The Diabolical Spiral: Food Prices and Civil Conflicts

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Abstract

Factors of production may be destroyed in countries that experience a civil conflict, which most likely limits agricultural production and drives up domestic food prices. Thus, a country can enter into a diabolical spiral between food prices and civil conflicts. Our study estimates this diabolical spiral by employing three-stage least squares. Our results reveal that a one per cent rise in domestic food prices increases the likelihood of civil conflicts by two percentage points the following year, and this magnitude is significantly higher in Southeast Asia. During an episode of civil conflict, domestic food prices are around 69 per cent higher. Finally, we use our results to calculate the impact of the 2006-2009 food crisis on the probability of conflicts. This probability increased by almost 4 percentage points during the 2006-2009 food crisis, with the highest relative increase occurring in the Middle East and North Africa.

Keywords: Civil Conflicts, Food Prices, Natural Resources

JEL Codes: Q24, Q34, O13

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1 Introduction

'Let them eat cake' was Marie Antoinette's response on being told that her starving peasant subjects had no bread. This event occurred just before the storming of the Bastille, the symbol of the beginning of the French Revolution in 1789. Throughout history, food price spikes are frequently thought to cause food riots and conflicts like the French Revolution, the fall of Confederate States of America, and the fall of the British Raj in India (Bellemare, 2015). Since 2000, world food prices have experienced a rapid increase, raising concerns about the intra-stability of the world's poorest countries.[1] After the peak in food prices in 2007 and 2008, many food riots broke out.[2] Even more recently, between 2006 and 2011, Syria had its worst prolonged drought and crop failures since civilization began in the Fertile Crescent. For Syria, which experienced poor governance and inappropriate agricultural policies, this drought led to political unrest (Kelley et al., 2015).

In *standard* economic theory, agents can only produce and trade to satisfy their needs. In the economic analysis of conflicts, agents can also engage in appropriation, seize the production of others, or defend what they have produced. Thus, the central trade-off is between production and appropriation. Haavelmo (1954) pioneers a canonical general equilibrium model of resource allocation among appropriative and productive activities. After some less productive decades, the research on the economics of conflicts has grown during the past 30 years, spearheaded by Grossman. Grossman (1991) develops a general equilibrium model of insurrections in which peasant families can allocate their labour time among insurrections, soldiering, and production. Agents weigh the relative returns, costs, and risks when deciding whether to produce, defend state resources as a solider, or predate. By extending this simple framework, Dal Bó and Dal Bó (2011) develop two theories to explain the relationship between natural resources and civil conflicts. The first one, called the opportunity cost theory, suggests that resource prices can

[1] This increase was in contrast to the decline in food prices from 1960 to 2000, a period during which food prices decreased by approximately 40% in real terms. From 2005 to 2008, the world corn price doubled and that of wheat increased by 70%.

[2] See Schneider (2008) and Bush (2010) for a complete description of food riots after the 2008 food crisis.

directly affect household purchasing power; thus, these prices may change the opportunity cost of conflicts, which is the forgone returns from production or labour. For instance, food price upturns lead to lower household purchasing power if households are net buyers of food. This phenomenon reduces the opportunity cost of conflicts and increases the likelihood of conflicts. Thus, an inverse relationship between insurrections and commodity prices may exist. Not all commodities equally affect a household's purchasing power. Purchasing power is *directly* affected by shocks to labour-intensive goods, such as agricultural goods. Revenues from capital-intensive commodities, such as minerals and fuels, *directly* affect state revenue and *indirectly* affect a household's purchasing power through public transfers. This phenomenon is explained by the second theory on the relationship between natural resources and civil conflicts, called the state prize theory.

Most of the studies that analyses the causal relation between civil conflicts and food prices focus on one channel: whether civil wars are more likely to break out following downturns in the international prices of countries' main export commodities (Arezki and Brückner, 2014, Bazzi and Blattman, 2014, Van Weezel, 2016). However, these studies neglect the potential impact of a rise in agricultural commodity prices on households' real income through consumption. To the best of our knowledge, only two studies examine the direct links among food prices, household purchasing power, and the occurrence of conflicts. The first study, by Bellemare (2015), employs monthly data on the international food price index to test the causal relationship between food prices and social unrest from 1990–2011 at the global level. The results of the study reveal that food price increases can lead to an increase in social unrest, whereas food price volatility has not been associated with increases in social unrest. The second study, by McGuirk and Burke (2016), analyses the impact of a shock to the food price index in Africa. By using geospatial data, the study distinguishes the impact of food price shocks between net producers and net sellers of food. These two studies can examine how high prices for staple grains negatively impact households' purchasing power and may raise poverty (Deaton, 1989).[3] And then, they

[3]Several studies analyse the impact of a food price increase using the methodology developed by Deaton (1989). Porto (2006) extends Deaton's framework to analyse the effects of the Mercosur free-trade zone on Argentinian households. He estimates both the labour and the consumption effects. Nicita (2009) enriches Porto's approach by estimating the pass-through elasticity from international to domestic

can investigate how these high prices also lower *the opportunity cost* of conflicts. However, they neglect to consider the imperfect pass through from international to domestic food prices.[4] In response to international food price spikes, governments can intervene by reducing their import protections or by increasing export restraints (Anderson et al., 2013) in order to protect their domestic markets. They also neglect to account for the effect of civil conflicts on domestic food prices. Indeed, civil conflicts can negatively affect food production by destroying the factors of production and driving up food prices. Thus, a country can experience a diabolical spiral between food prices and conflicts. Our study contributes to the literature in two ways. The first contribution of our study is in estimating the transmission from world to domestic food prices and then estimating how a change in domestic food prices induced by a change in world food prices makes some countries more prone to civil conflicts by affecting households' real income. The second contribution of our study is to consider the feedback effect of conflict on domestic food prices.

This study digs into the question of the diabolical spiral between international and domestic food prices and the likelihood of civil conflicts by employing the three-stage least squares method for a panel of 82 countries over the period 1995-2009. We estimate a system of two equations. The first equation examines how domestic food prices can affect the incidence of conflicts over the following year. The second equation analyses how international food prices, together with civil conflicts, impact domestic food prices. Four findings stand out. First, a positive food price shock of one per cent increases the likelihood of conflicts by 2.1 percentage points the following year. The size of this effect doubles in Southeast Asian countries. However, the effect is a bit lower in Central and Eastern Asia and in Sub-Saharan Africa. Second, the pass-through elasticity of world to

food prices and focuses on the impact of Mexico's trade liberalization. Marchand Ural (2012) uses this methodology to analyse the distributional impact of trade liberalization in India.

[4]By using household survey data from Guatemala, De Janvry and Sadoulet (2010)'s results reveal that the effects of international food price spikes on households' purchasing power are very limited due to the imperfect transmission between international and domestic food prices. In the same vein, Chakravorty et al. (2017) estimate the price pass-through in India for four food commodities: rice, wheat, sugar, and meat. They find no significant transmission between the international and domestic prices of wheat and meat, indicating that international food prices do not impact domestic food prices. The pass-through elasticity was 0.18 for rice and 0.38 for wheat.

domestic food prices is significant but small, indicating that a one per cent increase in international food prices causes a 0.06% increase in domestic food prices. Third, during a period of conflict, domestic food prices are around 69% higher. Finally, with these results in hand, we estimate the impact of the 2006-2009 food crisis on the likelihood of conflicts in different regions. The probability of conflicts during the food crisis increased by 3.98 percentage points, from 17% to 20.98%. The highest increase in the probability of conflicts in absolute terms is observed in Southeast Asia, where it grew from 29% to 37.89%. The highest increase in absolute value is observed in the Middle East and North Africa, where the probability of conflicts increased by around 40%, growing from 10.80% to 15.33%. This region is characterized by a higher cereal import dependency ratio and a lower quality of governance.

