Social Protection and Food Security in Sub-Saharan Africa: An Evaluation of Cash Transfer Programmes

d'Agostino, Giorgio and Pieroni, Luca and Scarlato, Margherita

Department of Economics, Roma Tre University (Italy), Department of Economics, Finance and Statistics, University of Perugia (Italy), Department of Economics, Roma Tre University (Italy)

5 September 2013

Social Protection and Food Security in Sub-Saharan Africa: An Evaluation of Cash Transfer Programmes

d'Agostino Giorgio.[a], Pieroni Luca[b], Scarlato Margherita[a]
[a] Department of Economics, Roma Tre University (Italy)
[b] Department of Economics, Finance and Statistics, University of Perugia (Italy).

Abstract

This paper evaluates the effects of cash transfer (CT) programmes introduced during the 1990s and 2000s on food security in a sample of sub-Saharan African countries. We apply the synthetic control method to compare changes in the post-intervention food insecurity trajectories of economies affected by CT programmes relative to their unaffected counterparts. The results suggest that CT programmes exert differential effects on the prevalence of undernourishment. Although the estimates in the upper-middle income countries in our sample show mixed effects for the application of CT programmes on food insecurity, these effects appear to be important in low-income and fragile sub-Saharan countries. Robustness analysis via placebo experiments confirms the soundness of our results, and their implications for policymakers are discussed.

Keywords: Sub-Saharan Africa, food security, social protection.
JEL Classification: Q1, Q18, O13

*Corresponding author: Margherita Scarlato, Roma Tre University, Via Silvio DAmico 77, 00145, Rome. E-mail margherita.scarlato@uniroma3.it.

**Acknowledgment: The research leading to these results has received funding from the European Union's Seventh Framework programme FP7/2007-2011 under Grant Agreement n290693 FOODSECURE - Exploring the Future of Global Food and Nutrition Security. The views expressed are the sole responsibility of the author(s) and do not necessarily reflect the views of the European Commission.

September 5, 2013

1. Introduction

Recently, threats of financial collapse and global recession, food shortages, and rising food prices have exacerbated economic vulnerability to adverse shocks[1]. One consequence has been the increased presence of food insecurity even in countries unaffected by recurrent famine and the issue is now perceived to be part of broader social protection strategies (Gentilini, 2007; Crawford et al., 2010). A number of inquiries show that the relationship between food intake and nutritional achievement can vary greatly depending, amongst other things, on the level of access to complementary inputs: healthcare, basic education, clean drinking water, sanitation and so on (Dreze and Sen, 1989). These analyses support a pragmatic approach to promoting capabilities and incentives, one that tackles hunger and food insecurity by bridging food assistance and other pillars of social protection (Crawford et al., 2010). In accordance with this perspective, new social protection measures have been implemented in numerous underdeveloped and emerging countries (Duflo, 2012).

Social protection programmes targeting the poor, or those who may become poor as a result of adverse shocks, can take many forms: cash transfer (CT) schemes involving welfare payments, child allowances or pensions; in-kind transfers such as food aid or school food programmes; subsidies for goods purchased by the poor; unemployment insurance, and public works or workfare schemes. The 'new social protection agenda' includes interventions that link the recipients of cash or food payments to other government services and conditional cash transfer (CCT) schemes (Hoddinott, 2012). These programmes provide cash payments to poor households that meet certain behavioural requirements, generally related to children's healthcare, child nutrition and education, with the aim of promoting longer-term human capital investments (Fiszbein et al., 2009).

Despite the abundance of social protection innovations and studies assessing their effectiveness, the literature still lacks inquiries that rigorously measure the effects of such innovations in sub-Saharan Africa (Gilligan et al., 2009)[2]. This paper partially fills this gap by evaluating the effects of specific social protection programmes (i.e. CTs) introduced in the past 20 years on food security

[1] Following the food and economic crises, in 2009 more than a billion people worldwide were undernourished (FAO, 2011). The UN Food and Agriculture Organization (FAO) estimates that in 2010-12 period, about 870 million people were undernourished (FAO, 2012).

[2] An exception is Ethiopia's Productive Safety Nets Programme (PSNP), the largest social protection programme in sub-Saharan Africa. The PSNP has been rigorously evaluated across a range of indicators by Gilligan et al. (2009) and Sabates-Wheeler and Devereux (2011), amongst others.

in sub-Saharan Africa (Grosh et al., 2008; Garcia and Moore, 2012). These programmes, which constitute the dominant form of social transfer in this region, can be provided as alternatives or complements to vouchers or traditional food transfer programmes[3], deal with short-term poverty by providing guaranteed extra money and serve as insurance against the risk of food insecurity [4].

This paper makes two major contributions. First and foremost, we determine whether CT has positive shifts in alleviating food insecurity, an interesting exercise because of the nature of our sample countries. The extreme poverty and pervasiveness of hunger in sub-Saharan Africa opens to question certain facts that are taken for granted in other parts of the world, particularly the responses to welfare transfers in terms of individual or household behaviour.

Second, we use the synthetic control method (Abadie et al., 2010) to evaluate food security policy interventions. As our data were collected primarily for evaluation of CTs' effects on the proportion of the population suffering chronic undernourishment, we were able to estimate the extent to which the trajectory defined by the synthetic control estimator predicts changes in that proportion, as implied by the quasi-experimental setting. Because the latter can be estimated with some degree of confidence given the existence of similar countries that are not subject to CTs, we can use these results to measure the effects of the policy intervention in question. Note that identification of the specific country features we estimate in predicting how undernourishment status changes with policy implementation, may or may not confirm the channel through which the intervention operates.

Our results suggest that CT programmes have differing effects on the countries in our sample and, in some cases, reduce food insecurity significantly. In particular, although the results are mixed for countries in the upper-middle income bracket because we were unable to identify exogenous variations in CTs, the effects of these programmes appear to be important when applied in low-income and fragile countries in sub-Saharan Africa. For example, the reduction in the prevalence of undernourishment averaged over three years ranges from 0.5 to 2 percentage points in Ethiopia, Mali, Malawi, Sierra Leone and Zimbabwe, whilst food insecurity was largely reduced in Rwanda consequent to the CT programme launched in 2005 (3.96 percentage points). In most of the cases

[3]For a discussion of alternative food assistance policy tools, see Gentilini and Omamo (2011).

[4]CTs are also linked to improvements in human capital because most of the money is spent on more and better food and on child education, health, and nutrition, thus reducing the intergenerational transmission of poverty (Hanlon et al., 2010; Devereux, 2012), although they are susceptible to price inflation Sabates-Wheeler and Devereux (2010).

considered here, CTs were part of the humanitarian response to an emergency and thus the flow of money to a large part of the (poor) population had immediate effects on food purchases, given the high degree of food income elasticity. The soundness of these results were tested through placebo experiments using countries that were not subjected to CTs, applying the same synthetic control estimator used for those that were so subjected.

The remainder of the paper is organised as follows. In Section 2, we discuss methodological issues and present the data. In Section 3 we provide the results of our empirical analysis, discuss the main results and draw the relevant policy implications. Section 4 concludes the paper by summarising the key issues.

2. Data and evaluation methodology

Our empirical analysis is based on a dataset covering 48 sub-Saharan African countries for the 1992-2010 period. The length of the sample period is strongly influenced by data availability and our aim of evaluating the effects of CTs in this region. Here, we present the main variables of interest for our analysis.

The outcome variable, which we use as a measure of food insecurity, is the prevalence of undernourishment (PU) and is based on the proportion of the population subject to chronic undernourishment[5]. This measure indicates individuals whose dietary energy supply is below the minimum level necessary to maintain health and carry out light physical activities. It proxies the availability and access dimensions of food security at the country level, and is extracted from the Food Security Indicators redacted yearly by the Food and Agricultural Organization (FAO).

Despite the wide adoption of this indicator in food security analyses, a number of questions arise in its use. Dasgupta (1993) and Svedberg (2002) discuss this indicator critically and argue that reliance on it may result in a significant underestimation of global undernutrition[6]. Such an argument is also advanced by Masset (2011) whose criticism relies on the lack of robustness of the

[5]See Masset (2011) for a review of hunger indices and methodological issues.

[6]With regard to content, the indicator's reliance on the distribution of the country's average annual per capita food consumption means that short-term phenomena such as seasonal crises are not covered. Further, the indicator is not intended to capture the evolution in the fundamental elements that drive the long-term nutrition condition in a country. In addition, chronic hunger is not the only interesting phenomenon that needs to be monitored. The evolution in food production, prevailing dietary composition and ratio of food expenditure to other basic needs expenditures such as health services and education may be equally important in monitoring the state of food security and the role that agricultural and food policies play therein (Cavatorta and Pieroni, 2013).

parameters used in the indicator's calculation; in particular, energy cut-off points, food availability and the distribution of calories across households.

The FAO indicator of chronic hunger, in contrast, has the undeniable merit of having raised and kept high awareness of the broader malnutrition problem. Cafiero and Gennari (2011) suggest that this indicator provides evidence that not enough is being done to monitor this problem. Thus, if the aim is to assess the country-level changes in chronic hunger affected by one specific policy (e.g. CT), the limited reliability of the FAO's PU indicator is not likely to influence significantly its patterns because it can be detached during estimation by including country fixed effects or specific control variables that are linked with its multidimensional framework.

