**Food prices, social unrest and the Facebook generation**

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**Abstract[[2]](#footnote-2)**

We empirically test the widespread perception that an upsurge in food prices increases social unrest using data from Asian and African countries for the period 1960-2010. The association between international food prices and social unrest has become stronger over time. We hypothesize that the causes for this closer association are that increases in global food trade have strengthened the link between international and domestic food prices and that the worldwide internet revolution not only made protests more contagious across countries, but also may have helped activists overcome the coordination problems in collective action.

Keywords: Food security, food prices, social unrest, riots, protests

JEL codes: Q02, Q18, P22

### Introduction

In 2008, food prices soared to a boiling point, triggering riots from Haiti to Bangladesh to Egypt and causing mass social tensions even in high-growth countries like China and India. In 2011, several North African countries fell prey to riots and mass demonstrations, and again these protests occurred in a climate of rising food prices. Apart from these recent events, several historic events testify of the role of food prices in explaining social unrest, among many others the 1684 Moscow Salt Riot, the 1713 Boston bread riot, the 1837 New York City Flour Riot, and the 1918 Rice Riots in Japan. Hence, both recent and historic events suggest a close link between riots and food prices.

There is a large literature on the political economy of food policies (see Swinnen (2010) for a recent review). An important insight from this literature is that changes in market prices trigger political pressure by those hurt by the changes in order to induce governments to respond to protect them through policies. Such political pressure may take different forms, including transferring funds t political campaigns or demonstrations and riots. The resulting government response is well-documented and “the relative income hypothesis” of endogenous government policy (see e.g. de Gorter and Tsun (1991) and Swinnen (1994) for theory and Anderson and Hayami (1986), Gardner (1989), Swinnen et al (2001) for empirical evidence). However, much less is known about the direct relationship between food price changes and demonstrations and riots. Studying demonstrations and riots yields additional insights, beyond food policy responses. Better insights in the impact of food prices on social unrest is valuable, not only because it helps to understand real world events, but also because it allows to assess the real cost and benefit of food price changes.

Notice that demonstrations and riots may have both benefits and costs. The public may receive utility from expressing their concerns in demonstrations as it may lead to government actions that respond to the public’s preferences (Note that countries seeking to reduce the political cost from rising food prices by altering trade restrictions at their national border (e.g. the imposition of export restrictions) may initially succeed in dampening increases in domestic food prices, but the more countries revert to such actions, the more these actions become collectively self-defeating, reducing the role that global trade can play in dampening fluctuations in international prices (Anderson and Nelgen, 2010)). This is in line with the argument of Acemoglu and Robinson (2001) that transitory economic shocks can give rise to a democratic window of opportunity. On the other hand, demonstrations can turn violent, leading to casualties, destroying private and public property, and looting. Riots may divert domestic and foreign investment, increasing economic hardship, and when riots occur in important food or oil producing countries, they may in turn lead to increases in commodity prices. However, there has been no empirical assessment so far of the cost and benefits of demonstrations and riots.

Most of the literature on the relationship between economic shocks and social unrest has focussed on the economic causes of civil war (Blattman and Miguel (2010), Collier and Hoeffler (1998), Easterly & Levine, (1998) and Elbadawi and Sambanis (2000)). There is a strong negative association between civil war and economic development but the direction of causality is often unclear. While poor economic performance may lead to conflict, the reverse relationship is equally credible, and this complicates the analysis[[3]](#footnote-3).

From this perspective, food price riots are an interesting area of study. Fluctuations in the international food prices are often determined by external factors, such as world demand and supply for food. Hence, such fluctuations are exogenous, which should make the analysis of their impact on social unrest relatively straightforward. However, to the best of our knowledge, there are only two empirical studies on the relationship between international food prices and social unrest. Hendrix et al. (2009) study the link between food prices and social unrest for the period 1961-2006 in 55 major cities in 49 Asian and African countries. The authors find that producers riot more easily with a price decrease than consumers do with a price increase. In addition, they find that the impact of food prices on riots depends on regime type, with riots upon food price changes more frequently occurring in hybrid regimes than in democratic or repressive regimes. Arzeki and Brückner (2011) examine the effects of variations in international food prices on democracy and intra-state conflict using panel data for 120 countries during 1970-2007. They find a negative effect of food price increases on political institutions in the Low Income Countries. In addition, increases in food prices significantly increase the incidence of civil conflict as well as the number of anti-government demonstrations and the number of riots.