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, and section 5 concludes.

2 Empirical Strategy

In this section, we describe the empirical strategy employed in this study. We first present the equation that estimates the direct causal relationship between food prices and the occurrence of civil conflicts as in numerous studies (Bellemare (2015), McGuirk and Burke (2016), Arezki and Brückner (2014), Bazzi and Blattman (2014)). Then, we present the system of two equations that enables us to estimate the diabolical spiral between food prices and civil conflicts.

Direct Causal Relation: Food prices and Civil Conflicts To measure 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 a conflict event that takes a value of 1 if a conflict is observed in country i in year t (the conflict can be onset or continuing) and a value of 0 otherwise, α_i is the country fixed effect, and γ_t is the year fixed effect. By considering lagged prices instead of contemporaneous prices, as in (Bazzi and Blattman, 2014), we limit also the problem of endogeneity between conflicts and food prices. The coefficient β should be interpreted as follows. An increase in the food price index by one per cent increases the likelihood of a conflict by β percentage points in the following year. 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 alternatively and independently. We first use, the lagged world food price index, thus $IntP_{t-1}$. Then, we use, the domestic lagged food price index relative to the price of the generic consumption basket, thus $P_{t-1} = DomP_{it-1}$. $\mathbf{X_{it}}$ is a set of control variables that does not change when we use world or domestic food prices as the main explanatory variable. The control variables include a measure of the duration of conflicts representing the sensibility of the country to conflicts, the open rate, the population, a measure of autocracy, the cereal import dependency ratio, and the lagged growth in per capita GDP to take into account economic shocks. A fixed effects linear model is preferred to estimate equation (1). In this respect, we can take into account individual and time fixed effects when necessary.[5] It is crucial to implement time-invariant country fixed effects to control for unobserved country characteristics. We also account for economic-zone-specific effects by introducing interaction variables.

Diabolical Spiral: Food prices and Civil Conflicts However, we argue that a diabolical spiral between food prices and conflicts exists. Any rise in domestic food prices leads to a decline in households' real income through the consumption effect (Deaton,

[5]Time fixed effects are not included in equation (1) when the world food price index is the main explanatory variable. Indeed, the world price is country invariant.

1999), which then lowers the opportunity cost of conflicts.[6] Even if the long-run economic development impact of conflicts is still unclear, a conflict episode can temporarily destroy factors of production and infrastructure and weaken institutions, so it may cause a rise in domestic food prices. However, many factors affect domestic food prices, and one of the most important is the world food price, since agricultural markets are integrated. The pass-through from world to domestic food prices is far from perfect. In response to spikes in international food prices, many governments adjust their agricultural trade barriers (through, for example, a reduction in imports protection or an increase in exports restraints) in an attempt to partially insulate their domestic food markets.[7] Thus, we also need to estimate the pass-through elasticity from world to domestic food prices.

To account for this diabolical spiral 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 three-stage least squares (3SLS) method, as described in Greene (2011).

$$\begin{cases} logPDom_{it} &= \alpha_{1i} + \beta_1 C_{it} + \pi_1 logPInt_t + \theta_1 \mathbf{X_{1,it}} + \epsilon_{1,it} \\ C_{it} &= \alpha_{2i} + \gamma_{2t} + \beta_2 logPDom_{it-1} + \theta_2 \mathbf{X_{2,it}} + \epsilon_{2,it} \end{cases} \tag{2}$$

The first equation of the system examines the determinants of the domestic food price. $PDom_{it}$ is the domestic food price index, as defined earlier; C_{it} is the indicator for a conflict event; $PInt_t$ is the index of the international food price, as in equation (1); and $\mathbf{X_{1,it}}$ is the set of exogenous variables. The exogenous variables include the level of inflation. α_{1i} represents country fixed effects. β_1 enables to measure the increase in food prices during an episode of conflicts ($C_{it} = 1$). π_1 can be interpreted as the pass-through from the world food price to the domestic food price, indicating that a 1% increase in the domestic food price causes a π_1 % increase in the domestic food price. The second equation of the system analyses the determinants of the occurrence of conflicts. C_{it}

[6] Of course, a rise in food prices raises the income of farmers who are net sellers of food commodities. However, it is difficult to capture this effect at an aggregate level.

[7] For instance, India raised its export ban on rice to insulate its market in 2008 (Anderson et al., 2013).

represents the same indicator for a conflict event as in equation (1); $PDom_{it-1}$ represents the lagged domestic food price index, a predetermined variable[8]; and $\mathbf{X_{2,it}}$ is the set of exogenous variables that includes the same set of control variables as in equation (1), that is, the duration of conflict, the open rate, the population level, the degree of autocracy, and the lagged GDP growth. β_2 measures the change in the likelihood of conflicts in percentage points induced by a one percent change in domestic food prices. Finally, $\epsilon_{1,it}$ and $\epsilon_{2,it}$ are the structural disturbances, and they are assumed to be correlated. Indeed, a random shock that impacts the domestic food price might also be correlated with a random shock that impacts the occurrence of a conflict, such as, for example, a climate shock. Thus, the system is triangular and has to be estimated with an iterative 3SLS method.

3 Data

Our data cover 82 countries over the period 1995-2009. To capture geographic zone fixed effects, we split our sample into five geographical regions: the Middle East and North Africa (MENA); Sub-Saharan Africa (SSA); Central, Eastern, and Southern Asia (CESAs)[9]; Southeast Asia (SeAs); and Latin America (LA) (see Figure 1).[10]

Civil Conflicts Data on civil conflicts are obtained from the Armed Conflict Dataset of the Uppsala Conflict 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, 2011, page 1). We consider the occurrence of conflicts without distinguishing onset or continuing conflicts. As pointed out by Bellemare (2015), food price spikes can trigger a civil conflict, as, for example, in Egypt in January

[8]With respect to the current value of the occurrence of conflicts, the lagged domestic price has already been determined, and we assume that it is uncorrelated with current disturbances.

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

[10]The list of countries per region are reported in Table A.1, and the countries excluded from the sample are reported in Table A.2.

1997, in Tunisia in January 1983, or, more recently, in the Middle East during the 2008 food crisis, or food price spikes can intensify an existing conflict, as in Darfour in 2003. The variable for civil conflicts is coded as 1 in the year of a new or continuing conflict and 0 otherwise.

Food Price Index We use two food price indexes, namely, the Worlds Bank's international food price and the FAO's domestic food price index. The former is an annual indicator of the price of food worldwide that covers three categories of food commodities: grains, vegetable oils and meals, and other foods.[11] This indicator is calculated in real 2005 US dollars (World Bank, 2017a). To come up with an aggregate group, the World Bank calculates the Laspeyres Index where the weights are the group-specific export shares.[12]. The latter index, the FAO's domestic food price level index (FAO, 2016), provides an annual indicator of the food price in a country relative to the price of a generic consumption basket.[13] A higher index means that food is relatively more expensive than other goods. By capturing the importance of food expenditures in the overall consumption basket, this indicator can therefore measure the exposure of real income swings to a change in food prices.

Macroeconomic Variables Since food prices differently affect the occurrence of conflicts depending on whether the country is a net exporter or net importer of food, we introduce two measures. The first measure, the cereal import dependency ratio, is calculated as the ratio of cereal imports to cereal domestic consumption (FAO, 2016). This ratio is calculated as a three-year average to reduce concerns that food imports and exports are endogenous year-to-year changes in countries' socio-political environments. The second measure, the open economy rate, is measured by the total value of imports

[11]Grains include wheat, rice, maize, sorghum, and barley. Soybeans, soybean oil, soybean meal, palm oil, coconut oil, groundnuts, and groundnut oil are in the category vegetable oils and meals. The group of other foods is a composite group including beef meat, chicken meat, sheep meat, shrimp, sugar, bananas, and oranges.

