Journal of Development Economics 99 (2012) 314–329

Contents lists available at SciVerse ScienceDirect

Journal of Development Economics

journal homepage: www.elsevier.com/locate/devec

The (hidden) costs of political instability: Evidence from Kenya's 2007 election crisis ☆

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ARTICLE INFO

Article history:
Received 14 March 2011
Received in revised form 27 March 2012
Accepted 30 March 2012

JEL classification:
O20
I10
D74

Keywords:
Political instability
Risk-coping
Kenyan post-election crisis

ABSTRACT

This paper studies the microeconomic impacts of the political crisis and civil conflict that immediately followed the December 2007 presidential election in Kenya. Income, expenditures, and consumption dramatically declined for a broad segment of the rural population for the duration of the conflict. To make up for the income shortfall, women who supply transactional sex engaged in higher risk sex both during and after the crisis. While this particular crisis was likely too short for these behavioral responses to seriously increase the risk of HIV or other STIs for these women, such responses could have long-term repercussions for health in countries with longer or more frequent crises. Overall, our results suggest that social unrest can be an important channel through which political instability can affect long-term outcomes such as health.

1. Introduction

After a contentious and bitterly fought campaign between the incumbent Mwai Kibaki and the challenger Raila Odinga, Kibaki was announced the winner of Kenya's presidential election on December 29, 2007 despite widespread reports of vote-rigging. The announcement sparked violent protests that quickly transformed into ethnic clashes, and led to a state of emergency that virtually shut down roads and markets. The civil conflict lasted for two months, and ended in late February 2008 when a peace agreement was signed and a power-sharing government was formed.

This type of civil conflict is common in sub-Saharan Africa and in developing countries in general (Blattman and Miguel, 2010). Besides the Kenyan crisis, recent examples of social conflict generated by political instability include the disputed 2010 presidential election in Cote d'Ivoire, coups in Madagascar in early 2009 and Guinea in late 2008, state violence before the presidential election run-off in Zimbabwe in 2008, and riots following Benazir Bhutto's assassination in Pakistan in 2007, among others. Understanding how these sporadic yet recurrent episodes of social unrest affect households is critical in understanding the role of political instability in underdevelopment.

This paper uses a unique dataset collected immediately following the upheaval to estimate the impact of Kenya's political crisis on households in Busia District, Western Kenya, an area in which the crisis did not result in a substantial direct human toll in terms of casualties, but in which market activity was seriously disrupted. Episodes of social unrest and associated market disruptions such as this, even if short-lived, may have long-term consequences on a variety of important outcomes. The basic issue is that such crises tend to drastically reduce individual income during (and sometimes after) the period of unrest, and many individuals are unable to cope with this income reduction except by engaging in activities which are detrimental to their long-term well-being. These responses will be particularly large in poor countries where formal means of coping with risk (such as insurance or savings accounts) are largely absent, and where the marginal utility of consumption

☆ We thank Daron Acemoglu, Bruce Berman, Dara Cohen, Taryn Dinkelman, Kim Dionne, James Fearon, Sarah Green, Seema Jayachandran, David Laitin, Ted Miguel, Rohini Pande, Nishith Prakash, Leonard Rubenstein, Ryan Sheely, Chris Udry, two anonymous referees and numerous conference participants for helpful comments and suggestions. Though we cannot name them all individually, we are grateful to the field staff who collected this data. We thank in particular Carol Kemunto, Violet Kanyanga, Jack Adika, Eric Bwire, Anthony Oure, and Isaac Ojino for their field work, and Nathaniel Wamkoya for data entry. We thank Katie Conn, Eva Kaplan, Espen Beer Prydz, and Stephanie Ruiz for overseeing the data collection, and Sefira Fialkoff, Seth Kerstein, and Yao Yao for research assistance. We thank Innovations for Poverty Action for administrative support and the UCSC Committee on Research for funding. All errors are our own.

