(0.065)	(0.065)	(0.059)	(0.067)	
GDP per capita crisis	-0.159				-0.079	0.006	-0.107				-0.132+	-0.008
	(0.144)				(0.103)	(0.118)	(0.083)				(0.087)	(0.062)
Political crisis		-0.077			0.030	-0.401*		-0.233*			-0.192+	-0.178+
		(0.220)			(0.174)	(0.204)		(0.131)			(0.127)	(0.120)
Internal conflict			-0.389+		-0.026	-0.402+			-0.287**		-0.267*	-0.230*
			(0.235)		(0.268)	(0.261)			(0.142)		(0.145)	(0.127)
Population affected by natural disaster				-0.687+	-0.715+	-0.142				0.417	0.513	0.342
(over total population)				(0.441)	(0.440)	(0.297)				(0.343)	(0.368)	(0.308)
Observations	956	956	956	956	956	1767	953	953	953	953	953	1759
Countries	120	120	120	120	120	134	121	121	121	121	121	135
AR1 (p-value)	0.014	0.012	0.018	0.035	0.035	0.069	0.000	0.000	0.000	0.000	0.000	0.000
AR2 (p-value)	0.535	0.525	0.507	0.276	0.319	0.846	0.300	0.324	0.344	0.370	0.272	0.684
Hansen test (p-value)	0.310	0.265	0.056	0.109	0.216	0.091	0.167	0.204	0.104	0.361	0.148	0.163

Notes: Robust standard errors in parentheses, + p<0.15, * p<0.10, ** p<0.05, *** p<0.01. Each specification includes year dummies and a constant.
Sources: Authors' calculations based on World Bank data.

Table 6: The impact of crises on primary school enrolment, 1999-2012, System GMM

	Gross primary school enrolment (ODA Commitments)						**Gross primary school enrolment** (ODA Disbursements)		**Ratio of female to male in primary** (ODA Commitments)	
	1	2	3	4	5	6	7	8	9	10
Lagged dependent	0.750***	0.775***	0.803***	0.900***	0.688***	0.915***	0.712***	0.914***	0.813***	0.780***
(in logarithm)	(0.109)	(0.140)	(0.091)	(0.070)	(0.193)	(0.060)	(0.104)	(0.060)	(0.074)	(0.068)
Total ODA to Education	0.001	0.001	0.001	0.000	0.003+	0.001	0.006	0.003	0.000	0.000
(per capita)	(0.001)	(0.001)	(0.001)	(0.001)	(0.002)	(0.001)	(0.004)	(0.004)	(0.001)	(0.001)
GDP per capita	-0.020	0.031	-0.038	-0.044	0.086	-0.042	0.043	-0.039	0.015	0.014
(in logarithm)	(0.054)	(0.090)	(0.059)	(0.043)	(0.105)	(0.038)	(0.070)	(0.038)	(0.027)	(0.023)
GDP per capita squared	0.001	-0.002	0.002	0.003	-0.005	0.002	-0.003	0.002	-0.001	-0.001
(in logarithm)	(0.003)	(0.006)	(0.004)	(0.003)	(0.006)	(0.002)	(0.004)	(0.002)	(0.002)	(0.001)
0-14 population	-0.000	0.000	-0.000	-0.000	-0.000	-0.000	-0.001	-0.001**	-0.001+	-0.001*
(over total population)	(0.001)	(0.001)	(0.000)	(0.000)	(0.001)	(0.000)	(0.001)	(0.000)	(0.000)	(0.000)
Public spending on education	-0.004+	-0.003	-0.003	-0.002	-0.001	-0.004	0.000	-0.002	0.001	0.002+
(over GDP)	(0.002)	(0.003)	(0.003)	(0.002)	(0.003)	(0.003)	(0.006)	(0.002)	(0.002)	(0.001)
GDP per capita crisis	-0.015*		-0.014*			-0.012***	-0.013	-0.009*	-0.003	-0.001
	(0.008)		(0.008)			(0.004)	(0.010)	(0.005)	(0.005)	(0.003)
Political crisis		-0.007	-0.007			0.009	-0.043***	-0.040***	-0.027**	-0.017**
		(0.017)	(0.015)			(0.012)	(0.014)	(0.014)	(0.014)	(0.008)
Internal conflict				-0.026		-0.031*		-0.018		-0.000
				(0.019)		(0.016)		(0.017)		(0.006)
Population affected by natural disaster					0.042	-0.014		0.007		-0.010
(over total population)					(0.047)	(0.024)		(0.027)		(0.035)
ODA to Education x GDP per capita crisis	0.005		0.005			0.003*	0.002	0.002	0.003	-0.000
	(0.004)		(0.004)			(0.001)	(0.005)	(0.004)	(0.004)	(0.001)
ODA to Education x Political crisis		-0.033**	-0.037*			-0.042***	0.118**	0.162***	0.073**	0.055**
		(0.016)	(0.019)			(0.016)	(0.048)	(0.054)	(0.036)	(0.021)
ODA to Education x Internal conflict				0.049		0.049+		0.078		-0.008
				(0.046)		(0.031)		(0.069)		(0.008)
ODA to Education x Natural disaster					-0.042	0.008		0.001		0.006
					(0.029)	(0.020)		(0.030)		(0.033)
Observations	820	820	820	820	820	820	819	819	810.000	810.000
Countries	109	109	109	109	109	109	109	109	109.000	109.000
AR1 (p-value)	0.008	0.012	0.005	0.005	0.026	0.002	0.007	0.003	0.000	0.000
AR2 (p-value)	0.564	0.596	0.584	0.975	0.624	0.899	0.346	0.468	0.217	0.213
Hansen test (p-value)	0.631	0.933	0.778	0.509	0.771	0.652	0.902	0.892	0.298	0.425

