Civil Conflicts and Food Price Spikes

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Abstract

In this paper, we investigate the relation between food prices and civil conflicts by using a panel data set of 82 developing and emerging countries spanning from 1995 to 2009. While all the papers to the literature on the causal relation between food prices and conflicts exploit the international food prices as an explanatory variable, our study accounts for the impact of international food prices on domestic food prices. Most of the paper deals with the endogeneity issue between food prices and civil conflicts by employing instrumental variables. Our study goes deeper into the analysis by estimating the reverse causality between food prices and conflicts with an iterative three-stage-least square. Thus, we can estimate the impact of domestic prices on the likelihood of conflicts but also the impact of international food prices together with the impact of a period of conflicts on the domestic food prices. Our results reveal that a rise in domestic food prices increases the likelihood of civil conflicts. The size of the estimated impact of domestic food prices on conflicts is higher in South-East Asia. Finally, we compare the estimated impact of international and domestic food prices on the occurrence of conflicts. Due to the imperfect pass-through, the effect of international food prices on the occurrence of civil war is significantly lower and even close to zero in most of our estimations.

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1. Introduction

Many factors underpin civil wars and conflicts like weak institutions, ethnic diversity, inequality.[1] However, economic shocks are among the strongest and most robust correlate of civil wars and conflicts. Traditionally, two theories are developed to explain the income-conflicts causal relation depending whether the income shock is positive or negative (Blattman and Miguel, 2010). On the one hand, some studies argue that a decline in households income and economic opportunities rise the incentive to rebel (Grossman, 1991). This theory named *the opportunity cost of insurrection* often predict an inverse relation between export price shocks and conflicts (Bazzi and Blattman, 2014). On the other hand, studies argue that the abundance of natural resources like fossil fuels or minerals causes more violence by raising resource rents. Since the institutions that constrain power are weak, states are a prize that can be seized. This theory named *State Prize* predicts that insurrection and rebellion can rise with the value of the resource rent. Before the paper by Dal Bó and Dal Bó (2011), the literature focuses on one of this theory without discussing an element of paradox: in some case, a positive income shocks increase the occurrence of conflicts while others decrease it. By developing a general equilibrium model of appropriation in a small open economy, Dal Bó and Dal Bó (2011) solve this paradox by distinguishing the income shocks affecting labor-and-capital intensive sectors. In labor-intensive sectors like agriculture a drop in food prices may lower the opportunity of conflicts and rise the incidence of conflicts. Alternatively, in capital sector a rise in income may conflict by raising gains from appropriation. Bazzi and Blattman (2014) test the evidence of these theories and find weak evidence in favor of either theory. By using district level data, Dube and Vargas (2013) also test simultaneously both theories in Columbia. Their results corroborate the existence of both theories. A fall in coffee prices induces a decline in wages, lowering the opportunity cost of fighting. In contrast, a rise in oil price generate greater rents to fight over via a rapacity

[1] Some papers have analyzed the relation between ethnic diversity and conflicts(Montalvo and Reynal-Querol (2005) and Esteban et al. (2012)).

effect.

Concerning the relation between food prices and the likelihood of conflicts, most of the studies focus on one aspect: are civil wars more likely to start following downturns in the international price of countries' main exports commodities? However, they neglect the potential impact of a rise in agricultural commodity prices on households income. Since 2000, world food prices have experienced rapid increase, raising concerns about the intra-stability of the world's poorest countries. Corn and wheat prices nearly triple and price for rice doubles (World Bank, 2013b). Throughout history, food prices spikes are frequently thought to cause food riots and conflicts like the French Revolution (1789). Shortly before the French Revolution of 1789, the queen, Marie Antoinette, upon being told that the poor people of Paris had no bread, reputedly replied: "Then let them eat cake". High prices for these stapled grains impact negatively households purchasing power and may raise poverty.[2] Thus, it also lowers *the opportunity cost* of conflicts.[3]

Obtaining a clean estimate of the effect of commodity prices on the likelihood of conflicts is not an easy task. All the studies investigating the link between commodity prices and the likelihood of conflicts employ international commodity prices as an explanatory variable. But, the transmission between domestic food prices and international food prices is far from being perfect.[4] In response to international food price spikes, governments can intervene by reducing their import protection or by increasing export restraints. Thus, domestic food prices rise less than international food prices (Anderson et al., 2013). By considering international food prices instead of domestic food prices, previous studies misspecified the model

[2]Several studies analyzed the impact of food price increase by using the methodology developed by Deaton (1989). By using household survey data from Guatemala, De Janvry and Sadoulet (2010) results reveal that the effects of food price spike on households purchasing power is very limited due to the imperfect transmission between international and domestic food prices. Chakravorty et al. (2012) show that the food price increase due the U.S energy policy should increase the number of poor in India.

[3]After the peak in food prices, See Schneider (2008) and Bush (2010) for a complete description of food riots after the 2008 food crisis.

[4]Chakravorty et al. (2012) estimate the price pass-through in India for four food commodities, e-g, rice, wheat, sugar and meat. They found no significant transmission between the international and domestic price for wheat and meat, indicating that international food prices does not impact domestic food prices. The pass-through elasticity was 0.18 for rice and 0.38 for wheat.

(Arezki and Bruckner (2011) and Bellemare (2012). Most of the studies identifies potential sources of endogeneity in the relation commodity prices/civil conflicts. They deal with this issue by using instrumental variables. However, we argue that this relation is *more complex* and that a reverse causality exists between food prices and the likelihood of conflicts. A rise in food prices can reduce household's purchasing power, which decreases the opportunity cost of conflicts and raise the likelihood of conflicts. Then, internal conflicts can affect negatively food production, driving up food prices.