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doi:10.1016/j.jdeveco.2012.03.003

is very high, so that households are forced to take costly actions to maintain consumption.[1]

For example, households might be forced to reduce caloric intake (Bhattacharya et al., 2003; Maccini and Yang, 2009), which may have long-term effects for children's health (e.g., Hoddinott et al., 2008), or they may pull children out of school (Jacoby and Skoufias, 1997; Thomas et al., 2004; see Ferreira and Schady, 2009 for a recent review article). While these types of responses may be very costly, they will not show up in basic risk-coping tests which examine the responsiveness of consumption to income shocks (Chetty and Looney, 2006; Morduch, 1995).[2] In general, these types of hidden costs are difficult to identify empirically and consequently have received relatively little attention.

We show that the two months of civil conflict in Kenya had a sizeable negative impact on the incomes of a broad range of households, and led to large declines in expenditures and in consumption of necessary items, notably food. We then focus our analysis on a specific "hidden" cost: the extent to which the crisis affected the supply of unprotected transactional sex. This is a relevant question in the context of the area of study (Busia, Kenya), because Busia is a known "hotspot" for transactional sex (mostly because it is a border town on a major trucking route). In the immediate aftermath of the crisis, we tracked 226 women who supply transactional sex and asked them detailed questions about their sexual behavior before, during, and after the crisis.

We find compelling evidence that women supplying transactional sex lacked adequate insurance or consumption smoothing devices to cope with the income downfall, and so increased their supply of high-risk but more lucrative sex (particularly unprotected sex) after the crisis ended. In informal qualitative interviews, women tended to report needing to make up for their lost income as a rationale for their post-crisis behavior, and our data bears this out. Such impacts are noteworthy because unprotected sex is extremely dangerous in this part of Kenya: in the 2003 Kenya Demographic and Health Survey, HIV prevalence was estimated to be 9.8%, substantially higher than the national average of 6.7% (Central Bureau of Statistics, 2004). Over a long enough time period, substituting to these types of activities can have a sizeable effect on the probability of contracting or transmitting HIV.

While sex workers are obviously a selected sample, a surprisingly large fraction of women supply transactional sex in the study area (12.5% of women aged 15–49 — see Robinson and Yeh, 2011). While sex work is likely more prevalent in Busia than in Kenya as a whole, transactional sex is relatively common in developing countries (Luke, 2006; Swidler and Watkins, 2007; Wojcicki, 2002). Moreover, the transactional sex market warrants serious attention because it has long been seen as an important factor in the spread of HIV/AIDS (i.e. Chen et al., 2007; Plummer et al., 1991; UNAIDS, 2002).

Our contribution to the literature is four-fold. First, and most importantly, our dataset makes it possible to look at the household-level effects of an unanticipated and intense political crisis immediately after it ended.[3] While a previous literature has shown that civil war has devastating effects on human capital accumulation, particularly health and education (Akresh and De Walque, 2011; Blattman and Annan, 2010; Bundervoet et al., 2009), our contribution is to show that civil unrest, a milder and more common form of civil conflict, can also have important negative economic and health effects. Collecting quality data in areas of conflict is usually difficult, for multiple reasons: entering the study area during or soon after the crisis is often out of the question for security reasons, and pre-crisis data often does not exist. We were able to overcome both of these challenges because we had been following a broad range of individuals before the crisis began, which made it possible for us to track respondents down immediately after the peace-sharing agreement was signed, and ask them to recall their income, labor supply, and consumption throughout the crisis period.

Second, this paper contributes to the large literature on risk-coping over large, aggregate shocks.[4] Although the crisis we study was political, it caused major decreases in income and caused large market disruptions. For these reasons, the shock we study was similar to a destructive natural disaster (such as a flood or a hurricane), but with a much faster recovery of markets.