[12]The respective weights for grains, vegetable oils and meals, and other foods are 28%, 41%, and 31%. The weights are based on the export shares of developing countries in 2002-2004.

[13]This indicator, created in 2013 by FAO, has been widely used to measure food insecurity and the prevalence of undernourishment.

and exports to GDP. It is calculated at 2005 constant prices and comes from the Penn World Table (Heston et al., 2012). We consider other control variables, such as the lagged growth in per capita GDP, to control for the impact of economic shocks.[14] The inflation rate is from IMF (2017).[15]. Finally, the population is from (World Bank, 2017b).

Socio-political Variables Two variables are included to control for the socio-political context. Autocracy is the first such variable, and it is measured by the autocracy score of the Polity IV database (Marshall et al., 2011). This score ranges from 0 to 10; a value of 10 indicates a high level of autocracy, whereas a value of 0 indicates the lowest value of autocracy.[16] Then, as in Bazzi and Blattman (2014), we control for the persistence of conflicts by defining a variable named *duration of conflicts*. We code this variable as the number of years of conflicts over the last five years. Thus, this variable's lowest value is zero, indicating that no civil conflict has been recorded over the last five years, and its highest value is five, meaning that the country has experienced at least one civil conflict over the last five years.

Summary statistics Table 1 reports the summary statistics for the whole sample and for the different geographic regions. We first scrutinize data on civil conflicts. In this respect, we focus on the first line of Table 1 and Figure 2, which maps the total number of years of conflicts for each country in the five regions over the period 1995-2009. There were civil conflicts in fully 18% of all country-year observations. However, this number hides important regional disparities. The two regions with the most conflicts were Central, Eastern, and Southern Asia and Southeast Asia (around 30% of observations). In

[14]The growth in per capita GDP is calculated by employing data on per capita GDP from Heston et al. (2012). Per capita GDP is deflated by country into 2005 US dollars, and it is calculated in purchasing power parity.

[15]Inflation, as measured by the consumer price index, reflects the annual percentage change in the cost to the average consumer of acquiring a basket of goods and services that may be fixed or changed at a specified interval, such as a yearly interval. The Laspeyres formula is used.

[16]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. (2011), pages 15-16.

Central, Eastern, and Southern Asia, India, Nepal, Pakistan, Iran, Georgia, and Sri Lanka experienced persistent civil conflicts (see Figure 2). Half of the countries in Southeast Asia, including the Philippines, Thailand, Cambodia and Indonesia, experienced civil conflicts (see Figure 2). There were civil conflicts in around 15% of all observations in Latin America and in Sub-Saharan Africa. In Latin America, civil conflicts occurred only in three countries: Columbia, Peru, and Mexico. At least one civil conflict was recorded over the whole period in Columbia, whereas Peru experienced at least one civil conflict from 1995 to 1999 and then from 2007 to 2009. Only one civil conflict was observed in Mexico; it occurred in 1996. In Sub-Saharan Africa, 13 countries out of 36 total experienced at least one civil conflict. Among them, we can cite Angola, Ethiopia, and Chad (see Figure 2). Finally, there were civil conflicts in 10% of all observations the Middle East and North Africa region, where civil conflicts were observed in Turkey, Egypt, and Iraq. In all Asia, civil conflicts last at least one year on average, whereas they do not last as long in other regions (see Table 1).

Table 1 reports the mean of the real world food price and the mean of the regional domestic food price index over the period 1995-2009. To scrutinize their dynamics, Figure 3 plots the world food price index from 1995 to 2009 and Figure 4 represents the regional domestic food price index from 1995 to 2009. World food prices increased by 43% from 1995 to 2009 with a peak after 2006 (see Figure 3). A first glance at Figure 4 suggests that food is relatively more expensive than other goods in Sub-Saharan Africa. We can observe that the rise in food prices compared to other goods is very moderate in all regions. This finding indicates that the transmission of international to domestic food prices is far from perfect. From 1995 to 2009, food prices compared to those of other goods increased the most in the Middle East and North Africa (2%), followed by Central and East Asian countries (1%). In both Latin America and Sub-Saharan Africa, food became less expensive relative to other goods, as food prices declined by 2% and 5%, respectively from 1995 to 2009. In Southeast Asia, food prices dropped dramatically by 9% after 2007.

Table 1 gives additional information on countries' characteristics. The cereal import

dependency ratio is close to 60% in the Middle East and North African countries, whereas it ranges between 30% and 40% in other regions. The less autocratic regimes are in the Middle East and North Africa. On the contrary, countries in Latin America benefit from more democratic regimes. The level of autocracy is almost the same throughout Asia and Sub-Saharan Africa.

4 Estimation Results

We first investigate the results of equation (1), which examines how the food price index can affect the occurrence of civil conflicts. We alternatively and independently test the impact of international and domestic food prices. Then, we discuss the results of system (2). These results allow us to understand how the international food price index impacts the domestic food price index, which, in turn, can have an effect on the occurrence of civil conflict.

Direct Causal Relation: International Food Prices and Civil Conflicts Table 2 reports the results of the regression of equation (1) that accounts for the effect of the world food price index on the occurrence of conflicts. In column (1), the regional effects of the world food price are not considered, whereas they are considered in column (2). We see no evidence of an effect of lagged international food prices on the occurrence of conflicts at the global level (see column (1)). This result is in line with Bazzi and Blattman (2014), who find no evidence of a robust relationship between food prices and civil conflicts. In column (2), the results suggest that the world food price does not affect the likelihood of conflicts in any of the regions except Latin America. Since food-importing countries are expected to be more dependent on international food prices, we examine in columns (3) and (4) the impact of the international price conditional on the cereal import dependency ratio. Again, we distinguish the results when regional effects are not considered (see column (3)) from that when region effects are considered (see column (4)). The standard errors are high, implying that there is no evidence of a robust relationship between international food prices conditional on the cereal import

dependency ratio and civil conflicts.

All else being equal, the likelihood of conflicts is higher in countries that have experienced conflicts over the last five years. The occurrence of conflicts is even more important in countries that have an autocratic political regime. The open rate has the expected negative sign and a significant impact on the occurrence of civil conflicts. The population has no significant effect on the occurrence of conflicts. These results are robust across the different specifications (see columns (1) to (4)).

Direct Causal Relation: Domestic Food Prices and Civil Conflicts Again, we analyze the results of the regression of equation (1). But, we now turn to the effect of domestic food prices on the occurrence of conflicts (see Table 3). In column (1), no significant evidence of an effect of domestic food prices on the occurrence of conflicts exists. However, domestic food prices do have a differential impact on civil conflicts across the different regions (see column (2)), indicating that some regions are more sensitive to a rise in food prices. This impact is significantly positive in Central, Eastern, and Southern Asia and in Southeast Asia, corroborating the opportunity cost theory. The domestic food price conditional on the cereal dependency ratio index has a positive impact on the occurrence of conflicts (see column (3)). We observe differential effects across the regions (see column (4)), finding significantly positive effects in Southeast Asia and in Latin America. However, these effects are not significant in the other regions.

As shown in Table 2, some countries are prone to conflicts, including countries that have experienced a conflict over the last five years, relatively more autocratic countries that are already in conflict, and countries with a lower open rate. The effect of GDP growth is significant at the 10 per cent level across all specifications with the exception of the second one (see column (2) of Table 3). This effect also has the expected sign: during a conflict episode, GDP growth is lower. The level of population never has a significant effect.