From the same data source (Food Security Indicators), we extract four additional variables, which we use as covariates in the evaluation procedure: the access to improved water sources (AW), access to improved sanitation facilities (AS), the cereal import dependency ratio (CID), and the political stability and absence of violence/terrorism index (PSV). Whilst AW and AS reduce the risks of diarrhoea and other diseases that hamper the capacity to convert food into good nutritional outcomes, the CID and PSV have direct effects on a country's probability of experiencing undernourishment (Dreze and Sen, 1989; Smith, 2000; Masset, 2011; UNDP, 2012). In more detail, AW is measured as the percentage of the population with reasonable access to an adequate amount of water from an improved source, such as a household connection, public standpipe, borehole or protected well or spring or rainwater collection. Reasonable access is defined as the availability of at least 20 litres per person per day from a source within one kilometre of the individual's dwelling. AS refers to the percentage of the population with at least adequate access to excreta disposal facilities that can effectively prevent human, animal and insect contact with excreta. Improved facilities range from simple, but protected, pit latrines to flush toilets with a sewerage connection. To be effective, these facilities must be correctly constructed and properly maintained. CID is the sum of imports and production minus exports by region and sub-region. When the international prices of primary commodities start to rise, highly import-dependent countries are likely to suffer, with a consequent increase in food insecurity. Finally, the PSV index represents the underlying institutional determinants of food availability. This index measures perceptions of the likelihood that the government will be destabilised or overthrown by unconstitutional or violent means, including politically motivated violence and terrorism. We use

an indicator produced by the Brookings Institution and World Bank Development Research Group, which reflects the statistical compilation of survey responses given by a large number of enterprises, citizens and experts in industrial and developing countries, as reported by several survey institutes, think tanks and non-governmental and international organisations. The PSV index varies from approximately -2.5 (weak stability) to 2.5 (strong stability), with an improvement in governance indicating increased food security.

In addition, data on two variables are collected from the World Bank's African Development Indicators. Our variables of interest are the percentage of female pupils at the primary level, including enrolments in public and private schools, and the annual growth rate of per-capita GDP. A discussion of the importance of per-capita GDP for summarising a country's economic condition is omitted to save space. The positive relationship between female education and food security is well documented in the development literature (Behrman and Wolfe, 1987; Kassouf and Senauer, 1996; Burchi and Muro, 2012). Educated women ensure good nutritional outcomes for their families through their capability to make use of information on good health and nutritional practices.

2.1. Synthetic control approach

In evaluating the effects of CTs on food insecurity, it is necessary to compare countries that have and have not experienced these transfers. The challenge is to find countries that are sufficiently similar in the sub-Saharan Africa to ensure that any differences in food security outcomes reflect the policy intervention rather than disparities in country characteristics. We follow Abadie and Gardeazabal (2003) and Abadie et al. (2010, 2012) who propose a method based on the synthetic control approach. In this approach, a weighted combination of potential control countries (the synthetic control) is constructed to approximate the most relevant characteristics linked with the food insecurity indicator of the treated countries. Schematically, when a CT is introduced, the synthetic control method estimates the PU changes by comparing the observable outcome trends with those estimated in countries undergoing no policy intervention.

More formally, given a sample of sub-Saharan African countries indexed by J, we can distinguish between a set of J_1 countries that have introduced a CT policy (treated countries) and a set of J_0 countries that are potential controls for comparison, such that that $J = J_0 + J_1$. Following Abadie et al. (2012), we define the potential comparison controls the "donor pool"[7] and suppose

[7]The donor pool is defined as a reservoir of potential comparison units.

that the characteristics of each treated unit may be better approximated by a weighted average of countries in the donor pool. It is also assumed that the sample is a balanced panel for the time span $t = 1, ..., T$ and includes a number of pre-intervention periods T_0 and post-intervention periods T_1, such that $T = T_0 + T_1$. The synthetic control can then be represented by a vector $(J_0 \times 1)$ of weights $W = w_1, ..., w_{J_0}$, with $0 \leq w_{J_0} \leq 1$ and $w_1 + ... + w_{J_0} = 1$, where W is chosen to better reassemble the characteristics of the treated units in the synthetic control (Abadie and Gardeazabal, 2003).

We define X_{j_1} as a $(k \times 1)$ vector containing the pre-intervention characteristics of one treated unit j_1 in the set of treated unites J_1, and X_{J_0} as a $(k \times J_0)$ matrix of the pre-intervention characteristics of the donor pool. Our intent is to find a set of W^* that minimises the distance $\sum_{m=1}^{k} v_m \left(X_{j_1 m} - X_{J_0 m} W\right)^2$, where $m = 1, ..., k$ and v_m is a weight that reflects the relative importance assigned to the $m - th$ variable when we measure the discrepancy between X_{j_1} and $X_{J_0} W$. Introducing synthetic control weights v_m, we can describe the relevance of the explanatory variable chosen to measure the synthetic control. Indeed, as Abadie et al. (2012) show, we can infer the goodness of the chosen variables by comparing the synthetic control values of each k variable with their simple mean in the donor pool.

We now focus on Y_1, one vector $(T_1 \times 1)$ of the outcome of unit j_1 in set J_1 in post-intervention period T_1, that is, $Y_1 = (Y_{j_1 T_0 + 1}, ..., Y_{j_1 T})'$. Symmetrically, we define Y_0 as a matrix $(T_1 \times J_0)$ containing all of the post-intervention characteristics of the countries in the donor pool. The synthetic control estimator for the countries that experienced CTs in the given period is expressed as the difference between $Y_1 - Y_0 W^*$. Hence, for a given post-intervention period $t > T_0$, the synthetic control estimator for a treated unit j is $Y_{j_1 t} - \sum_{J_0} w^* Y_{J_o t}$. Matching variables X_{j_1} and X_{J_0} are supposed to be the predictors of post-intervention outcomes, which are themselves unaffected by the intervention. Abadie et al. (2010) propose a linear factor model to estimate $Y_1 - Y_0 W^*$, to reduce both the number of unmeasured factors affecting the outcome variables and the heterogeneity in the effects of observed and unobserved factors.

Controlling for unobservable factors ideally requires a large pre-intervention time span T_0. However, when PU is used as the outcome variable, trade-offs may arise between the length of the time span and the PU indicator's performance. As clarified in the previous section, the temporal behaviour of food insecurity is highly volatile and depends on a series of shocks, such as epidemics

or natural disasters or distractions arising from armed conflicts, which can permanently modify the behaviour of that series. In addition, to evaluate the effects of CT policies, we need to find a period of time in which no other policies have been implemented specifically to reduce food insecurity. As a consequence, an ad hoc sufficiently long time span is proposed for each treated country.

We perform a placebo test for each CT intervention on the food insecurity indicator to confirm the goodness of our estimated results. We replicate the synthetic control estimate of each treated unit for each country in the donor pool. In other words, for a given country in subset J_0 that does not implement a CT policy at time $t > T_0$, we expect an unusually large gap in relation to the respective treated country. If we do obtain this result, our interpretation is that the analysis provides significant evidence that CTs reduce PU. If the placebo tests produce gaps similar to those for the treated countries, in contrast, then our interpretation is that the analysis does not constitute evidence of a significant CT impact on PU.

2.2. Case study selection

A preliminary step in the synthetic control method is to identify feasible treated units and the donor pool. The upper part of Table 1 lists countries that introduced CT policies (treated units) in the sample period, whilst the bottom part lists the donor pool countries. The last column of Table 1 shows the sub-Saharan African countries by income class following the World Bank classification (Garcia and Moore, 2012). This classification allows us to distinguish CTs implemented in upper-middle income countries from those offered to low-income and fragile state countries.

Middle-income CTs often take the form of cash grant programmes planned for the long term. They are usually managed by government institutions and are domestically funded. These CT programmes are stable in nature and target social protection, without any specificity to food insecurity, and are addressed to vulnerable groups such as the elderly.

Conversely, low-income and fragile state countries implement CTs that are often designed to combat food insecurity within a relatively short time frame. They are typically non-government programmes that are partially or fully funded by donors. Because they are not centrally administered, the management information systems of these programmes are usually ad hoc in nature. They are generally emergency responses to natural disasters or man-made events, and they are not linked to other programmes.