The current article differs from these previous studies in four main ways, by (1) using the most recent data up to 2010, (2) analysing monthly rather than annual time series, (3) performing a sub period analyses, and by (4) determine the price shocks with Hodrick-Prescott filtering which allows us to separate the “cyclical component” of prices from its trend[[4]](#footnote-4).

This article empirically estimates the impact of food prices on social unrest manifested in the form of demonstrations or riots. First, we analyze monthly data on riots and international food prices for the period 1990-2010. The riot data are from the PRIO Social Disturbance dataset, while food prices are calculated as an export share weighted average of international prices for five commodity group indices - cereals, meat, dairy products, sugar and oil & fat.

Second, we compare results for the period 1990-2010 with results for a longer time period, 1960-2010. Due to data limitations, this analysis uses US wheat prices instead of the international food price index.

Our use on monthly time series of the past two decades makes it distinct from two recent working papers, Hendrix et al. (2009) and Arezki and Brückner (2011), that study the impact of food prices on social unrest analyzing annual data from respectively the periods 1961-2006 and 1970-2007. Hendrix et al. (2009) find that producers react more easily with riots upon a price decrease than consumers react upon a price increase. Arzeki and Brückner (2011) report that a one standard deviation increase in the food price index increases the number of anti-government demonstrations and riots by about 0.01 standard deviations. The use of monthly rather than annual time series is expected to yield more accurate estimates. First, it allows to capture within-year fluctuations in prices, which, due to the impact of weather and pest related shocks may be high, even after taking into account the usual seasonal fluctuations (Petersen and Tomek, 2005). Second, the relationship between food price shocks and social unrest is often instantaneous, justifying the use a high frequency time series. Thirdly, the use of monthly data multiplies the number of data points. Our findings indicate that a one percent increase in the deviation of prices from the long-run trend increases the relative probability (odds) of occurrence of a disturbance manifold, ranging from twice to 12 times depending on the specification. We find that the association between food prices and social unrest became stronger over time, in particular consumers’ reaction increased, whereas the reaction of producers remained largely unchanged.

The remainder of the paper starts with a discussion of the determinants of food prices and protests. Section 3 sets out the empirical framework. In section 4, we provide an overview of the data sources used. Section 5 discusses the statistical results. Section 6 concludes.

### Concepts and literature

***2.1. Protests: how small (price) shocks can put in motion a revolutionary bandwagon***

From the discussion above, we can assume that dramatic changes in food prices imply a negative welfare impact for a part of the population in a number of countries. This is likely to generate grievances, in particular material or economic grievances stemming from relative or absolute deprivation. But, how and under which circumstances do price-induced grievances translate into protests? In order to address this question, we give a brief overview of the theory of protest movements, which focuses on the coordination or collective action problem. It is well documented that economic theory, assuming self-interested rational individuals, predicts an undersupply of collective action (Olson, 1965). At the same time, the frequent occurrence of mass demonstrations and protests contradicts this basic economic insight. This has led to two strands of literature that try to reconcile this apparent contradiction.

A first strand argues that mass political movements cannot be explained by models based on rational preferences and, instead, puts forward expressive theories of participation whereby a person places value on the act of political expression itself (e.g. Opp, 1988; Klosko et al., 1987; Muller and Opp, 1986; Verba et al., 2000). In this line of thought, Kuran (1989) provides an useful theoretical framework which is tailored to explain spontaneous occurrence of revolutions, but a number of features are also instructive in the case of protests. Essentially, in her decision to protest, a person i makes a trade-off of two costs. On the one hand, a person who privately opposes the regime, but fails to express her opinion publicly, has an *internal cost* (the so-called preference falsification). This cost increases with the level of private discontent, xi, but can be removed when the persons decides to express herself, i.e. participate in the protest movement. However, on the other hand, the public expression of one’s private opinion comes with a cost, e.g. the risk of being persecuted for outspokenness, and facing government security forces or hostile supporters of the government. Importantly, this *external cost* falls with the size of the public opposition, which is denoted by S.