Notes: Robust standard errors in parentheses, + p<0.15, * p<0.10, ** p<0.05, *** p<0.01. Each specification includes year dummies and a constant.
Sources: Authors' calculations based on World Bank data.

Table 7: The impact of crises on primary school enrolment, 1999-2012, System GMM, robustness checks

	Gross primary school enrolment Without UMIC				**Gross primary school enrolment** Without ODA to education lowest 10%				**Gross primary school enrolment** Sub-Saharan Africa only			
	Commitments		Disbursements		Commitments		Disbursements		Commitments		Disbursements	
	1	2	3	4	5	6	7	8	9	10	11	12
Lagged primary school enrolment	0.777***	0.919***	0.732***	0.918***	0.854	0.918***	0.826***	0.906***	0.965***	0.863***	0.912***	0.892***
(in logarithm)	(0.107)	(0.052)	(0.125)	(0.059)	(0.921)	(0.050)	(0.106)	(0.070)	(0.127)	(0.156)	(0.201)	(0.152)
Total ODA to Education	-0.010	-0.051	-0.009	-0.068*	0.004	-0.037	-0.079	0.002	-0.044	-0.051	-0.037	-0.101
(per capita)	(0.079)	(0.038)	(0.069)	(0.040)	(5.409)	(0.043)	(0.067)	(0.067)	(0.102)	(0.099)	(0.082)	(0.071)
GDP per capita	0.000	0.003	0.000	0.004+	-0.001	0.002	0.005	-0.001	0.002	0.003	0.002	0.006
(in logarithm)	(0.005)	(0.002)	(0.004)	(0.003)	(0.354)	(0.003)	(0.004)	(0.004)	(0.007)	(0.007)	(0.006)	(0.005)
GDP per capita squared	-0.000	-0.000	-0.001	-0.000	-0.000	-0.000	0.000	0.000	-0.001	-0.001	-0.002	-0.001
(in logarithm)	(0.001)	(0.000)	(0.001)	(0.000)	(0.018)	(0.000)	(0.001)	(0.000)	(0.001)	(0.001)	(0.002)	(0.001)
0-14 population	0.001	-0.005	0.001	-0.003	-0.002	-0.004	-0.000	-0.002	-0.006	-0.001	-0.010+	-0.002
(over total population)	(0.005)	(0.004)	(0.004)	(0.004)	(0.026)	(0.003)	(0.003)	(0.002)	(0.010)	(0.007)	(0.007)	(0.004)
Public spending on education	-0.022*	-0.017***	-0.030**	-0.017**	-0.021	-0.013*	-0.023	-0.018	-0.032	-0.021	-0.030	-0.020+
(over GDP)	(0.012)	(0.006)	(0.012)	(0.007)	(0.116)	(0.007)	(0.019)	(0.013)	(0.027)	(0.030)	(0.022)	(0.013)
