Fiscal Policy and Civil Conflict in Africa

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Abstract

I explore empirically the effect of fiscal policy responses to economic shocks on the likelihood of conflict in Africa. The main finding is that a countercyclical fiscal response to these shocks lowers the likelihood of conflict. This result is stronger when considering positive shocks to the price of mineral commodities, and negative shocks to the price of agricultural commodities, as the triggers to macroeconomic cycles. The effect is focused on politically underdeveloped countries, and has been stronger during the last decades. I also show that it is not related to changes in military expenditures. Although macroeconomic income shocks are behind conflict onset, the effect of the fiscal response is not only associated with macroeconomic stabilization.

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1 Introduction

The disastrous effects of civil wars and their prevalence in poor countries have spawned a research agenda that tries to understand their occurrence and persistence.[1] Two different theoretical perspectives frame this analysis (Rule, 1989). The first one emphasizes relative deprivation as the motivation for political action. The second stresses that, regardless of grievances, conflict is determined by the ability to mobilize resources to create and sustain rebel groups. In this context of greed versus grievances, as put forth by Collier and Hoeffler (2004), the role of income inequality, lack of political rights, and ethnic and religious divisions, may be downplayed by geography and external support.

Perhaps since it relates to both greed and grievances hypotheses, economic growth has been one of the most studied determinants of civil conflict (See for instance Miguel et al., 2004; Hegre and Sambanis, 2006; Brückner and Ciccone, 2010; Dube and Vargas, 2013; Bazzi and Blattman, 2014). Under the greed hypothesis it influences the opportunity costs of fighting (Chassang and Padro-i-Miquel, 2009), the gains from state appropriation (Besley and Persson, 2011), and the capacity of the state to bargain or fight insurgencies (Fearon and Laitin, 2003; Bazzi and Blattman, 2014). In term of grievances, the larger availability of resources may be used to alleviate the problems of marginalized groups, reducing the likelihood of conflict, or, alternatively, to increase it if resources are appropriated by narrow elites.

But despite the abundant literature on the effect of economic shocks on conflict, the role of stabilization policies has been neglected. The macroeconomic framework, particularly the conduct of fiscal policy, may influence both the impact of shocks on economic growth, and the effects of growth on conflict. The first, although studied in different contexts, is well known. And if fiscal policy is able to stabilize output after a certain exogenous shock then it would mitigate the effect of that shock on the occurrence of conflict. The second link, how macro policies intermediate the effect of aggregate growth on conflict, has not been explored. In the case of poor countries fiscal management may downplay the link between growth and the income of the poor, providing social insurance and guaranteeing the provision of public goods, or may exacerbate rapacity effects, raising the value of capturing (parts of) the State and inequality.[2] Hence different macroeconomic policies could generate an heterogeneous relationship between economic shocks and conflicts, both across countries and time.

The aim of this paper is to fill this gap, and explore the different strategies on the macroeconomic front, and specifically fiscal management, to lower the vulnerability of countries to civil conflict.[3] I modify previous empirical work, introducing interactions of growth shocks, specifically commodity prices shocks, and indices capturing fiscal responses. Since these and other economic policies depend on deeper, slow-moving country characteristics, that are also deep determinants of conflict (i.e. political institutions), I focus on time, instead of cross-country variation, to identify the effects

[1] See Sambanis (2002), Collier and Hoeffler (2007), and Blattman and Miguel (2010) for detailed literature reviews.

[2] Calderón and Levy-Yeyati (2009) show that the adverse effects of aggregate volatility on inequality and poverty are mitigated by public expenditure. Their focus is on the size of the public sector, but here is on the short-term response of fiscal spending. This feature differentiates this paper from others who explore the relationship between fiscal variables and conflict (Savun and Tirone, 2012; Singh et al., 2014). See the literature review for a comparative analysis of the two approaches.

[3] I focus on fiscal policy because it is more likely to influence the relationship between economic activity and the risk of conflict. Additional macroeconomic policies, such as monetary and exchange rate policies, have a clearer role smoothing shocks to output.

of policies. I am aware however that, still in this framework, the effect of policies on conflict is dependent on these features, and hence the improvement of policies is not likely to change the long-run incidence of conflict in countries that do not improve institutions at the same time. In my view this last step, although difficult, may be facilitated by temporarily reducing the incidence of violent conflict through a better macroeconomic management.

In a sample of 44 African countries I find a significant effect of commodity price shocks on conflict onset when considering not only full-blown civil conflicts but also small armed conflicts. Fiscal spending growth does not seem to affect the likelihood of conflict when not interacted with commodity price shocks. The novel and main finding is that the sensitivity of violent conflict to economic shocks depends on the fiscal response to them.[4] The estimated coefficient on the interaction between commodity price shocks and the change in fiscal spending is positive and significant. As explained below, under the econometric specification used in this paper this means that a countercyclical fiscal response to these shocks lowers the likelihood of conflict. This is confirmed when estimating different responses depending on the sign of the shock. After a positive price shock a reduction in fiscal spending increases the drop in the probability of observing a conflict, and after a negative shock an increase in spending reduces the increase in this probability. I also find some conditionality to fiscal responses in the case of large civil wars. In this case however increases in spending, both after positive and negative shocks, reduce conflict risks.

To better understand what is behind the results I explore heterogeneous effects. First I consider differences between agricultural and mineral commodity prices. A rise in agricultural commodities prices is more likely to raise the opportunity cost of engaging in rebellious activity in comparison to a rise in mineral prices. This is because the production of the first type of commodities is more labor-intensive (Dal Bó and Dal Bó, 2011). On the other hand changes in mineral prices, which are more influential for public revenues and easier to appropriate, are more closely related to theories that emphasize rapacity effects (Bazzi and Blattman, 2014). When analyzing differences among type of commodities I find that the estimated effect is common to agricultural and mineral commodity price shocks, but stronger in the case of positive mineral price shocks, and negative agricultural price shocks. This may imply that countercyclicality lowers conflict risk for different reasons. More spending would alleviate the negative effects of negative shocks on households income, while less spending would reduce rapacity after positive shocks.

When considering heterogeneity across countries, I find that the effect is particularly focused in less politically developed countries. When exploring possible changes in the relationship between conflict, economic shocks, and fiscal policy I find that this hasn't been stable. The response of fiscal spending has been much more relevant since the 1990s, mainly because of the role of fiscal policy when facing positive price shocks. Finally, using a smaller sample, I show that results are not driven by changes in military spending.

Causality cannot be identified in the simple framework developed here, since I do not implement an instrumental variables approach. I leave this for future research. But I claim it is unlikely that the results are driven by reverse causality. Some features of the econometric specification make this less likely. And some of the findings go against it. Reverse causality should be stronger in the case of larger wars or military spending, and the main result differs from the ones obtained when considering these two alternatives. In the case of large conflicts, or civil wars, their onset is

[4] In a previous version I considered a larger cross-section of countries, but results were mostly found in the sample of African countries. This is the region with the highest incidence of conflict, and the one where the growth-conflict nexus seems to be the strongest (Brückner and Ciccone, 2010; Bazzi and Blattman, 2014).

associated with less spending. In the case of military spending growth, this is positively correlated with conflict. In either case the response doesn't depend on the sign of the shock. Moreover I don't find significant effects of spending on conflict risk when not interacted with shocks.

I finally explore if the results are explained by the effects of fiscal policy on business cycles stabilization. What I find when considering the effect of the explanatory variables on growth is that, although the unconditional effect of commodity shocks is significant, validating growth as the main channel in that case, the response of fiscal policy to shocks is not always significant. Fiscal policy seems to be able to reduce the fall in output after a negative shock, and through this to reduce conflict risk as well. But after positive price shocks I don't find evidence that reducing spending lowers their effect on growth, suggesting a role for fiscal policy beyond its effects on macro stability. Note that this is in line with the findings from differentiating between types of commodities since the response to negative shocks is more important in labor-intensive agricultural commodities, and positive shocks in "extractive" mineral commodities.

After a brief literature review, section 2 presents the empirical strategy and describes the data. Section 3 shows the baseline econometric results and in section 4 heterogeneous effects are explored. Section 5 shows the results when controlling for military spending and Section 6 explores GDP growth as a transmission mechanism. Section 7 concludes.

1.1 Literature Review

There is a large empirical literature on the effects of economic growth on civil conflict. Hegre and Sambanis (2006), after an extensive empirical exploration of the literature on civil war determinants, conclude that the relationship between annual growth and conflict is particularly robust. More recently the literature has focused on finding a causal relationship between growth and civil war trough the use of instrumental variables and panel regressions. Miguel et al. (2004) use rainfall annual growth as an instrument for economic stagnation to explain, successfully, the onset of civil wars in sub-Saharan Africa. Brückner and Ciccone (2010) use annual variations in international commodity prices as the exogenous determinant. They find that, between 1981 and 2006, a 20% drop in countries' export price indices raised the probability of civil war outbreak by around 2.8 percentage points in Sub-Saharan Africa. They show that commodity prices affect the likelihood of conflict because of their effect on economic growth. Bazzi and Blattman (2014) find weaker results for a larger sample of countries, but they still find a significant effect of commodity price shocks, particularly on the intensity of fighting. Dube and Vargas (2013) focus on Colombia and find differential effects depending on the type of commodities, with those easily-captured commodities raising violence, and the rest, basically agricultural and labor intensive commodities, lowering it. My empirical framework is based on these papers. I use commodity price shocks as an exogenous determinant of growth to see how stabilization policies may reduce the vulnerability to conflict, and I explore heterogeneous effects depending on the type of commodities.