Diabolical Spiral: International-Domestic Food Prices and Civil Conflicts Table 4 reports the estimation results of system(2). We first discuss the results of the system

without considering the regional effects of the domestic food prices on the occurrence of conflicts (see columns (1a) and (1b)), and, then, these regional effects are considered in columns (2a) and (2b).

Column (1a) presents the results of the first equation of system (2), and it allows us to discuss the determinants of the domestic food price index. The pass-through between international and domestic food prices is significant at the 1% level but is far from perfect. A one per cent rise in the world food price induces a rise in the domestic food price of around 0.06%. This result is robust across all specifications and indicates that countries are able to define economic policies to protect domestic food markets from a rise in international food prices. Domestic prices are more likely to be higher in countries afflicted by a conflict, suggesting that factors of production and infrastructure may be destroyed. During an episode of conflict, the domestic food price increases on average by 69%[17]; the highest increase in food prices should be observed in the Middle East and North Africa, whereas the lowest increase should be observed in Sub-Saharan Africa (see Figure 5, which reports the regional increase in the domestic food price during an episode of conflict). Inflation has no significant effect on domestic food prices. Column (1b) includes the results of the second equation of the system, which examines the determinants of the likelihood of conflicts. The domestic price index has a strongly significant and positive effect on the likelihood of conflicts; a one per cent increase in the domestic price increases the likelihood of civil conflicts in the next year by around two percentage points. The duration and the interaction of the duration with autocracy are significant at the 1% level. In other words, countries that already experienced a conflict over the last five years and, more specifically, relatively more autocratic countries are less likely to avoid 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

[17]We calculate this percentage change in two steps. We first determine the domestic food price index during a conflict episode as $(MeanDomesticFoodPrice/100) * e^{\beta_1}$, where $MeanDomesticFoodPrice$ is the mean value of the domestic food price over the period 1995-2009 (see Table 1, column 3, line 4; we divide $MeanDomesticFoodPrice$ by 100 since the system has been estimated with domestic food price index divided by 100.) and β_1 is the estimated coefficient of system (2). Then, we calculate the percentage change between the $MeanDomesticFoodPrice$ that represents the domestic food price in absence of conflicts and the value calculated in the first step which represents the domestic food price during an episode of conflicts. We repeat this procedure for each region.

conflicts (Miguel et al., 2004, Miguel and Satyanath, 2011). The level of population and the cereal dependency ratio have no significant impact on the occurrence of conflicts. Countries with a higher open rate are less prone to conflicts, everything else being equal (Van der Ploeg, 2011).

Let us now analyze the results of the system (2) by considering the regional effects.[18] In column (2b), we examine whether the domestic food price index has a differential impact across the regions. Domestic prices have the highest impact on the likelihood of conflict in Southeast Asia, where an increase of one per cent of domestic food prices increases the likelihood of conflict by nearly five percentage points. The effect is the lowest in Central, Eastern, and Southern Asia, where the likelihood of conflicts is reduced by almost three percentage points. A surprising result at a first glance is the relatively low impact of food prices on the likelihood of conflicts in Sub-Saharan Africa, since domestic food prices are relatively higher in this region (see Table 1). However, it is important to note that we cannot include in the sample countries that are always in conflict over the period, suggesting that we may underestimate the effect of domestic food prices. The significance and signs of the other control variables are robust across the specifications.

Table 5 reports the results of the regression of system (2), which includes the food price effect conditional on the cereal dependency ratio. Column (1a) reports the results of the first equation of the system. Again, international food prices and conflicts significantly impact domestic food prices. They are both significant at the 1% level (see column (1a)). The pass-through elasticity is consistent across the specifications and is still equal to 0.06. The level of inflation appears to be significant at the 10% level, but its effect is very small. Column (1b) of Table 5 presents the results of the second equation of system (2). Domestic prices conditional on the cereal dependency ratio have a positive impact on the likelihood of conflict, suggesting that countries that are relatively more dependent on cereal imports are more prone to civil conflicts. A positive shock of one per cent on food prices raises the probability of conflicts by 0.38 percentage points.[19] As indicated

[18]The results of the first equation are robust to the inclusion of the regional effects (see column 2a). So, we do not comment them.

[19]We calculate this probability as the product of the estimated coefficient β_2 of system (2) to the average point of the cereal import dependency ratio over all years and all observations (see Table 1).

by column (2b) of Table 5, this effect differs across the different regions and is stronger in Southeast Asian 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 impacts of the control variables are similar to the previous estimations with the exception of the population level, which is now significant at the 10% level. As in Brückner (2010), we find a decreasing relationship between the population level and the likelihood of conflicts.[20]

Impact of the 2006-2009 Food Crisis on the Occurrence of Conflicts In light of these results, we can calculate the impact of sharp rise in food prices from 2006 to 2009 on the likelihood of conflicts. We proceed in two steps. First, we calculate the impact of a 1% increase in world food prices on the likelihood of conflicts by multiplying the coefficient, β_2 of the second equation of the system (2), by the pass-through elasticity, π_1 (see the first equation of the system (2)). The results are reported in the third columns of Table 6. We immediately observe that the impact of world food prices on the likelihood of conflicts is much lower than the impact of domestic food prices given that the transmission from world to domestic food prices is not perfect (see the estimated pass-through elasticity columns (1a) and (2a) of Tables 4 and 5). This result suggests that all policies aimed at insulating domestic food markets from a rise in world food prices can mitigate the occurrence of conflicts. Thus, we can derive the increase in the probability of conflicts following the 2006-2009 food crisis (period over which world food prices raised by 31% according to World Bank (2017a)). The results are reported in the fourth column of Table 6.

Second, given this results in hand, we can calculate the mean probability of conflicts after the food crisis. In response to the world food crisis, the probability of conflicts increased by almost 3.98 percentage points (see the fourth column of Table 6). Given that the mean incidence of conflicts in our sample is 17%, the probability of conflicts rises to 20.98; this corresponds to a rise by around 23.9%. This result hides important

[20] We included additional exogenous variables in our system of equations, like GDP per capita, and a measure of natural disasters, like the number of droughts, earthquakes, and extreme temperatures that might impact prices and conflicts. However, these variables turned out not to be significant.

disparities across geographical regions, as the Southeast Asian countries are impacted the most (an 8.70 percentage point increase in the probability of conflicts from 29% to 37.89%), followed by Middle Eastern and North African countries (a 4.53 percentage point increase in the probability of conflicts from 10.80% to 15.33%), with Central, Eastern, and Southern Asian countries experiencing less of an impact. It is worth noting that the probability of conflicts in percentage terms increased more in the Middle East and North Africa, which can be one of the explanations for the Arab Spring (see the last column of the Table 6).

Additional Results In the previous estimations, all countries are assumed to be price takers. However, countries that produce a large share of world output can be price makers on the world market. During an episode of conflict, negative supply shocks may increase world food prices, and, thus, a spurious positive correlation can be observed between civil conflicts and world prices. To avoid this spurious correlation, we exclude from the sample the largest producers.[21] The results of the estimation are reported in Tables 7 and 8. This yields similar results.