For the inclusion in the set of treated units, a country had to satisfy two narrow and necessary

Table 1: Cash transfer policies in sub-Saharan Africa

Country code	Country name	Treatment date	Income group
	Treated units		
LSO	Lesotho*	2005, (2009)	Upper-middle income
SWZ	Swaziland	2005	Upper-middle income
BFA	Burkina Faso	2008	Low income
ETH	Ethiopia	2005	Low-income
GHA	Ghana	2008	Low-income
MLI	Mali	2000-2007	Low-income
MWI	Malawi	2005	Low-income
NER	Niger	2008	Low-income
RWA	Rwanda	2006	Low-income
SLE	Sierra Leone	2005	Fragile state
ZWE	Zimbabwe	2004	Fragile state
	Donor pool countries		
AGO	Angola		Upper-middle income
CMR	Cameroon		Upper-middle income
GAB	Gabon		Upper-middle income
GNQ	Equatorial Guinea		Upper-middle income
MUS	Mauritius		Upper-middle income
SYC	Seychelles		Upper-middle income
COM	Comoros		Low-income
GIN	Guinea		Low-income
MDG	Madagascar		Low-income
MRT	Mauritania		Low-income
TCD	Chad		Low-income
UGA	Uganda		Low-income
BDI	Burundi		Fragile state
CIV	Ivory Coast		Fragile state
COG	Republic of Congo		Fragile state
LBR	Liberia		Fragile state
SDN	Sudan		Fragile state
SOM	Somalia		Fragile state
STP	Sao Tome and Principe		Fragile state
TGO	Togo		Fragile state
	Countries excluded in line with treatment requirements		
BWA	Botswana	1996, 2002	Upper-middle income
CPV	Cape Verde	1992, 1995	Upper-middle income
NAM	Namibia	2000	Upper-middle income
NGA	Nigeria	2008, 2009	Upper-middle income
SEN	Senegal	2009, 2010	Upper-middle income
ZAF	South Africa	1990	Upper-middle income
KEN	Kenya	2005, 2009	Low-income
MOZ	Mozambique	1993	Low-income
TZA	Tanzania	2010	Low-income
ZMB	Zambia	2004,2006, 2007,2008	Low-income
ZAR	Dem. Rep. of Congo	2004	Fragile state
ERI	Eritrea	2009	Fragile state
	Countries excluded in line with donor pool requirements		
BEN	Benin		Low-income
DJI	Djibouti		Low-income
GMB	Gambia		Low-income
GNB	Guinea-Bissau		Low-income
CAF	Central African Republic		Fragile state

Notes: The income classification of the 48 sub-Saharan African countries presented in the third column, follows the World Bank classification Garcia and Moore (2012). The asterisk for Lesotho describes the post-intervention constraint (2009 in parenthesis).

conditions: i) its CT policy had to be implemented after 1996, with a minimum of pre-intervention periods, $T_0 = 5$ and ii) only one CT policy was implemented. The latter condition was adopted to allow identification of the interventions effects. Following application of these conditions, we excluded Botswana, Cape Verde, Nigeria, Senegal, South Africa, Kenya, Mozambique and Zambia from the treatment sample. In addition, Tanzania and Eritrea were excluded because there was an insufficient post-intervention time period for these two countries. The Democratic Republic of Congo and Namibia were excluded because of missing data. The final treatment sample thus comprises 11 countries.

Note that in the majority of the upper-middle income countries more than one CT policy was implemented, thus violating condition ii). This condition restricts our analysis to Lesotho and Swaziland, meaning that we could examine CTs' effects on PU only at the country level for this income group.

The donor pool was also chosen to satisfy two main requirements: i) the countries therein had not experienced a CT policy or ii) any other policy with indirect effects on food insecurity. Twenty countries met both requirements and thus formed the donor pool after excluding 12 countries that did not meet the first requirement in the 1990-2010 period and we excluded 5 countries (Benin, Central African Republic, Djibouti, Gambia and Guinea-Bissau) that did not meet the second.

The interventions that had important food security implications for these five excluded countries were: i) the Emergency Food Security Support Project (EFSSP) implemented in 2008 by the government of Benin and the World Bank (World Bank, 2008b) to assist the population experiencing food insecurity following a food price crisis; ii) a poverty reduction strategy launched in Djibouti in 2004 by the National Food Security Council (World Bank, 2012); iii) a well-structured programme designed to increase household and national food security through improved agricultural productivity, production and producers income introduced by the government of Gambia in 2004 (Republic of Gambia, 2005); iv) the EFSSP promoted by the World Bank in Guinea-Bissau in 2008 to rescue the food-insecure population following a food price crisis; and v) several programmes to combat food insecurity launched by international agencies in the Central African Republic, where about 45% of the population was living in conditions of food insecurity following the end of the country's civil war in 2005 World Bank (2008a); Global Food Security (2009).

3. Empirical results

3.1. Estimates

As previously explained, we constructed a synthetic estimator for each country as the convex combination of characteristics in the donor pool that most resembled the matching treated country in terms of the undernourishment predictor.

Table 2 displays the statistical results of a comparison between the pre-treatment characteristics of the actual treated countries and those of the synthetic control estimators, in addition to the average of the countries in the donor pool. It should first be noted that the mean estimators of the countries that did not implement a CT programme during our sample period do not appear to provide suitable information as a control group. Conversely, in almost all of the treated countries under investigation, there is a large gap in the pre-treatment covariate means relative to the synthetic estimators. The results in Table 2 highlight the affinity between a country exposed to the CT programme and its synthetic counterpart, similarly to matching estimator, safeguarding against estimation of extreme counterfactuals (King and Zeng, 2006).

The model is constructed by choosing the weight w^*, which minimises the mean squared prediction error ($RMSPE$) of PU in each treated country during the pre-CT period[8]. The last lines in Table 2 confirms that the degree of $RMSPE$ is small, except in the case of Ghana and Niger. Thus, whilst the choice of pre-treatment covariates fits well in general, we suspect that other pre-treatment influences may have affected PU in these two countries. Table 3 displays the weights of each control country across the synthetic estimates. These weights indicate, for example, that the PU trend in Lesotho prior to CT programme implementation is best represented by the combination of Gabon (0.657), Republic of Congo (0.107) and six other countries for its complement (0.235), whilst the other countries in the donor pool have $W - weight = 0$. We extend this interpretation in creating the counterfactual samples for all of the columns in Table 3, which represent the weight of estimates in countries subjected to a CT programme.

Figure 1 shows the PU trends in the treated countries (solid line) and synthetic control samples (dotted line) during the 1992-2010 period. Figure 2 reports the results of the placebo tests. We

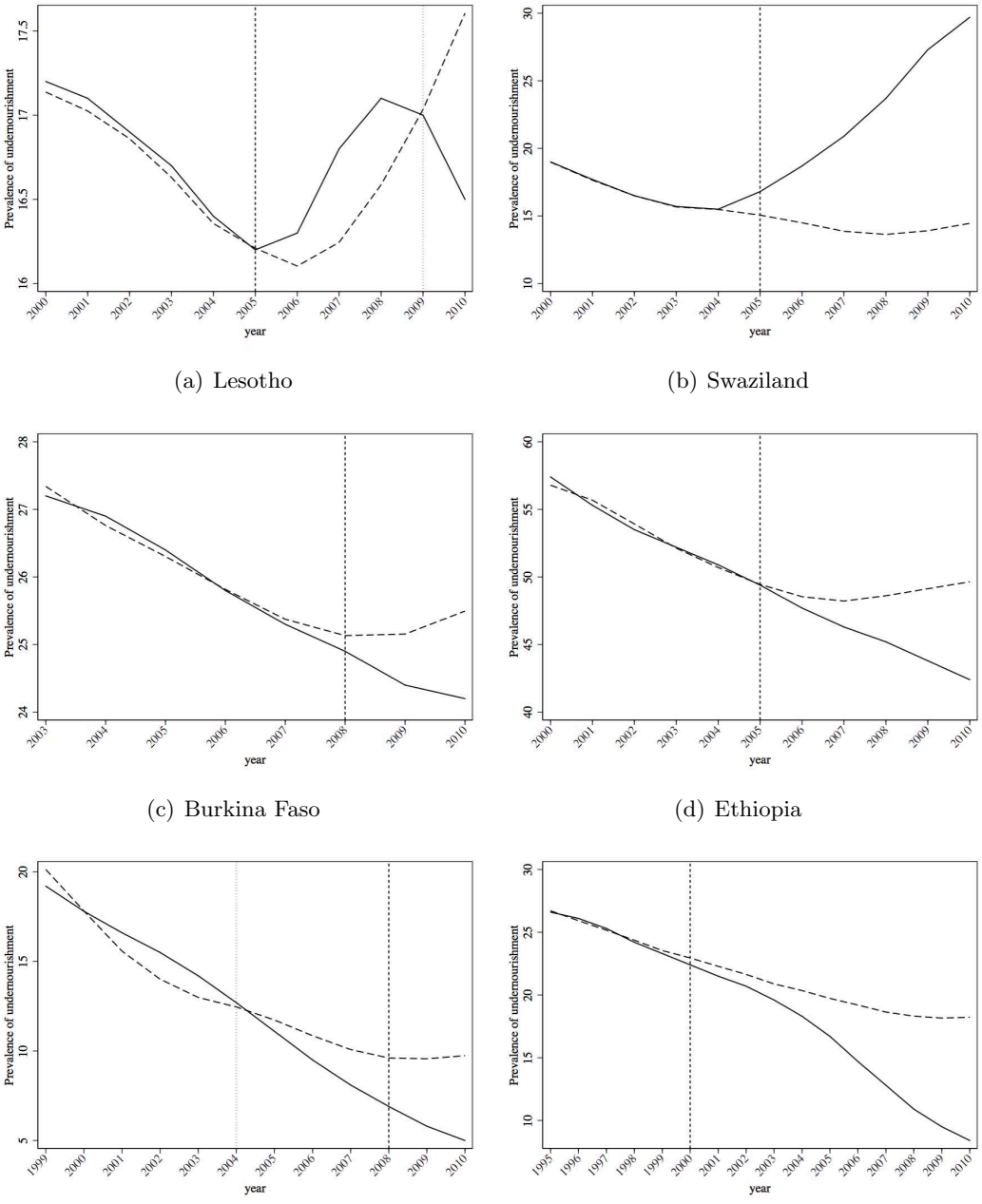
[8]The RMSPE measures the lack of fit between the path of the outcome variable (PU) in each country and its synthetic counterpart. The pre-intervention RMSPE for a given country is defined as $RMSPE = \left(1/T_0 \sum_{t=1}^{T_0} \left(Y_{1t} - \sum_{J_0} w^* Y_{J_o t}\right)^2\right)^{1/2}$.