This paper digs into the question of the complex relation between international-domestic food prices and the likelihood of civil conflicts by employing the iterative three stage least square method for a panel of 82 developing and emerging countries over the period 1995-2009. We estimate a system of two equations. The first equation examines how the domestic food prices can affects the incidence of conflicts over the following year. The second equation analyzes how international food prices together with the civil conflicts affects the domestic food prices. Three findings stand out. First, there is no direct statistical evidence between food price index and the occurrence of civil conflicts. Whether we consider international food price or domestic food price, the relationship is insignificant. This is true even when we introduce the regional effects. Second, the relation between food prices and conflicts becomes significant if we consider the reverse relationship between international food prices-domestic food prices and the occurrence of civil conflicts. The effects are larger in South East Asia and in North Africa and Middle East. Third, we find that the impact of international food prices on the occurrence of civil conflicts is significant but small.

The paper is organized as follows. Section 2 presents the empirical strategy. In section 3, data and descriptive statistics are presented. Section 4 discusses the results, along with the results of several robustness checks. Section 6 concludes.

2. Empirical strategy

To take into account the effects of food prices on the occurrence of conflicts, we first estimate the following generic equation:

$$C_{it} = \alpha_i + \gamma_t + \beta log(P_{t-1}) + \theta \mathbf{X_{it}} + \epsilon_{it} \tag{1}$$

where C_{it} is an indicator for conflicts events which takes the value "1" if a conflict is observed in country i the year t, α_i is the country fixed-effects and γ_t is the year fixed-effect. The coefficient β should be interpreted as follows: an increase of one percent in food price index increases the likelihood of conflicts by β percentage point. A positive β supports the *opportunity cost theory* indicating that any rise in food prices reduces purchasing power and thereby lowers the opportunity cost of conflicts. To measure the impact of food prices on the occurrence of conflicts, we use two different food price indexes. As it is commonly used in the literature on conflicts, we first use $IntP_{t-1}$ the lagged international food price index (Miguel et al. (2004), Bazzi and Blattman (2014) and Bazzi and Blattman (2014)). However, the pass-through between international and domestic food prices is imperfect. In response to spikes in international food prices, many governments adjust their agricultural trade barriers (reduction in imports protection or increase in exports restrains) in an attempt to partially insulate their domestic food markets. For instance, India raises its export bans on rice to insulate in 2008 (Anderson et al., 2013). To account for imperfect pass-through between international prices and domestic food prices, we use $DomP_{it-1}$ the domestic lagged food price index relative to the price of the generic consumption basket. Commodity price shocks can take at least one period to impact incomes and thus the likelihood of conflicts. Thus, we consider lagged prices instead of contemporaneous prices as in (Miguel et al. (2004); Brückner and Ciccone (2010); Bazzi and Blattman (2014)).[5] $\mathbf{X_{it}}$ is the vector of control variables including the measure of duration of conflicts representing the sensibility of the

[5]We also include two and three lags for food prices, but, they turn to be not significant.

country to conflicts, the openness rate, the population, the cereal import dependency ratio and the first difference of growth in per capita GDP to take into account economic shock .[6] We estimate equation 1 using a within estimator taking into account individual and time fixed effects as in Miguel et al. (2004).[7] It is crucial to implement time-invariant country fixed-effects to control for unobserved country's characteristics that lead a country to be more conflict-prone. We will also account for economic zone specific effects by introducing interact variables.

There is also potential source of endogeneity in the relation between conflicts and food prices. Even if long-run economic development impact of conflicts is still unclear, an episode of conflict can destroy the factors of production (population and capital) and limit economic activity. Several approaches have been adopted for dealing with this endogeneity issue. Some papers employ the IV-estimation and choose some instruments. For estimating the causal relation between economic conditions and civil conflicts, Miguel et al. (2004) use the growth in rainfall as an instrument for economic growth. To estimate the impact of population size on the probability of occurrence of civil conflicts, Brückner, Markus (2010) uses randomly occurring drought as an instrumental variable.[8]. In addition, to account for endogeneity issue of per capita income to both population and civil conflict, the authors uses two instrument variables: smooth variations in rainfall and international commodity prices.[9] Instead of employing instrumental variables, Bazzi and Blattman (2014) omit from a nation's price shock any products where they produce more than a 10% share of global exports.[10] However, this approach fails to account for the reverse causality between food prices and conflicts and the impact of international food prices on domestic food prices. Any rise in food price leads to a decrease in real income for all households, which lowers the

[6]The control variables are expressed in log except if they are expressed in percentage.

[7]To estimate equation 1, we prefer a fixed effects linear model.

[8]Droughts are identified by an indicator function that is one for the 5% largest negative drops in the level of rainfall over two consecutive years.

[9]The index of international commodity prices is calculated from the price of 19 commodities weighted by a fixed export share.

[10]The authors also consider a 3 percent and 20 percent thresholds.

opportunity cost of conflicts (Deaton, 1999).[11] But also, a period of conflicts can destroy factors of production, infrastructure, weaken institutions and cause a rise in domestic food prices. Many factors affect domestic food prices, one of the most important is international food prices. Any shock on international food prices leads to a less than one-for-one increase in domestic food prices.