The role of macroeconomic policies intermediating the link between shocks and conflict has not been studied before. Singh et al. (2014) explore if public spending has a mitigating effect on conflict. But they study a different dimension of fiscal policy. They focus on how differences across countries in terms of the size of public spending to GDP, and its allocation, affect the incidence of conflict in natural-resource abundant countries. I focus on variations over time in total spending growth, without considering cross-section variability. Hence the results are associated with the short-run response of fiscal policy to shocks (i.e. fiscal policy cyclicality), while theirs is associated

with state capacities and conflict (on this see also Fjelde and De Soysa, 2009; Thies, 2010).[5]

2 Empirical Strategy

I extend Brückner and Ciccone (2010) framework to investigate the effect of fiscal policy on the impact of commodity prices on conflict onset. The main estimation equation in Brückner and Ciccone (2010) links a dummy for conflict onset in period t to the growth of commodity prices over the three years leading up to t, in a linear panel-data setting which includes time and fixed effects, and country-specific trends. To that specification I add fiscal spending, and its interaction with the growth in commodity prices, as additional explanatory variables. I maintain the linearity assumption to make the results comparable to previous estimations (Brückner and Ciccone, 2010; Bazzi and Blattman, 2014) and because it allows to estimate more flexible specifications.[6] The baseline specification, for county i and year t, is the following,

$$co_{i,t} = \alpha_i + \delta_t + \gamma_i\ t + \beta_0 dlnP_{i,t} + \beta_1 dlnP_{i,t-1:2} + \beta_2 dlnG_{i,t-1:2} + \beta_3 \Big(dlnP_{i,t-1:2} \times dlnG_{i,t-1:2} \Big) + \epsilon_{i,t}$$

where α_i and δ_t are fixed and time effects respectively, $\gamma_i\ t$ capture country-specific trends, $dlnP$ and $dlnG$ are the percentage changes in commodity prices and spending, respectively, and the subindex $t-1:2$ denotes the two-years average lag of the corresponding variable.

The dependent variable is $co_{i,t}$, a conflict onset dummy. Similarly to Brückner and Ciccone (2010), it takes a value of 1 if there is conflict in period t but not in period $t-1$, and a value of 0 if there is no conflict both in period t and $t-1$. Otherwise, if in both periods t and $t-1$, or only in $t-1$, there is conflict, the country-year pair for t is dropped from the sample. Hence neither persistence nor conflict ending are included. In my framework this is particularly useful since violent conflict constraints macroeconomic management, the focus of this study, and because during years of conflict data on fiscal spending is less reliable.[7]

The explanatory variables are the percentage change in commodity prices, $dlnP$, and in public spending, $dlnG$. For the last variable I use its lagged value to reduce the likelihood of capturing reverse causality. Additionally I use the two-year average to minimize the effects of measurement problems. Hence I split the effect of commodity prices into a contemporary effect and a two-year lagged effect. Although I drop from the sample large commodity exporters, separating contemporary and lagged effects of commodity shocks also helps in minimizing the effect of reverse causality in the estimations. I explore heterogeneous effects decomposing the commodity price index by type

[5] Moreover they focus on the link between natural resources and conflict –oil reserves are the main driver of conflict in their framework–, while I focus on the link between growth and conflict, and use commodity prices only as an exogenous determinant of growth following the literature just described. Relatedly, Savun and Tirone (2012) explore the interaction of shocks with foreign aid in generating civil wars, but they results are influenced by cross-section differences as well, they don't explore how fiscal policy responds to shocks, and their focus is on agricultural commodities only.

[6] The alternative non-linear method, including fixed effects, is the conditional fixed-effects logit. Bazzi and Blattman (2014) also implement this method to estimate a similar regression and find little substantive difference with respect to the linear model. Because coefficients are easier to interpret and because it allows them to estimate more flexible specifications, their preferred method is the linear fixed-effects model.

[7] Bazzi and Blattman (2014) and Hegre and Sambanis (2006) also implement this strategy to avoid the bias when the dynamics of the dependent variable is ignored. Bazzi and Blattman (2014) also include a separate regression for episodes when conflicts end.

of commodity, and by the sign of its change. I also control for military spending growth, although in a smaller sample.

Behind the vulnerability to conflicts there are deep determinants, mainly associated with geography and political institutions. These, on the other hand, may be important determinants of macroeconomic policies. Since most of the variation of these deep determinants is observed across countries, I exploit only time variation in the specification to try to isolate the effect of macro policies on conflict onset. In addition to using the change in spending instead of its level as the explanatory variable, allowing me to focus on the stabilization role of fiscal policy, I adjust the variation in public spending by country means, so the interaction does not capture cross-section differences in public spending behavior.[8]

Note that the elasticity of conflict onset to commodity price shocks in the present framework is defined as,

$$\frac{\partial co_{i,t}}{\partial dlnP_{i,t-1:2}} = \beta_1 + \beta_3 dlnG_{i,t-1:2}.$$

I expect from the results in previous papers that $\beta_1 < 0$. Under a positive value for β_3 a procyclical fiscal policy (i.e. positively correlated with the shock) lowers the drop in the probability of conflict after a positive price shock, and increases the rise in the probability when facing a negative price shock. A countercyclical policy has the opposite effects and hence it would be the type of policy that minimizes the probability of conflict onset under $\beta_3 > 0$. Therefore the specification allows to test the effect of fiscal cyclicality (with respect to commodity prices) including only one interaction effect. In most of the estimations I plot the results to illustrate this, and facilitate the interpretation. I also include two interactions, separating positive from negative price shocks, to confirm the results.

2.1 Data

I collect data on civil conflict, commodity prices, and public spending for 44 African countries from 1960 to 2013. The list of the countries included is presented in Table 1. The sample is obtained after dropping observations for which data on the variables considered is not available, dropping countries with less than 5 observations, and dropping large exporters.[9] In the following paragraph I describe the sources and present basic statistics. For comparisons I use in this section a larger sample of 123 countries, of which 102 are developing economies.

Civil Conflict: The source is the UCDP/PRIO Armed Conflict Dataset (Gleditsch et al., 2002; Themnér and Wallensteen, 2014). UCDP/PRIO defines armed conflict as "a contested incompatibility that concerns government and/or territory where the use of armed force between two parties, of which at least one is the government of a state, results in at least 25 battle-related deaths in a year." In particular internal armed conflict occurs between the government of a state and one or more internal opposition group(s) regardless of intervention from other states. These data allow me to distinguish between small and large conflicts, an exercise I implement below. In particular I distinguish between civil conflicts, an episode with more than 25 battle-related deaths in a year, and civil wars, where the threshold raises to 1000 deaths.

[8] Differences in average spending growth would affect the estimations despite the use of fixed-effects because they would interact with time-varying commodity price shocks. Since I adjust spending growth by country-means, controlling for interactions between commodity price shocks and time-invariant variables capturing deeper determinants of conflict and policies doesn't change the results (see footnote 15).

[9] Two large exporters are dropped from the sample, Ivory Coast (35% of cocoabeans' World exports) and Senegal (47% of ground nut oil).

Table 2 describes the conflict data in the sample of 44 African countries and the other groups of countries. I show the probability of conflict onset conditional on observing peace, which is the mean of the dependent variable, and the unconditional probability of conflict onset (i.e. considering both peace and ongoing conflicts as zeros when computing the mean). In Africa the first are 5.7% and 1.6% for civil conflicts and wars respectively. These events are almost completely concentrated in developing countries, particularly in Africa. For the World the same statistics fall to 3.8% and 1%, respectively. When considering the unconditional probability conflict onset occurs in 3.5% and 1.2% of the African sample in the case of civil conflicts and wars, respectively. Table 2 also shows how prevalent is conflict in the countries analyzed. While a 10.5% of the time the average country in the World was in conflict, a 2.9% was in civil war. These numbers rise to 14% and 4.5% in the case of African countries.

Figure 1 shows the temporal pattern of conflict. The upper panel shows conflict prevalence, for each type of conflict, and for Africa and the World separately. In the last group we can see an inverse U-shaped prevalence of conflict, with a peak around 1990. For Africa, although weaker, we observe a similar shape but with a different peak, closer to the year 2000. In the lower panel I show conflict onset, which doesn't seem to show a pattern as clear as in the case of prevalence.

Commodity prices: I construct a commodity price index following the methodology proposed by Collier and Goderis (2012), which is based on Deaton and Miller (1995) and Dehn (2000). I collect yearly commodity price indices for 50 different commodities. For each country I first construct a weighted average of commodity prices, considering only commodities in which the country is a net exporter. The weight for each commodity is its share of total net exports in 1990 of the commodities considered.[10] Additionally I construct subindexes for minerals, agricultural commodities, and oil.

Table 3 shows summary statistics of the commodity price indexes. Panel A presents statistics for the aggregate index, and panels B, C, and D for minerals, agricultural, and oil subindexes, respectively. I denote by w_i the fraction of net commodity exports in GDP in the base year, which is 1990. In the sample of 44 African countries the average fraction of net commodity exports is 10%. A similar number is observed in other developing countries, but not in developed countries, which show a smaller fraction. In terms of volatility the standard deviations are similar across groups, with Africa showing a slightly higher number. In the case of subindexes most countries have positive net agricultural exports, while in the case of minerals and oil only 60% and 28% show positive numbers, respectively. These last two fractions are lower in Africa, although conditioning on being positive, the mean and median values are in general higher than in the other groups. Volatilities are similar across groups and subindexes, although the price of commodities related to oil seems to be more volatile when considering developing countries in and out of Africa.

Public Spending: The third main variable is the change in public spending. I use data from the World Bank's WDI. I obtain a measure of real public spending multiplying GDP in constant local currency units and general government final consumption expenditure as a % of GDP (NE.CON.GOVT.ZS). This increases the sample size considerably relative to using public spending in constant local currency units, and the correlation with this last variable is close to 1. The data shows extreme observations so I drop the highest and lowest 2.5% changes in spending of the World

[10] Commodity export and import values are obtained from UNCTAD Commodity Yearbook 2003 and UN Trade Statistics Yearbook 2003 and 2004. Prices are obtained from the International Financial Statistics (IFS). As in Collier and Goderis (2012), prices are deflated by an annual world average of export unit values constructed from the IFS and the WDI. I followed the adjustments proposed by these authors to treat gaps and missing values. See their paper for details.

sample. In the first two columns of Table 4 I show the main statistics, both for yearly and two-year changes. On average spending grows at a rate of 4.3% in African countries, a similar rate than the one observed in the rest of the countries. The standard deviation is much higher in developing countries. In Africa the average standard deviation is 10.5%, while in developing countries out of Africa is 8.6%. The fact that I use two-year averages in the regressions also helps with the problem of extreme observations. As can be seen in Table 4 the standard deviation of the percentage change in public spending in Africa is reduced from 10.5% to 7.5% after averaging it for two years.

