International Commodity Prices and Civil War Outbreak: New Evidence for Sub-Saharan Africa and Beyond

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June 2020

Abstract

A new dataset by Bazzi and Blattman (2014) allows examining the effects of international commodity prices on the risk of civil war outbreak with more comprehensive data. I find that international commodity price downturns sparked civil wars in Sub-Saharan Africa and a much wider sample including all larger countries in Africa, the Middle East, Latin America, and Asia. My conclusions contrast with those of Bazzi and Blattman, who argue that the new dataset rejects that commodity price downturns cause civil wars. The reason is that I obtain country-specific commodity price shocks using time-*invariant* (fixed) export shares as commodity weights. Bazzi and Blattman use time-*varying* export shares as commodity weights. Time-varying export shares jeopardize causal estimation because they reflect endogenous changes in exports and also because the lack of data for developing countries makes it necessary to piece together, interpolate, and backcast the time variation in export shares.

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1 Introduction

Civil wars are intrastate conflicts involving large-scale armed combat. Their death toll in the last 60 years is in the tens of millions (e.g. Fearon and Laitin, 2003; Ghobhara et al., 2003; Eck and Hultman, 2007). A central question in the debate on the causes of civil wars is the role of economic conditions. An early literature examined whether civil wars are more likely where incomes are low (e.g. Collier and Hoeffler, 1998). More recently, attention has shifted to whether civil war outbreaks are caused by droughts, falling international commodity prices, or other exogenous negative income shocks (e.g. Miguel et al., 2004; Sandholt Jensen and Skrede Gleditsch, 2009; Bruckner and Ciccone, 2010).

My goal is to understand the role of falling international commodity prices for civil war outbreak. A natural starting point is Bazzi and Blattman's (2014) influential recent study. Their categorical conclusion is that commodity price shocks have no effect on new conflict, even large shocks in high-risk nations. While this contrasts with previous studies of civil war, Bazzi and Blattman use more export and price data plus updated data on civil war outbreaks.[1] Previous findings may be the spurious result of more limited data (Bazzi and Battman, p.13).

However, Bazzi and Blattman's conclusion that commodity price shocks have no effect on civil war outbreaks could be driven by methodological choices rather than new data. Previous studies of the consequences of falling international commodity prices obtain country-specific commodity price shocks using time-*invariant* (fixed) export shares as commodity weights (e.g. Miller and Deaton, 1995; Deaton, 1999; Bruckner and Ciccone, 2010; see also Caselli and Tesei, 2016). Bazzi and Blattman use time-*varying* export shares instead. They acknowledge this measurement issue but note in their discussion of the previous literature that, as far as their discrepant conclusion is concerned, the coding of the shocks measure is inconsequential (p.13).

I find it matters whether country-specific commodity price shocks are obtained using time-varying or time-invariant export shares as commodity weights. When time-invariant commodity export shares are used, the new dataset put together by Bazzi and Blattman indicates that falling commodity prices cause civil war outbreaks. This is the case for countries in Sub-

[1]The disagreement concerns civil wars. The previous literature, like Bazzi and Blattman, does not find a statistically significant effect of commodity price shocks on all civil conflicts at the country level, see Bruckner and Ciccone (2010). For within-country evidence on the effect of price shocks on civil conflict in Sub-Saharan Africa see Berman and Couttenier (2015) and Berman et al. (2017).

Saharan Africa – a focus of previous research – and all larger countries in Africa, the Middle East, Latin America, and Asia. Effects tend to be especially strong for agricultural, forestry, and fishery commodities and statistically insignificant for minerals, metals, oil, and gas.

If the goal of the empirical analysis is to understand whether civil wars may be caused by falling commodity prices, the better methodological choice is to obtain country-specific commodity price shocks using time-invariant export shares as commodity weights. Any result obtained using time-varying export shares as commodity weights cannot be interpreted as causal as the time variation in exports is endogenous. Moreover, the lack of export data for developing countries often forces researchers – including Bazzi and Blattman – to piece together, interpolate, and backcast the time variation in export shares. This induces imputation errors in the time variation of country-specific price shocks when time-varying export shares are used as commodity weights. How these imputation errors bias estimates of the effect of price shocks on civil war outbreak depends on whether or not they are pure noise.

The next section discusses some important aspects of the data. Section 3 explains the construction of country-specific commodity price shocks. Section 4 presents my empirical results.