Table 2: Comparison countries for each selected treatment unit

	Lesotho			Swaziland			Burkina Faso		
	Real	Sint. control (6 countries)	Simple mean (20 countries)	Real	Sint. control (4 countries)	Simple mean (20 countries)	Real	Sint. control (3 countries)	Simple mean (20 countries)
Access to improved water source	79.923	79.617	68.647	48.462	57.329	67.247	59.125	63.331	70.047
Access to improved sanitation facilities	24.615	32.686	29.471	50.923	21.067	31.094	11.188	20.066	29.812
Cereal import dependency ratio	65.500	75.307	51.745	54.523	71.948	52.015	9.488	22.636	50.487
Female primary education level	50.947	48.762	46.441	48.496	48.102	46.335	41.977	42.147	46.959
Political stability and absence of violence	0.028	0.009	-0.578	-0.068	0.314	-0.582	-0.077	-1.518	-0.541
Agricultural population	13.558	13.457	14.615	12.840	13.066	14.570	16.185	15.739	14.807
Growth rate of per-capita GDP	3.109	-1.116	-0.237	-0.997	-0.441	-0.575	1.797	0.571	1.433
Mean prevalence of undernourishment	16.860	16.802	26.620	16.880	16.857	26.621	26.320	26.319	25.514
RMSPE	0.013			0.017			0.104		
	Ethiopia			Ghana			Mali		
	Real	Sint. control (4 countries)	Simple mean (20 countries)	Real	Sint. control (4 countries)	Simple mean (20 countries)	Real	Sint. control (4 countries)	Simple mean (20 countries)
Access to improved water source	25.308	66.647	65.859	69.688	69.671	69.092	37.750	40.804	63.129
Access to improved sanitation facilities	7.154	34.690	28.624	9.938	20.005	28.948	17.000	24.585	27.282
Cereal import dependency ratio	9.090	52.318	48.818	24.794	66.203	50.318	4.575	51.081	46.045
Female primary education level	39.667	45.618	45.922	47.553	47.379	46.591	40.699	47.527	45.177
Political stability and absence of violence	-1.135	-1.132	-0.656	-0.122	0.192	-0.569	0.285	-0.694	-0.495
Agricultural population	17.758	14.906	14.865	16.199	12.639	14.782	15.892	15.064	14.689
Growth rate of per-capita GDP	1.001	-0.090	-0.394	1.738	0.272	0.813	2.706	2.059	2.167
Mean prevalence of undernourishment	53.860	53.845	28.796	13.856	13.961	25.933	25.100	25.138	29.319
RMSPE	0.385			1.145			0.168		
	Malawi			Niger			Rwanda		
	Real	Sint. control (5 countries)	Simple mean (20 countries)	Real	Sint. control (3 countries)	Simple mean (20 countries)	Real (8 countries)	Sint. control	Simple mean (20 countries)
Access to improved water source	57.417	79.684	67.510	41.750	55.302	67.268	66.071	65.973	68.541
Access to improved sanitation facilities	43.833	43.691	30.500	6.813	13.331	28.752	44.929	29.624	31.247
Cereal import dependency ratio	14.792	58.603	48.388	7.381	18.469	49.157	24.350	31.907	49.986
Female primary education level	48.923	47.754	46.271	39.932	43.624	46.146	50.186	46.790	46.754
Political stability and absence of violence	-0.276	-0.603	-0.590	-0.256	-0.933	-0.579	-1.570	-0.949	-0.656
Agricultural population	15.982	13.950	14.755	16.048	15.773	14.775	15.679	15.344	14.760
Growth rate of per-capita GDP	-1.809	-1.797	-0.327	-0.427	0.271	0.618	0.429	0.432	0.077
Mean prevalence of undernourishment	27.250	27.232	27.531	22.033	21.979	26.501	43.680	43.668	27.575
RMSPE	0.249			1.777			0.848		
	Sierra Leone			Zimbabwe					
	Real	Sint. control (3 countries)	Simple mean (20 countries)	Real	Sint. control (5 countries)	Simple mean (20 countries)			
Access to improved water source	44.769	51.047	66.800	79.667	61.942	68.035			
Access to improved sanitation facilities	11.154	15.393	28.647	40.500	40.474	29.988			
Cereal import dependency ratio	43.292	26.517	50.974	19.683	19.749	50.271			
Primary education: females	42.416	47.973	46.007	49.209	45.797	46.101			
Political stability and absence of violence	-1.405	0.094	-0.646	-1.124	-1.275	-0.680			
Agricultural population	14.846	15.327	14.691	15.861	15.831	14.738			
Growth rate of per-capita GDP	-1.477	-1.615	-0.015	-2.304	-1.297	-0.556			
Mean prevalence of undernourishment	40.360	40.365	27.998	42.960	43.014	28.760			
RMSPE	0.193			0.008					

Notes: We report in parentheses the number of countries used to measure the synthetic controls and the simple means. The *RMSPE* are estimated using the real behaviour of undernourishment prevalence and the synthetic control for the five-year pre-intervention period. The means prevalence of undernourishment is averaged for the five year pre-intervention period.

Figure 1: Cash transfer policies and food insecurity



(a) Lesotho

(b) Swaziland

(c) Burkina Faso

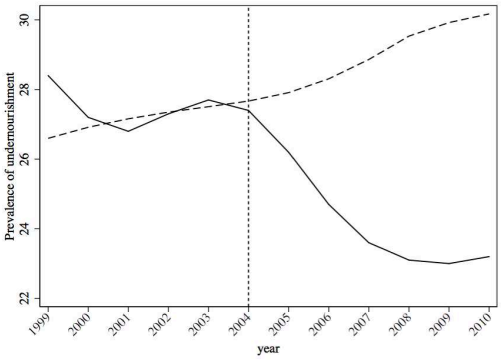
(d) Ethiopia

(e) Ghana

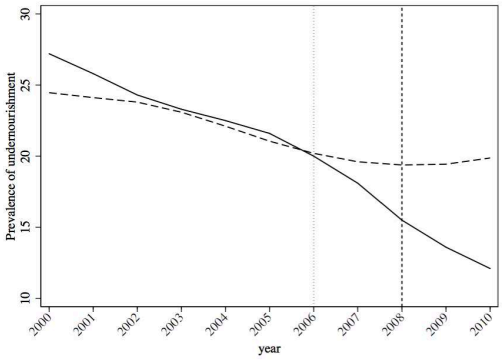
(f) Mali

Notes: The solid line shows the real behaviour of the PU variable, whereas the dotted line is the synthetic control. The covariates used for the synthetic controls are reported in Table 2 and the country weights in Table 3.

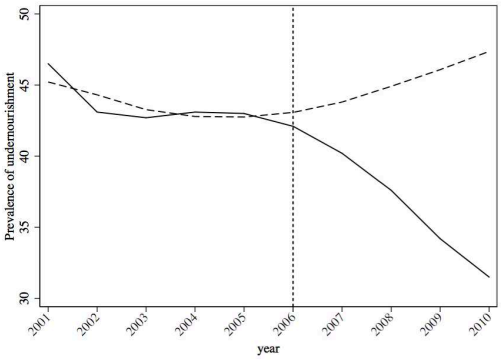
Cash transfer policies and food insecurity (continued)



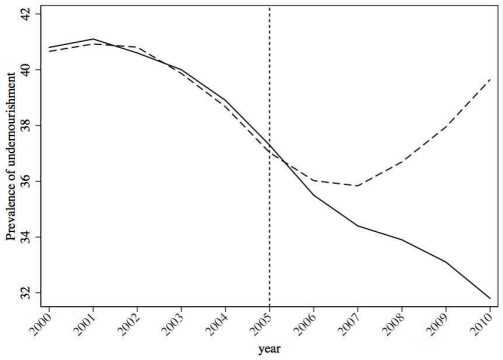
(g) Malawi



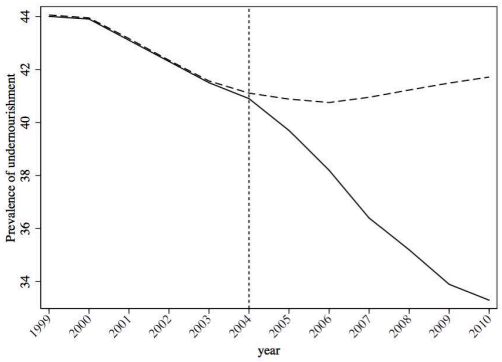
(h) Niger



(i) Rwanda



(j) Sierra Leone



(k) Zimbabwe

Notes: The solid line shows the real behaviour of the PU variable, whereas the dotted line is the synthetic control. The covariates used for the synthetic controls are reported in Table 2 and the country weights in Table 3.