I also consider military spending as a control in some of the regressions. The WDI reports data on military spending as a fraction of GDP from the Stockholm International Peace Research Institute (SIPRI). This is the best documented data on military expenditures (Nordhaus et al., 2012), but it is only available since 1988, so the sample size is reduced importantly. In addition I employ the Correlates of War (COW) data and combine it with the WDI/SIPRI series to enlarge the sample size, as it has been done previously in empirical studies (e.g. Nordhaus et al., 2012; Brauner, 2014). In the last four columns of Table 4 I show the growth rate statistics for the two series (WDI/SIPRI and WDI/SIPRI-COW, respectively).[11] According to the WDI/SIPRI series the average growth rate of military spending in Africa is 2.9% and the standard deviation is 14.9%. The series using COW shows a higher mean (5.5%), and a higher standard deviation (19.2%). This is due to the different time span since the figures for the common period (1988-2007) are roughly similar.

Before showing regression results I explore the relationship between the three main variables of interest. To do this I first identify all the episodes of conflict onset for which there was no conflict in the previous three years. Then I compute the median value of the changes in commodity prices and public spending across all the episodes, before and after the onset of a conflict. Figure 2 shows the results, both for the entire sample and African countries separately. It also presents the median values for the two variables of interest for all the years and countries in the sample. On the upper panels civil conflict onset episodes are considered. The clearest feature is the large drop, from a relatively high value, in commodity prices during the two years before the onset of conflict in African countries. This is not observed in the rest of the countries, as only a mild drop in prices is observed before the onset when considering the whole sample (upper left graph). I also find a more pronounced change in fiscal spending growth in Africa, which falls below its average two years before the onset, but returns to that level afterwards. In the case of civil wars (lower panels) we can observe a similar pattern, but with a relatively larger fall in fiscal spending growth which persists after the war onset.

3 Regression Results

In this section I present the regression results. Before considering public spending I first explore in detail the relationship between commodity price changes and conflict onset. Table 5 shows the results. The first three columns show the results using civil conflicts as the dependent variable, and the remaining columns use civil wars. In column (1) I include the contemporary change in the commodity index and its two lags. The coefficient on the first variable is very close to zero. Each of the two lags has a negative coefficient, but they are not significant. I include the two-lags average in column (2), my preferred specification for the reasons indicated above, and the coefficient is

[11] I adjust the series for extreme observations following the same procedure used to adjust public spending.

significant at the 10% confidence level. When I include the average of the three years in column (3) the coefficient becomes not significant. I do not find significant effects in either case when considering civil wars (columns 4-6).[12] Overall these results are weaker than the ones found by Brückner and Ciccone (2010) for their sample of Sub-saharan African countries, specially in the case of civil wars.[13] But in the case of civil conflicts they find, for the period 1960-2006 and using the three-year average of commodity price changes, a coefficient of -0.075, which is exactly what I find (column 3).[14]

The first two columns of Table 6 show the results from estimating the baseline specification when considering civil conflicts. I show results with and without public spending using the preferred specification, which is separating the contemporary effect from the average two-year lagged effects. As already shown I find a significant effect of commodity prices (column 1). In column (2) I include public spending, and although it is not significant by itself, its interaction with commodity prices is. Its positive value means that the likelihood of civil conflict becomes more sensitive to changes in commodity prices as the growth rate of public spending goes down. Specifically the estimations imply that after a 1% drop in commodity prices the effect on conflict onset is reduced by 0.18% for every percentage change of public spending increase. I plot in Figure 3 the effect on the probability of civil conflict of an average 10% decrease in commodity prices for two years, as a function of public spending growth. As just mentioned, the unconditional elasticity, reported in column 1 of Table 6, is close to the elasticity estimated by Brückner and Ciccone (2010), assuming in this last case that the average drop of 10% occurs for three years. Figure 3 also shows the unconditional elasticity of civil conflict onset in the region, which is close to 6% as reported in Table 2. The estimated conditional elasticity (in grey) means that an increase in spending larger than 5%, which is a little above the mean for African countries, eliminates the significance of the effect from the drop in commodity prices. It also implies that negative growth rates in spending make the response significantly larger than the unconditional response. For instance, if public spending remains constant, the increase in the probability of conflict onset is more than twice as large than in the unconditional case, and one-third of the unconditional likelihood of conflict onset. It is important to notice that since I exploit only time variation in spending the results are not influenced by fixed differences across countries.[15]

To further illustrate the implications of the baseline estimations I explore actual episodes of large drops in the price of commodities in Africa. In particular I compute the change in the predicted probability of conflict using the coefficients in column 2 of Table 6 when, instead of using

[12] I repeat the same for developing countries (including Africa) and for the World sample of 123 countries in a previous version of the paper. In none of the cases I find a significant effect of commodity prices.

[13] As previously shown by Bazzi and Blattman (2014), these differences are mainly due to the use of an older version of the conflict dataset by Brückner and Ciccone (2010).

[14] Brückner and Ciccone (2010) don't adjust the change in commodity prices by the number of periods used to compute the average, as I do. Their reported coefficient in their Table 7 is -0.025.

[15] I included in the regressions interactions between variables that vary across countries and commodity price changes and the size and significance of the interaction coefficient between commodity prices and spending was almost unchanged. I used mountainous terrain, ethnolinguistic fractionalization and polarization, the share of agricultural land occupied by family farms in 1858, constructed by Vanhanen (2003), a measure of rain variability, the ICRG index, average executive constraints from the Polity IV database, average urbanization and population density, the fraction of agricultural land and fertile soil, the wheat-sugar ratio used by Easterly (2007) as an instrument for income inequality, latitude, and a dummy for tropical climate. I included interactions with time-varying variables as well; the time-varying component of executive constraints, democracy (both from Polity), the ICRG index, urbanization, and population density, and again the coefficient of interest is unchanged.

the observed change in spending, I use the country's average to evaluate this predicted probability. Table 7 shows the results. I select episodes where the commodity index fell more than 10%, and pick the 10% with the largest increase in the predicted probability, and the 10% with the largest reduction. In the upper panel are presented the episodes where an expansionary response of fiscal policy generated the largest reduction in the probability of conflict onset. The table shows the country and the year of the episode, the change in the commodity price index and in government spending, and the change in the fitted value of the probability of conflict ($d\hat{co}$). Despite the large drops in commodity prices, in none of these episodes did a conflict actually start. Botswana shows the three largest episodes, with reductions in the predicted likelihood of conflict larger than 10%. Most of these episodes are concentrated in the 1970s and 1980s. The latest events are Nigeria in 1999 and Mali in 2000, when drops of roughly 15% in the commodity indexes were accompanied by increases of more than 20% in fiscal spending, implying reductions in the likelihood of conflict of 6% in both cases. In the lower panel I show the largest increases in the predicted probability. The latest event is Botswana 2005, when a 0.7% fall in fiscal spending increased the fitted probability in 3.3%. In two out of these 16 episodes a conflict actually started; Chad in 1976 and Sudan in 1983. This last case is the onset of a very long and devastating civil war, where ethnic differences and other deep determinants have been identified as the main causes. But the combination of a drop in commodity prices and a contractionary fiscal policy may have triggered violence. Sudanese external debt grew rapidly during the 1970s. Successive stabilization programs proposed by the IMF were abandoned due to political constraints and the ready availability of external finance (Rahman, 1995; Ali and Elbadawi, 2002). But the global financial crisis in the early 1980s forced the fiscal adjustment at a time when the price of cotton fell by more than 20%. According to the estimates the fiscal contraction of 16.2% increased the probability of conflict onset in 5.3%.[16]

Results so far indicate that public spending reduces the sensitivity of conflict onset to commodity price shocks. Note that, although results were interpreted considering a drop in commodity prices, the same would happen in the case of a positive shock. Higher spending growth would reduce the fall in the likelihood of conflict in this case. Then, a positive response of fiscal savings during booms would be desirable not only to generate resources to spend in bad times, but also because of a direct effect in the risk of conflict. A lower rate of spending growth may make the country less vulnerable to other type of shocks or saving resources may reduce the incentives to fight over them. Hence, as explained in the beginning of Section 2, the fact that the coefficient on the interaction is positive means that a countercyclical response of fiscal policy reduces the risk of conflicts. To confirm that spending acts in this way both after a fall and rise in prices, I split commodity shocks by their sign. Results for civil conflicts are shown in the third column of Table 6. The interactions are positive and very similar for positive as well as negative shocks. Although the effects are less precisely estimated, the significance of the conditionality on fiscal spending remains in each case. I plot in Figure 4 the response to a 10% positive and negative shock, with the corresponding 10% confidence intervals. The prediction about the desirability of a countercyclical fiscal policy is validated: to reduce the likelihood of a civil conflict not only does a government need to spend more when facing a bad shock, but it also has to spend less when receiving a good shock.

For civil wars (columns 4-6) results are different than for civil conflicts. Not only the uncon-

[16]The onset of the conflict in Rwanda in 1990 is another well-known episode, although the raise in the likelihood of conflict (0.6%) is not enough to be included in Table 7. A drop in coffee prices and a fiscal contraction contributed to growing resentment, which in turn led to ethnic persecution by a government in need to fortify their own position with its supporters (Meredith, 2011).

ditional effect of commodity prices but also the interaction term (column 5) are not significant When differentiating between positive and negative shocks in column (6) the sign of the coefficients differ. Consistent with the near-zero coefficient for the interaction in column (5), this pattern, mainly found in African countries, means that the risk of conflict falls with higher spending growth independently of the type of price shock, although the conditionality is significant only in the case of negative shocks.