2 Data

All the data comes directly from Bazzi and Blattman (2014). Because of the lack of export data for developing countries, they have to piece together, interpolate, and backcast some of the time variation in export shares from various sources, especially for earlier years in their dataset. Bazzi and Blattman's main civil war data comes from two sources. First, the UCDP/PRIO Armed Conflict Dataset also used in previous studies of civil war by Miguel et al. (2004), Sandholt Jensen and Skrede Gleditsch (2009), and Bruckner and Ciccone (2010) for example. Second, the COW (Correlates of War) dataset. I do not consider the COW dataset for two reasons: it is conceptually inappropriate and does not fit well with Bazzi and Blattman's calendar-year commodity price shocks. To see why the COW civil war measure used by Bazzi and Blattman is conceptually inappropriate it is useful to look at the case of Nigeria. According to the COW measure of civil war, Nigeria was involved in civil wars in 1990, 1992, and 1999. These were military engagements of Nigeria (in most cases together with other countries) in civil wars outside of Nigeria. There is no reason to treat such engagements like domestic civil

wars in Nigeria. The UCDP/PRIO civil war measure of Bazzi and Blattman only codes a country in a civil war if there is a domestic civil war. There is a second important difference between the UCDP/PRIO and the COW civil war measure used by Bazzi and Blattman. When UCDP/PRIO codes a civil war in a calendar year, it is because estimates indicate more than 1,000 battle deaths in that calendar year. This matches the calendar-year coding of Bazzi and Blattman's commodity price shocks. The COW definition of civil wars also involves a 1,000 battle-deaths threshold but not for calendar years. Instead, COW applies the 1,000 battle-deaths threshold to the twelve-month period following the start of a civil war. The start of a civil war is dated by the formal declaration if followed by immediate combat or by the first day of combat. As civil wars may not start with large-scale combat, COW may date civil wars to have started in calendar years without any large-scale fighting. This can make it difficult to uncover a causal effect of commodity price shocks on civil war outbreak when the measure of commodity price shocks is for calendar years (Ciccone, 2018).

3 Country-Specific Commodity Price Shocks

My empirical analysis is based on country-specific commodity price shocks that use time-invariant (fixed) export shares as commodity weights. The fixed-weight (FW) price shock of country c in year t is

$$FWshock_{c,t} = \sum_i \omega_{i,c}(\log p_{i,t} - \log p_{i,t-1}) \tag{1}$$

where $p_{i,t}$ is the international price of commodity i in year t and $\omega_{i,c}$ the time-invariant commodity weight obtained as (i) the share of commodity i in the country's commodity exports in a specific year or as (ii) the average commodity export share over the period of analysis.

Bazzi and Blattman's export-weighted commodity price shocks allow for time varying commodity weights

$$BBshock_{c,t} = \sum_i (\omega^{BB}_{i,c,t} \log p_{i,t} - \omega^{BB}_{i,c,t-1} \log p_{i,t-1}) \tag{2}$$

where the time-varying weights $\omega^{BB}_{i,c,t}$ are calculated using lagged averages of commodity export

shares. Specifically

$$\omega_{i,c,t}^{BB} = \frac{(e_{i,c,t-2} + e_{i,c,t-3} + e_{i,c,t-4})/3}{\sum_i (e_{i,c,t-2} + e_{i,c,t-3} + e_{i,c,t-4})/3} \tag{3}$$

with $e_{i,c,t}$ defined as exports of commodity i by country c in year t over the country's total exports (including non-commodities) during the year

$$e_{i,c,t} = \frac{\textit{exports of commodity } i \textit{ by country } c \textit{ in year } t}{\textit{total exports by country } c \textit{ in year } t}. \tag{4}$$

The sum across commodities in the denominator of (3) is a normalization ensuring that the commodity weights sum to one across commodities for a given country-year.[2] When time-invariant (fixed) export shares are used in (3), Bazzi and Blattman's export-weighted commodity price shocks in (2) simplify to the fixed-weight commodity price shocks in (1).[3]

4 Commodity Price Shocks and Civil War Risk

I start with results for Sub-Saharan Africa and then turn to a wider sample with all larger countries in Africa, the Middle East, Latin America, and Asia. All results control for country fixed effects, year fixed effects, and country-specific linear time trends.