To account for the reverse causality between domestic food prices and the occurrence of civil conflicts together with the impact of international food prices on domestic food prices, we estimate the following system of equations with individual and time fixed effects. We employ the iterative three stage least square (3SLS) method.

$$\begin{cases} C_{it} &= \alpha_{1i} + \gamma_{1t} + \pi_1 logPDom_{it-1} + \theta_1 \mathbf{X_{1,it}} + \epsilon_{1,it} \\ logPDom_{it} &= \alpha_{2i} + \gamma_{2t} + \beta_2 C_{it} + \pi_2 logPInt_t + \theta_2 \mathbf{X_{2,it}} + \epsilon_{2,it} \end{cases} \tag{2}$$

The first equation of the system analyzes how the determinants of the incidence of conflicts. C_{it} also represents the incidence of conflicts, $PDom_{it-1}$ represents the lagged food price index, $\mathbf{X_{1,it}}$ is the *first* vector of control variables. It includes the duration of the conflict, the open rate, the GDP growth and the level of population.π_2 can be interpreted the pass-trough between the international food price and the domestic food price. If international food prices increase by 1%, domestic food price should increase by π_2 %. The second equation of the system examines the determinants of the domestic food price. $PDom_{it}$ is the domestic food price index as defined earlier, α_{2i} and γ_{2t} represent respectively the country and the time fixed-effects, C_{it} is an indicator for the incidence of conflicts, $PInt_t$ is the index of international food price as defined earlier and finally, $\mathbf{X_{2,it}}$ is the *second* vector of control variables. It includes the level of inflation, the duration of conflicts and the disaster period. Due to the reverse causality between food prices and conflicts, the disturbances $\epsilon_{1,it}$, $\epsilon_{2,it}$ are correlated, the system has to be estimated with iterative 3SLS method assuming contemporaneous correlation between disturbances.

[11] Of course, a rise in food prices raises the income of farmers who are net sellers of food commodities.

3. Data

Our data cover most of the developing and emerging countries over the period 1995-2009. To capture economic zone fixed-effects, we split our sample into five geographical regions with homogeneous economic characteristics, e.g., Middle East and North Africa (MENA), Sub-Saharan Africa (SSA), Central, Eastern, Southearn Asia (CESAs)[12], South-eastern Asia (SeAs), and Latin America (LA) (see Figure 1).[13]

Civil conflicts Data on civil conflicts are obtained from the Armed Conflict Dataset of the Uppsala Conflict Data Program (UCPD) and the Centre for the Study of Civil War at the International Peace Research Data Program (UCPD). Civil conflicts are defined 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-deaths related" (UCDP/PRIO (2011a), page 1). We consider the incidence of conflicts without distinguishing onset or continuing conflicts. This variable is coded as 1 in year of a new or ongoing conflict and 0 if the numbers of yearly drop under 25 deaths[14].

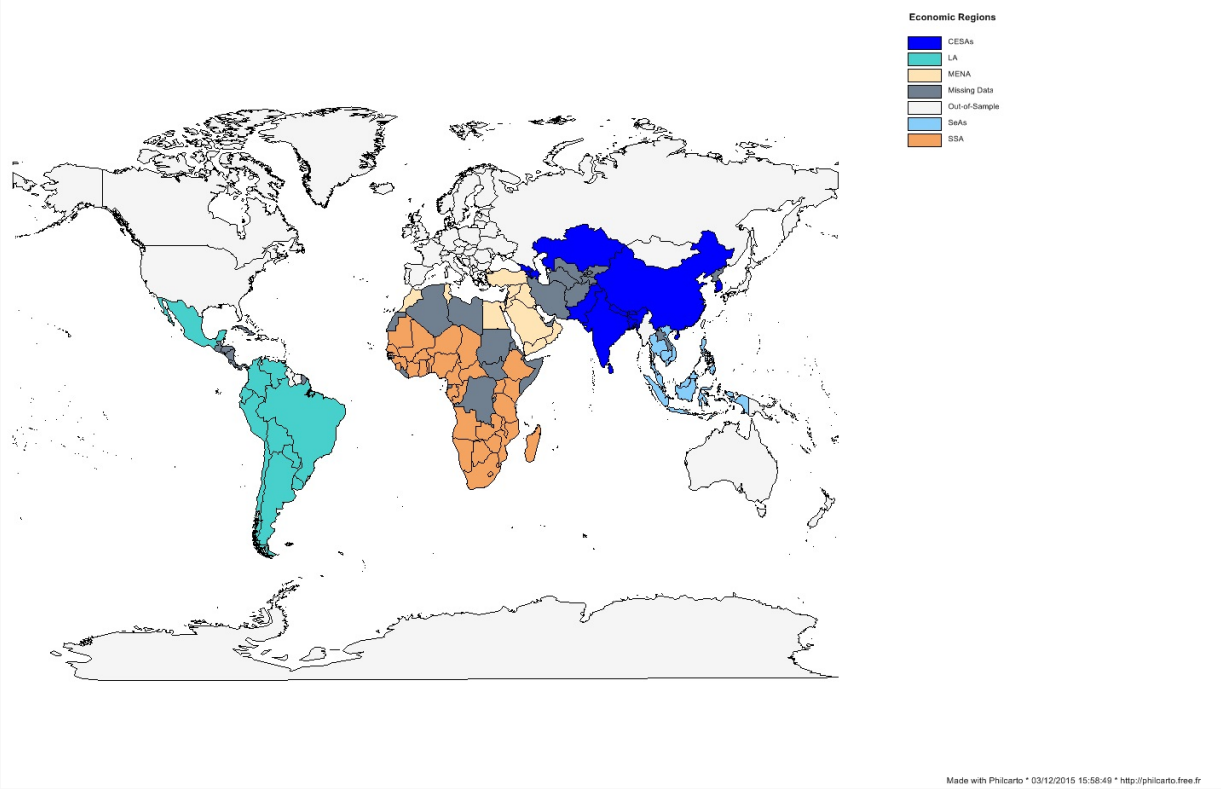
Food price index In terms of our main explanatory variable: food price, we use two food price indexes, i.e, the international food price and the domestic food price index. The former, the international food price index, weights exports price of a variety of food commodities (grains, fat and oils, other foods) around the world in nominal U.S. dollar prices, 2005 = 100 (World Bank, 2013a). The later, the Domestic Food Price Level index, built by FAO

[12]This region includes Central Asia, East Asia and South Asia. The two main countries of this region are India and China.

[13]The list of countries per region are reported in Table **??**. Some countries are excluded since data are missing for some variables like domestic food price index or GDP. Costa-Rica, El Salvador, Guatemala, Honduras, Nicaragua, Panama, Democratic Republic of the Congo, Djibouti, Eritrea, Guinea-Bissau, Liberia, Sudan, Tajikistan, Turkmenistan, Uzbekistan, Democratic People's Republic of Korea and Afghanistan and Myanmar are excluded.