5 Conclusion

The objective of this study is to estimate the diabolical spiral between food prices and civil conflicts by employing a panel data set of 82 countries from 1995 to 2009. As a first step, we test the *direct* causal relation between food prices and civil conflicts. We find no effect of international food prices on the occurrence of conflicts. However, we do find a regional effect of domestic food prices on the occurrence of conflicts in Central, Eastern, and Southern Asia and in Southeast Asia. We also show that countries with a higher cereal dependency ratio are more prone to conflicts after a rise in domestic food prices in Southeast Asia and in Latin America. Then, we go deeper into the analysis of the relationship between food prices and civil conflicts by estimating the diabolical spiral between food prices and civil conflicts. We find that a one per cent increase in

[21] China, Brazil, and India are excluded.

domestic food prices raises the probability of conflicts by two percentage points, with the effect being twice as high in Southeast Asia. During an episode of civil conflict, food prices are expected to rise by 69%. However, this finding hides important regional effects; the percentage increase in domestic food prices should be higher in the Middle East and North Africa. With our results in hand, we calculate that the probability of conflicts increased on average by 3.9 percentage points during the 2006-2009 food crisis, with the highest increase in relative value being observed in the Middle East and North Africa.

Our analysis corroborates *the opportunity cost theory*, explaining that any increase in food prices leads to a decrease in the opportunity cost of conflicts. However, it may be enriched by accounting for the positive effect of a rise in food prices on farmers' incomes. 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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Tables and Figures

Table 1: Summary Statistics

	All countries			*SSA*			*MENA*		
	Obs.	Mean	Std. Dev.	Obs.	Mean	Std. Dev.	Obs.	Mean	Std. Dev.
Dependent Variable									
Conflicts	1230	0.178	0.383	540	0.143	0.35	195	0.108	0.311
Domestic Food Price Index	1221	174	41	534	202	37	194	132	32
Explanatory Variables									
World Food Price Index	1230	109	19	540	109	19	195	109	19
Cereal Import Dependency Ratio	1155	0.38	0.31	540	0.37	0.30	150	0.60	0.29
Open Rate	1230	0.78	0.50	540	0.71	0.34	195	0.90	0.36
Duration (years)	1230	0.93	1.71	540	0.75	1.50	195	0.68	1.60
Autocracy	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 Rate	1143	.040	7.37	502	0.78	11.12	189	0.11	0.32

	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
Domestic Food Price Index	208	170	26	120	158	16	165	146	20
Control Variables									
World Food Price Index	210	109	19	120	109	19	165	109	19
Cereal Import Dependency Ratio	195	0.32	0.32	105	0.34	0.37	165	0.31	0.18
Open Rate	210	0.68	0.39	120	1.46	0.94	165	0.54	0.24
Duration (years)	210	1.39	1.91	120	1.50	2.13	165	0.79	1.70
Autocracy	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 Rate	199	0.12	0.36	106	0.05	0.07	147	0.10	0.12

For ease of interpretation of the results, the variables are presented in the units used in the econometric analysis.

Table 2: Direct Causal Relation: International Food Prices and Civil Conflicts

	Dependent Variable: Civil Conflicts			
	(1) No Regional Effect	(2) Regional Effect	(3) No Regional Effect/Cereal Dependency	(4)Regional Impact/Cereal Dependency
Log $IntP_{t-1}$	0.0510			
	(0.96)			
Log $IntP_{t-1}$ **SSA*		0.00283		
		(0.03)		
Log $IntP_{t-1}$ **MENA*		0.0478		
		(0.77)		
Log $IntP_{t-1}$ **CESAs*		0.0551		
		(0.44)		
Log $IntP_{t-1}$ **SEAs*		0.0192		
		(0.12)		
Log $IntP_{t-1}$ **LA*		0.208**		
		(2.26)		
Log $IntP_{t-1}$ **Cer.Dep.*$_{it-1}$			0.0100	
			(0.46)	
Log $IntP_{t-1}$ **Cer.Dep.*$_{it-1}$ **SSA*				-0.000346
				(-0.01)
Log $IntP_{t-1}$ **Cer.Dep.*$_{it-1}$ **MENA*				-0.0389
				(-0.98)
Log $IntP_{t-1}$ **Cer.Dep.*$_{it-1}$ **CESAs*				0.0878
				(0.66)
Log $IntP_{t-1}$ **Cer.Dep.*$_{it-1}$ **SeAs*				0.372**
				(2.21)
Log $IntP_{t-1}$ **Cer.Dep.*$_{it-1}$ **LA*				0.0714
				(1.14)
$Duration_{it}$	0.0474**	0.0476**	0.0474**	0.0449**
	(2.36)	(2.37)	(2.35)	(2.21)
$Duration_{it}$ **Autocracy*$_{it}$	0.0108***	0.0108***	0.0109***	0.0108***
	(2.71)	(2.71)	(2.73)	(2.72)
$GDPGrowth_{it-1}$	-0.0870	-0.0958	-0.0815	-0.0709
	(-0.50)	(-0.54)	(-0.47)	(-0.42)
Open Rate$_{it}$	-0.0964*	-0.0982*	-0.0961*	-0.106**
	(-1.84)	(-1.87)	(-1.84)	(-2.03)
Log Pop.$_{it}$	0.0168	0.0286	0.0476	0.0540
	(0.17)	(0.29)	(0.51)	(0.57)
Cer. Dep.$_{it}$	0.000293	0.000275		
	(0.28)	(0.26)		
Constant	-0.214	-0.314	-0.280	-0.389
	(-0.25)	(-0.37)	(-0.32)	(-0.44)
Country Fixed Effects	Yes	Yes	Yes	Yes
Year Fixed Effects	No	No	No	No
N	1155	1155	1155	1155
Adjusted R^2	0.628	0.627	0.628	0.628
RMSE	0.239	0.239	0.239	0.239

Notes: t statistics are in parentheses, and we define * $p < 0.10$, ** $p < 0.05$, and *** $p < 0.01$. IntP_{t_1} is the lagged international food price index; Cer.Dep.$_{it}$ is country i's cereal dependency ratio at date (t); Pop.$_{it}$ is country i's population at date t.

Table 3: Direct Causal Relation: Domestic Food Prices and Civil Conflicts

	Dependent Variable: Civil Conflicts			
	(1) No Regional Effect	(2) Regional Effect	(3) No Regional Effect/Cereal Dependency	(4) Regional Effect/Cereal Dependency
Log $DomP_{it-1}$	0.126			
	(1.54)			
Log $DomP_{it-1}$**SSA*		0.0150		
		(0.16)		
Log $DomP_{it-1}$**MENA*		0.0457		
		(0.33)		
Log $DomP_{it-1}$**CESAs*		0.514*		
		(1.92)		
Log $DomP_{it-1}$**SeAs*		0.917***		
		(1.77)		
Log $DomP_{it-1}$**LA*		0.174		
		(1.29)		
Log $DomP_{it-1}$**Cer.Dep.*$_{it-1}$			0.263**	
			(2.06)	
Log $DomP_{it-1}$**Cer.Dep.*$_{it-1}$**SSA*				0.211
				(1.42)
Log $DomP_{it-1}$**Cer.Dep.*$_{it-1}$**MENA*				-0.0335
				(-0.15)
Log $DomP_{it-1}$**Cer.Dep.*$_{it-1}$**CESAs*				0.351
				(0.90)
Log $DomP_{it-1}$**Cer.Dep.*$_{it-1}$**SeAs*				2.862***
				(2.66)
Log $DomP_{it-1}$**Cer.Dep.*$_{it-1}$**LA*				0.877*
				(1.77)
$Duration_{it}$	0.0457**	0.0409**	0.0458**	0.0428**
	(2.28)	(2.06)	(2.28)	(2.14)
$Duration_{it}$**Autocracy*$_{it}$	0.0114***	0.0120***	0.0113***	0.0114***
	(2.90)	(3.14)	(2.88)	(2.94)
$GDPGrowth_{it-1}$	-0.267*	-0.237	-0.260*	-0.243*
	(-1.77)	(-1.58)	(-1.75)	(-1.65)
Open $Rate_{it}$	-0.0992**	-0.102**	-0.104**	-0.112**
	(-1.97)	(-2.00)	(-2.02)	(-2.18)
Log Pop_{it}	-0.189	-0.181	-0.205	-0.188
	(-1.09)	(-1.03)	(-1.18)	(-1.05)
Cer. Dep.$_{it}$ *(%)*	0.000388	0.000266		
	(0.36)	(0.25)		
Constant	1.963	1.853	2.157	1.964
	(1.17)	(1.08)	(1.29)	(1.13)
Country Fixed Effects	Yes	Yes	Yes	Yes
Year Fixed Effects	Yes	Yes	Yes	Yes
N	1152	1152	1152	1152
Adjusted R^2	0.629	0.630	0.629	0.630
RMSE	0.239	0.239	0.239	0.239

Notes: t statistics are in parentheses, and we define * $p < 0.10$, ** $p < 0.05$, and *** $p < 0.01$. DomP_{it-1} is the lagged international food price index; Cer.Dep.$_{it}$ is country i's cereal dependency ratio at date (t); Pop.$_{it}$ is country i's population at date t.