Considering both the internal and external cost, i’s publicly revealed preference depends on S and xi. For each person i with internal cost xi, there exists a value of S for which the external cost falls below her internal cost and i publicly expresses her opinion. This switching value can be referred to as person i’s *public opposition threshold* Ti.[[5]](#footnote-5) And, vice versa, for each individual i and a given level of S, there exists a level of discontent xi for which the internal cost exceeds the external cost. Hence, even in a heterogeneous society in which people differ in their private preferences and public opposition thresholds Ti, mass protest can occur because a minor change in xi for one or more individuals can increase the size in S and set in motion a process in which the value of S reaches the public opposition threshold of an increasing number of individuals. In the words of Kuran (1989) “a suitable shock would put in motion a bandwagon process that exposes a panoply of social conflicts, until then largely hidden” (p.42).

To what extent and under which circumstances can a price change be such as “suitable shock”? Imagine a N-person society featuring a threshold sequence (T1,T2,T3,T4,T5, T6,T7,T8,T9…,TN), with Ti≤Ti+1, T1=0 and TN=X, meaning that person 1 will always express her opinion publicly and person N will never do so. For the other eight persons in society the decision will depend on S. Assume for example that T2=*x* then person 2 will express her opinion publicly if S≥T2, in other words if at least *x*% of the population does so. A price shock P can mobilize person 2 only if the shock increases person 2’s discontent, x2 , sufficiently to lower her threshold value T2 from 20 to 10 (given that person 1 represents 10% of the 10-person society). Will the participation of person 2 now put in motion the bandwagon? The outcome crucially hinges on the values for T3, T4, etc. If, after the price shock, T3 is as low as 20, a third person will join the protest movement; person 4 will join if T4 has declined to at least 30 after the shock; and so on.

Thus, whether or not a price shock leads to protests depends on the size of the price shock, the initial distribution of the threshold sequence and the impact of the price shock on the threshold sequence. In the previous section we have elaborated on the determinants of the size of the shock, i.e. the factors that determine the international price shock as well as its transmission to domestic price levels. We are now ready to hypothesize on the role of the initial threshold sequence and on the impact of the shock on the threshold sequence. Let us start with an example. Imagine the following four initial threshold sequences:

A=(0,20,20,20,20,20,20,20,90,100)

B=(0,20,30,30,30,30,30,30,30,100)

C=(0,30,30,30,30,30,30,30,90,100)

D=(0,20,30,40,50,60,70,80,90,100)

The average threshold is as low as 33 in both sequences A and B, while it is 40 in sequence C and 54 in sequence D.

First, imagine a shock P that reduces the threshold level of person 2 by 10, leaving threshold levels of other persons unaffected. This shock only triggers a large protest movement in sequence A, which illustrates that for a given shock to lead to mass protests, both the level and distribution of initial discontent matters. These features may be closely related to regime type. For example, in authoritarian regimes thresholds may be low because the public may feel strong internal opposition against the regime. On the other hand, in a very repressive regime the external cost of protesting may be high, raising thresholds for most individuals (except for a number of “extremists”). Because of this dichotomy, Hendrix et al. (2009) argue that protest occur mostly in hybrid regimes. Marwell and Oliver (1993) argue that heterogeneity may enhance the prospects for collective action, since the critical mass of initial protesters typically consists of individuals with extremist tendencies, rather than moderates.

Second, suppose that a shock P’ decreases the threshold values of both persons 2 and 3 by 10. This will trigger of mass demonstration not only in A, but also in B and C. If a shock P’’ affects even more moderate persons, e.g. those with thresholds up to 50, then also sequence D will experience a cascade of protesters until half the society participates. Thus, everything else being equal, a shock is much more likely to result in mass mobilization if it not only affects “extremists”, but also “moderates”. We argue that, compared to political shocks, such as further concentration of power in the hands of a few, human rights violations or restriction of freedom, economic shocks are more likely to lower threshold levels of both “extremists” and “moderates”. One obvious reason is that economic shocks affect persons regardless their regime preference or political engagement. Price shocks may be particularly powerful to lower thresholds because they can be monitored by the general public in day-to-day life and often hit a large group of people at once. In contrast, GDP growth is more difficult to track on a day-to-day basis and unemployment may be faced by individuals in a sequence rather than at once. We hypothesize that these features of a price shock make it a powerful tool in overcoming the coordination problem by increasing the probability of a simultaneous decline in threshold levels for a large number of individuals.