Table 3: Comparison countries for each selected treatment unit

	Lesotho	Swaziland	Burkina Faso	Ethiopia	Ghana	Mali	Malawi	Niger	Rwanda	Sierra Leone	Zimbabwe
Angola	0.000	0.013	0.040	0.434	0.000	0.249	0.000	0.000	0.064	0.000	0.000
Burundi	0.000	0.000	0.159	0.151	0.000	0.000	0.350	0.000	0.134	0.000	0.379
Benin	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000
Ivory Coast	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000
Cameroon	0.000	0.000	0.000	0.000	0.000	0.000	0.015	0.000	0.001	0.000	0.385
Republic of Congo	0.107	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.001	0.000	0.000
Comoros	0.097	0.107	0.000	0.380	0.000	0.000	0.000	0.000	0.310	0.273	0.029
Gabon	0.658	0.000	0.000	0.000	0.000	0.000	0.514	0.000	0.000	0.000	0.000
Guinea	0.000	0.000	0.801	0.000	0.170	0.000	0.000	0.630	0.000	0.000	0.000
Liberia	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.001	0.000	0.000
Madagascar	0.064	0.000	0.000	0.000	0.030	0.000	0.025	0.252	0.105	0.713	0.117
Mauritania	0.001	0.539	0.000	0.000	0.137	0.554	0.000	0.000	0.000	0.014	0.000
Mauritius	0.029	0.000	0.000	0.000	0.000	0.000	0.096	0.000	0.000	0.000	0.000
Sao Tome and Principe	0.001	0.340	0.000	0.000	0.663	0.000	0.000	0.000	0.000	0.000	0.000
Togo	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.118	0.000	0.000	0.000
Uganda	0.041	0.000	0.000	0.035	0.000	0.198	0.000	0.000	0.383	0.000	0.091

Notes: Countries and $W - Weights$ for synthetic controls constructed from the best fitting combination of countries.

present the results of two placebo tests that include all of the countries in the donor pool and a selection of those countries with a $RMSPE$ less than three times that of the treated countries (Abadie et al., 2012).

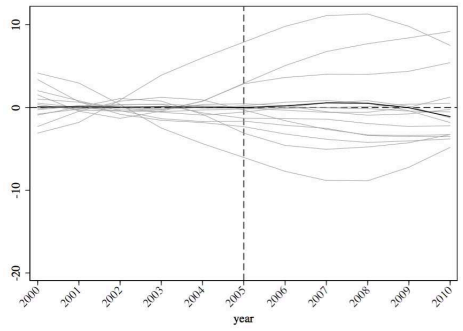
We first consider the two upper-medium income countries, Lesotho and Swaziland, both of which introduced CTs in 2005 (Figure 1: panels *a* and *b*). The prevalence of undernourishment in the synthetic Lesotho closely tracks the trajectory of this variable in the pre-treatment period (panel a). Along with the previous estimates of the pre-treatment covariates, the synthetic Lesotho thus provides an approximation of the PU that would have been recorded in Lesotho after 2005 in the absence of any CT. Note that the real PU trend shows no change in trajectory following policy implementation. As a consequence, we can conclude that CTs have not improved food security in Lesotho. Applying the same line of reasoning to the case of Swaziland, we find that immediately after CTs introduction, the country's real trend diverged from the trajectory of its synthetic control in an unexpected direction, i.e. there was an increase in food insecurity[9]. We confirmed these results with the placebo tests reported in Figure 2 (panel a and b)[10].

A different picture emerges for the low-income and fragile state countries. Panels (c) to (h) of Figure 1 show the main outcomes of analysis of the low-income group. Whilst PU in the synthetic Rwanda, Burkina Faso, Ethiopia, Mali and Malawi displayed a primarily upward trend, the real

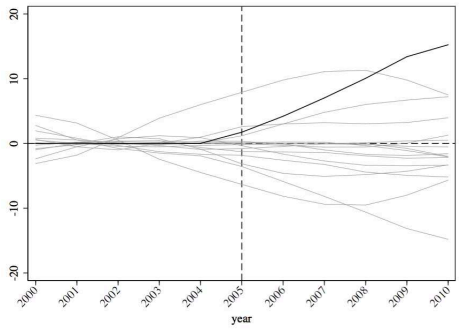
[9]In the case of Lesotho, we stopped our analysis before 2009 when a second CT programme, the Child Grants Programme, was introduced.

[10]For Lesotho, Swaziland and Zimbabwe, we omitted the second placebo test, as we consider only those countries for which the $RMSPE$ was less than three times that of the treated country.

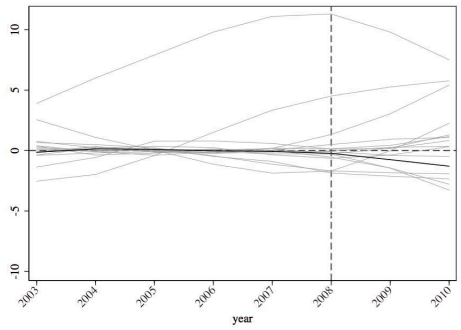
Figure 2: Placebo tests



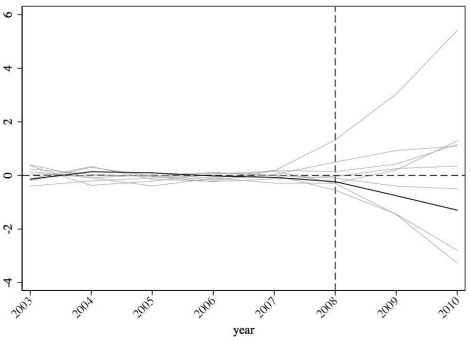
(a) Lesotho placebo test I



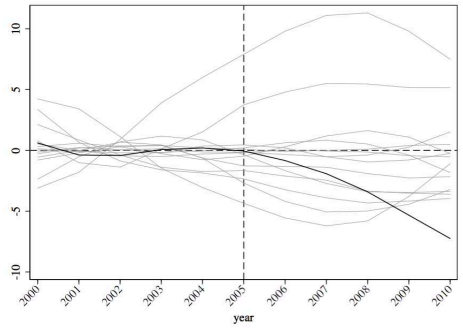
(b) Swaziland placebo test I



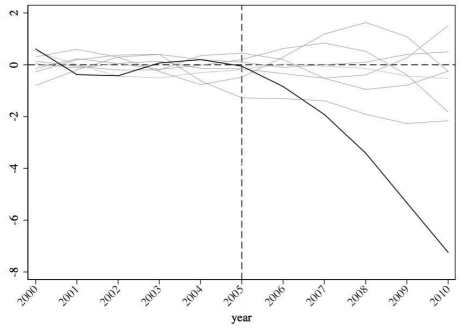
(c) Burkina Faso placebo test I



(d) Burkina Faso placebo test II



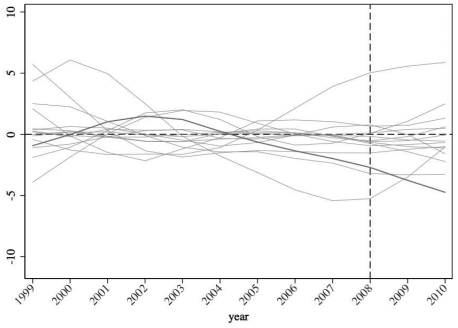
(e) Ethiopia placebo test I



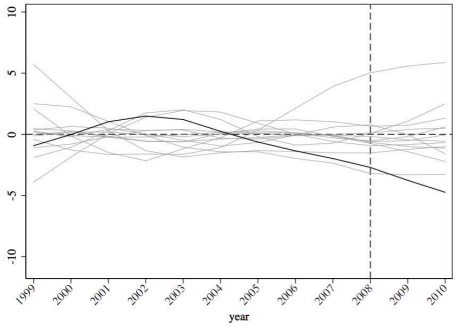
(f) Ethiopia placebo test II

Notes: The black line is the difference between each treated country and its synthetic control, whereas the gray lines are the differences between the treated countryies potential controls and their synthetic controls in the placebo tests. The results of two different placebo tests are reported: i) with the entire donor pool, ii) with a redistricted set of countries in the donor pool in which the RMSPE is no more than three times higher than that of the treated country. Because the RMSPE for Lesotho and Swaziland is alway three times less than that for the other countries in the donor pool, we report only the first placebo test for these two countries.

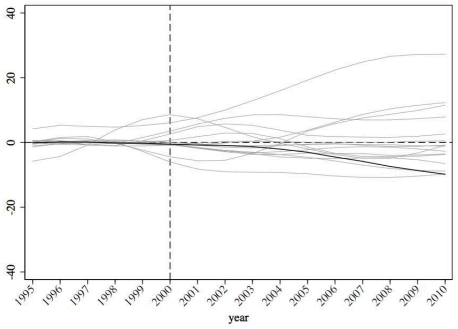
Placebo tests (continued)