Third, by identifying the increase in unprotected sex during and after the crisis, our paper contributes to a literature which looks at the hidden costs of conflict, such as excess mortality due to the deterioration of health infrastructure or the diversion of public funds from public health or education toward military or economic rebuilding.[5]

Fourth, our paper contributes to a literature on the effect of economy-wide income shocks or economic downturns on the decision to engage in commercial sex. Historically, such crises have generated an increase in entry into sex work as a coping strategy, both in developed and less developed countries. For instance, Bullough and Bullough (1987) discuss how entry into sex work increased in immediate post-World War II Germany, Italy, and Japan. Similar increases were seen following the Great Depression in the United States (Allen, 2004) and during the economic turmoil in the former USSR in the 1990s (Aral et al., 2003; Atlani et al., 2000). These studies all focus on the extensive margin of sex work (entry into the profession). Our study differs in that it looks at the intensive margin, which is harder to observe and therefore typically overlooked.

2. Analytical framework

2.1. Permanent income hypothesis

While the primary goal of this paper is to describe the effects of Kenya's political crisis, it is useful to briefly lay out a framework within which to interpret the observed impacts. The permanent income hypothesis (PIH) is the benchmark economic framework for estimating the relationship between income, savings and consumption (see Jappelli and Pistaferri, 2010 for a review). In its most basic form, the PIH is based on the idea that risk averse individuals dislike consumption fluctuations, and would prefer to smooth the marginal utility of consumption over periods. The motivation for saving in the PIH is therefore in anticipation of possible future income shocks.

Given this, a first consideration is that the response to the post-election crisis depended on whether people anticipated the crisis before it happened or not. If they anticipated it, they could have planned for it in advance by reducing consumption so as to smooth over the shock. While it's possible that Kenyans did think election-related violence was possible, it is very unlikely that they expected anything as serious as what occurred. This is consistent with the massive decrease in consumption we observe during the crisis. Furthermore, the uptick in consumption in December 2007 (just before the election) suggests that people celebrated the Christmas holiday "as usual." Had they feared a crisis, they would likely have limited their holiday consumption.

Second, the response to the crisis will depend on whether people thought it was a transitory shock which would be resolved relatively

[1] See Oxfam (2002) and Skoufias (2003) for reviews of risk coping strategies taken by households in crisis periods. See also Corbett (1988).

[2] See Baird et al. (2011) for evidence that negative aggregate income shocks are strongly correlated with increased child mortality.

[3] Estimation of such effects is typically very difficult because of the dual causality between conflict and economic outcomes (Collier, 2007; Miguel et al., 2004).

[4] We do not give an exhaustive list of papers on the effects of aggregate shocks. Some notable studies include Frankenberg et al. (2003) on the 1997 Asian Financial Crisis, McKenzie (2003) on the 1995 Mexican Peso Crisis, and Stillman and Thomas (2008) on the 1996–98 economic crisis in Russia.

[5] See, for example, Burnham et al. (2006), Coghlan et al. (2006), Ghobarah et al. (2003) and Roberts et al. (2003).

quickly, or a more permanent descent into civil conflict. Transitory shocks which last a short while and which are small relative to lifetime income should be handled with savings. In contrast, permanent shocks should be handled through permanently reduced consumption to balance the lifetime budget constraint.

The post-election crisis was transitory and was ultimately small compared to lifetime income (even sex workers, who were the worst affected, lost less than a month's worth of income in total). If people (correctly) realized the crisis was transitory, the PIH would suggest that they should have tried to maintain consumption during the crisis by relying on their savings. If people instead (wrongly) thought the crisis was permanent, they would have dramatically decreased consumption immediately and not relied on savings. In either case, assuming demand and supply in the transactional sex market eventually returned to normal, people would also work about as much in the post-crisis period as they did in the pre-crisis period, since lifetime income would only have changed marginally (for those who thought the crisis was transitory) or not at all (for those who thought the crisis was permanent).[6]

We have reason to suspect that the PIH would not hold in this sample, because access to formal credit in the area is very limited and because many households are not able to save as much as they would like (Dupas and Robinson, 2012, forthcoming). Thus even though the shock was not large relative to lifetime income, people might not have had enough liquidity to smooth it over. In fact, the shock may have completely wiped out informal savings at home so that once the crisis ended, individuals had to build their savings back up by increasing their labor supply.