In sum, Kuran (1989)’s model provides us with a useful framework to think about the way price shocks can lead to mass protests. The factors that matter are threefold: (1) the size of the shock; (2) the initial threshold sequence; and (3) the impact of the shock on the threshold sequence. We have argued that the latter depends on the heterogeneity of the initial threshold sequence as well as on the nature of the shock (affecting only extremists or also moderates). Although, Kuran’s model is in essence an informational cascade, where an individual’s turnout decision depends on information of existing turnout, Kuran does not explicitly model information streams and how such streams may affect actions of protesters. Therefore, we now turn to a theoretical framework that addresses this caveat and will be particularly insightful in explaining demonstrations in the current era of internet.

***2.2. Protests: the collective action problem and the Facebook generation***

The dynamic informational cascade theory of Lohmann (1993, 1994, 2000) belongs to a second strand of literature that has developed several theories on how collective action can emerge from rational behaviour at the level of the individual. It is particularly relevant in our case, since it highlights the role of information streams and signalling, allowing us to formulate hypotheses on the role of online communication in present-day mass mobilization. We will not go through the entire Lohmann model, but we will highlight a number of distinctive features and then continue with the simple notation and examples of the previous section to illustrate how a dynamic theory of informational cascades can yield new insights.

The most important distinctive feature of Lohmann’s theory is that an individual’s action not only contributes to overturning the status quo in a given period (because, as in Kuran’s model, it makes the number of people taking costly action exceed a critical threshold), but it also signals the actor’s information about the status quo (the quality of a policy, regime, etc) and influences other people’s decisions to act or abstain. This signalling function of an action makes an individual action non-negligible in overturning the status quo, which explains why rational individuals that care about overturning the status quo engage in costly collective action. For the sake of simplicity we illustrate this point using the Kuran framework. Instead of interpreting xi as the internal cost stemming from preference falsification, it can be now interpreted as the net-gains of individual i in changing the status quo. This is of course also a positive function of discontent with the current status quo; the difference lies in the fact that xi now results from a rational calculus rather than a feeling of psychological discomfort.

Turning back to the examples above, upon the shock P, person 2 in sequence A takes the costly action of publicly revealing her preferences, not because doing so reliefs her from her psychological discomfort, but because she knows that her action can set in motion a protest movement that can change the status quo. But, what about sequence B? Above we noted that, if we only take into account that the action of person 2 increases S, then this is not sufficient for mass mobilization to unfold because T3=30 instead of 20. At this point, the signalling function of an action comes into play. If person 3 observes that person 2 takes action, person 3 updates her (imperfect) observation about the pros and cons of the status quo, affecting the value of x3. Concurrently, persons 4-9 observe the action of person 2 and may also update their perception of the status quo. If the signal is strong enough, the shock P may put in motion the bandwagon not only in sequence A, but also in sequence B, and possible C and D. This examples illustrates that, if mass behaviour results as a by-product of rational behaviour of a decentralized mechanism of information aggregation and updating, even small shocks can gain momentum.

An important note to make is that the strength of the signal, i.e. the value attached to the information, depends on the type of the sender. For example, moderates will attach less importance to signals send by extremists than to signals send by other moderates because moderates know that the preferences of extremists may not be in line with their own preferences. In the words of Lohmann (2000) “The participation of moderates (actors who generate reliable informational cues) is crucial for the success of a social movement, but the (uninformative) turnout of ‘extremists’ is discounted.” Because of this feature, the impact of group heterogeneity is not monotonous. In fact: “Overall, the maximum degree of information revelation is associated with the degree of group heterogeneity that maximizes the number of activist moderates.”

Now that we have illustrated the basic insights of Lohmann’s complex model (in an admittedly simplistic way), we are ready to hypothesize about the possible impact of mass media and online (political) communities. Firstly, both mass media and online communities allow the public to take notice of the signals sent, whereas otherwise many signals may be blocked by those that benefit from a status quo. Second, both may be instrumental in coordinating action in the sense that the former reduces information asymmetries and the latter is a tool in enhancing the simultaneity of turnout, e.g. by agreeing on the timing and location of turnout. Such coordination is important because a mass demonstration takes place when sufficient people lower their thresholds. Thirdly, online communities play an additional role by allowing individuals to signal their perception of the status quo at a very low cost. This new form of signalling is a double-edged sword. On the one hand, it lowers the value of the signal because receivers know that the risks of signalling are much lower. On the other hand, it increases the number of senders, and importantly, especially among the moderates, who otherwise might have found the cost of signalling too high.