GDP per capita crisis	0.004	0.012	-0.058***	-0.052**	-0.017	-0.008	-0.165+	-0.201***	0.085	0.031	0.079	0.063
	(0.023)	(0.015)	(0.020)	(0.024)	(0.252)	(0.024)	(0.101)	(0.067)	(0.080)	(0.083)	(0.077)	(0.074)
Political crisis		-0.044**		-0.040		-0.019		0.142**		-0.024		-0.049
		(0.020)		(0.030)		(0.049)		(0.068)		(0.039)		(0.057)
Internal conflict		0.027		0.112		0.027		0.047		-0.010		-0.054
		(0.051)		(0.122)		(0.036)		(0.054)		(0.080)		(0.143)
Population affected by natural disaster	0.000	0.001	0.005	0.002	0.000	0.001	0.001	-0.000	-0.001	0.000	0.004	-0.001
(over total population)	(0.001)	(0.001)	(0.004)	(0.003)	(0.030)	(0.001)	(0.004)	(0.003)	(0.011)	(0.010)	(0.009)	(0.006)
ODA to Education x GDP per capita crisis	0.001	0.003+	0.008**	0.005+	0.003	0.002+	0.004	0.005	0.025	0.021	0.037*	0.030**
	(0.004)	(0.002)	(0.004)	(0.003)	(0.028)	(0.001)	(0.006)	(0.004)	(0.034)	(0.030)	(0.021)	(0.014)
ODA to Education x Political crisis	-0.068***	-0.050***	0.124*	0.143**	0.005	-0.009	0.350+	0.381**	-0.199	-0.107	-0.261	-0.213
	(0.025)	(0.014)	(0.069)	(0.068)	(0.184)	(0.022)	(0.232)	(0.152)	(0.187)	(0.168)	(0.193)	(0.199)
ODA to Education x Internal conflict		0.055*		0.084		0.018		-0.162**		0.011		0.081
		(0.033)		(0.072)		(0.030)		(0.074)		(0.044)		(0.114)
ODA to Education x Natural disaster		-0.014		-0.051		-0.011		-0.021*		-0.025		0.117
		(0.025)		(0.053)		(0.009)		(0.011)		(0.219)		(0.418)
Observations	585	585	585	585	268	268	267	267	292	292	292	292
Countries	78	78	78	78	65	65	65	65	39	39	39	39
AR1 (p-value)	0.012	0.002	0.011	0.001	0.332	0.067	0.055	0.035	0.013	0.004	0.006	0.002
AR2 (p-value)	0.641	0.571	0.410	0.715	0.905	0.537	0.549	0.097	0.891	0.924	0.755	0.741
Hansen test (p-value)	0.570	0.998	0.827	0.676	0.973	0.998	0.661	0.916	0.662	0.856	0.639	0.254

Notes: Robust standard errors in parentheses, + p<0.15, * p<0.10, ** p<0.05, *** p<0.01. Each specification includes year dummies and a constant.
Sources: Authors' calculations based on World Bank data.