Table 4: Diabolical Spiral: International-Domestic Food Prices and Civil Conflicts

Dependent Variables:	*(1a) Log Domestic Food Price*	*(1b) Civil Conflicts*	*(2a) Log Domestic Food Price*	*(2b) Civil Conflicts*
	No Regional Effect		*Regional Effect*	
$Conflicts_{it}$	0.179***		0.192***	
	(5.34)		(5.80)	
$Log\ InterP_t$	0.0600***		0.0596***	
	(3.63)		(3.55)	
$InflationRate_{it}$	0.000400		0.000410*	
	(1.61)		(1.74)	
$Log\ DomP_{it-1}$		2.096***		
		(25.78)		
$Log\ DomP_{it-1}$*SSA				1.990***
				(22.16)
$Log\ DomPrice_{it-1}$*MENA				2.383***
				(9.52)
$Log\ DomP_{it-1}$*CESAs				1.916***
				(6.81)
$Log\ DomP_{it-1}$*SeAs				4.678***
				(13.11)
$Log\ DomPrice_{it-1}$*LA				2.267***
				(9.92)
$Duration_{it}$		0.0384***		0.0274***
		(4.04)		(3.01)
$Duration_{it} * Autocracy_{it}$		0.00540***		0.00583***
		(2.92)		(3.21)
$OpenRate_{it}$		-0.105**		-0.0927**
		(-2.30)		(-2.14)
$GDPGrowth_{it-1}$		-0.234**		-0.171*
		(-2.33)		(-1.79)
$LogPop._{it}$		-0.152		-0.108
		(-1.10)		(-0.82)
$Cer.Dep_{it}$		0.000506		0.000396
		(0.45)		(0.37)
Country Fixed Effects	Yes	Yes	Yes	Yes
Year Fixed Effects	No	Yes	No	Yes
N	1066		1066	
R^2	0.978	0.648	0.978	0.637
RMSE	0.0872	0.265	0.0888	0.269

Notes: t statistics are in parentheses. We define * $p < 0.10$, ** $p < 0.05$, and *** $p < 0.01$

Table 5: Diabolical Spiral: International-Domestic Food Prices, Civil Conflicts and Cereal Dependency Ratio

Dependent Variables:	*(1a) Log Domestic Food Price*	*(1b) Civil Conflicts*	*(2a) Log Food Domestic Price*	*(2b) Civil Conflicts*
	No Regional Effect/Cereal Dependency		*Regional Effect/Cereal Dependency*	
$Conflicts_{it}$	0.117***		0.127***	
	(3.75)		(4.10)	
$Log\ InterP_t$	0.0613***		0.0611***	
	(3.97)		(3.92)	
$InflationRate_{it}$	0.000625*		0.000617*	
	(1.94)		(1.93)	
$Log\ Dom.\ Price_{it-1} * CerDep_{it-1}$		0.986***		
		(5.89)		
Log Dom. $Price_{it-1} * CerDep_{it-1}$ **SSA*				0.895***
				(4.38)
Log Dom. $Price_{it-1} * CerDep_{it-1}$ **MENA*				1.029***
				(2.72)
Log Dom. $Price_{it-1} * CerDep_{it-1}$ **CESAs*				0.829*
				(1.82)
Log Dom. $Price_{it-1} * CerDep_{it-1}$ **SeAs*				4.851***
				(3.78)
Log Dom. $Price_{it-1} * CerDep_{it-1}$ **LA*				2.061***
				(3.41)
$Duration_{it}$		0.0527***		0.0488***
		(4.92)		(4.60)
$Duration_{it} * Autocracy_{it}$		0.00786***		0.00764***
		(3.73)		(3.67)
$OpenRate_{it}$		-0.134**		-0.136**
		(-2.43)		(-2.51)
$GDPGrowth_{it-1}$		-0.284**		-0.254**
		(-2.37)		(-2.14)
$LogPop._{it}$		-0.304*		-0.303*
		(-1.79)		(-1.79)
Country Fixed Effects	Yes	Yes	Yes	Yes
Year Fixed Effects	No	Yes	No	Yes
N	1066		1066	
R^2	0.981	0.733	0.981	0.733
RMSE	0.0816	0.231	0.0823	0.231

Notes: t statistics are in parentheses. We define * $p < 0.10$, ** $p < 0.05$, and *** $p < 0.01$

Table 6: Impact of Food Crisis on the Probability of Conflicts

	% point change in the probability of conflicts if increase by			Mean probability of conflicts	
	1% of domestic price	1% of world price	31% of world price	before the food crisis	during the food crisis (31% rise in world prices)
No regional effect	2.096	0.128	3.98	17.00	20.98
Regional effect					
SSA	1.990	0.122	3.78	14.30	18.08
MENA	2.383	0.146	4.53	10.80	15.33
CESA	1.916	0.117	3.64	29.00	32.64
SeAs	4.678	0.287	8.89	29.00	37.89
LA	2.267	0.139	4.31	14.50	18.81

Notes: The second column of this table gives the estimated coefficient β_2 of system (2) as reported in Table 4. To calculate the impact of a 1% increase in world food prices on the likelihood of conflicts, we multiply the coefficient of the second column by the pass-through elasticity (this corresponds to the coefficient π_1 of the system (2)). In the fifth column, we report the mean probability of conflicts over the period (1995-2009) as shown in Table 1; this represents the mean probability of conflicts before the food crisis. To calculate the mean probability of conflicts during the food crisis (see the last column of the Table above), we add the mean probability before the food crisis and the change in point of percentage induced by a rise of 31% of world food price. We calculate the rise in world food prices from 2006 to 2009 by using data from World Bank (2017a).