We develop a simple framework to explain the incidence of protests based on a cost-benefit analysis and the role of food prices and communication technologies (the sort of facebook)

Let Vi denote the utility of individual i at a particular policy level. In our case policy would mean to be policy that maps to food price. Let Vio denote the ‘desired’ individual utility (in other words, acceptable price level).

Deviation from acceptable level of utility, Vio-Vi≥0.

Utility(protest)= фi\*( Vio-Vi)- c(Ne)

where фi is the individual level propensity to protest (the parameter that distinguishes extremists from moderates) and c (.) is the cost of protesting (which is a function of the expected number of participants).

Condition for protesting :Utility (protest) ≥Utility(No protest)=0

Letting c(Ne)=k/Ne, assuming that the expected cost of protesting decreases with the expected number of protestors, we get the following condition,

ne ≥k/[N\* фi\*( Vio-Vi)]=Ti

where ne=Ne/N, the fraction of protestors

Here Ti is has the same interpretation as the threshold in Granovetter(1978), i.e. the number of already participating protestors required for an individual to participate (that results in a domino effect).

If individual thresholds, Ti are distributed according to the cdf F(.), F(ne) gives the percentage of people in the population protesting. The rational expectations equilibrium is given by the intersection of the curve with the 45° line. Clearly, there is the presence of multiple equilibria, with A and C being the stable ones. This can be guaranteed by assuming the presence of complete extremists, who would protest anyway and complete pacifists, who would never protest.

Better communication technologies act more as coordinating rather than signaling device in the presence of high food prices and both together reduce the thresholds and change the distribution distribution such that F(ne) shifts upward and the equilibrium percentage of protestors increases.

Determination of the Equilibrium Fraction of People Protesting

*n*

*45°*

A

B

C



In sum, this discussion highlights the role of online networking as a tool that can significantly contribute to the power of informational cascades. Let us conclude with anecdotal evidence from the Egypt revolution to stress this point further[[6]](#footnote-6). As a reaction to social unrest in Egypt in January 2011, the Egyptian Government instructed providers to shutdown services in parts of the country[[7]](#footnote-7). In addition, all mobile operators in Egypt were instructed to suspend services supporting cell phone text messages in selected areas[[8]](#footnote-8). These actions on the part of the Egyptian government were clearly motivated by the aim to prevent activists from communicating to agree on timing and locations of their actions and to post pictures, tweets and videos live from the action. There is ample evidence that, apart from helping protesters to coordinate actions and send out signals once the protest bandwagon was rolling, online communication was used to set the bandwagon in motion. Right after a businessman, Khaled Said, died in police custody in Alexandria in June 2010, Wael Ghonim, the Egyptian-born Google marketing executive, started the Facebook page 'We are all Khaled Said'. The page became a rallying point for a campaign against police brutality. For many Egyptians, it revealed details of the extent of torture in their country (resulting in updates of xi), and the page increased its numbers of followers (S). However, until January 2011, most of the followers were youngsters who chose to hide their identity for fear of persecution. As argued above, it is no coincidence that at a time of food price increases the protest gained in momentum and started to appeal to “moderates”. In the words of Wael Ghonim: "This is the revolution of the youth of the internet, which became the revolution of the youth of Egypt, then the revolution of Egypt itself". Clearly, without the new media a rather ordinary (read credible) person like Wael would not have been able to send signals to so many people.

### Empirical model

The general empirical specification can be written as follows:

 (I)

where g(p)=log[p/(1-p)] is the logit link function that maps the linear index with the response probability of an event taking place in a country i in a given month m;  indicates the country-specific fixed effects; andis the fluctuation in real (logged) food prices with respect to the long-run trend. The price fluctuation is obtained by first de-seasoning the logged real price series using Holt-Winters seasonal smoothing (Holt, 1957: Winters, 1960) and then decomposing the resulting series by Hodrick-Prescott filtering to identify a long-term trend and the shocks to the trend[[9]](#footnote-9). The latter correspond to the fluctuations in the real food price.