Turning to political crisis, results appear puzzling. While ODA to education measured by commitments is less effective, disbursements tend to be more effective. This shift of sign seems to be robust to the various specifications presented in Tables 6 and 7. Let's recall from Table 1 that ODA to education disbursements tend to decline sharply during political turmoil while the effect on commitments was less clear. A rapid examination of the data supports this finding as the ratio of disbursements to commitment is significantly lower during political crises. It implies that ODA actually disbursed during political crises is significantly lower that ODA committed. This shift of sign could then be easily explained if ODA to education presents decreasing return or to be more precise if the absorptive capacity of aid receiving countries decreases during political crises. As central governments are unable to operate efficiently, it is likely that those countries are not able to manage as much ODA financed projects. This hypothesis is illustrated in Table A4 in the appendix where we introduce *ODA to Education x Political crisis* squared as an additional variable. As can be seen from columns 1 to 3, the decreasing returns hypothesis tends to be confirmed. It implies that ODA to education is also more efficient during political crisis but that the absorptive capacity of receiving countries is lower. As the actual response from the donor community to political crisis is to cut aid flows, it appears critical to design new aid instruments to enhance absorptive capacities and maintain a sustained level of disbursements during political crisis by working for example with NGOs or local governments[7]. Furthermore, looking at gender issues and the ratio of female to male in primary education in columns 9 and 10 of Table 6, we find, as for school enrolment, that political crises have detrimental effects and that the interactive variable *political crisis x ODA to education* turns out to be positive and significant. In time of political crises aid to education appears to be more efficient regarding gender issues in primary education.

Concerning the two other types of crisis namely conflicts and natural disasters, results displayed in Tables 6 and 7 don't tell much about the specific effectiveness of aid to education in those particular contexts. The largely heterogeneous natures of those events seem to make it difficult to draw clear conclusions on the nature of the relationship between primary education and aid to education in times of conflict or natural disaster.

V. SUMMARY AND IMPLICATIONS

The effect of macroeconomic crises on human capital investment and the response of the international community through aid appear as critical issues for the success the 2030 Sustainable Development Goals. While the relationship between crisis, education and aid is intensively discussed by the international community, rigorous macroeconomic evidence is still missing. The impact of crises on education, aid on education and aid effectiveness in a time of crisis remains weakly documented.

To address this issue, we first develop an explicit methodology to define episodes of macroeconomic crisis and specific episodes of political crisis, internal conflicts and natural disasters. With our methodology, crises are frequent, deep and long. The average duration for

[7] Interestingly, we could not find any effect of humanitarian ODA on education (results upon request) implying that the greater effectiveness of ODA to education is not conditional to the use of humanitarian aid.

macroeconomic crisis is 14 years, which is more than two times the normal duration of primary education. The most severe crises in relative terms occur in the poorest countries but much variability is observed between regions and periods. We use system GMM techniques to measure impacts of crisis on education, impact of crisis on aid to education and aid effectiveness on education. We use a sample of 109 developing countries over the period 1999-2012 and focus on gross primary school enrolment and ODA to education committed and disbursed. Our results show that macroeconomics crisis have a strong and significant impact on primary school enrolment with a macroeconomic crisis reducing access to primary education by 1.5% per year. With our data, other types of crisis don't seem to significantly influence enrolment rates in primary education and girls do not appear to be more significantly impacted than boys. Regarding the impact of crises on aid to education flows, we find no significant effect of economic downturn in the receiving country using either commitments or disbursements. However, aid to education disbursements and public spending on education over GDP tend to strongly react to political crises and internal conflicts. Growth downturns and political turmoil have a strong impact on primary education either directly or indirectly through a sharp reduction of financial flows directed at education, and while aid does not appear to be procyclical with respect to GDP per capita growth, ODA to education disbursements decrease strongly during times of political distress. Looking for the impact of aid on education in a time of crisis, our results show that aid to education is more effective during macroeconomic crisis. On the specific case of political crisis, our results indicate that while ODA to education measured by disbursements tend to be more effective pointing to a lower absorptive capacity during political crisis.

The design of an optimal response strategy from the donor community in case of acute macroeconomic or political crisis is one of the main challenges underlying the implementation of the new SDGs. As countries that lag the furthest behind in terms of poverty reduction or education are also those which face the mostcrises, they should not be treated as special cases, but are in dire need of a clear, new framework that specifically addresses their needs and special characteristics. If aid to education plays a major role in the financing of education in those countries, a sharp decrease in disbursements can only mean a worsening of the effects of political crises and a strengthening of their long-lasting effects on children's lives. Likewise, during a macroeconomic crisis, as budget balance becomes an even more binding constraint for developing countries, ODA should react more rapidly to play its role of macroeconomic buffer and so should ODA to education. Hence, the donor community has to develop new partnerships and design new instruments to reinforce the effectiveness of their actions in fragile countries that go beyond short term humanitarian aid. This issue is not limited to education and remains central for other sector such as health, for which the Ebola crisis has also raised numerous questions regarding the appropriate international response in case of acute crises in fragile countries, in terms of timing and also in terms of amounts and coordination.