4 Heterogeneous Effects

4.1 Type of Commodities

Not all commodities may have the same effect on conflict risk. As discussed in the introduction exploring differences in the effect of fiscal policy responses to different commodity shocks may help to understand the mechanisms behind the results presented so far. In Table 8 I explore heterogeneity across different commodity types, again considering civil conflicts and wars. For comparisons, in columns (1) and (5) I present the baseline results, which correspond to those in columns (2) and (5) of Table 6. In columns (2) to (4) I split the commodity index in agricultural, minerals, and oil subindexes, and show the results using civil conflict onset as the dependent variable.[17] I include all of the subindexes in a single regression, so the results in columns (2) to (4) are estimated jointly. The signs of the variables of interest are the same as in column (1), meaning that results are not influenced by a certain group of commodities. There are differences in the size and significance of the coefficients though. In particular the unconditional effect is stronger when considering agricultural goods, but the interaction effect is larger in the case of minerals. This implies that after a negative price shock a larger response of fiscal spending is needed to reduce the likelihood of conflict when the shock affects agricultural commodities. In the case of civil wars (columns 6-8), the coefficients are not significant for every subindex. I explore the same type of heterogeneity when considering different effects for positive and negative price shocks in Table 9. Again both coefficients are positive. But the strength of the results varies depending on the type of commodities. The gains from countercyclicality are stronger when facing a positive shock in mineral prices and a negative shock in agricultural prices. These differences may suggest that the effects of an expansionary policy come from stabilizing household incomes, while the ones from a contractionary policy come from reducing rapacity incentives.

4.2 Country Heterogeneity

The incidence of fiscal policy on conflict onset may depend on deeper country characteristics. In this subsection I focus on differences in the interaction of fiscal policy and shocks among groups of countries that differ in terms of development, political institutions, geography, and ethnicity, among other features. Since interactions between three continuous variables are difficult to identify and interpret, I consider one of these determinants at a time and split the sample into two groups: countries with values of the corresponding variable above and below the median. A dummy variable is used to capture this classification and estimate a unique regression to obtain the coefficient of the interaction term corresponding to each group. Results for civil conflicts are presented in Table 10. Each row presents regression results when considering each of the variables used to classify

[17] When adding oil to the minerals subindex results don't change much.

countries (listed in the first column), with the baseline specification on top for comparisons. The first two columns show the estimated coefficients for the interaction of fiscal policy and price shocks. The column labeled *High* contains the estimated coefficient for countries with above-the-median values of the corresponding variables, while the one labeled *Low* contains the coefficient for the other group of countries. The number of observations and the R^2 of the regression are presented next, and the last two columns show how prevalent is conflict in each of the groups.

I consider whether the country is in Sub-Sahara Africa (*High* means that it does in this case), whether the country is rich in natural resources (*High* means that rents from natural resources are above 10% of GDP according to the WDI),[18] the average level of democracy (from polity), political institutions (executive constraints from polity), protection against expropriation (ICRG index), the average level of income per capita (from WDI), ethnolinguistic fractionalization (from Alesina et al., 2003), inequality (gini index from WDI), the roughness of the territory (from Fearon and Laitin, 2003; Hegre and Sambanis, 2006), the fraction of land that can be used for agriculture (from WDI), and latitude.

The main result from this exercise, as shown in Table 10, is that the interaction term is stronger in Sub-Saharan Africa and in countries with low levels of political development and relatively poor in natural resources. The largest differences are observed with respect to political development. While the interaction coefficient is small and not significant for the groups of politically developed economies (rows 3-5), it is significant and larger than in the baseline case when considering the group of less politically developed countries. And this is not driven by a higher prevalence of conflict in these groups. While conflict is more prevalent in poorer countries, it is less so in politically underdeveloped countries (column 6). Regarding the rest of the variables considered there are no important differences when considering groups according to economic development, ethnicity, and geographical features related to agricultural productivity. I also estimate separately the coefficients depending on the sign of the price shock, although I don't show the results to save space. As in the baseline case, when considering politically underdeveloped countries the coefficients are similar between positive and negative shocks, confirming that countercyclicality reduces risks.

4.3 Temporal Changes

As shown in Figure 1 the pattern of conflict incidence in Africa since 1960 has not been stable. To see if the nature of the relationship between conflict, commodity prices, and fiscal policy has changed over time as well I estimate the baseline regressions, those in columns (2) and (5) of Table 6, in windows of 20 years, from 1960 to 2013. The resulting series for the interaction between commodity prices and fiscal spending, and its 10% confidence interval, are presented in Figure 5. On the left-hand side panel we can see that the interaction is more or less stable until the mid-eighties, when the point estimate goes from 0.7, to close to 3.5 in the samples starting around 1990. In the case of civil wars, shown in the right-hand side panel, we can observe an increase in the coefficient as well, although sooner (around 1985), and the coefficient remains not significant as in the entire sample.

To explore in more detail the change in the interaction for civil conflicts, I present in Table 11 the results from estimating the baseline specifications, including differences by signs of the shocks,

[18] I use natural resource rents excluding forests. I include Botswana, Namibia, Sierra Leone, and Niger in the group of resource-rich countries despite having rents below the threshold, because of their possession of diamonds (the first three), and uranium (Niger).

for the years before and after 1990. The first thing to notice is that the unconditional effect of commodity prices (columns 1 and 4) is significant only in the second period, and its size is three times as large as the one estimated for the first period. As expected from the rolling regressions just analyzed, the interaction term with public spending has also increased, from 1.01 to 3.77 (columns 2 and 5). To better understand these results in columns (3) and (6) I differentiate the interaction term by the sign of the shock. We can see that before 1990 the interaction is positive only in the case of positive shocks. After 1990 both coefficients are positive, and the one for positive shocks is particularly large and significant. These results suggest that while countercyclicality after positive shocks has been effective in reducing conflict risk since 1990, its effectiveness after negative shocks can be observed for the whole sample.

5 Military Spending

Results may be influenced by military spending. If that were the case then the mechanisms behind the results would not be related to the stabilization or insurance roles of fiscal policy. Moreover it would be more likely that the results were capturing reverse causality. To explore this possibility I control in the regressions by the growth of military spending and its interaction with changes in commodity prices. As already mentioned there is a trade-off between reliability and sample-size when choosing the source for military spending. The WDI publishes data on this category from SIPRI, the most reliable source, only from 1988 onwards. This roughly coincides with the first year of the second sub-sample considered in the previous sub-section. To enlarge the size of the sample we follow Nordhaus et al. (2012) and combine this data with COW. Regression results for the group of African countries are presented in Table 12. The first four columns presents the results using the first series (WDI/SIPRI). The first column presents the baseline results for comparisons, using only spending as before, but adjusting the sample to countries and periods where data on military spending is available. Column (1) shows that the interaction is positive and significant, and similar to the coefficient estimated for the second sub-sample in Table 11. In column (2), in addition to public spending I include military spending (M) growth, by itself and interacting with commodity price changes. The coefficient on the interaction between public spending and commodity prices is positive, larger, and significant. The coefficient on military spending on the other hand is negative and not significant. This implies that it is not military spending which is behind the results obtained so far in the paper.

In columns (3) and (4) I explore heterogeneous effects with respect to the sign of the shock. Again for comparisons, column (3) shows the results with total spending. Although results are still similar to those for the second sub-sample in Table 11, the coefficients are not significant in this case, probably because of the smaller sample. In column (4) I control again for military spending growth. In the case of public spending results become stronger in the case of negative shocks. Although smaller and still not significant, the coefficient remains large in the case of positive shocks. There can be seen that the results are in line with what we have observed in the previous specifications; a countercyclical fiscal policy lowers the likelihood of conflict when facing a commodity shock, irrespectively of its sign. Results for military spending are not significant for each of the shocks and their signs differ. The estimations imply that lower increases in this type of spending after commodity shocks are always associated with a lower probability of conflict onset. Hence, it is very likely in this case causality is running from this last variable to spending changes.

In the last four columns of Table 12 I present the same regressions but using the WDI/SIPRI-

COW series for military spending. With this I get close to 83% of the size of the sample used in the baseline regressions. Results are in line with these: estimated coefficients, although more precisely estimated thanks to the larger sample, are smaller than in the first four columns, as the differences in the estimations for different periods would suggest. More importantly qualitative results are very similar. The interaction remains positive and significant. The left-hand side panel of Figure 6 shows the corresponding elasticity and confidence interval for the case of a drop in commodity prices. When distinguishing among type of shocks both remain positive. The conditional elasticities and their respective confidence intervals are shown in the center panel of Figure 6. This validates the results obtained when using only the most reliable data for military expenditures from WDI/SIPRI.

6 Growth Effects

Brückner and Ciccone (2010) show that the significant effects of commodity price shocks on conflict onset are due to the effects on economic growth. To explore the same question but regarding the interaction between these shocks and public spending I run the baseline regressions but using GDP growth as the dependent variable. In Table 13 the results are presented. For comparisons the table presents again the results when civil conflict onset is the dependent variable in columns (1) and (2). In column (3) we can see that the commodity price index do have a significant effect on GDP growth, both contemporarily and with lags. This is consistent with the results presented by Brückner and Ciccone (2010). But note that in the case of the interaction with public spending, unlike when explaining civil conflict in column (1), the effect is not significant.