In order to distinguish between the incentives to protest for producers and consumers, we run a second empirical specification:

 (II)

, where *price\_fluctuation+im* (*price\_fluctuation-im* )

takes the value zero for negative (positive) fluctuations from the trend.

Both equations I and II are estimated using monthly time series data. As argued in the introduction, this is likely to be appropriate because of (1) important within-year fluctuations in prices, (2) the instantaneous nature of the relationship between food prices and demonstrations, (3) the multiplication of data points which allows a sub period analysis for the two most recent decades. In addition, it can be argued that many forms of protests are short-lived. For example, the recent toppling of Tunisian and Egyptian governments last month took respectively 28 and 18 days from the first incident until the toppling of the government. Furthermore, from the FAO webpage on government responses to the 2008 food price spike, we observe that such responses take around four weeks on average to implement measures intended to appease the protesting populace.[[10]](#footnote-10) Thus, a year seems to be too long a period to try to obtain the estimate of food price changes on riots.

In our main specification the dependent variable unrest is the occurrence of an event characterized by any kind of social disturbance during the period 1990-2010.

As an indicator of unrest, we use the updated Urban Social Disturbances in Asia and Africa (USDAA) dataset compiled by the International Peace Research Institute, Oslo, that tabulates event-related news reports sourced from Keesing’s world news archive in 55 cities in 49 countries in Asia and Africa, from 1960 onwards through 2010 (Urdal, 2008). The events are classified and accordingly coded ranging from those related to civil war, armed/terrorist attacks to those involving government repression, riots and demonstrations. We aggregated the original city-level data at country level. So if any one city of a multiple-city country in the dataset experiences an event, the dependent variable unrest assumes the value of 1. Figures 1 and 2 provide the spatial distribution of events, while Figure 3 tracks their evolution over time, with a distinction made between the. occurrence of all events and those associated with riots and demonstrations.

As a first robustness check in alternative specifications, we restrict our sample to incidents of unrest marked by the participation of the general public as one of the actors involved (events coded as riots, demonstrations, pro- or anti- government terrorism). In addition, in order to check whether the events in 2008 and 2010 – by some tagged as exceptional - are driving our results we remove those two years from the sample.

The main explanatory variable *price\_fluctuations* is calculated in two different ways

because of data limitations. For the data analysis using time series since 1960, we use the US all-wheat cash price, since it is the only one available for that time period.

Monthly data are from the United States Department of Agriculture’s Economic Research Unit for cash prices of different varieties of wheat (Figure 4) deflated by CPI from World Development Indicators. For the sub period analysis (1990-2010), we use the FAO (international) monthly food price index from the FAO Food Price Index database (Figure 3). In calculating the index, the FAO classifies 55 commodity quotations into 5 groups-meat, dairy, cereals, oil & fat and sugar and takes the average of these indices, weighting them by their average export shares over 2002-2004. These indices themselves are constructed by export-weighted average of the respective combination of commodity quotation included therein. One of these indices, the cereal price index, is used as a robustness check. Monthly series are available starting from January 1990.

In a robustness check, we use the more restricted price series of cereals as well as the US all-wheat cash price (deflated using US CPI).

In models using annual data, it is important to include country-fixed effects to control for country-characteristics that remain fixed over time. However, the use of monthly data effectively rules out bias from variables that only change slowly over time. Therefore, in the main specification we do not control for country characteristics that vary over time, both because few accurate monthly level data exists on such characteristics and because it seems reasonable to assume that the most relevant characteristics – e.g. GDP/capita, unemployment level and urbanization level – do not exhibit much variation across the different months. Moreover, several of these characteristics may be thought as endogenous, and hence, whereas including them may reduce omitted variable bias (to the extent that their short term variation immediately instigates protests), it may lead to other forms of endogeneity bias.

Not only does it lesson the problem of reverse causality, as governments do take action in view of protests to mediate and affect the prices, but also record of incidence of onset as a binary variable seems to be less prone to misunderstanding related events of the same movement as distinct thereby introducing error in the count and lending itself even more to sample selection bias (selection of news reports from places already under spotlight or public attention) attributable to the news agency (Keesing’s in our case).