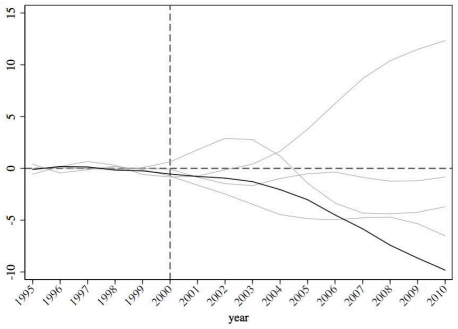
(g) Ghana placebo test I



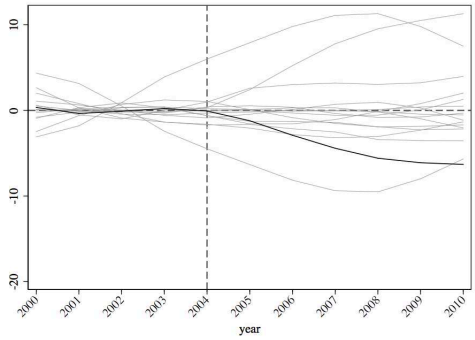
(h) Ghana placebo test II



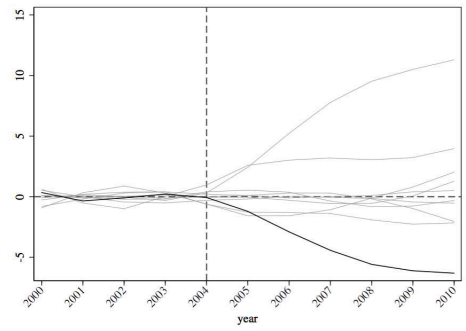
(i) Mali placebo test I



(j) Mali placebo test I



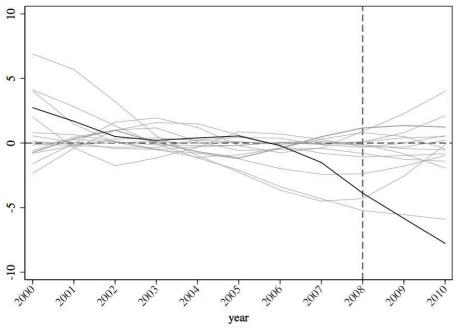
(k) Malawi placebo test I



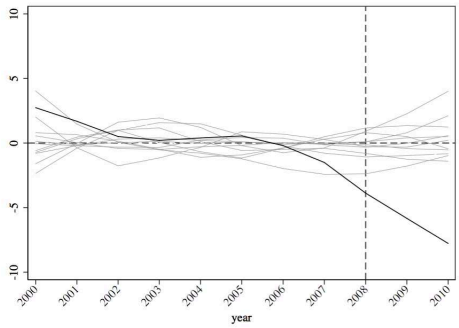
(l) Malawi placebo test II

Notes: The black line is the difference between each treated country and its synthetic control, whereas the gray lines are the differences between the treated countries potential controls and their synthetic controls in the placebo tests. The results of two different placebo tests are reported: i) with the entire donor pool, ii) with a redistricted set of countries in the donor pool in which the RMSPE is no more than three times higher than that of the treated country.

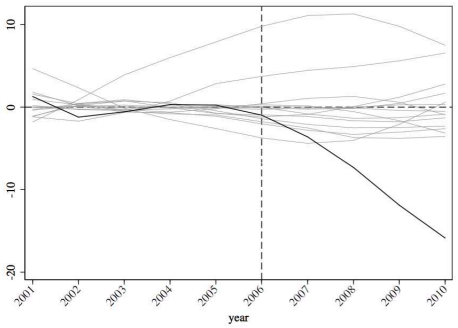
Placebo tests (continued)



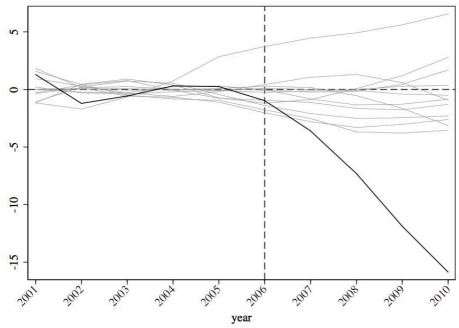
(m) Niger placebo test I



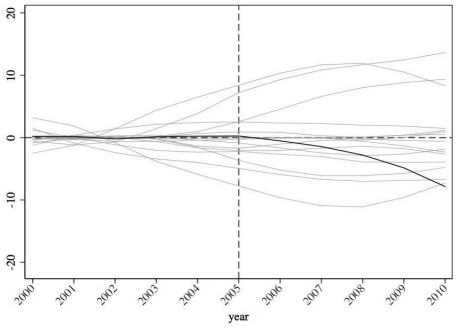
(n) Niger placebo test II



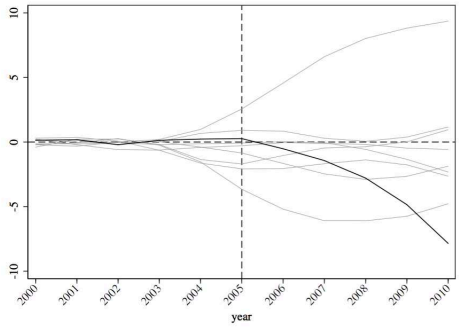
(o) Rwanda placebo test I



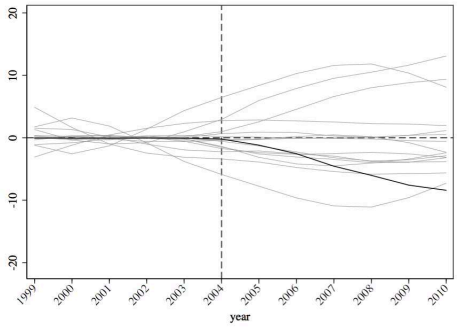
(p) Rwanda placebo test II



(q) Sierra Leone placebo test I



(r) Sierra Leone placebo test II



(s) Zimbabwe placebo test I

Notes: The black line is the difference between each treated country and its synthetic control, whereas the gray lines are the differences between the treated countries potential controls and their synthetic controls in the placebo tests. The results of two different placebo tests are reported: i) with the entire donor pool, ii) with a redistricted set of countries in the donor pool in which the RMSPE is no more than three times higher than that of the treated country. Because the RMSPE for Zimbabwe is alway three times less than that for the other countries in the donor pool, we report only the first placebo test for this country.

PU trend in these countries underwent a sharp decline immediately after CT policy intervention. The difference between the two trajectories in subsequent years suggests a large improvement in food security outcomes.

As previously noted, no CT effects were identified for Ghana and Niger, which motivated us to look at the correlates with other indirect policy effects on food insecurity. For example, in 2004 Ghana introduced subsidies to compensate for higher liquid petroleum gas (LPG), petrol and kerosene prices (Grosh et al., 2008). With an expenditure totalling about 2.2% of GDP, this intervention probably had a significant influence on income and food security. Similarly, since 2005 the government of Niger has made cut-price cereals available to those who need help in recovering from shortages in the previous years. This policy is aimed at combating the food insecurity caused by primary commodity price increases, and is thus likely to be at least time-correlated with the CT intervention.

The placebo tests (Figure 2) indicate that our results identify the causal effects of CT policies, except for Burkina Faso. This exception is unsurprising because the policy introduced in Burkina Faso was a pilot project targeted at orphans and other vulnerable children. It covered 3.250 randomly selected households with children under the age of 15. We speculate that the implementation of a main project, increasing the targeting, could determine a reduction of the impact on food insecurity.

The results for the fragile state group are presented in panels q, r, s of Figure 1. The estimates show that the PU trends for the synthetic Sierra Leone and Zimbabwe continued on their moderate downward trajectories, whilst the real such trends underwent a sharper decline. In the post-intervention period, we estimated a significant reduction in the prelevance of undernourishment in these two countries. Finally, different from the previous group of countries, the placebo tests for Sierra Leone and Zimbabwe present a less clear picture concerning interpretation of the causal effects of CTs on PU. We recorded sharp PU reductions in the placebo estimations, although enough was confounded by other trends. Hence caution must be exercised in estimating the magnitude of the CT effects in these two countries.

Table 4 lists the PU estimates as variation in percentage points. The immediate effects of CT policies on PU are given in bold, and the two last lines of Table 4 report the average effects after two and three years, whereas the estimates for years after the third should be used with caution

because they may be affected by the progressive importance of time correlate confounders.

Interestingly, the magnitude of the CT effects is strongly heterogeneous. CTs have had a large effect on food insecurity in Rwanda and Malawi, which saw a reduction of between 1.8 and 4 percentage points (3-year mean value), whilst an intermediate effect of less than 1% (3-year mean value) was realised in Ethiopia and Mali. With regard to to the low-income countries, we found that CTs in Zimbabwe had larger effects on food insecurity than did those in Sierra Leone, where the 3-year mean value of PU indicated only a half percentage point reduction.

Table 4: Cash transfer effects on prevalence of undernourishment

Year of the intervention	Ethiopia	Mali	Malawi	Rwanda	Sierra Leone	Zimbabwe
2000	-	0.550	-	-	-	-
2001	-	0.782	-	-	-	-
2002	-	0.939	-	-	-	-
2003	-	1.281	-	-	-	-
2004	-	2.050	0.268	-	-	0.207
2005	0.053	3.026	1.710	-	-0.266	1.182
2006	0.841	4.495	3.608	0.974	0.521	2.553
2007	1.917	5.836	5.262	3.604	1.435	4.551
2008	3.411	7.414	6.434	7.309	2.794	6.024
2009	5.329	8.659	6.923	11.881	4.849	7.587
2010	7.246	9.821	6.971	15.864	7.847	8.413
Average effect after 2 years	0.447	0.666	0.989	2.289	0,127	0.694
Average effect after 3 years	0.937	0.757	1.862	3.962	0.563	1.314

Notes: The yearly effects of policy introduction on the prevalence of undernourishment, along with the two and three years averages, for each country. Both the synthetic control and real PU are given (see Figure 1).