Table 7: Diabolical Spiral: International-Domestic Food Prices and Civil Conflicts; Large Producers and Consumers Excluded

Dependent Variables:	*(1a) Log Domestic Food Price*	*(1b) Civil Conflicts*	*(2a) Log Food Domestic Price*	*(2b) Civil Conflicts*
	No Regional Effect/Cereal Dependency		*Regional Effect/Cereal Dependency*	
$Conflicts_{it}$	0.118***		0.127***	
	(3.71)		(4.05)	
$LogInterP_t$	0.0600***		0.0599***	
	(3.75)		(3.71)	
$Inflation_{it}$	0.000622*		0.000616*	
	(1.91)		(1.90)	
$LogDomPrice_{it-1}$		1.008***		
		(5.95)		
$LogDomPrice_{it-1} * SSA$				0.914***
				(4.42)
$LogDomPrice_{it-1} * MENA$				1.051***
				(2.75)
$LogDomPrice_{it-1} * CESAs$				0.875*
				(1.90)
$LogDomPrice_{it-1} * SeAs$				4.903***
				(3.78)
$LogDomPrice_{it-1} * LA$				2.083***
				(3.36)
$Duration_{it}$		0.0524***		0.0484***
		(4.83)		(4.50)
$Duration_{it} * Autocracy_{it}$		0.00786***		0.00767***
		(3.69)		(3.64)
$OpenRate_{it}$		-0.141**		-0.144***
		(-2.53)		(-2.61)
$GDPGrowth_{it}$		-0.287**		-0.256**
		(-2.36)		(-2.12)
$LogPop_t$		-0.246		-0.240
		(-1.41)		(-1.38)
Country Fixed Effects	Yes	Yes	Yes	Yes
Year Fixed Effects	No	Yes	No	Yes
N	1021		1021	
R^2	0.981	0.716	0.981	0.716
RMSE	0.0828	0.234	0.0835	0.234

Notes: t statistics are in parentheses. We define * $p < 0.10$, ** $p < 0.05$, and *** $p < 0.01$

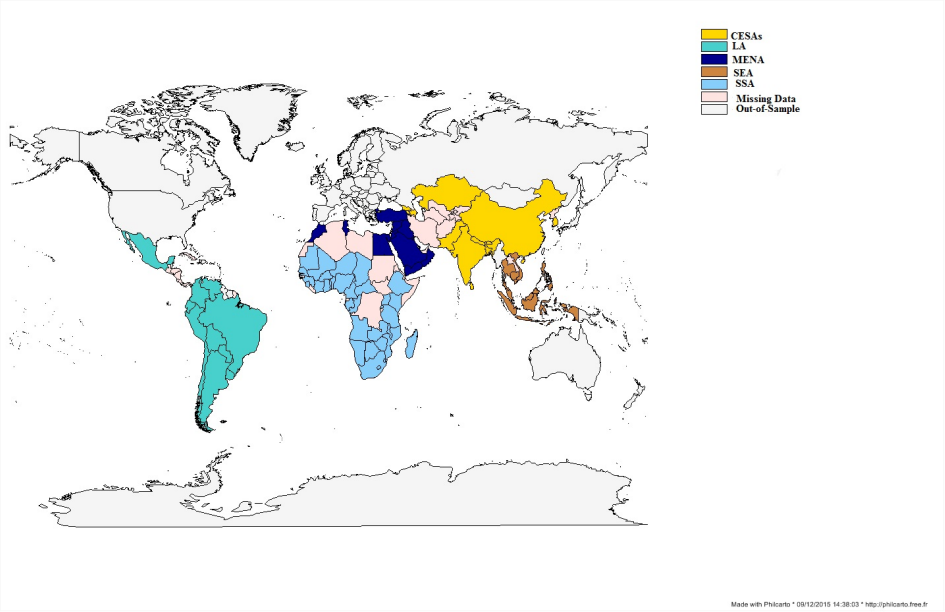
Table 8: Diabolical Spiral: International-Domestic Food Prices, Civil Conflicts and Cereal Dependency Ratio: Large Producers and Consumers Excluded

Dependent Variables:	*(1a) Log Domestic Food Price*	*(1b) Civil Conflicts*	*(2a) Log Food Domestic Price*	*(2b) Civil Conflicts*
	No Regional Effect/Cereal Dependency		*Regional Effect/Cereal Dependency*	
$Conflicts_{it}$	0.124***		0.129***	
	(3.94)		(4.12)	
$LogIntP_t$	0.0605***		0.0603***	
	(3.59)		(3.57)	
$LogIntP_t$	0.000609*		0.000615*	
	(1.84)		(1.87)	
$LogDomPrice_{it-1} * CerDep_{it-1}$		0.854***		
		(5.26)		
$LogDomPrice_{it-1} * CerDep_{it-1} * SSA$				0.760***
				(3.81)
$LogDomPrice_{it-1} * CerDep_{it-1} * MENA$				0.892**
				(2.43)
$LogDomPrice_{it-1} * CerDep_{it-1} * CESAs$				0.755*
				(1.71)
$LogDomPrice_{it-1} * CerDep_{it-1} * SeAs$				5.501***
				(2.68)
$LogDomPrice_{it-1} * CerDep_{it-1} * LA$				1.905***
				(3.22)
$Duration_{it}$		0.0561***		0.0518***
		(4.93)		(4.53)
$Duration_{it} * Autocracy_{it}$		0.00830***		0.00838***
		(3.87)		(3.91)
$OpenRate_{it}$		-0.117**		-0.115**
		(-2.18)		(-2.16)
$GDPGrowth_{it-1}$		-0.244**		-0.231**
		(-2.06)		(-1.97)
$LogPop_{it}$		-0.234		-0.212
		(-1.40)		(-1.27)
Country Fixed Effects	Yes	Yes	Yes	Yes
Year Fixed Effects	No	Yes	No	Yes
N	962		962	
R^2	0.980	0.739	0.980	0.739
RMSE	0.0843	0.223	0.0846	0.223

Notes: t statistics are in parentheses. We define * $p < 0.10$, ** $p < 0.05$, and *** $p < 0.01$

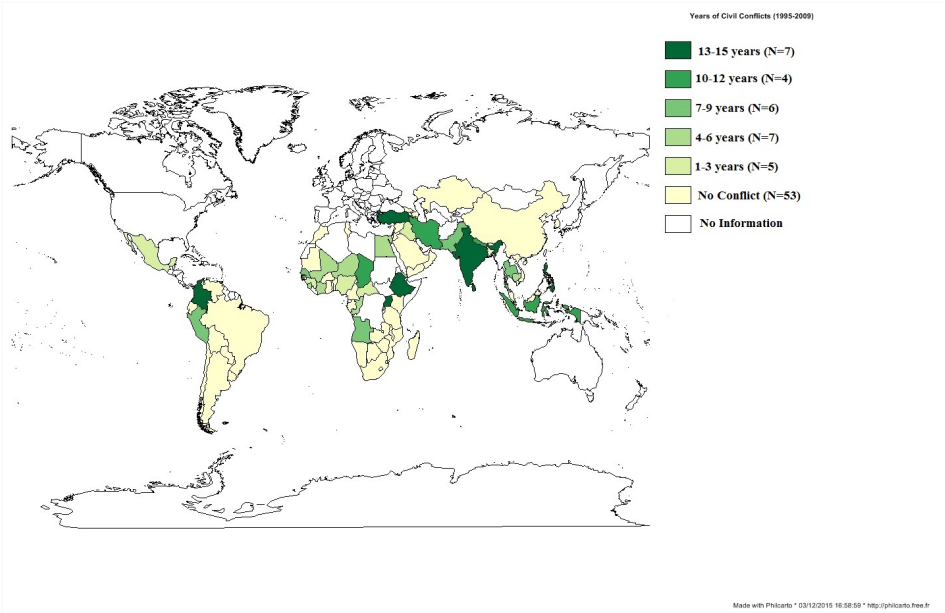
Figures

Figure 1: Five Economic Regions



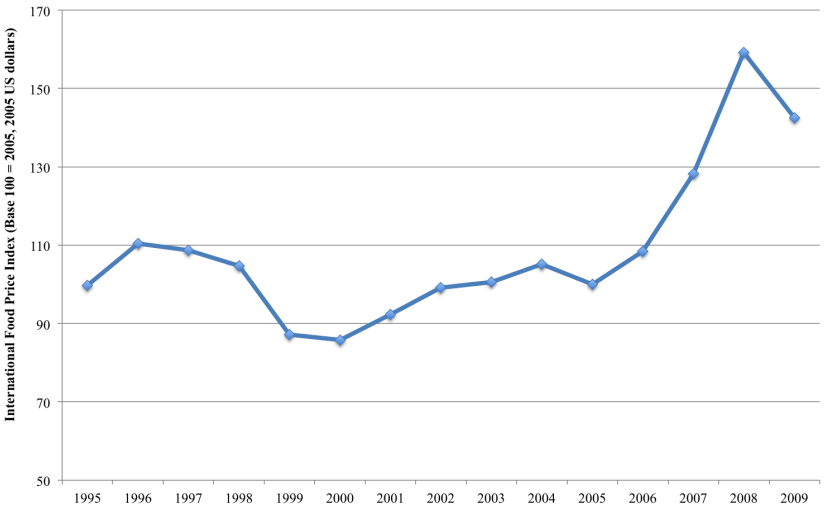
Notes: Abbreviations: CESAs: Asia; LA: Latin America; SSA: Sub-Saharan Africa; NAME: North Africa and Middle East; and SEAs: Southeast Asia. In each geographical region, some countries are excluded due to missing data.