[14]In the literature, different measures of internal war exist. Most of them uses the arbitrary 1,000 deaths threshold to identify an internal conflict or civil war (Fearon and Laitin (2003); Sambanis (2004) and the Correlates of War or COW Sarkees and Wayman (2010)). The danger of this definition is to exclude conflicts of small intensity or riots.

Figure 1: Five Economic Regions



Notes: Abbreviations: CESAs: Asia, LA: Latin America, SSA: Sub-Saharan Africa, NAME: North Africa and Middle East, SEAs: South East Asia. In each geographical region, some countries are excluded due to missing data. In Sub-Saharan Africa: Democratic Republic of the Congo, Djibouti, Eritrea, Guinea-Bissau, Liberia, Sudan; In Latin America: Costa Rica, El Salvador, Guatemala, Honduras, Nicaragua, Panama; in Asia: Afghanistan, Democratic People's Republic of Korea, Tajikistan, Turkmenistan, Myanmar and Uzbekistan.

(FAO, 2013), is calculated by dividing the Food Purchasing Power Parity (FPPP) by the General Purchasing Power Parity. Thus, it provides an index of the food price in the country relative to the price of generic consumption basket. A higher index means that food prices are relatively more expensive compared to the price of other goods.

Macroeconomic variables Per capita Gross Domestic Product (GDP) are from Penn World Table (Heston et al., 2012). Per capita GDP is deflated by country into real year 2005 US dollars and it is calculated in Purchasing Power Parity (PPP). We also consider the growth in per capita GDP to control for the impact of economic shocks. Since food prices affect differently the occurrence of conflicts depending on whether if the country is a net exporter or net importer of food, we introduce the cereal import dependency ratio (FAO, 2013). It is calculated as the ratio of cereal imports to the cereal domestic consumption. Since this ratio is calculated on 3-year average, it reduces concerns that food imports and exports are endogenous year-to-year changes in countries socio-political environment. We also consider the open economy rate measured by the total value of the imports and exports to GDP. It is calculated at 2005 constant prices and it is from Penn World Table (Heston et al., 2012).

Socio-political variables Autocracy is measured by the autocracy score of the Polity IV database(Marshall et al., 2002). This score ranges from 0 to 10; a value of 10 indicates a high level of autocracy while a value of 0 indicates the lowest value of autocracy.[15] As in Bazzi and Blattman (2014), we control for the persistence of conflicts. We code the variable conflict duration as follows: the number of years of conflicts over the last 5 years. So, its lowest value is 0 indicating that no civil conflicts has been recorded over the last five years and its highest value is 5 meaning that the country has experienced civil conflicts over the

[15]The autocracy is defined as follows: *In mature form, autocracies sharply restrict or suppress competitive political participation. Their chief executives are chosen in regularized process of selection within the political elite, and one in office they exercise power with few institutional constraint. Most modern autocracies also exercise a high degree of directiveness over social and economic activity, but we regard this as a function of political ideology and choice, not a defining property of autocracy.* Marshall et al. (2002), pages 15-16

last five years. We also control for the level of population (World Bank, 2013b).

Natural disasters To analyze the impact of natural disasters on the occurrence of conflicts, we employ data from CRED (2013) which identifies different types of natural disasters like droughts, earthquake, extreme temperature.[16] The variable natural disaster is coded as 1 the year of natural disaster and 0 otherwise. To account for the country vulnerability to natural disasters, we use this information to build a new variable named *Disaster period* which measures the proportion of years during which a natural disaster occurs. For instance, if during the 14 year-period (1995-2009), natural disasters have been observed during 7 years, the variable *Disaster period* takes the value 50%.

Summary statistics Table 1 reports the summary statistics. There were civil conflicts in fully 18 % of all-country year observations. This percentage reaches 30% if we consider CESAs countries and it drops to 15% and 10% respectively in LA and MENA. It is only equal to 15% in SSA region since the countries with high conflicts are not included in the sample due to missing data. Figure 2 maps the duration conflicts for each country in the five regions over the period 1995-2009. We immediately notice that some countries never experience a civil conflict like Brazil, China, South Africa while a persistence effect may be observed in some countries like in India, Columbia. The analysis of the domestic Food Price Index suggests that food prices are more relatively expensive than other goods in SSA, CESAs and SeAs. The cereal import dependency ratio is close to 60% in MENA countries while it ranges between 30% and 40% in other regions.

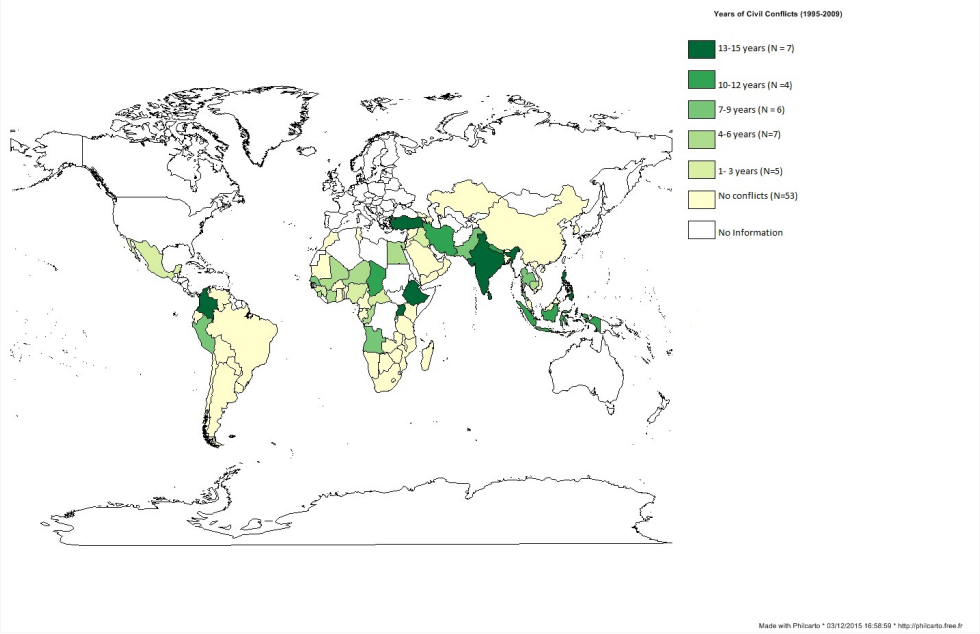
[16] The complete list of natural disaster is: droughts, earthquake, epidemic, insect infection, mass movement dry, mass movement wet, wildfire, extreme temperature, flood, storm, volcano.