When decomposing the shock (column 4) we can see that in the case of a negative shock the coefficient is positive and significant, meaning that fiscal spending reduces the negative effect of the shock on GDP growth. Hence output stabilization could be the mechanism behind the sensitivity of conflict to fiscal responses. But this is not the case when considering positive shocks, since unlike the case with civil conflict onset as the dependent variable (column 2), the interaction coefficient is negative and close to zero. Hence it is likely that the response of fiscal spending to commodity shocks influence the likelihood of conflict trough channels that are not only related to economic growth, particularly in the face of positive price shocks. The effect of fiscal policy on the relationship between growth and conflict, and not between commodity shocks and growth, seems to be the relevant dimension behind the results in this latter case. Note that this is consistent with the mechanisms suggested before; the contractionary policy helps reducing rapacity effects, while the expansionary policy helps stabilizing households' income.

7 Conclusions

This paper pursues an empirical analysis to investigate the effect of fiscal policy, particularly short-term spending changes, on conflict risk triggered by macroeconomic shocks. This has been neglected by the existent literature, which focuses instead on state capacity. To do this I modify previous empirical work introducing interaction effects between commodity price shocks and changes in fiscal spending, considering only time variation to estimate the coefficients of interest.

The results confirm the negative effect of commodity shocks on the likelihood of conflict onset in Africa, and economic growth as the main channel behind this. More importantly for the analysis is that the effect is conditional on public spending: drops in commodity prices that coincide with an

increase in public spending, and hikes that coincide with low spending, reduce the risk of conflict. With the caveat that reverse causality cannot be discarded, this implies a new benefit from pursuing a countercyclical fiscal policy.

Results are heterogeneous. I explore differences across commodities, countries, and time. The effect is particularly strong in politically underdeveloped countries. It is also stronger in the second part of the sample, beginning around 1990, when spending responses to positive shocks became particularly strong. In terms of type of commodities, the effects are present when analyzing both minerals and agricultural goods. However it is stronger after negative agricultural price shocks and positive mineral price shocks. Importantly for the conclusions, the effect is not driven by military spending, which shows a different pattern, probably affected by reverse causality. I also show that results are not completely generated by the effect of fiscal policy on growth, particularly in the face of a positive price shock, where I don't find evidence of a stabilizing role of fiscal policy in the estimations. Although I try to minimize the probability that the results are driven by reverse causality I cannot ensure this, as I do not implement an instrumental variables approach. Addressing this is left for future research.

References

Alesina, A., A. Devleeschauwer, W. Easterly, S. Kurlat, and R. Wacziarg (2003): "Fractionalization," *Journal of Economic Growth*, 8, 155–194.

Ali, A. A., and I. A. Elbadawi (2002): "Explaining Sudans economic growth performance," Cambridge General Economic Surveys of Africa, Eastern and Southern Africa.

Bazzi, S., and C. Blattman (2014): "Economic shocks and conflict: the Evidence from commodity prices," *American Economic Journal: Macroeconomics*, Forthcoming.

Besley, T., and T. Persson (2011): "The Logic of Political Violence," *Quarterly Journal of Economics*, 78(1), 1–34.

Blattman, C., and E. Miguel (2010): "Civil War," *Journal of Economic Literature*, 48(1), 3–57.

Brauner, J. (2014): "Military spending and democracy," *Defence and Peace Economics*, (ahead-of-print), 1–15.

Brückner, M., and A. Ciccone (2010): "International Commodity Prices, Growth and the Outbreak of Civil War in Sub-Saharan Africa," *The Economic Journal*, 120(544), 519–534.

Calderón, C., and E. Levy-Yeyati (2009): "Zooming in: From Aggregate Volatility to Income Distribution," *World Bank Policy Research Working Paper Series 4895*.

Chassang, S., and G. Padro-i-Miquel (2009): "Economic shocks and civil war," *Quarterly Journal of Political Science*, 4(3), 211–228.

Collier, P., and B. Goderis (2012): "Commodity prices and growth: An empirical investigation," *European Economic Review*, 56(6), 1241–1260.

Collier, P., and A. Hoeffler (2004): "Greed and Grievance in Civil War," *Oxford Economic Papers*, 56(4), 563–595.

——— (2007): "Civil War," *Handbook of Defense Economics*, 2, 711–739.

Dal Bó, E., and P. Dal Bó (2011): "Workers, warriors, and criminals: social conflict in general equilibrium," *Journal of the European Economic Association*, 9(4), 646–677.

Deaton, A., and R. I. Miller (1995): *International Commodity Prices, Macroeconomic Performance, And Politics In Sub-Saharan Africa*. Princeton, NJ: Princeton Studies in International Finance, No 79.

Dehn, J. (2000): "Commodity Price Uncertainty In Developing Countries," World Bank Policy Research Working Paper N.2426.

Dube, O., and J. F. Vargas (2013): "Commodity price shocks and civil conflict: Evidence from Colombia," *The Review of Economic Studies*, 80(4), 1384–1421.

Easterly, W. (2007): "Inequality does cause underdevelopment: Insights from a new instrument," *Journal of Development Economics*, 84(2), 755 – 776.

Fearon, J. D., and D. D. Laitin (2003): "Ethnicity, Insurgency, and Civil War," *American Political Science Review*, 97(1), 75–90.

Fjelde, H., and I. De Soysa (2009): "Coercion, Co-optation, or Cooperation? State Capacity and the Risk of Civil War, 1961-2004," *Conflict Management and Peace Science*, 26(1), 5–25.

Gleditsch, N. P., P. Wallensteen, M. Eriksson, M. Sollenberg, and H. Strand (2002): "Armed conflict 1946-2001: A new dataset," *Journal of peace research*, 39(5), 615–637.

Hegre, H., and N. Sambanis (2006): "Sensitivity Analysis of Empirical Results on Civil War Onset," *Journal of Conflict Resolution*, 50(4), 508–535.

Meredith, M. (2011): *The fate of Africa: A history of the continent since independence*. PublicAffairs.

Miguel, E., S. Satyanath, and E. Sergenti (2004): "Economic Shocks and Civil Conflicts: An Instrumental Variable Approach," *Journal of Political Economy*, 112(4), 725–753.

Nordhaus, W., J. R. Oneal, and B. Russett (2012): "The effects of the international security environment on national military expenditures: A multicountry study," *International Organization*, 66(03), 491–513.

Rahman, A. R. A. A. (1995): "The Domestic Origins of Sudan's External Debt Crisis," *Intellectual Discourse*, 3(2).

Rule, J. B. (1989): *Theories of civil violence*. Univ of California Press.

Sambanis, N. (2002): "A review of recent advances and future directions in the quantitative literature on civil war," *Defence and Peace Economics*, 13(3), 215–243.

Savun, B., and D. C. Tirone (2012): "Exogenous Shocks, Foreign Aid, and Civil War.," *International Organization*, 66(3).

Singh, R. J., C. Bodea, and M. Higashijima (2014): "Oil and civil conflict: can public spending have a mitigation effect?," *World Bank Policy Research Working Paper*, (7100).

Themnér, L., and P. Wallensteen (2014): "Armed conflicts, 1946–2013," *Journal of Peace Research*, 51(4), 541–554.

Thies, C. G. (2010): "Of rulers, rebels, and revenue: State capacity, civil war onset, and primary commodities," *Journal of Peace Research*, 47(3), 321–332.

Vanhanen, T. (2003): *Democratization: A Comparative Analysis of 170 Countries*, Routledge Research in Comparative Politics, 7. Taylor & Francis Group.

1	Angola	16	Guinea-Bissau	31	Nigeria
2	Burundi	17	Equatorial Guinea	32	Rwanda
3	Benin	18	Kenya	33	Sudan
4	Burkina Faso	19	Liberia	34	Sierra Leone
5	Botswana	20	Libya	35	Somalia
6	Central African Republic	21	Lesotho	36	Swaziland
7	Cameroon	22	Morocco	37	Chad
8	Congo, Rep.	23	Madagascar	38	Togo
9	Djibouti	24	Mali	39	Tunisia
10	Algeria	25	Mozambique	40	Tanzania
11	Egypt, Arab Rep.	26	Mauritania	41	South Africa
12	Gabon	27	Mauritius	42	Congo, Dem. Rep.
13	Ghana	28	Malawi	43	Zambia
14	Guinea	29	Namibia	44	Zimbabwe
15	Gambia, The	30	Niger		

Table 1: African Countries in the Sample

		Conflict Onset				Conflict Prevalence	
		Conditional on peace		Unconditional			
	Countries	Civil Conflict	Civil War	Civil Conflict	Civil War	Civil Conflict	Civil War
Africa	44	5.72	1.61	3.53	1.23	13.96	4.48
Other Developing	58	3.50	0.92	2.30	0.75	10.87	2.73
Developed	21	0.33	0.00	0.19	0.00	2.05	0.00
Total	123	3.75	1.01	2.38	0.79	10.47	2.89

Notes: Figures are group means of country means, in %. Conflict onset is the variable $co_{i,t}$ defined in the text. Conditional on peace means that the average is taken considering only observations where either $co_{i,t} = 1$ or $co_{i,t} = 0$, i.e. not considering periods in which a conflict persists from the previous period. Unconditional means that the average is taken considering periods in which a conflict persists from the previous period as well. In this case $co_{i,t}$ is given a zero value. Conflict prevalence is the average periods in conflict over the entire sample.

Table 2: Civil Conflict: Summary Statistics

	Africa	*Other Developing*	*Developed*	*Total*
A. All commodities				
$w_i > 0$	44	58	21	123
Mean w_i	10.0	11.7	3.1	9.6
Mean $sd(dlnP_{i,t})$	17.6	16.8	24.5	18.4
B. Agricultural				
$w_i > 0$	44	57	20	121
Mean w_i	4.1	5.6	1.7	4.4
Mean $sd(dlnP_{i,t})$	18.1	15.3	30.0	18.7
C. Minerals				
$w_i > 0$	21	30	19	70
Mean w_i	3.3	2.5	0.5	2.2
Mean $sd(dlnP_{i,t})$	23.5	24.0	24.2	23.9
D. Oil				
$w_i > 0$	11	17	7	35
Mean w_i	17.5	16.8	3.0	14.2
Mean $sd(dlnP_{i,t})$	22.5	21.7	14.5	20.5

Notes: w_i is net exports of the commodities considered in each index as a percentage of GDP in 1990. Mean w_i is the group mean of country means, and Mean $sd(dlnP_{i,t})$ is the group mean of country standard deviations. Both statistics are computed across all the countries in the group for which w_i is positive.