3.2. Discussion and policy implications

Although our estimates provide no clear-cut lessons on the way in which CT implementation in sub-Saharan Africa has influenced food security policy outcomes, we can infer that such interventions have positive effects in low-income and fragile state countries. The result obtained for upper-middle income countries is instead more complex. The two upper-middle income countries considered here, Lesotho and Swaziland, are not representative of upper-middle income countries as a whole, although they are interesting for their specificity. Neither the universal Old Age Pension introduced in Lesotho in 2005 to reduce the effects of primary commodity price increases on the elderly nor the Old Age Grant for poor people over 60 introduced in Swaziland in 2005 had any appreciable effect on food security. A possible explanation is that Lesotho, like most of upper-middle income countries, has adopted a rights-based social protection system that covers a wide range

of vulnerable groups and a significant proportion of the population. Thus, the implementation of various social policies may conceal the positive influence of CTs on food security. In addition, the rapid increase in food prices after 2005 resulted in reduced purchasing power for pensioners and thus as CTs became inadequate to meet the nutritional needs of this group (Croome et al., 2007). In Swaziland, in contrast, we have a counterintuitive result: after CT implementation, the indicator of food insecurity increased. The explanation may lie in the food crisis that began to unfold in 2005. In the wake of that crisis, CTs proved ineffective in Swaziland for two reasons: their lack of universal coverage and the huge administrative problems associated with the old age grant (e.g. high transfer and disbursement costs and fraud) (Garcia and Moore, 2012). Moreover, Swaziland is a peculiar case facing a number of long-term systemic problems, including the interaction amongst food insecurity, HIV/AIDS and drought, which cannot be addressed by the CTs in place (Masuku and Sithole, 2009). Further evaluation is necessary to reach firmer conclusions concerning the upper-middle income countries of sub-Saharan Africa.

The success stories are focused on low-income and fragile state countries, in which CTs have proved effective in enhancing food security. Although it must be stressed that this analysis omits the transmission channel through which reductions in the prevalence of undernourishment is achieved, we speculate that the drivers of CTs' effects on food security improvements are linked with the short-term response of food purchases made possible by changes in household income. In particular, given that food is a luxury for a large proportion of the population in poor countries, the share of food increases with additional income at low levels of total consumption distribution, an argument largely discussed by Ibrahim et al. (2007) using the Ethiopian Urban Household Survey.

Addressed to a political perspective, we must also emphasise that, in all of these cases, the CT programmes have been funded both by governments and foreign donors and administered by government institutions, with the universal aim of reducing the socio economic vulnerability of a large proportion of the population. In most of the cases, CTs have been part of the humanitarian response to emergencies, following the human rights-based approach that considers humanitarian assistance to be a right of the population affected (FAO, 2009; United Nations, 2009; Harvey et al., 2010).

Ethiopia, Rwanda, Zimbabwe and Sierra Leone have experimented large-scale emergency assistance programmes in response to crises. Unlike other emergency appeals, the programmes in

this countries are characterised by a long-term focus and integrated with a package of measures designed to both ensure minimum subsistence and also offer opportunities to increase income and assets (Devereux, 2012). In the case of Ethiopia (Productive Safety Net Programme-Direct Support) and Zimbabwe (CTs, including the Protracted Relief Programme, Care for the Elderly, Drought Relief, Support for Families in Distress) these programmes address natural and human-caused disasters, including those that result from conflict, in addition to chronic food insecurity and a lack of development (Béné et al., 2012; Jones et al., 2005) [11]. Similarly, in Rwanda the Child Soldiers Reintegration Grant is a short-term CT programme that addresses the post-conflict emergency (it helps individuals to start new occupations in post-conflict contexts), whilst the Vision 2020 Umurenge Programme is a leading component of the country's long-term National Economic Development and Poverty Reduction Strategy Sabates-Wheeler and Devereux (2011). The comprehensive approach to tackling food insecurity includes public works and low-interest loans for land improvements as a pathway from food insecurity to food sufficiency (Devereux, 2012). Sierra Leone's CT schemes (the Old and Needy and Reinsertion Benefits) have been implemented in the context of post-conflict recovery and with reference to the country's IMF-mandated Poverty Reduction Strategy Paper, which recommends the implementation of a social protection policy that takes the form of short-to-medium-term programme linking access to social services and food security (Holmes and Jackson, 2007). The beneficiaries are typically the elderly and those lacking a stable income, in accordance with the strategic objective providing a social safety net to the vulnerable and increasing social cohesiveness in the aftermath of the conflict.

Mali presents a different case. Its pilot programme, called Bourse Maman, which had limited coverage and funding, had a significant effect on food security. It is interesting to note that this programme, which was championed by UNICEF, focused on improving education and required that the CT recipients be women (Holmes and Barrientos, 2009; Pereznieto, 2009). Similarly, the successful CT pilot programme in Malawi (the Social Cash Transfer Programme, funded by the government and UNICEF) targets children's school enrolment and attendance and provides transfers to female household representatives (Miller et al., 2010, 2011)[12]. Our findings are also interesting

[11] Ethiopia's CT scheme is complemented by a public works programme and a programme that promotes a combination of productivity-enhancing transfers or agricultural extension services, including subsidised credit, technology transfers and community investments (Other Food Security Programme) (Gilligan et al., 2009; Sabates-Wheeler and Devereux, 2010).

[12] Although limited in scale and duration, the humanitarian intervention during the food crises of 2005-2006, the

because may represent a bridge with the CCTs focused on human capital investments and targeted at women and children have sparked considerable attention for their role in combating hunger and promoting nutrition security (Bassett, 2008; de Brauw and Hoddinott, 2011; Hoddinott and Bassett, 2009; Hoddinott, 2010; Paes-Sousa et al., 2011). Whilst it remains open to question whether CCT schemes are suitable in the context of low-incomes sub-Saharan African countries (Kakwani et al., 2005; Schubert and Slater, 2006; Schüring, 20102010a,2010b), our evaluation indicates that CCTs may have positive effects on food security by improving a population's nutritional status. Consequently, our analysis supports Bassett's call for sub-Saharan Africa to promote policies that encourage groups at high risk of undernutrition (women and children) to utilise education and nutrition services, improve the quality of these services and prioritise nutrition-related conditionalities based on best practices in nutrition (Bassett, 2008) .

Another common feature of all of the programmes that have had a positive and significant influence on food security is that they have been implemented with the involvement of local communities. The implication is that programmes built on participatory and community-driven approaches, although controversial (World Bank, 2013), are more likely to be successful (Devereux, 2012). The experience of Sierra Leone, whose CT programme began at the end of its long-running civil war and was implemented following a bottom-up approach, shows that the institutional arrangements (the institutional and political context) are also of paramount importance in determining the effects of CTs on food security (Devereux, 2009, 2012) which concurs with the views of Harvey and Homes (2007), Holmes and Jackson (2007) and Slater (2009) that social policy in the post-conflict context helps to provide an enabling environment for growth, bridging the gap between crisis and development.

4. Concluding remarks

In this paper, we estimate the effects of CT policies on food insecurity in a sample of sub-Saharan African countries. We study the prevalence of undernourishment patterns amongst the

Food and Cash Transfer (FACT) project, and the Dowa Emergency Cash Transfers (DECT) project implemented in 2006-2007 also generated positive effects in Malawi (Devereux et al., 2006). In this case, the transfers were index-linked to local food prices, thus reducing their vulnerability to the price inflation that undermines purchasing power. Moreover, in 2005 the government of Malawi introduced input subsidies (the Malawi Agricultural Input Subsidy Programme), which boosted national maize production and dampened fluctuations in the market price of maize. These interventions helped to increase food availability and reduce food insecurity (Devereux, 2012).

fragile, low- and middle-upper income countries targeted by these policies and separately for each country that has introduced such a policy. The availability of similar countries that have not implemented a CT programme allows us to estimate the short-term effects of these policies under a quasi-experimental framework.

The introduction of CTs programmes provides a useful test for the choice of food policies in the sub-Saharan region. We find their introduction in low-income and fragile countries to lead to a 1-4 percentage points reduction in the prevalence of undernourishment over three years, although these policies result in no significant improvements in food security in their upper-middle income counterparts. Although correlates forces linked with institutions may affect the results of the CT application on food insecurity, our results lead to conclude that CT policies are important where is large the reaction in food consumption to impulses in available income, which reduces food insecurity.

More work is needed in this field. In particular, because CT programmes place strong emphasis on nutrition, providing advices on best healthcare and nutrition practices, it is important to determine whether they are having the desired effects also in these outcomes. It would be interesting to repeat our analysis in assessing the effects of CCTs, because understanding the effects and mechanisms of such programmes are also essential for the effective design and redesign of policy interventions.

References

Abadie, A., Diamond, A., Hainmueller, J., 2010. Synthetic control methods for comparative case studies: Estimating the effect of California's tobacco control program. Journal of the American Statistical Association 105 (490), 493–505.

Abadie, A., Diamond, A. J., Hainmueller, J., 2012. Comparative politics and the synthetic control method. Tech. rep., MIT Political Science Department Research Paper.

Abadie, A., Gardeazabal, J., March 2003. The economic costs of conflict: A case study of the Basque Country. American Economic Review 93 (1), 113–132.

Barrett, C. B., Carter, M. R., Ikegami, M., 2008. Poverty traps and social protection. Social Protection Discussion Papers 42752, The World Bank.

Bassett, L., 2008. Can conditional cash transfer programs play a greater role in reducing child undernutrition? Social Protection Discussion Papers 46687, The World Bank.

Behrman, J. R., Wolfe, B. L., 1987. How does mother's schooling affect family health, nutrition, medical care usage, and household sanitation? Journal of Econometrics 36 (12), 185-204.