Table 1: Summary Statistics

	All countries			*SSA*			*NAME*		
	Obs.	Mean	Std. Dev.	Obs.	Mean	Std. Dev.	Obs.	Mean	Std. Dev.
Dependent variable									
Conflicts	1230	.178	.383	540	.143	.35	195	.108	.311
Explanatory variables									
Domestic Food Price Index	1221	174	41	534	202	37	194	132	32
World Food Price Index	1230	109	19	540	109	19	195	109	19
Control variables									
Cereal Import Dependency Ratio (%)	1155	38	31	540	37	30	150	60	29
Duration (years)	1230	0.93	1.71	540	0.75	1.50	195	0.68	1.60
Autocraty	1172	2.74	3.06	520	2.22	2.38	188	6.39	2.71
GDP growth rate	1230	0.025	0.061	540	0 .019	0 .061	195	0.025	0 .076
Population (Million people)	1230	56.18	180.35	540	16.22	23.84	195	20.77	22.70
Inflation	1143	.040	7.37	502	0.78	11.12	189	0.11	0.32
Disaster Period(%)	1230	21.83	20.54	540	20.28	16.97	195	7.69	11.23

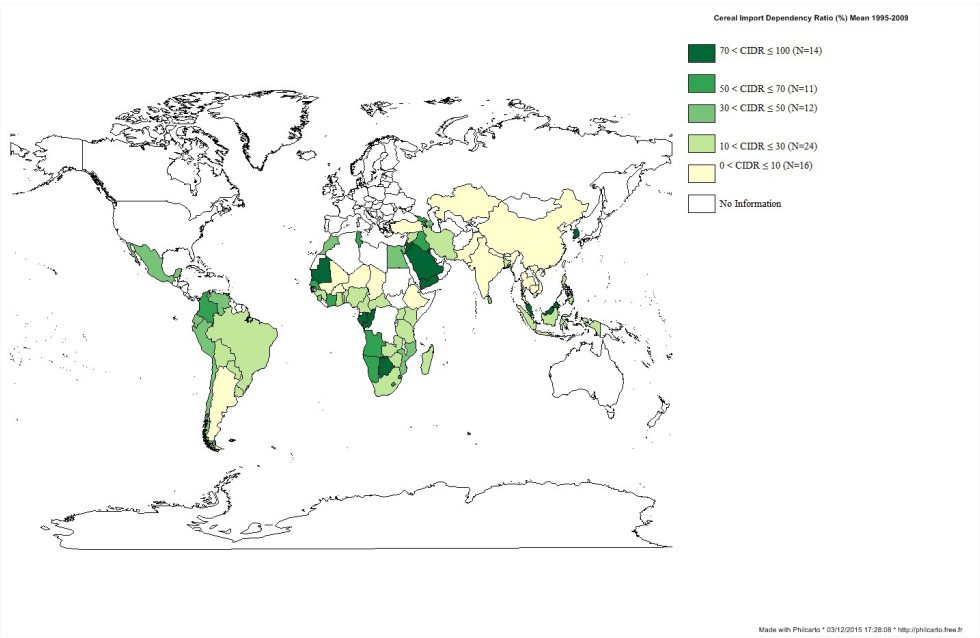
	CESAs			*SEAs*			*LA*		
	Obs.	Mean	Std. Dev.	Obs.	Mean	Std. Dev.	Obs.	Mean	Std. Dev.
Dependent variable									
Conflicts	210	0.29	0.46	120	0.29	0.46	165	0.145	0.354
Explanatory variables									
Domestic Food Price Index	208	170	26	120	158	16	165	146	20
World Food Price Index	210	109	19	120	109	19	165	109	19
Control variables									
Cereal Import Dependency Ratio (%)	195	32	32	105	34	37	165	31	18
Duration (years)	210	1.39	1.91	120	1.50	2.13	165	0.79	1.70
Autocraty	195	3.07	3.28	105	2.30	2.62	164	0.10	0.47
GDP growth rate	210	0.05	0.06	120	0.03	0.05	165	0.02	0.04
Population (Million people)	210	200.35	397.74	120	61.26	68.31	165	41.64	51.76
Inflation	199	0.12	0.36	106	0.05	0.07	147	0.10	0.12
Disaster Period (%)	210	27.5	29.27	120	22.5	14.64	165	35.91	18.25

Figure 2: Duration of conflicts (1995-2009)



Source: Gleditsch et al. (2002); Themnér and Wallensteen (2012). *Notes:* We use UCDP/PRIO Armed Conflicts Dataset Version4-2011 ((UCDP/PRIO, 2011b)).

Figure 3: Cereal Import Dependency Ratio



Source: FAO (2013).

4. Results

We first analyze the results of equation 1 as it has been widely investigated in the literature. Then, we examine the results of the system 2 to understand the international-domestic food prices-civil conflict causal relation.