4.1 Sub-Saharan Africa

Following Miguel et al.'s (2004) study of civil conflict in Sub-Saharan Africa since 1980, several studies have focused on this time period (e.g. Sandholt Jensen and Skrede Gleditsch, 2009; Bruckner and Ciccone, 2010). I therefore start with the time period since 1980 and then turn

[2]The formula in (2) differs from the formula described in Bazzi and Blattman's Online Appendix in two respects that are inconsequential empirically. First, Bazzi and Blattman subtract a term capturing US consumer price inflation in year t. As these terms are the same for all countries for each t, they are absorbed by year fixed effects in the estimating equation. Second, Bazzi and Blattman write that the weights used in (2) are $\omega_{i,c,t}^{BB} = (e_{i,c,t-2} + e_{i,c,t-3} + e_{i,c,t-4})/3$ instead of (3). As the commodity export shares $e_{i,c,t}$ are shares in total exports, these weights would – in contrast to the weights in (3) – not necessarily sum to one for a given country-year. However, the export-share-weighted commodity price shocks Bazzi and Blattman use in their empirical work do incorporate the normalization of the weights in (3), see Ciccone (2018) for details.

[3]Bazzi and Blattman, following Bruckner and Ciccone (2010), also use country-specific price shocks that drop commodities in years where the country's exports exceed a certain percentage of world exports. For results with a 3-percent and 10-percent threshold of world exports using the Bazzi and Blattman data, see Ciccone (2018). For the results in this paper using the more stringent 3-percent threshold see www.antoniociccone.eu.

to the longest possible time period in the Bazzi and Blattman (2014) data.

Sub-Saharan Africa 1980-2007 Table 1, Panel A shows the effect of year-on-year international commodity price shocks on the risk of civil war outbreak. Following Bruckner and Ciccone (2010) and Bazzi and Blattman, I include the contemporaneous price shock and two lags. Using time-varying export shares as commodity weights as in Bazzi and Blattman in column (1) yields negative effects that are statistically insignificant. The cumulative effect of the three year-on-year shocks is -0.14 with a P-value of 0.11. Hence, year-on-year commodity price shocks are not a statistically significant determinant of civil war risk individually or cumulatively at conventional levels using time-varying export weights.

This changes when time-invariant (fixed) export shares are used as commodity weights, whether I use export shares in 1980 – the beginning of the period – in column (2); export shares in 1990 in column (3); or period averages in column (4). The contemporaneous and the twice lagged year-on-year price shock have negative effects on the risk of civil war outbreak that are statistically significant at the 10-percent level (at least) and 20-50 percent larger in absolute terms than in column (1). The cumulative effect of the three year-on-year commodity price shocks on the risk of civil war outbreak is between -0.18 and -0.23. These effects are statistically significant at confidence levels between 1 and 3 percent.

Table 1, Panel B summarizes the effect of international commodity price shocks between years t and t–3 on the risk of civil war outbreak in year t. These 3-year price shocks capture more sustained price downturns than year-on-year shocks (see Miller and Deaton, 1995; Deaton, 1999; Bruckner and Ciccone, 2010). Using time-varying export shares as commodity weights in column (5) yields a negative effect that is statistically insignificant at conventional levels.

Results change when time-invariant (fixed) export shares are used as commodity weights, whether I use beginning-of-period, 1980 export shares in column (6); 1990 export shares in column (7); or period averages in column (8). The effect of commodity price shocks is now statistically significant at confidence levels between 2 and 4 percent, and 30-50 percent larger in absolute terms than using time-varying export weights in column (5).

Column (9) separates agricultural, forestry, and fishery commodities from minerals, metals, oil, and gas (for previous results by commodity type see Bruckner and Ciccone, 2010, and Bazzi and Blattman, 2014). Negative price shocks raise civil war risk for agricultural, forestry, and

fishery commodities and the effect is statistically significant at the 5-percent level. The effect for minerals etc. is statistically insignificant.

Sub-Saharan Africa 1957-2007 Table 1, Panel C shows the effect of 3-year international commodity price shocks on civil war outbreak over the 1957-2007 period. Using time-varying export shares as commodity weights in column (10) yields a negative effect that is statistically insignificant at conventional levels. Using time-invariant (fixed) 1980 export shares – approximately the mid-point of the period – in column (11) or period averages in column (12), yields effects that are statistically significant at the 10-percent level (at least) and 40 to 100 percent larger in absolute terms than in column (10). Column (13) separates agricultural, forestry, and fishery commodities from minerals, metals, oil, and gas. Negative price shocks raise civil war risk for agricultural, forestry, and fishery commodities and the effect is statistically significant at the 5-percent level. The effect for minerals etc. is statistically insignificant.