Table 3: Commodity Prices: Summary Statistics

	Fiscal Spending		Military Spending			
			WDI/SIPRI		WDI/SIPRI-COW	
	$dlnG_t$	$dlnG_{t-1:2}$	$dlnM_t$	$dlnM_{t-1:2}$	$dlnM_t$	$dlnM_{t-1:2}$
Mean						
Africa	4.3	4	2.9	1.7	5.5	4.6
Other Developing	4	4	3.2	2.7	4	3.5
Developed	4.3	4.4	0.1	0.2	1.9	1.9
Total	4.1	4.1	2.5	1.8	4.2	3.6
SD						
Africa	10.5	7.5	14.9	9.6	19.2	12.4
Other Developing	8.6	6.6	12.5	8.8	15.6	10.6
Developed	4.4	3.5	6.1	4.2	9.1	6.5
Total	8.5	6.4	12.2	8.2	15.8	10.6

Notes: Figures are group means of country means. Series of military expenditures (M) are based on data from the WDI, which is constructed by SIPRI (WDI/SIPRI), and the former combined with data from COW (WDI/SIPRI-COW) (see the text for details).

Table 4: Fiscal Spending: Summary Statistics

	Civil Conflicts			*Civil Wars*		
	(1)	(2)	(3)	(4)	(5)	(6)
$dlnP_t$	0.013	0.0090		−0.011	−0.0090	
	(0.44)	*(0.28)*		*(0.53)*	*(0.44)*	
$dlnP_{t-1}$	−0.056			0.014		
	(1.56)			*(0.81)*		
$dlnP_{t-2}$	−0.019			−0.0057		
	(0.51)			*(0.29)*		
$dlnP_{t-1:2}$		−0.085*			0.0076	
		(1.65)			*(0.23)*	
$dlnP_{t:3}$			−0.075			−0.0025
			(1.02)			*(0.060)*
R^2	0.13	0.13	0.13	0.11	0.11	0.11
Observations	1256	1256	1256	1412	1412	1412

Notes: The sample is 44 African countries 1960-2013. The dependent variable is a conflict onset dummy. Fixed and time effects, and country-specific trends are included in all the regressions. Below the OLS coefficients t-values are reported in parenthesis, based on standard errors clustered by country. * means significant at 10%, ** significant at 5%, and *** significant at 1%.

Table 5: Commodity Prices and Civil Conflict

	Civil Conflicts			*Civil Wars*		
	(1)	(2)	(3)	(4)	(5)	(6)
$dlnP_t$	0.0090	0.0071	0.0070	−0.0090	−0.0092	−0.0087
	(0.28)	*(0.22)*	*(0.21)*	*(0.44)*	*(0.45)*	*(0.42)*
$dlnP_{t-1:2}$	−0.085*	−0.097*	−0.095*	0.0076	0.0060	−0.0032
	(1.65)	*(1.96)*	*(1.74)*	*(0.23)*	*(0.19)*	*(0.11)*
$dlnG_{t-1:2}$		−0.065	−0.077		−0.020	0.052
		(0.73)	*(0.69)*		*(0.49)*	*(1.16)*
$dlnP_{t-1:2} \times dlnG_{t-1:2}$		1.78**			−0.077	
		(2.49)			*(0.20)*	
$dlnP_{t-1:2} > 0 \times dlnG_{t-1:2}$			1.89			−0.69
			(1.46)			*(0.78)*
$dlnP_{t-1:2} < 0 \times dlnG_{t-1:2}$			1.63			0.87
			(1.47)			*(1.56)*
R^2	0.13	0.14	0.14	0.11	0.11	0.12
Observations	1256	1256	1256	1412	1412	1412

Notes: The sample is 44 African countries 1960-2013. The dependent variable is a conflict onset dummy. Fixed and time effects, and country-specific trends are included in all the regressions. The change in fiscal expenditure is adjusted by country means. Below the OLS coefficients t-values are reported in parenthesis, based on standard errors clustered by country. * means significant at 10%, ** significant at 5%, and *** significant at 1%.

Table 6: Commodity Prices, Fiscal Spending, and Civil Conflict

Country	Year	$dlnP_{t-1:2}$	$dlnG_{t-1:2}$	$d\hat{co}$
Botswana	1975	-34.4	30.5	-15.0
Botswana	1976	-32.2	24.2	-10.1
Botswana	1982	-29.9	24.9	-9.9
Lesotho	1976	-32.2	20.8	-8.8
Swaziland	1977	-32.4	17.7	-8.3
Gabon	1987	-31.0	17.1	-8.1
Niger	1976	-26.9	15.2	-6.1
Mali	2000	-14.5	22.6	-5.9
Cameroon	1987	-23.1	16.7	-5.8
Cameroon	1988	-18.4	18.8	-5.6
Gambia, The	1988	-13.6	20.5	-5.6
Nigeria	1999	-13.8	21.4	-5.5
Kenya	1973	-12.5	24.5	-5.5
Mauritania	1973	-13.4	17.5	-5.4
Lesotho	1981	-10.3	27.7	-5.1
Rwanda	1976	-14.7	20.4	-5.1
Equatorial Guinea	1991	-12.0	-12.2	2.4
Mali	1983	-10.4	-6.6	2.7
Togo	1982	-11.1	-8.9	2.7
Niger	1982	-18.7	-3.3	2.9
Chad	1976	-24.0	-3.1	3.0
Rwanda	1980	-16.9	-3.8	3.2
Botswana	2005	-16.8	-0.7	3.3
Egypt, Arab Rep.	1988	-13.2	-6.6	3.3
Burkina Faso	2000	-14.0	-6.8	3.5
Benin	1976	-23.8	-4.4	3.7
Nigeria	1987	-30.9	-2.8	3.9
Guinea	1993	-15.0	-8.5	4.3
Sudan	1983	-10.8	-16.2	5.3
Zambia	2000	-13.3	-13.9	5.5
Congo, Dem. Rep.	1973	-19.4	-7.8	5.8
Liberia	1976	-38.0	-5.9	8.4

Table 7: Fiscal Spending and Conflict Onset: Major Events

	Civil Conflicts				*Civil Wars*			
	Equation 1: Baseline	*Equation 2: by type*			*Equation 1: Baseline*	*Equation 2: by type*		
		Agro	*Minerals*	*Oil*		*Agro*	*Minerals*	*Oil*
	(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)
$dlnP_t$	0.0071	−0.0065	−0.0031	0.038	−0.0092	−0.0066	0.0033	0.0052
	(0.22)	*(0.26)*	*(0.097)*	*(0.98)*	*(0.45)*	*(0.39)*	*(0.11)*	*(0.18)*
$dlnP_{t-1:2}$	−0.097*	−0.066*	−0.025	−0.033	0.0060	0.0036	−0.022	−0.034
	(1.96)	*(1.67)*	*(0.35)*	*(0.38)*	*(0.19)*	*(0.11)*	*(0.50)*	*(0.99)*
$dlnP_{t-1:2} \times dlnG_{t-1:2}$	1.78**	1.12*	2.05**	1.96	−0.077	−0.13	0.060	0.16
	(2.49)	*(1.88)*	*(2.16)*	*(1.12)*	*(0.20)*	*(0.31)*	*(0.43)*	*(0.64)*
R^2	0.14	0.14			0.11	0.11		
Observations	1256	1256			1412	1412		

Notes: The sample is 44 African countries 1960-2013. The dependent variable is a conflict onset dummy. Fixed and time effects, country-specific trends, and the change in public spending are included in all the regressions. The change in fiscal expenditure is adjusted by country means. Below the OLS coefficients t-values are reported in parenthesis, based on standard errors clustered by country. * means significant at 10%, ** significant at 5%, and *** significant at 1%.

Table 8: Commodity Prices, Fiscal Spending, and Civil Conflict, by Type of Commodity

	Civil Conflicts				*Civil Wars*			
	Equation 1: Baseline	*Equation 2: by type*			*Equation 1: Baseline*	*Equation 2: by type*		
		Agro	*Minerals*	*Oil*		*Agro*	*Minerals*	*Oil*
	(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)
$dlnP_t$	0.0070	−0.0082	−0.0034	0.040	−0.0087	−0.0068	0.0039	0.0057
	(0.21)	*(0.32)*	*(0.11)*	*(1.04)*	*(0.42)*	*(0.41)*	*(0.13)*	*(0.20)*
$dlnP_{t-1:2}$	−0.095*	−0.073*	−0.027	−0.0040	−0.0032	−0.0038	−0.022	−0.036
	(1.74)	*(1.84)*	*(0.38)*	*(0.043)*	*(0.11)*	*(0.15)*	*(0.52)*	*(0.84)*
$dlnG_{t-1:2}$	1.89	0.73	2.09*	3.05	−0.69	−0.67	−0.27	0.050
	(1.46)	*(0.81)*	*(1.89)*	*(1.08)*	*(0.78)*	*(0.67)*	*(0.73)*	*(0.13)*
$dlnP_{t-1:2} \times dlnG_{t-1:2}$	1.63	1.72*	1.86	−0.0061	0.87	0.62	0.58	0.51
	(1.47)	*(1.75)*	*(0.96)*	*(0.0053)*	*(1.56)*	*(1.15)*	*(1.10)*	*(0.64)*
$dlnP_{t-1:2} > 0 \times dlnG_{t-1:2}$	0.14	0.15			0.12	0.12		
	1256	1256			1412	1412		

Notes: The sample is 44 African countries 1960-2013. The dependent variable is a conflict onset dummy. Fixed and time effects, country-specific trends, and the change in public spending are included in all the regressions. The change in fiscal expenditure is adjusted by country means. Below the OLS coefficients t-values are reported in parenthesis, based on standard errors clustered by country. * means significant at 10%, ** significant at 5%, and *** significant at 1%.