Incidence of Civil Conflicts and Food Price Index Table 2 reports the effect of international food price index on the occurrence of civil conflicts. In column (1), we see no evidence of lagged international food prices on the occurrence of conflicts. This result is in line with Bazzi and Blattman (2014), they find no evidence of a robust relationship between food prices and civil conflicts. The results of column (2) suggest that in none region the international food price rise the likelihood of conflicts. Food import countries are expected to be more dependent to international food prices, thus, in columns (3) and (4) we examine the impact of the international price conditional to the cereal import dependency ratio. The standard errors are high, implying that there is no evidence of a robust relationship between international food prices and civil conflicts. All else being equal, the likelihood of conflicts is higher in countries that have experienced conflicts over the last five years. Not surprisingly, the occurrence of conflicts is even more important in countries that have an autocratic political regime. The open rate has the expected negative and a significant impact on the occurrence of civil conflicts. Population has no significant effect on the occurrence of conflicts. Those results are robust across the different specifications (columns 1 to 4).

Let us now turn to the effect of domestic food prices on the occurrence of conflicts. Table 3 investigates the relationship between domestic food price index and the occurrence of civil conflicts. From column (1), we can notice that no significance evidence of domestic food prices on the occurrence of conflicts exist. However, domestic food prices do have a differential impact on civil conflicts across the different regions. This impact is significantly positive in Asia and Southeastern Asia. Finally, we test the regional impact of food price

conditional to the cereal import dependency ratio. If we consider the whole sample, the domestic food price index has a positive impact on the occurrence of conflicts (see column (3)). However, we again observe differential effects across the regions. The impact is significantly positive in Asian and Southeastern countries while it is not significant in other regions (see column (4)). We also examine if domestic food price has a different impact in countries with a higher cereal import dependency ratio. The results suggest that the impact of domestic food price on the occurrence of conflicts is more likely in countries that are more import dependent like in Asian countries and in Latin America. As in Table 2, countries already in conflicts, relatively more autocratic countries that experienced a conflicts over the last 5 years, and countries with a lower open rate are more prone to conflicts. The growth in GDP is significant at 90 percent confidence across all specifications with the exception of the second one (see column (2)) and has the expected sign. The level of population is never significant.

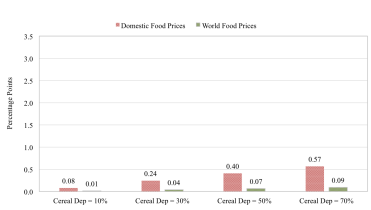
Conflict Incidence, Food Price Index and Pass-through Table 4. Column (1a) indicates that the pass-through between the international and the domestic food prices is significant at 1%. A rise of one percent of international food prices induces a rise in domestic food price of around 0.16%. Domestic prices are more likely to be higher in countries afflicted by a conflict, suggesting that conflicts destroy factors of production and infrastructures. More surprisingly, disaster period has a negative but very low impact on the domestic food prices, indicating that domestic prices should be relatively lower in countries more sensitive to natural disasters. Inflation has no significant effect on the domestic food prices. The domestic price index has a strongly significant and positive effect on the likelihood of conflicts: a one percent increase in the the domestic price rises the likelihood of civil conflicts in the next year by around 2 percentage points (column 1b). The duration and the interaction of duration and autocracy are significant at 99 percent confidence. In other words, countries that already experienced a conflicts over the last five years, and more specifically relatively more autocratic

countries that already experienced a conflicts are less likely to avert conflicts. Countries hit by negative income shocks are more prone to conflicts in the next year, suggesting that poor economic performance has a causal effect on civil conflicts (Miguel et al. (2004) and Miguel and Satyanath (2011)).The level of population as well as the cereal dependency ratio has no significant impact on the occurrence of conflicts. Higher open rate can mitigate the impact of domestic food prices. However, there is a significant difference in the effect of domestic food prices on conflicts across regions (see column (2)). The impact is very strong in Southeastern Asia where an increase of one percent of domestic food prices yields an rise in the likelihood of conflicts by nearly 5 points of percentage. The effect is the lowest in Asia where the likelihood of conflicts is reduced to almost two points of percentage. A surprising result at a first glance is that the relatively low impact of food prices on the likelihood of conflicts in Sub-saharan Africa since in this region domestic food price appears to more expensive than other goods (see Table 1). But, it is important to note that we drop from the sample countries that are always in conflicts over the period, suggesting that we under estimate the effect of conflicts. The number of disasters over the period has a negative effect on the domestic food price index that can be explained by the negative impact of humanitarian aid during disaster periods on local food markets. The other control variables are significant and they have the expected sign.

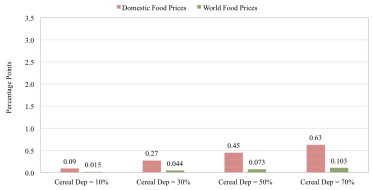
Then, we examine the impact of domestic food prices conditional to the cereal dependency ratio (see Table 5). Again, international food prices, conflicts and the sensitivity to the country to natural disasters are significant at 99 percent confidence. The pass-through elasticity is consistent across the specifications and still equal to 0.164. The level of inflation appears to be significant at 90 percent confidence, but, its effect is close to zero. Overall domestic prices conditional to cereal dependency ratio have a positive impact on the likelihood of conflicts (see column 1b), suggesting that relatively more dependent countries for cereal imports are more prone to civil conflicts in response to a rise in domestic food prices. This effect is very strong Southeastern countries and in Latin America. This result may

indicate that it is more difficult for these countries to protect their consumers from a rise in domestic food prices. The impact of control variables are similar to the previous estimation, with the exception of the level of population which is now significant at 90 percent confidence. As in Brückner, Markus (2010), we find a decreasing relation between the level of population and the likelihood of conflicts. In light of these results, we can calculate the impact of domestic and international food prices on the occurrence of conflicts. Figure **??** represent the impact of an increase in one percentage of the domestic and the international food price on the occurrence of conflicts conditional to the cereal dependency ratio for each region. We immediately notice that the impact of international food prices on the likelihood of conflicts is much lower than the impact of domestic food prices. This suggests that all policies aiming at insulating domestic food markets from a rise in world food prices mitigate the conflicts. In all regions with the exception of Southeastern Asia and Latin America, an increase of one percent of international food prices increases the likelihood of conflicts in the next year by less than 0.10 percentage point whatever the cereals imports dependency ratio. In Southeastern Asia and Latin America, The likelihood of conflicts can reach 0.50 percentage point after an increase in international food prices.