Béné, C., Devereux, S., Sabates-Wheeler, R., 2012. Shocks and social protection in the horn of africa: Analysis from the productive safety net programme in Ethiopia. Tech. Rep. 395, IDS Working Paper, Brighton.

Burchi, F., Muro, D., 2012. A human development and capability approach to food security: Conceptual framework and informational biases. Tech. Rep. 9, UNDP, Washington D.C.

Cafiero, C., Gennari, P., 2011. The FAO indicator of the prevalence of undernourishment. Paper prepared for the Workshop on Measuring Food Insecurity and Assessing the Sustainability of Global Food Systems, Keck Center of the National Academies, Washington D.C.

Cavatorta, E., Pieroni, L., 2013. Background risk of food insecurity and insurance behaviour: Evidence from the West Bank. Working Paper Series 0613, The Rimini Centre for Economic Analysis.

Cook, S., Kabeer, N., 2009. Socio-economic security over the life course: A global agenda review of social protection. Tech. rep., Center for Social Protection, Ford Foundation, New York.

Crawford, N., Pattugalan, G., Dale, K., 2010. Revolution: From food aid to food assistance. WFP, Rome.

Croome, D., Nyanguru, A., Molisana, M., 2007. The Impact of the Old Age Pension on Hunger Vulnerability: A Case-Study from the Mountain Zone of Lesotho. Prepared for the Regional Hunger Vulnerability Programme, Institute of Southern African Studies and National University of Lesotho, Roma.

Dasgupta, P., 1993. An inquiry into well-being and destitution. Oxford University Press, Oxford.

de Brauw, A., Hoddinott, J., November 2011. Must conditional cash transfer programs be conditioned to be effective? The impact of conditioning transfers on school enrollment in Mexico. Journal of Development Economics 96 (2), 359–370.

Devereux, S., 2009. Why does famine persist in Africa? The Science, Sociology and Economics of Food Production and Access to Food 1 (1), 25–35.

Devereux, S., 2012. Social protection for enhanced food security in Sub-Saharan Africa. Working Papers 2012-010, United Nations Development Programme, Regional Bureau for Africa (UNDP/RBA).

Devereux, S., Mvula, P., Solomon, C., 2006. After the fact: An evaluation of Concern Worldwide's food and cash transfers project in three districts of Malawi. Tech. rep., Concern Worldwide, Malawi.

Devereux, S., Sabates-Wheeler, R., 2007. Editorial introduction: Debating social protection. IDS Bulletin 28 (3), 1–7.

Dreze, J., Sen, A., 1989. Hunger and public action. Oxford University Press, Oxford.

Duflo, E., 2012. Women empowerment and economic development. Journal of Economic Literature 50 (4), 1051–79.

FAO, 2009. Hunger in the face of crises. Tech. rep., FAO, Rome.

FAO, 2011. The state of food insecurity in the world 2011. Tech. rep., FAO, Rome.

FAO, 2012. The state of food insecurity in the world 2012. Tech. rep., FAO, Rome.

Fiszbein, A., Schady, N., Ferreira, F. H. G., Grosh, M., Keleher, N., Olinto, P., Skoufias, E., July 2009. Conditional cash transfers: Reducing present and future poverty. No. 2597 in World Bank Publications. The World Bank.

Garcia, M., Moore, C. M. T., 2012. The Cash Dividend: The Rise of Cash Transfers Programs in Sub-Saharan Africa. The World Bank.

Gentilini, U., 2007. Cash and food transfers: A primer. Tech. rep. 18, WFP Occasional Paper, Rome.

Gentilini, U., Omamo, S. W., June 2011. Social protection 2.0: Exploring issues, evidence and debates in a globalizing world. Food Policy 36 (3), 329–340.

Gilligan, D., Hoddinott, J., Taffesse, A. S., 2009. The impact of ethiopia's productive safety net programme and its linkages. The Journal of Development Studies 45 (10), 1684–1706.

Global Food Security, 2009. Central african republic report. Tech. rep., United Nations.

Grosh, M., del Ninno, C., Tesliuc, E., Ouerghi, A., 2008. For protection and promotion: The design and implementation of effective safety nets. Tech. rep., World Bank.

Hanlon, J., Barrientos, A., Hulme, D., 2010. Just give money to the poor: The development revolution from the South. Kumarian Press, Sterling, VA.

Harvey, P., Homes, R., 2007. The potential for joint programmes for long-term cash transfers in unstable situations. Tech. rep., Humanitarian Policy Group, ODI, London.

Harvey, P., Proudlock, K., Clay, E., Riley, B., Jaspars, S., 2010. Food aid and food assistance in emergency and transitional context. a review of current thinking. Tech. rep., Humanitarian Policy Group, ODI, London.

Hoddinott, J., 2010. Conditional cash transfers in Latin America: A magic bullet to reduce poverty. Johns Hopkins University Press, Baltimore.

Hoddinott, J., 2012. Social protection in West Africa. Tech. rep. 3, IFPRI Thematic Research Note, Washington, D.C.

Hoddinott, J., Bassett, L., 2009. Conditional cash transfer programs and nutrition in latin america: Assessments of impacts and strategies for improvement. Tech. rep., UN-FAO, Washington D.C./Rome.

Holmes, R., Barrientos, A., 2009. The potential role of cash transfers in addressing childhood poverty and vulnerability in West and Central Africa. Regional thematic report, UNICEF, ODI, London.

Holmes, R., Jackson, A., 2007. Cash transfers in Sierra Leone: Appropriate, affordable and feasible? Project Briefing Paper 8, ODI, London.

Ibrahim, G., Kedir, A., Torres, S., 2007. Household-level Credit Constraints in Urban Ethiopia, Discussion Papers

in Economics 07/03, Department of Economics, University of Leicester.

Jones, S., Matiza, G., Mlalazi, B., Wiggins, S., 2005. Zimbabwe: Protracted relief programme. Output to purpose review. Tech. rep., ODI, London.

Kakwani, N., Veras Soares, F., Son, H., 2005. Conditional cash transfers in African countries. Tech. rep., UNDP Working Paper, Washington, DC.

Kassouf, A. L., Senauer, B., July 1996. Direct and indirect effects of parental education on malnutrition among children in Brazil: A full income approach. Economic Development and Cultural Change 44 (4), 817–38.

King, G., Zeng, L., 2006. The dangers of extreme counterfactuals. Political Analysis 14, 131–159.

Masset, E., January 2011. A review of hunger indices and methods to monitor country commitment to fighting hunger. Food Policy 36 (Supplement), S102–S108.

Masuku, M. B., Sithole, M., June 2009. The impact of HIV/AIDS on food security and household vulnerability in Swaziland. Agrekon 48 (2).

Miller, C. M., Tsoka, M., Reichert, K., 07 2010. Targeting cash to Malawi's ultra-poor: A mixed methods evaluation. Development Policy Review 28 (4), 481–502.

Miller, C. M., Tsoka, M., Reichert, K., April 2011. The impact of the social cash transfer scheme on food security in Malawi. Food Policy 36 (2), 230–238.

Paes-Sousa, R., Pacheco Santos, L., Shisue Miazaki, E., 2011. Efects of a conditional cash transfer programme on child nutrition in Brazil. Bulletin of the World Health Organization 89 (7), 496–503.

Pereznieto, P., 2009. Social protection to tackle child poverty in Malawi. Project Briefing Paper 25, ODI, London.

Republic of Gambia, 2005. Support of NEPADCAADP implementation. Tech. rep., Government of the Republic of Gambia & FAO.

Sabates-Wheeler, R., Devereux, S., 2010. Cash transfers and high food prices: Explaining outcomes on Ethiopia's Productive Safety Net Programme. Food Policy 35 (4), 274-285.

Sabates-Wheeler, R., Devereux, S., 2011. Transforming livelihoods for resilient futures: How to facilitate graduation in social protection programme. Tech. rep. 3, Centre for Social Protection, Brighton.

Schubert, B., Slater, R., 09 2006. Social cash transfers in low-income African countries: Conditional or unconditional? Development Policy Review 24 (5), 571–578.

Schüring, E., 2010a. Conditions, conditionality, conditionalities, responsibilities: Finding common ground. Tech. rep., Maastricht Graduate School of Governance, Maastricht, the Netherlands.

Schüring, E., 2010b. Strings attached or loose ends? The role of conditionality in zambia's social cash transfer scheme. Tech. rep., Maastrict Graduate School of Governance, Maastrict, Netherlands.

Slater, R., 2009. Cash transfers: Growth and graduation. Project Briefing 29, ODI, London.

Smith, R. P., 2000. Defence expenditure and economic growth. Regina Books, California.

Svedberg, P., 2002. Undernutrition overestimated. Economic Development and Cultural Change 51 (1). 5-36.

UNDP, 2012. Africa human development report 2012. towards a food secure future. Tech. rep., UNDP, Washington, DC.

United Nations, 2009. High-level task force on the global food security crisis. progress report, April 2008-October 2009. Tech. rep., United Nations, Washington, DC.

World Bank, 2008a. Guinea Bissau-Food price crisis response program (p113468). Tech. rep., World Bank.

World Bank, 2008b. Republic of Benin. Food price crisis response trust fund emergency project paper. Tech. rep., World Bank.

World Bank, 2012. Project performance assessment report. Republic of Djibouti. Food crisis response development policy grant. Tech. rep., World Bank.