Table 9: Commodity Prices, Fiscal Spending, and Civil Conflict, by Type of Commodity and Sign of Shock

	Interaction Coefficients ($dlnP_{t-1:2} \times dlnG_{t-1:2}$)				Civil Conflict Prevalence	
	High	Low	Obs.	R^2	High	Low
Baseline	1.78**		1256	0.14	15	
Sub-Sahara	1.84**	0.78	1256	0.14	23	14
Natural Resources	1.09	2.34**	1256	0.14	16	12
Democracy	0.53	3.06**	1256	0.14	19	10
Pol Institutions	0.36	2.85**	1256	0.14	18	11
Prot. expropriation	-0.1	3.19**	938	0.15	16	13
Income per capita	1.67	1.93*	1256	0.14	13	18
Ethnic frac.	1.98	1.81**	1256	0.14	17	13
Inequality	1.9**	1.89	1256	0.14	14	16
Rough terrain	1.73	1.82*	1244	0.14	11	22
Agricultural land	2.13	1.6*	1221	0.14	14	17
Latitude	1.23	2.87**	1256	0.14	22	8

Notes: The sample is 44 African countries 1960-2013. Results from estimating the baseline specification adding an interacting dummy for high and low values of the variable indicated in each row (each row is a different regression). The dependent variable is a conflict onset dummy. Fixed and time effects, country-specific trends, and the change in public spending are included in all the regressions. The change in fiscal expenditure is adjusted by country means. Below the OLS coefficients t-values are reported in parenthesis, based on standard errors clustered by country. * means significant at 10%, ** significant at 5%, and *** significant at 1%.

Table 10: Commodity Prices, Fiscal Spending, and Civil Conflict, Groups of Countries

	1960-1989			*1990-2013*		
	(1)	(2)	(3)	(4)	(5)	(6)
$dlnP_t$	0.0020	0.0031	0.0016	0.039	0.027	0.022
	(0.052)	*(0.079)*	*(0.042)*	*(0.62)*	*(0.43)*	*(0.34)*
$dlnP_{t-1:2}$	−0.055	−0.054	−0.076	−0.14**	−0.13**	−0.13**
	(0.75)	*(0.75)*	*(0.91)*	*(2.26)*	*(2.17)*	*(2.15)*
$dlnP_{t-1:2} \times dlnG_{t-1:2}$		1.01*			3.77**	
		(1.94)			*(2.12)*	
$dlnP_{t-1:2} > 0 \times dlnG_{t-1:2}$			−0.35			4.82*
			(0.50)			*(1.79)*
$dlnP_{t-1:2} < 0 \times dlnG_{t-1:2}$			2.82*			1.23
			(1.79)			*(0.39)*
R^2	0.17	0.17	0.18	0.28	0.30	0.30
Observations	614	614	614	642	642	642

Notes: The sample is 44 African countries 1960-2013. The dependent variable is a conflict onset dummy. Fixed and time effects, country-specific trends, and the change in public spending are included in all the regressions. The change in fiscal expenditure is adjusted by country means. Below the OLS coefficients t-values are reported in parenthesis, based on standard errors clustered by country. * means significant at 10%, ** significant at 5%, and *** significant at 1%.

Table 11: Commodity Prices, Fiscal Spending, and Civil Conflict, Subsamples

	WDI/SIPRI				*WDI/SIPRI-COW*			
	(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)
$dlnP_t$	−0.080	−0.066	−0.079	−0.066	−0.0024	0.0016	0.0001	0.0054
	(1.04)	*(1.09)*	*(1.03)*	*(1.26)*	*(0.066)*	*(0.043)*	*(0.0014)*	*(0.14)*
$dlnP_{t-1:2}$	−0.16	−0.15	−0.15	−0.14*	−0.13**	−0.11*	−0.13**	−0.11*
	(1.42)	*(1.55)*	*(1.40)*	*(1.67)*	*(2.05)*	*(1.82)*	*(2.03)*	*(1.82)*
$dlnG_{t-1:2}$	−0.11	−0.15	−0.24	−0.17	−0.069	−0.089	0.0043	0.018
	(0.92)	*(1.20)*	*(1.16)*	*(0.90)*	*(0.74)*	*(0.96)*	*(0.038)*	*(0.17)*
$dlnP_{t-1:2} \times dlnG_{t-1:2}$	4.06*	4.55*			1.87**	1.96**		
	(1.67)	*(1.85)*			*(2.13)*	*(2.35)*		
$dlnM_{t-1:2}$		0.077		−0.29*		0.080		0.025
		(0.65)		*(1.69)*		*(1.05)*		*(0.25)*
$dlnP_{t-1:2} \times dlnM_{t-1:2}$		−1.57				−0.25		
		(1.21)				*(0.41)*		
$dlnP_{t-1:2} > 0 \times dlnG_{t-1:2}$			5.20	4.67			1.22	1.07
			(1.34)	*(1.19)*			*(1.17)*	*(1.04)*
$dlnP_{t-1:2} < 0 \times dlnG_{t-1:2}$			1.58	4.49			2.98*	3.66**
			(0.49)	*(1.16)*			*(1.72)*	*(2.13)*
$dlnP_{t-1:2} > 0 \times dlnM_{t-1:2}$				1.60				0.21
				(1.40)				*(0.36)*
$dlnP_{t-1:2} < 0 \times dlnM_{t-1:2}$				−7.84				−1.13
				(1.59)				*(0.66)*
R^2	0.36	0.37	0.36	0.39	0.19	0.19	0.19	0.19
Observations	428	428	428	428	1042	1042	1042	1042

Notes: The dependent variable is a conflict onset dummy. $dlnM$ is the change in military public spending. Fixed and time effects, and country-specific trends are included in all the regressions. The change in fiscal expenditure is adjusted by country means. Below the OLS coefficients t-values are reported in parenthesis, based on standard errors clustered by country. * means significant at 10%, ** significant at 5%, and *** significant at 1%.

Table 12: Commodity Prices, Fiscal Spending, and Civil Conflict, Military Spending

	Civil Conflicts		*Output Growth*	
	(1)	(2)	(3)	(4)
$dlnP_t$	0.0071	0.0070	0.028^{**}	0.028^{**}
	(0.22)	*(0.21)*	*(2.22)*	*(2.28)*
$dlnP_{t-1:2}$	-0.097^{*}	-0.095^{*}	0.065^{***}	0.060^{***}
	(1.96)	*(1.74)*	*(4.91)*	*(4.56)*
$dlnP_{t-1:2} \times dlnG_{t-1:2}$	1.78^{**}		0.22	
	(2.49)		*(1.21)*	
$dlnP_{t-1:2} > 0 \times dlnG_{t-1:2}$		1.89		-0.22
		(1.46)		*(0.86)*
$dlnP_{t-1:2} < 0 \times dlnG_{t-1:2}$		1.63		0.85^{*}
		(1.47)		*(1.96)*
R^2	0.14	0.14	0.22	0.22
Observations	1256	1256	1255	1255

Notes: The sample is 44 African countries 1960-2013. The dependent variable in columns 1-2 is the civil conflict onset dummy, and in columns 3-4 is GDP growth. Fixed and time effects, and country-specific trends are included in all the regressions. The change in fiscal expenditure is adjusted by country means. Below the OLS coefficients t-values are reported in parenthesis, based on standard errors clustered by country. * means significant at 10%, ** significant at 5%, and *** significant at 1%.