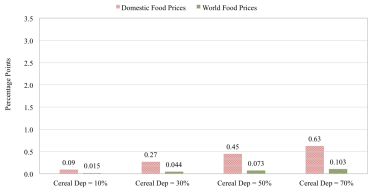
Figure 4: Impact of food prices on the incidence of conflicts



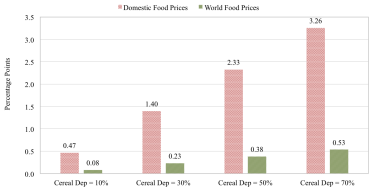
(a) Sub-Saharan Africa



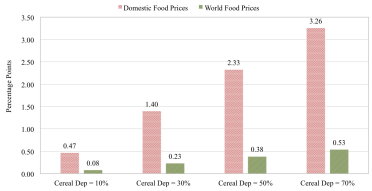
(b) Middle-East and North Africa



(c) Asia



(d) Southeastern Asia



(e) Latin America

5. Conclusion

The objective of this paper is to estimate the effect of food price spikes on the occurrence of conflicts. We build a data set of 82 developing and emerging countries from 1995 to 1979. Our results reveal that there exists a significant and positive relation between food price spikes and civil conflicts. Most likely, a civil conflict will occur in South-East Asia and Latin America after a food price spike. Due to the imperfect pass-through, the effect of international food prices on the occurrence of civil war is significantly lower and even close to zero in most of our estimations. The implications of this research are potentially important from a policy perspective. The recent food price spikes observed since 2000 can increase poverty and cause civil conflicts.

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6. Appendice A: Tables

6.1. Tables

Table 2: Conflicts Incidence and International Food Price Index

	(1)	(2)	(3)	(4)
$Duration_t$	0.0474**	0.0477**	0.0474**	0.0451**
	(2.36)	(2.37)	(2.36)	(2.23)
$Duration_t * Autocracy_t$	0.0108***	0.0108***	0.0108***	0.0107***
	(2.70)	(2.70)	(2.70)	(2.69)
$GDPGrowth_{t-1}$ (%)	-0.107	-0.115	-0.107	-0.0931
	(-0.59)	(-0.62)	(-0.59)	(-0.52)
$OpenRate_t$ (%)	-0.105**	-0.104**	-0.105**	-0.113**
	(-2.05)	(-2.02)	(-2.04)	(-2.23)
$LogPop._t$	-0.0417	-0.00319	-0.0415	-0.00979
	(-0.21)	(-0.02)	(-0.21)	(-0.05)
$Cer.Dep._t$ (%)	0.000205	0.000212		
	(0.19)	(0.19)		
$Log\ IntP_{t-1}$	0.0273			
	(0.15)			
$Log\ IntP_{t-1}$*SSA		-0.0196		
		(-0.09)		
$Log\ IntP_{t-1}$*MENA		0.0261		
		(0.14)		
$Log\ IntP_{t-1}$*CESAs		0.0262		
		(0.13)		
$Log\ IntP_{t-1}$*SEAs		-0.00692		
		(-0.03)		
$Log\ IntP_{t-1}$*LA		0.183		
		(0.91)		
$Log\ IntP_{t-1} * Cer.Dep.t-1$			0.00461	
			(0.20)	
$Log\ IntP_{t-1} * Cer.Dep._{t-1}$*SSA				-0.00406
				(-0.16)
$Log\ IntP_{t-1} * Cer.Dep._{t-1}$*MENA				-0.0392
				(-0.97)
$Log\ IntP_{t-1} * Cer.Dep._{t-1}$*CESAs				0.0727
				(0.52)
$Log\ IntP_{t-1} * Cer.Dep._{t-1}$*SeAs				0.362**
				(2.01)
$Log\ IntP_{t-1} * Cer.Dep._{t-1}$*LA				0.0735
				(1.16)
cons	0.481	0.123	0.617	0.253
	(0.23)	(0.06)	(0.33)	(0.13)
Country fixed effects	Yes	Yes	Yes	Yes
Time Fixed Effects	Yes	Yes	Yes	Yes
N	1155	1155	1155	1155
adj. R^2	0.625	0.624	0.625	0.625
rmse	0.240	0.240	0.240	0.240

Notes: t statistics in parentheses, * $p < 0.10$, ** $p < 0.05$, *** $p < 0.01$.