4.1.1 Africa, the Middle East, Latin America, and Asia

Bazzi and Blattman's (2014) dataset also covers countries in Africa, the Middle East, Latin America, and Asia with populations over one million (118 countries).

Africa, the Middle East, Latin America, and Asia 1980-2007 Table 2, Panel A shows the effect of year-on-year commodity price shocks on the risk of civil war outbreak over the 1980-2007 period. Using time-varying export shares as commodity weights in column (1) yields negative effects that are statistically insignificant at conventional levels.

The results in columns (2)-(4) are based on time-invariant (fixed) export shares as commodity weights. Column (2) uses beginning-of-period, 1980 export shares; column (3) uses 1990 export shares; and column (4) uses period averages. The negative effect of the contemporaneous year-on-year commodity price shock on the risk of civil war outbreak is now statistically significant at confidence levels between 1 and 2 percent, and 50-80 percent larger in absolute terms than using time-varying export weights in column (1). The twice lagged year-on-year commodity price shock has a negative effect on the risk of civil war outbreak that is statistically significant at the 5-percent level using beginning-of-period, 1980 export shares.

Table 2, Panel B summarizes the effect of 3-year commodity price shocks on the risk of civil

war outbreak. Using time-varying export shares as commodity weights in column (5) yields a negative, statistically insignificant effect. Columns (6)-(8) use time-invariant (fixed) export shares as commodity weights. The negative effect of price shocks on civil war outbreak is now statistically significant at confidence levels between 1 and 5 percent, and 60-80 percent larger in absolute terms than in column (5). Column (9) separates agricultural, forestry, and fishery commodities from minerals, metals, oil, and gas. Negative price shocks raise civil war risk for agricultural, forestry, and fishery commodities and the effect is statistically significant at the 6-percent level. The effect for minerals etc. is statistically insignificant.

Africa, the Middle East, Latin America, and Asia 1957-2007 Table 2, Panel C shows the effect of 3-year commodity price shocks on civil war outbreak over the 1957-2007 period. Using time-invariant export shares as commodity weights – either mid-period, 1980 export shares or period averages – in columns (11)-(12) yields estimates more than four times the estimate using time-varying export weights in column (10). The effect is statistically significant at the 10-percent level using 1980 export shares in column (11) and statistically insignificant using period averages in column (12). Column (13) separates agricultural, forestry, and fishery commodities from minerals, metals, oil, and gas. Negative price shocks raise civil war risk for agricultural, forestry, and fishery commodities and the effect is statistically significant at the 5-percent level. The effect for minerals etc. is statistically insignificant.

5 Conclusion

I examine whether falling international commodity prices cause the outbreak of civil wars using a new dataset put together by Bazzi and Blattman (2014). In contrast to Bazzi and Blattman, but following a previous literature on the consequences of commodity price shocks, I obtain country-specific price shocks using time-invariant export shares as commodity weights. The export shares I use are either for specific years – including beginning-of-period export shares for the 1980-2007 period – or period averages. My main empirical finding is that falling international commodity prices cause civil war outbreaks in Sub-Saharan Africa and a much wider sample including all larger countries in Africa, the Middle East, Latin America, and Asia.

6 References

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Table 1. International Commodity Price Shocks and Civil War Outbreak in Sub-Saharan Africa

Year-on-year commodity price shocks 1980-2007					3-year commodity price shocks									
						1980-2007					1957-2007			
	Panel A					Panel B					Panel C			
	(1)	(2)	(3)	(4)		(5)	(6)	(7)	(8)	(9)	(10)	(11)	(12)	(13)
Commodity export weights	***time-varying***	***fixed start-of-period (1980)***	***fixed 1990***	***fixed period average***		***time-varying***	***fixed start-of-period (1980)***	***fixed 1990***	***fixed period average***	***fixed period average***	***time-varying***	***fixed mid-period (1980)***	***fixed period average***	***fixed period average***
Price shock t (s.e.)	-0.066	-0.081	-0.100	-0.095	3-year price shock t	-0.048	-0.061	-0.073	-0.073		-0.017	-0.024	-0.034	
	(0.044)	(0.042)	(0.047)	(0.052)	(s.e.)	(0.029)	(0.026)	(0.029)	(0.035)		(0.013)	(0.014)	(0.017)	
Price shock t-1	-0.023	-0.034	-0.039	-0.038	3-year agriculture etc.					-0.098				-0.047
(s.e.)	(0.034)	(0.032)	(0.037)	(0.038)	price shock t (s.e.)					(0.05)				(0.023)
Price shock t-2	-0.055	-0.070	-0.083	-0.087	3-year minerals etc.					-0.042				-0.019
(s.e.)	(0.043)	(0.038)	(0.042)	(0.045)	price shock t (s.e.)					(0.034)				(0.015)
			0.050	0.060										
Cumulative 3-year	-0.14	-0.18	-0.22	-0.23										
effect [P-value]	[0.11]	[0.02]	[0.01]	[0.03]										
Observations	1007	1007	1007	1007	Observations	1007	1007	1007	1007	1007	1805	1805	1805	1805
Countries	45	45	45	45	Countries	45	45	45	45	45	45	45	45	45
R2	0.080	0.084	0.087	0.085	R2	0.079	0.083	0.085	0.083	0.085	0.103	0.103	0.104	0.104