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APPENDIX

Table A1: Macroeconomic crises

Country	Date	Duration (in years)	Maximum decline (min GDP pc min / Initial GDP pc)
Albania	1983	17	42%
Algeria	1986	17	19%
Angola	1989	16	40%
Antigua and Barbuda	2008	6	23%
Argentina	1981	16	26%
Argentina	1999	7	22%
Armenia	1991	12	51%
Azerbaijan	1991	15	61%
Bangladesh	1965	4	7%
Bangladesh	1971	22	22%
Belarus	1991	11	35%
Belize	1981	7	11%
Belize	1994	5	4%
Benin	1982	2	8%
Benin	1986	12	10%
Bolivia	1978	30	28%
Brazil	1981	6	13%
Brazil	1990	5	8%
Bulgaria	1989	14	22%
Burundi	1978	3	6%
Burundi	1992	22	36%
Cameroon	1987	27	42%
Central African Republic	1962	14	10%
Central African Republic	1978	37	43%
Chad	1963	41	43%
Chile	1972	8	20%
Colombia	1998	6	7%
Comoros	1985	29	17%
Congo, Dem. Rep.	1975	39	76%
Congo, Rep.	1976	4	13%
Congo, Rep.	1985	29	31%
Costa Rica	1980	12	16%
Cote d'Ivoire	1979	35	49%
Cuba	1986	20	38%
Djibouti	1991	23	32%
Dominica	2011	3	4%
Dominican Republic	1984	3	5%
Ecuador	1982	12	5%
Egypt, Arab Rep.	1966	3	3%
El Salvador	1979	24	35%
Eritrea	1998	16	33%
Ethiopia	1984	22	30%
Fiji	1982	12	15%
Gabon	1977	37	52%
Gambia, The	1984	26	13%
Georgia	1989	25	79%
Ghana	1964	6	9%
Ghana	1975	31	36%
Grenada	1992	4	5%
Grenada	2009	5	9%
Guatemala	1981	18	18%
Guinea	1990	10	8%
Guinea-Bissau	2001	8	5%
Guinea-Bissau	2012	2	7%
Guyana	1962	4	16%
Guyana	1977	3	9%
Guyana	1982	13	25%
Haiti	2000	14	13%
Honduras	1980	18	11%
India	1971	4	4%
Indonesia	1962	6	7%
Iran, Islamic Rep.	1977	35	52%
Iraq	1983	7	19%
Iraq	2000	9	43%
Jordan	1987	18	30%
Kazakhstan	1991	12	37%
Kenya	1981	7	7%
Kenya	1991	16	11%
Kiribati	1976	38	74%
Kyrgyz Republic	1991	23	51%
Lebanon	1999	8	6%
Lesotho	1968	3	3%
Lesotho	1980	8	7%
Liberia	1980	34	93%
Lithuania	1991	13	43%
Macedonia, FYR	1991	16	19%
Madagascar	1961	7	6%
Madagascar	1972	42	50%
Malawi	1962	3	5%