Table 3: Conflicts Incidence and Domestic Food Price Index

	(1)	(2)	(3)	(4)
$Duration_t$	0.0457**	0.0409**	0.0458**	0.0428**
	(2.28)	(2.06)	(2.28)	(2.14)
$Duration_t * Autocracy_t$	0.0114***	0.0120***	0.0113***	0.0114***
	(2.90)	(3.14)	(2.88)	(2.94)
$GDPGrowth_{t-1}$ (%)	-0.267*	-0.237	-0.260*	-0.243*
	(-1.77)	(-1.58)	(-1.75)	(-1.65)
$OpenRate_t$ (%)	-0.0992**	-0.102**	-0.104**	-0.112**
	(-1.97)	(-2.00)	(-2.02)	(-2.18)
$LogPop_t$	-0.189	-0.181	-0.205	-0.188
	(-1.09)	(-1.03)	(-1.18)	(-1.05)
$Cer.Dep._t$ (%)	0.000388	0.000266		
	(0.36)	(0.25)		
$Log\ DomP_{t-1}$	0.126			
	(1.54)			
$Log\ DomP_{t-1}$*SSA		0.0150		
		(0.16)		
$Log\ DomP_{t-1}$*MENA		0.0457		
		(0.33)		
$Log\ DomP_{t-1}$*CESAs		0.917***		
		0.514*		
		(1.92)		
$Log\ DomP_{t-1}$*SeAs		0.917***		
		(1.77)		
$Log\ DomP_{t-1}$*LA		0.174		
		(1.29)		
$Log\ DomP_{t-1} * Cer.Dep.t-1$			0.263**	
			(2.06)	
$Log\ DomP_{t-1} * Cer.Dep._{t-1}$*SSA				0.211
				(1.42)
$Log\ DomP_{t-1} * Cer.Dep._{t-1}$*MENA				-0.0335
				(-0.15)
$Log\ DomP_{t-1} * Cer.Dep._{t-1}$*CESAs				0.351
				(0.90)
$Log\ DomP_{t-1} * Cer.Dep._{t-1}$*SeAs				2.862***
				(2.66)
$Log\ DomP_{t-1} * Cer.Dep._{t-1}$*LA				0.877*
				(1.77)
cons	1.963	1.853	2.157	1.964
	(1.17)	(1.08)	(1.29)	(1.13)
Country fixed effects	Yes	Yes	Yes	Yes
Time Fixed Effects	Yes	Yes	Yes	Yes
N	1152	1152	1152	1152
adj. R^2	0.629	0.630	0.629	0.630
rmse	0.239	0.239	0.239	0.239

Notes: t statistics in parentheses, * $p < 0.10$, ** $p < 0.05$, *** $p < 0.01$.

Table 4: Conflict Incidence, Food Price Index and Pass-through

	(1)		(2)	
	Log $DomP$	Conflicts	Log $DomP$	Conflicts
$Conflicts_t$	0.160***		0.175***	
	(4.78)		(5.29)	
$Log\ InterP_t$	0.164***		0.164***	
	(16.91)		(16.59)	
$Inflation_t$	0.000390		0.000397*	
	(1.54)		(1.66)	
Disaster Period	-0.00470***		-0.00621***	
	(-6.59)		(-7.80)	
$Duration_t$		0.0411***		0.0295***
		(4.19)		(3.15)
$Duration_t * Autocracy_t$		0.00591***		0.00629***
		(3.10)		(3.36)
$OpenRate_t$ *(%)*		-0.108**		-0.0969**
		(-2.29)		(-2.15)
$GDPGrowth_{t-1}$		-0.250**		-0.184*
		(-2.40)		(-1.85)
$LogPop._t$		-0.165		-0.118
		(-1.15)		(-0.87)
$Cer.Dep_t$ *(%)*		0.000488		0.000386
		(0.41)		(0.35)
$Log\ DomP_{t-1}$		2.060***		
		(24.32)		
$Log\ DomP_{t-1}$*SSA				1.979***
				(21.18)
$Log\ DomPrice_{t-1}$*$MENA$				2.368***
				(9.09)
$Log\ DomP_{t-1}$*$CESAs$				1.933***
				(6.61)
$Log\ DomP_{t-1}$*$SeAs$				4.700***
				(12.69)
$Log\ DomPrice_{t-1}$*LA				2.259***
				(9.50)
Country fixed effects	Yes	Yes	Yes	Yes
Time Fixed Effects	Yes	Yes	Yes	Yes
N	1066		1066	
R^2	0.980	0.657	0.979	0.644
rmse	0.0841	0.262	0.0857	0.267

Notes: t statistics in parentheses, * $p < 0.10$, ** $p < 0.05$, *** $p < 0.01$.

Table 5: Conflict Incidence, Food Price Index and Pass-through

	(1)		(2)	
	Log $Dom.P$	Conflicts	Log $Dom.P$	Conflicts
$Conflicts_t$	0.0939***		0.105***	
	(3.00)		(3.40)	
$Log\ InterP_t$	0.164***		0.164***	
	(18.07)		(17.91)	
$Inflation_t$	0.000593*		0.000582*	
	(1.85)		(1.83)	
$Disaster\ Period$	-0.00520***		-0.00534***	
	(-7.05)		(-7.22)	
$Duration_t$		0.0539***		0.0501***
		(4.95)		(4.63)
$Duration_t * Autocracy_t$		0.00837***		0.00816***
		(3.90)		(3.84)
$OpenRate_t$ $(\%)$		-0.131**		-0.134**
		(-2.33)		(-2.43)
$GDPGrowth_{t-1}$		-0.300**		-0.269**
		(-2.45)		(-2.22)
$LogPop._t$		-0.306*		-0.302*
		(-1.76)		(-1.75)
$Log\ Dom.\ Price_{t-1} * CerDep_{t-1}$		0.877***		
		(5.13)		
$Log\ Dom.\ Price_{t-1} * CerDep_{t-1}$ *SSA				0.809***
				(3.87)
$Log\ Dom.\ Price_{t-1} * CerDep_{t-1}$ *MENA				0.893**
				(2.31)
$Log\ Dom.\ Price_{t-1} * CerDep_{t-1}$ *CESAs				0.796*
				(1.71)
$Log\ Dom.\ Price_{t-1} * CerDep_{t-1}$ *SeAs				4.651***
				(3.54)
$Log\ Dom.\ Price_{t-1} * CerDep_{t-1}$ *LA				1.937***
				(3.14)
Country fixed effects	Yes	Yes	Yes	Yes
Time Fixed Effects	Yes	Yes	Yes	Yes
N	1066		1066	
R^2	0.982	0.736	0.982	0.736
rmse	0.0787	0.230	0.0794	0.230

t statistics in parentheses. * $p < 0.10$, ** $p < 0.05$, *** $p < 0.01$