Table 13: Commodity Prices, Fiscal Spending, Civil Conflict and GDP growth

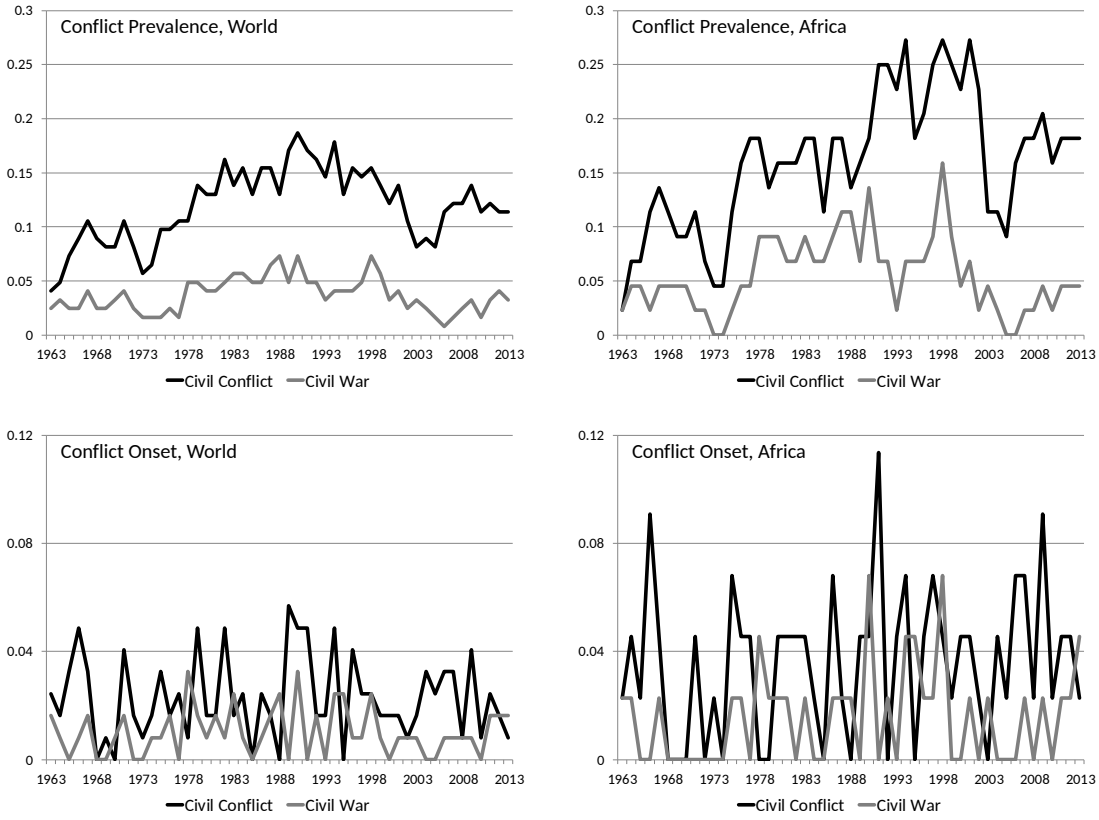
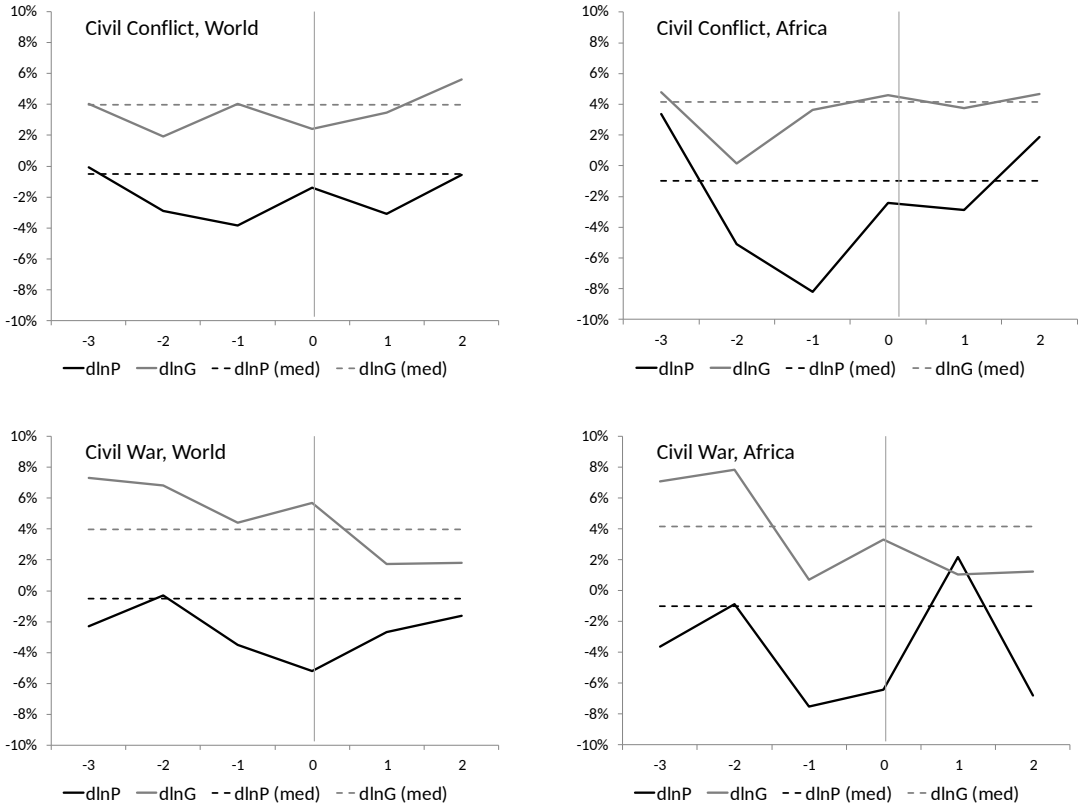
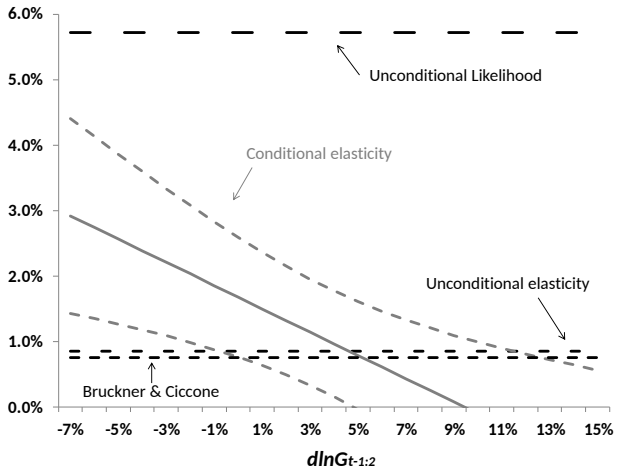


Figure 1: Civil Conflict, 1960-2013



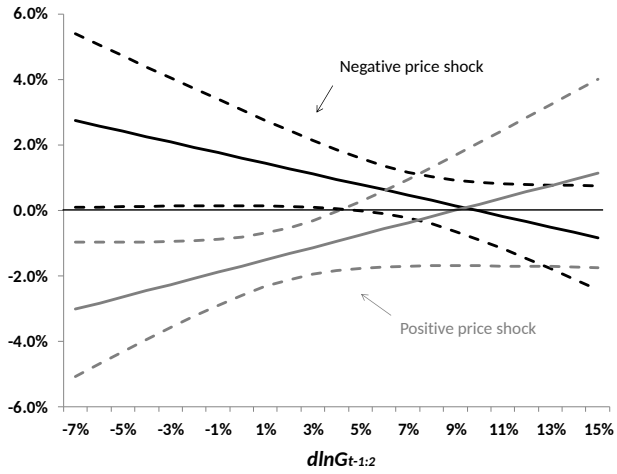
Notes: Median values of commodity prices (black) and public spending (grey) growth around episodes of conflict onset for which there was no conflict in the previous three years. Period 0 is the year of onset. Left: World sample. Right: African countries. Bottom: Civil War. Top: Civil Conflict. Dotted lines are the median values for the two variables of interest for all the years and countries in the sample.

Figure 2: Commodity Prices and Fiscal Spending around Civil Conflict Episodes



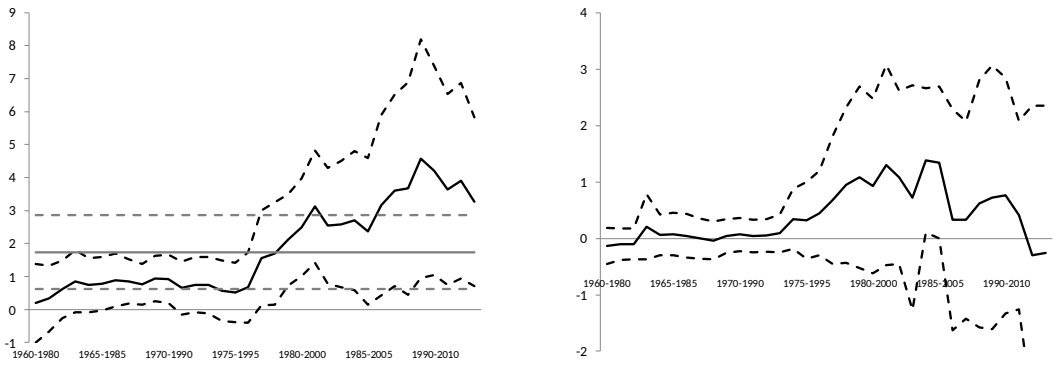
Notes: response of the probability of civil conflict to an average 10% decrease in commodity prices for two years, based on results presented in Table 6. Dotted grey lines are 90% confidence intervals. For Brückner and Ciccone (2010), whose estimations are for the period 1961-2006, three-years average changes in P and G are assumed to obtain the elasticity.

Figure 3: The Impact of a Negative Commodity Price Shock



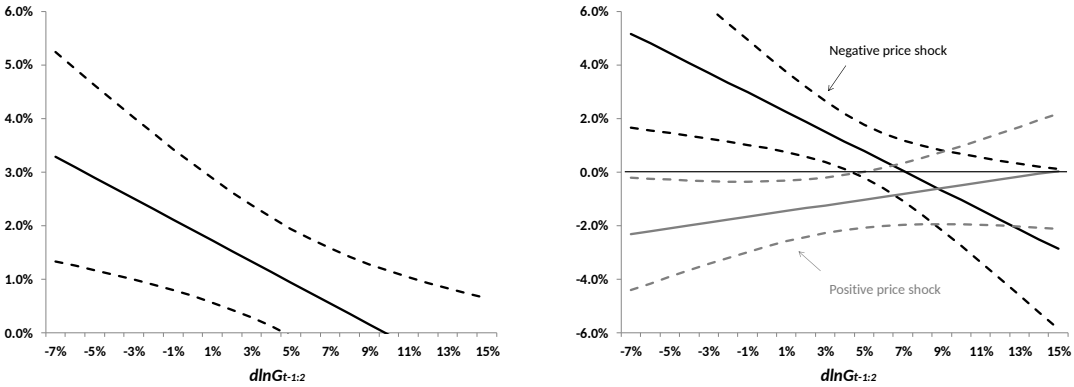
Notes: response of the probability of civil conflict to an average 10% change in commodity prices, for two years, based on results presented in Table 6. Dotted lines are 90% confidence intervals.

Figure 4: The Impact of a Commodity Price Shock, by Sign of Shock



Notes: interaction term between the growth in commodity price index and public spending estimated by rolling regressions for 20-year windows from 1960 to 2013. The dependent variables are civil conflict (left) and civil war (right) onset. Dotted lines are 90% confidence intervals.

Figure 5: Interaction between Commodity Price Shocks and Public Spending, Rolling Estimations



Notes: response of the probability of civil conflict to an average 10% change in commodity prices, for two years, based on results presented in Table 12 with WDI/SIPRI-Cow data for military expenditures. Dotted lines are 90% confidence intervals.

Figure 6: The Impact of a Commodity Price Shock, controlling for Military Expenditures