Malawi	1980	4	10%
Malawi	1986	12	18%
Malawi	2000	7	9%
Mali	1980	21	24%
Mali	2011	3	4%
Marshall Islands	1989	4	8%
Marshall Islands	1996	16	22%
Mauritania	1971	43	55%
Mexico	1982	15	13%
Mexico	2001	4	3%
Micronesia, Fed. Sts.	1996	5	10%
Micronesia, Fed. Sts.	2007	3	3%
Moldova	1990	24	66%
Mongolia	1990	14	27%
Mozambique	1982	16	33%
Namibia	1981	23	20%
Nicaragua	1978	36	59%
Niger	1966	48	54%
Nigeria	1966	4	25%
Nigeria	1981	3	28%
Nigeria	1986	19	23%
Palau	1992	22	22%
Panama	1974	4	4%
Panama	1987	6	19%
Papua New Guinea	1974	19	23%
Papua New Guinea	1997	14	22%
Paraguay	1982	6	10%
Paraguay	1998	10	14%
Peru	1976	4	5%
Peru	1982	4	15%
Peru	1988	18	31%
Philippines	1983	21	19%
Romania	1988	16	29%
Russian Federation	1990	17	44%
Rwanda	1963	13	24%
Rwanda	1987	4	9%
Rwanda	1993	14	48%
Samoa	1990	6	9%
Senegal	1977	37	22%
Seychelles	1980	8	18%
Seychelles	2001	5	11%
Sierra Leone	1975	7	6%
Sierra Leone	1994	10	21%
Solomon Islands	1996	18	36%
South Africa	1982	25	18%
St. Kitts and Nevis	2009	5	12%
St. Lucia	2009	5	6%
St. Vincent and the Grenadines	1965	5	11%
St. Vincent and the Grenadines	1973	9	28%
St. Vincent and the Grenadines	2009	5	6%
Sudan	1963	13	22%
Sudan	1978	22	28%
Suriname	1979	32	38%
Swaziland	1976	5	9%
Syrian Arab Republic	1965	4	12%
Syrian Arab Republic	1982	12	19%
Tajikistan	1989	25	75%
Tanzania	1991	9	7%
Thailand	1997	6	14%
Timor-Leste	2002	7	20%
Togo	1981	33	40%
Tonga	2006	5	7%
Turkey	1978	6	8%
Turkmenistan	1991	17	49%
Tuvalu	1999	2	3%
Tuvalu	2003	6	10%
Uganda	1984	9	12%
Ukraine	1990	24	60%
Uruguay	1982	10	21%
Uruguay	1999	8	16%
Uzbekistan	1990	16	28%
Vanuatu	1985	13	13%
Vanuatu	2001	6	13%
Vanuatu	2010	4	3%
Venezuela, RB	1978	36	39%
West Bank and Gaza	2000	12	26%
Zambia	1961	3	7%
Zambia	1968	7	9%
Zambia	1977	35	39%
Zimbabwe	1975	39	53%

Table A2: Political crisis

Country	Date	Duration (in years)
Afghanistan	1996	5
Albania	1996	1
Algeria	1992	12
Argentina	1976	7
Armenia	1995	19
Azerbaijan	1993	21
Belarus	1995	19
Benin	1972	18
Burundi	1996	5
Cambodia	1976	3
Cambodia	1997	1
Central African Republic	2003	11
Chile	1973	16
Congo, Dem. Rep.	1997	17
Ecuador	1972	7
El Salvador	1977	4
Ethiopia	1975	16
Gambia, The	1994	20
Ghana	1972	7
Ghana	1981	20
Guatemala	1974	12
Guinea-Bissau	1998	2
Guinea-Bissau	2003	2
Guinea-Bissau	2012	2
Guyana	1980	12
Haiti	1991	3
Haiti	1999	15
Iran, Islamic Rep.	2004	10
Lebanon	1975	15
Lesotho	1998	4
Madagascar	2009	5
Mali	2012	2
Mauritania	2008	6
Nepal	2002	4
Nicaragua	1981	9
Niger	1996	18
Pakistan	1977	11
Pakistan	1997	17
Peru	1992	9
Philippines	1972	15
Sierra Leone	1997	5
Solomon Islands	2000	3
Sudan	1971	14
Suriname	1980	11
Tajikistan	1992	6
Tajikistan	2003	11
Thailand	1971	3
Thailand	1976	12
Thailand	1991	1
Thailand	2006	8
Turkey	1971	2
Turkey	1980	9
Turkey	1993	18
Uruguay	1971	14
Venezuela, RB	2009	5
Zambia	1972	19
Zambia	1996	12
Zimbabwe	1987	22

Table A3: The impact of shocks on public spending on education, 1999-2012, System GMM