Figure 2: Episodes of conflicts (1995-2009)



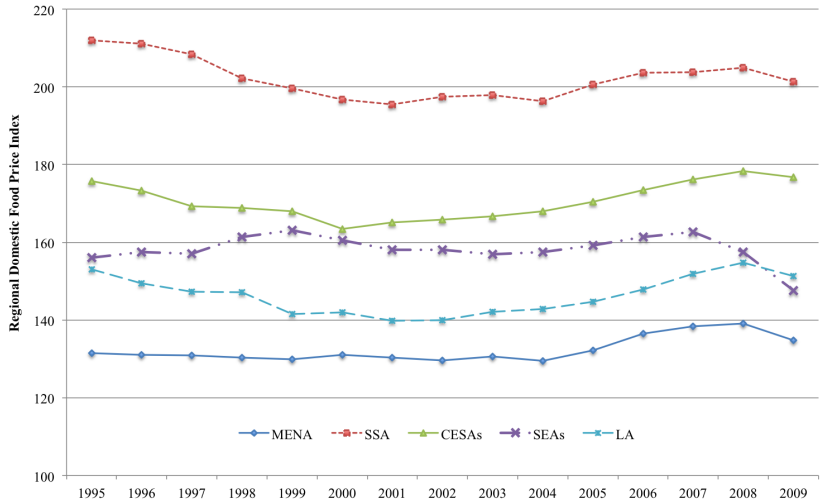
Source: Gleditsch et al. (2002); Themnér and Wallensteen (2012). *Notes:* We use UCDP/PRIO Armed Conflicts Dataset Version4-2011 (UCDP/PRIO, 2011).

Figure 3: International Food Price Index



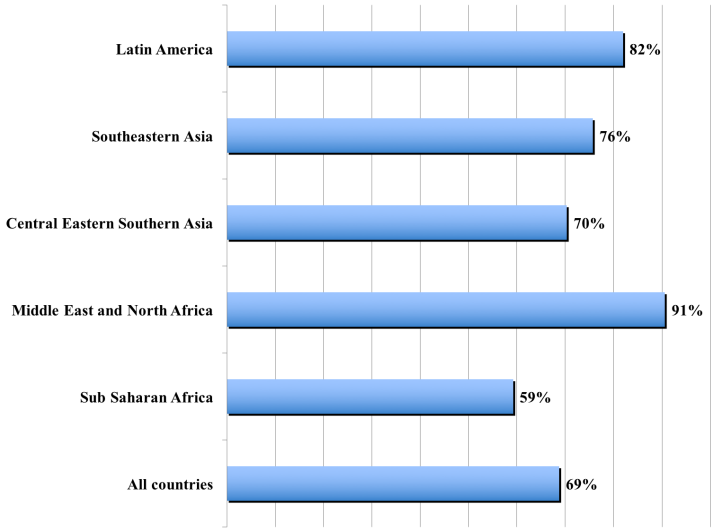
Source: World Bank (2017a)

Figure 4: Regional Domestic Food Price Index



Notes: The Regional Domestic Food Price is calculated as the average of countries' Domestic Food Price Index over the region. Source: Each country's Domestic Food Price Index is from FAO (2016)

Figure 5: Food Price Increase During an Episode of Conflict



Notes: In footnote 17, we explain how we calculate this percentage increase.

Appendices

A Tables

Table A.1: List of Countries Included in the Study

Sub-Saharan Africa (SSA)	*Middle East and North Africa (MENA)*	*Central East and South Asia (CEAs)*	*South East Asia (SEAs)*	*Latin America (LA)*
Angola	Egypt	Armenia	Brunei	Argentina
Benin	Morocco	Azerbaijan	Cambodia	Bolivia
Botswana	Tunisia	Georgia	Indonesia	Brazil
Burkina Faso	Bahrain	Kazakhstan	Malaysia	Chile
Cameroon	Iraq	China	Philippines	Colombia
Cape Verde	Jordan	Korea, Republic of	Singapore	Ecuador
Central African Republic	Kuwait	Bangladesh	Thailand	Mexico
Chad	Oman	Butan	Vietnam	Paraguay
Congo, Republic of	Qatar	India		Peru
Cote d'Ivoire	Saudi Arabia	Iran		Uruguay
Ethiopia	Syria	Maldives		Venezuela
Gabon	Turkey	Nepal		
Gambia, The	Yemen	Pakistan		
Ghana		Sri Lanka		
Guinea				
Kenya				
Lesotho				
Madagascar				
Malawi				
Mali				
Mauritania				
Mauritius				
Mozambique				
Namibia				
Niger				
Nigeria				
Rwanda				
Senegal				
Sierra Leone				
South Africa				
Swaziland				
Tanzania				
Togo				
Uganda				
Zambia				
Zimbabwe				

Table A.2: List of Countries Not Included in the Study

Country	Missing Data	Years of Conflicts over 1995-2009
	Sub Saharan Africa (SSA)	
Democratic Republic of Congo	Domestic Food Prices	1996-2001;2006-2008
Djibouti	Domestic Food Prices	1999
Eritrea	Domestic Food Prices	2008
Guinea-Bissau	Domestic Food Prices	1998-1999
Guinea-Equatorial	Domestic Food Prices	0
Liberia	Domestic Food Prices	2000-2003
Somalia	Domestic Food Prices	1995-1996;2001-2002;2006-2009
Sudan	Domestic Food Prices	1995-2009
	Middle East and North Africa (MENA)	
Algeria	Domestic Food Prices	1995-2009
Lebanon	Domestic Food Prices	0
Libya	Domestic Food Prices	0
Western Sahara	Domestic Food Prices	0
	Central East South Asia (CESAs)	
Afghanistan	Domestic Food Prices	1995-2009
Kyrgyzstan	Domestic Food Prices	0
North Korea	All data	0
Tajikistan	Domestic Food Prices	1995-2000
Turkmenistan	Domestic Food Prices	0
Uzbekistan	Domestic Food Prices	1999,2000,2004
	South East Asia (SEAs)	
Laos	Domestic Food Prices (Partial)	0
Myanmar	Domestic Food Prices	1995-2004
	Latin America (LA)	
Belize	Domestic Food Prices	0
Costa Rica	Domestic Food Prices	0
El Salvador	Domestic Food Prices	0
Guatemala	Domestic Food Prices	1995
Guyana	Domestic Food Prices	0
Honduras	Domestic Food Prices	0
Nicaragua	Domestic Food Prices	0
Panama	Domestic Food Prices	0
Suriname	Domestic Food Prices	0