Note: The left-hand-side variable in all regressions is an indicator variable for civil war outbreak. All regressions control for country fixed effects, year fixed effects, and country-specific linear trends. Standard errors are clustered at the country level. All data is from Bazzi and Blattman (2014). Year-on-year commodity price shocks in year t refer to export-weighted changes in commodity prices between year t and t-1. 3-year commodity price shocks in year t refer to export-weighted changes in commodity prices between year t and t-3. When commodity weights are "fixed", the (country-specific) commodity export weights used for each country are constant over time. When commodity weights are "time-varying", the commodity weights used for each country vary over time depending on the lagged commodity exports of the country. "Agriculture etc." refers to agricultural, forestry, and fishery. "Minerals etc." refers to minerals, metals, oil, and gas. See the main text for details.

Table 2. International Commodity Price Shocks and Civil War Outbreak in Africa, the Middle East, Latin America, and Asia

	Year-on-year commodity price shocks 1980-2007					3-year commodity price shocks								
						1980-2007					1957-2007			
	Panel A					Panel B					Panel C			
	(1)	(2)	(3)	(4)		(5)	(6)	(7)	(8)	(9)	(10)	(11)	(12)	(13)
Commodity export weights	*time-varying*	*fixed start-of-period (1980)*	*fixed 1990*	*fixed period average*		*time-varying*	*fixed start-of-period (1980)*	*fixed 1990*	*fixed period average*	*fixed period average*	*time-varying*	*fixed mid-period (1980)*	*fixed period average*	*fixed period average*
Price shock t	-0.033	-0.049	-0.054	-0.059	3-year price shock t	-0.02	-0.037	-0.033	-0.037		-0.003	-0.014	-0.014	
(s.e.)	(0.021)	(0.019)	(0.022)	(0.026)	(s.e.)	(0.014)	(0.014)	(0.016)	(0.019)		(0.009)	(0.008)	(0.009)	
Price shock t-1	-0.003	-0.021	-0.009	-0.014	3-year agriculture etc.					-0.061				-0.031
(s.e.)	(0.015)	(0.016)	(0.021)	(0.022)	price shock t (s.e.)					(0.032)				(0.015)
Price shock t-2	-0.026	-0.042	-0.038	-0.041	3-year minerals etc.					-0.016				-0.004
(s.e.)	(0.021)	(0.019)	(0.023)	(0.026)	price shock t (s.e.)					(0.017)				(0.009)
Observations	2662	2662	2662	2662	Observations	2662	2662	2662	2662	2262	4781	4781	4781	4781
Countries	118	118	118	118	Countries	118	118	118	118	118	118	118	118	118
R2	0.114	0.117	0.116	0.116	R2	0.114	0.116	0.115	0.115	0.119	0.086	0.086	0.086	0.087

Note: The left-hand-side variable in all regressions is an indicator variable for civil war outbreak. All regressions control for country fixed effects, year fixed effects, and country-specific linear trends. Standard errors are clustered at the country level. All data is from Bazzi and Blattman (2014). Year-on-year commodity price shocks in year t refer to export-weighted changes in commodity prices between year t and t-1. 3-year commodity price shocks in year t refer to export-weighted changes in commodity prices between year t and t-3. When commodity weights are "fixed", the (country-specific) commodity export weights used for each country are constant over time. When commodity weights are "time-varying", the commodity weights used for each country vary over time depending on the lagged commodity exports of the country. "Agriculture etc." refers to agricultural, forestry, and fishery. "Minerals etc." refers to minerals, metals, oil, and gas. See the main text for details.