	Gross primary school enrolment				
	1	2	3	4	5
Lagged public spending on education	0.872***	0.858***	0.858***	0.879***	0.818***
(over GDP, in logarithm)	(0.112)	(0.119)	(0.115)	(0.110)	(0.143)
Total ODA to Education	**0.066***	**0.063***	**0.060***	**0.069****	**0.041**
(per capita, in logarithm)	**(0.036)**	**(0.035)**	**(0.036)**	**(0.032)**	**(0.042)**
Total ODA per capita	-0.038	-0.039	-0.043	-0.032	-0.030
(minus education, in logarithm)	(0.032)	(0.031)	(0.031)	(0.028)	(0.041)
GDP per capita	-0.112	-0.095	-0.060	-0.158	0.025
(in logarithm)	(0.203)	(0.203)	(0.212)	(0.127)	(0.325)
GDP per capita squared	0.007	0.006	0.003	0.010	-0.003
(in logarithm)	(0.014)	(0.014)	(0.015)	(0.009)	(0.023)
0-14 population	-0.003	-0.003+	-0.002	-0.003	-0.003
(over total population)	(0.002)	(0.002)	(0.002)	(0.002)	(0.003)
GDP per capita crisis	0.012				0.032
	(0.020)				(0.030)
Political crisis		**-0.056**			**-0.092***
		(0.043)			**(0.051)**
Internal conflict			-0.021		-0.018
			(0.036)		(0.052)
Population affected by natural disaster				0.084	-0.074
(over total population)				(0.322)	(0.585)
Observations	770	770	770	770	770
Countries	107	107	107	107	107
AR1 (p-value)	0.001	0.001	0.001	0.000	0.002
AR2 (p-value)	0.448	0.428	0.450	0.477	0.290
Hansen test (p-value)	0.374	0.375	0.379	0.418	0.239

Notes: Robust standard errors in parentheses, + p<0.15, * p<0.10, ** p<0.05, *** p<0.01.
Each specification includes year dummies and a constant.
Sources: Authors' calculations based on World Bank data.

Table A4: The impact of crisis on primary school enrolment, 1999-2012, System GMM, robustness checks

	Gross primary school enrolment Commitments		
	1	2	3
Lagged primary school enrolment	0.862***	0.891***	0.915***
(in logarithm)	(0.082)	(0.066)	(0.062)
Total ODA to Education	0.001	0.001	0.001
(per capita)	(0.002)	(0.001)	(0.001)
GDP per capita	-0.019	-0.031	-0.034
(in logarithm)	(0.055)	(0.042)	(0.040)
GDP per capita squared	0.001	0.002	0.002
(in logarithm)	(0.003)	(0.003)	(0.003)
0-14 population	-0.000	-0.000	-0.000
(over total population)	(0.000)	(0.000)	(0.000)
Public spending on education	-0.000	-0.000	-0.001
(over GDP)	(0.003)	(0.002)	(0.002)
GDP per capita crisis		-0.008*	-0.008**
		(0.004)	(0.004)
Political crisis	-0.029	-0.029+	-0.018
	(0.022)	(0.019)	(0.018)
Internal conflict			-0.023
			(0.017)
Population affected by natural disaster			0.025
(over total population)			(0.056)
ODA to Education x GDP per capita crisis		0.003	0.003+
		(0.003)	(0.002)
ODA to Education x Political crisis	0.152+	0.172*	0.146+
	(0.104)	(0.104)	(0.092)
ODA to Education x Political crisis squared	-0.118*	-0.132*	-0.129**
	(0.072)	(0.070)	(0.063)
ODA to Education x Internal conflict			0.048
			(0.040)
ODA to Education x Natural disaster			-0.019
			(0.039)
Observations	820	820	820
Countries	109	109	109
AR1 (p-value)	0.004	0.002	0.003
AR2 (p-value)	0.682	0.656	0.774
Hansen test (p-value)	0.833	0.459	0.593

Notes: Robust standard errors in parentheses, + p<0.15, * p<0.10, ** p<0.05, *** p<0.01. Each specification includes year dummies and a constant.
Sources: Authors' calculations based on World Bank data.