### Results

Table 1. Impact of food price changes on the incidence of social unrest, all events



The estimation of equation I (in table 1) indicates a strong association between price shocks and the onset of social disturbance. More specifically, the coefficient, α1, associated with the first specification turns out to be significant at a 1% level and corresponds to a value of 12.32, which should be read as the change in the odds ratio of an event taking place in response to a 1% (absolute) change in deviation from the long-run price trend or put simply, in response to a “shock” [[11]](#footnote-11).

When we distinguish between consumer and producer responses, we need to look at differences between reactions to price declines (hurting producers) and price increases (hurting consumers). Table 1 column 2 shows that the coefficients are of similar magnitudes for respectively the positive and negative price shocks (Table 1 column 2).

Table 1 columns 3, 4 and 5 present results of robustness tests. The findings remain qualitatively the same when using the cereal price index or excluding the peak spike years, 2008 and 2010. However, in both of these robustness checks, the quantitative impact is less pronounced, with an 80% decrease in the former case and a 40% decrease in the odds ratio in the latter (Table 1 columns 3, 4 and 5). The findings also remain similar when including only ‘mass’ events (Table 2).

For the years prior to 1990, the detailed FAO price indices are not available. Hence, to compare results between 1960-2010 and the sub period 1990-2010, we rely on a different monthly time series data, i.e. the US all-wheat data, a specific constituent of which was also used in the analysis of Hendrix et al. (2009).

The results are reported in Table 3. Whereas the estimated coefficient of the wheat price shock is insignificant for the period 1960-2010, it turns significant for the sub period 1990-2010. Moreover, distinguishing between price shocks that negatively affect consumers and producers, we find that this difference between periods is entirely driven by a stronger reaction of consumers to food price increases. One explanation may be that the past two decades were characterized by dramatic price increases rather than decreases. Another potential explanation is our hypothesis of lower communication costs with new technologies, which may especially be helpful to overcome coordination problems for consumers, not only due to greater heterogeneity compared to producers, but also due to lack of alternative forms of organizing like the producer lobbies. This is in contrast with Hendrix et al., who find larger responses among producers than consumers in their analysis of annual time series for 1960-2006. Below we further analyze this and demonstrate that this difference can be attributed to the shift in the period of focus.

### Conclusion

In this paper we analyzed the impact of changes in food prices on demonstrations and riots.

A major difference between the historic riots in the 17th-19th century and the present-day riots is the global character of the latter. Rather than being triggered of by local harvest failures or local government decisions (e.g. tax increases), the causes of the fluctuations in food prices in modern times were global (e.g. increased global demand for raw materials). Moreover, globalization has continued to evolve in the past twenty years and hence has continued to shape the factors that influence the level and volatility of international food prices. Second, in the time span of the past two decades, a number of countries have transformed themselves from food exporting to food importing countries, and vice versa (Ng and Aksoy, 2008). Third, we will also argue that the internet revolution, which is by now a fact in many parts of the developing world, has altered the dynamics of protest movements, first by making them more contagious through the rapid spread of news events, and second, by providing activists with a powerful device, i.e. online social networking, to coordinate actions and overcome the collective action problem that often constraints demonstrations and protest movements.

In a conceptual framework that builds on models of political mobilization, we show that food price changes can act as a coordination device and trigger a powerful cascade in collective action because food is a basic necessity. It can thus mobilize ‘moderates’ which otherwise would not engage in costly collective actions. We also discussed how mass media and new technologies may add to the power of this information cascade and strengthen the relationship between food prices and protests.

In the empirical part, we analyze the relationship between food price changes and protests for major cities in Asia and Africa, controlling for country fixed effects. In contrast to previous studies, we use monthly data and include the most recent data available. The use of monthly data is a significant innovation of our study and should lead to better estimates because of the occurrence of important within-year fluctuations in food prices, the short-lived character of many forms of protests, the instantaneous character of the relationship between price changes and protests, and the reduction of possible omitted variable bias stemming from time varying country characteristics.

Moreover, the use of monthly data allows to work with a much larger dataset, which in turn allows a detailed post-1990 analysis. The sub period analysis for 1990-2010 is useful, not only because better data is available for the post-1990 period, but also because, as argued in the conceptual framework, both the evolution in the global food system and in communication technology may have profoundly affected the impact of food price changes on social unrest.