Figure A1: Number of internal conflicts in the World between 1989 and 2013

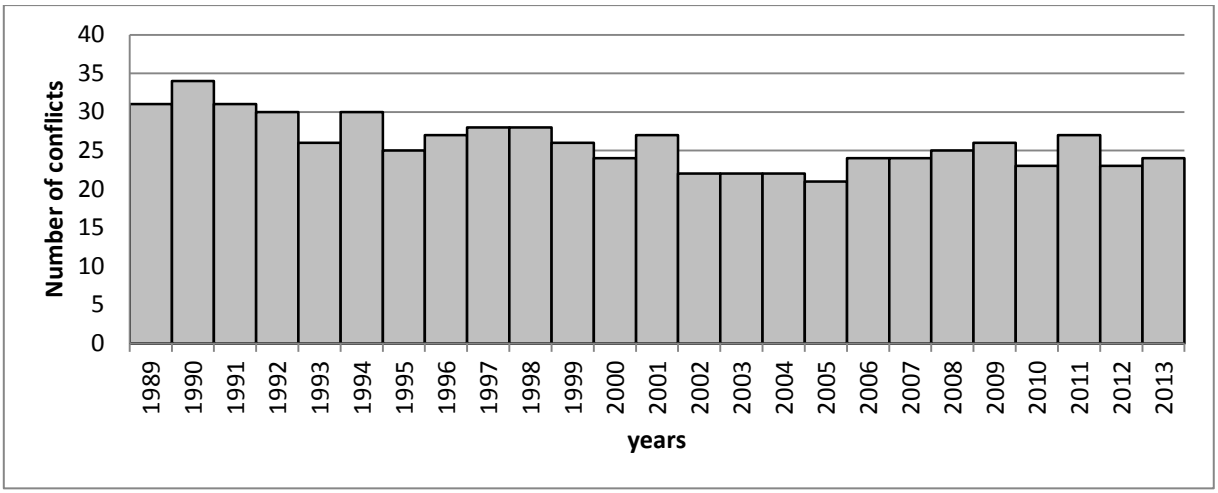
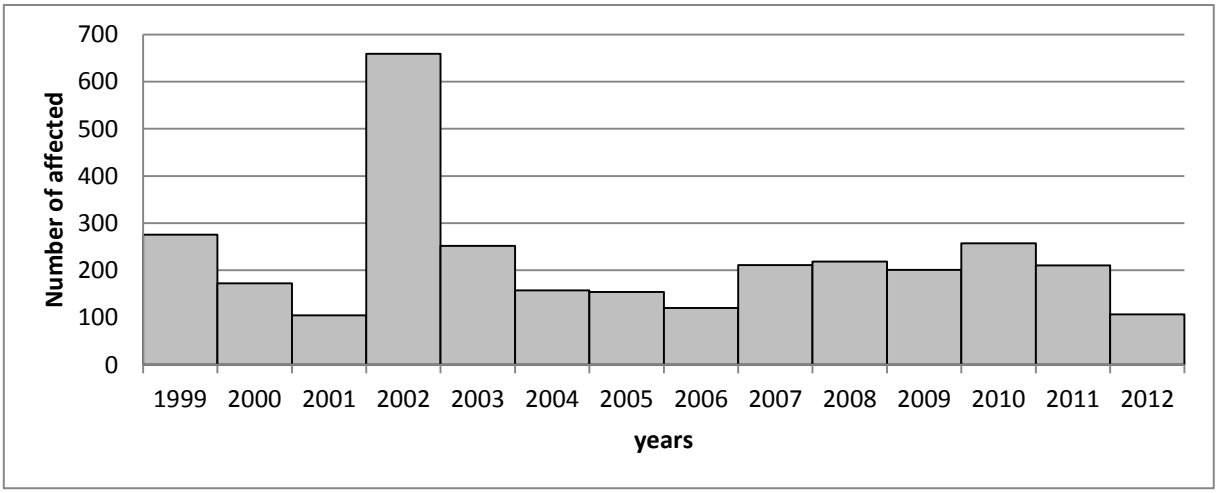


Figure A2: Number of people affected by natural disasters (in millions) between 1999 and 2012.



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