Our analysis indicates that a one percent increase in the deviation from the trend in food prices significantly increases the odds ratio of an urban disturbance event. This is true both for a positive and a negative deviation from the trend, indicating that consumers of food as well as producers engage in collective action upon price changes. When comparing results across the entire time series (1960-2010) and the sub period post-1990, we find that the relationship between food price increase and social unrest has become stronger over time. No such change can be found for the relationship between food price decreases and social unrest. These results are robust to removing the exceptionally high price spikes in 2008 and 2010 from the time series.

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**Figures & Tables**

Figure 1. Global distribution, all events (incidents involving disturbances) 1960-2010

Figure 2. Global distribution, all recent events (incidents involving disturbances), 1990-2010



Source: USDAA, 2010 (PRIO)

Figure 3 Time trend of events involving social disturbances, 1960-2010

Note: Mass events are those that involve collective action with the general public as one of the actors involved such as government repressions, riots and demonstrations

Figure 4. Real (log) food price index



Source: FAO, Calculated by export weighted average of 6 commodity price indices

Figure 5. Deflated price (averaged over all varieties) of wheat



Source: US deptt. of Agriculture, Economics Research Service

Figure 6. Event reportage and price correlation



Table 1. Impact of food price changes on the incidence of social unrest, all events



Table 2. Impact of food price changes on the incidence of social unrest, riots and demonstrations



Table 3. Impact of food price increases on social unrest, all events: 1960-2010 and 1990-2010



Table 4. Distribution of events (all, mass) across countries



1. Corresponding author: abhimanyu.arora@econ.kuleuven.be [↑](#footnote-ref-1)
2. We thank Henrik Urdal, Scott Gates, Halvard Buhaug, and attendants at seminars in Oslo (PRIO) and Leuven (LICOS) for helpful comments. We owe thanks to PRIO (Peace Research Institute Oslo) for making available the Urban Social Disturbance in Africa and Asia (USDAA) database and for hosting one of the authors of this paper (A. Arora) to update the data for the period 2005-2010. Special thanks to Koen Deconinck for stimulating discussions. [↑](#footnote-ref-2)
3. An exception is the study by Miguel et al (2004), who instrument for economic decline using rainfall shocks and establish a causal link between economic hardship and the incidence of civil war. [↑](#footnote-ref-3)
4. We owe thanks to Romain Houssa for suggesting the HP approach. [↑](#footnote-ref-4)
5. In the original article by Kuran (1989), this critical threshold is referred to as the *revolutionary* threshold. [↑](#footnote-ref-5)
6. Sources: BGPmon, a monitoring site that checks connectivity of countries. Internet intelligence authority Renesys: http://www.renesys.com/blog/2011/01/egypt-leaves-the-internet.shtml. BBC news: http://www.bbc.co.uk/news/technology-12306041. Huffington post: http://www.huffingtonpost.com/2011/02/03/vodafone-egypt-text-messages\_n\_817952.html [↑](#footnote-ref-6)
7. Between January, 27 and January, 31, the number of reachable Egyptian networks decreased from 2903 to 134, a decrease of more than 95% . [↑](#footnote-ref-7)
8. Moreover, the Egyptian government required Vodafone Egypt to send pro-government advertisement as text messages. [↑](#footnote-ref-8)
9. We make use of the Hodrick-Prescott (1981,1997), or HP-filter, generally used in the macroeconomic literature to extract business cycles from long-run trend of economic activity. The basic underlying concept remaining the same, HP-filtering of (logged and de-seasoned) international food price series leads to one series reflecting the general trend in food prices and another revealing the shocks or fluctuations in price index around that trend. The logged food price index series is deseasoned using the Holt- Winters smoothing. [↑](#footnote-ref-9)
10. See <http://www.fao.org/docrep/010/ai470e/ai470e05.htm> for policy response, and (Schneider (2008) for a comprehensive account of events in 2008. [↑](#footnote-ref-10)
11. The associated marginal effect is about .10 (evaluated at the mean change), or in other words there is a probability of 10% associated with occurrence of an event. [↑](#footnote-ref-11)