2.2. Implications for the market for sex

A negative shock such as Kenya's political crisis may have affected the market for transactional sex through two channels. First, the unrest had the mechanical effect of shutting down markets and made it risky to venture outside the home. This would have tended to decrease both the demand and supply of sex during the crisis. Note that the market disruption could also lead to a shift in client composition. In particular, such disruption might reduce the demand by casual clients (especially those who rely on the functioning of roads and markets, for example truck drivers or traders) much more than the demand by regular clients (who are involved in longer-term relationships with women). Again, this effect should be most pronounced during the crisis and should not persist afterwards.

Second, the crisis affected the incomes of both sex workers and their clients. As mentioned earlier, since the income shock was transitory, the PIH predicts that people should have dissaved to maintain consumption during the crisis (so long as people correctly perceived the shock as transitory). Thus, while prices and quantities would fall during the crisis because markets were shut down, demand and supply would return to normal after the crisis ended.

However, if people were unable to fully cope with the shock, it is likely that demand and supply would still be affected after the crisis. If sex work is a normal good and clients were unable to fully shield their income from the crisis, demand would likely be reduced because income had fallen. At the same time, supply would likely shift out if women had to make back the income lost during the crisis.

Thus, while it's clear that prices should fall, the effect on quantities is ambiguous and depends on the relative changes in supply and demand. There are two reasons to suspect that demand would be more affected than supply, however. First, clients tend to be richer than sex workers (Robinson and Yeh, 2012), which would make the shock itself less dramatic for them. Second, as modeled in Jayachandran (2006), the labor supply response to a negative productivity shock (such as a fall in demand) tends to be relatively inelastic for people close to subsistence with limited access to financial services. This is because the income effect of a decrease in the wage rate (here, the price of sex) can be quite substantial if people cannot borrow or dissave against future income, mitigating any substitution effect. Overall, then, the increase in supply coming from a desire to make up lost income among sex workers would likely overwhelm the countervailing force of the demand shock. Clients, by contrast, would likely be better able to borrow against future income, making demand more elastic to the price decrease resulting from a shift in supply.

2.3. Taking this to the data

Given this analytical framework, our empirical analysis below will examine:

1. The overall consumption impacts of the crisis, and how it varied with access to coping mechanisms, to understand whether the shock was considered transitory or permanent;
2. The relative magnitude of the impact of the crisis on those who may demand sex and those who supply it;
3. The impact of the crisis on the quantity of sex transacted during both the crisis period itself, and the immediate aftermath of the crisis.

3. Background: the 2007 election crisis in Kenya

After a long and contentious election campaign, Kenya held general elections on December 27, 2007. Despite concerns about serious flaws in the counting and tallying of votes and a long delay before announcing the results, the incumbent Mwai Kibaki was announced the winner of the presidential vote on December 29, by a narrow margin, over the opposition candidate, Raila Odinga. The announcement of the election results sparked widespread violence in many parts of Kenya. Looting, arson, and property destruction were rampant throughout January and February 2008. The violence is estimated to have resulted in about 1200 deaths and the displacement of 500,000 or more people (Gibson and Long, 2009). After weeks of negotiation, a power sharing agreement was finally signed on February 28, 2008, and general calm was restored.

The human toll was high. A few months after the end of the civil conflict, 30% of the population reported a specific personal impact of the post-election violence (Gutiérrez-Romero et al., 2008). These impacts included personal injury, displacement, property destruction, and the death of friends or relatives. In addition to the direct effect on the victims of the violence, the political crisis and resulting civil conflict led to massive economic disruptions in January and February, as commercial transport was halted through much of the country and market centers were closed. Areas dependent on transportation and imports or exports were particularly hard-hit (Glauser, 2008).

While election-related violence is not unprecedented in Kenya, all evidence suggests that the intensity, duration and geographic reach of the 2007–08 crisis was unparalleled and generally unanticipated. Although previous elections have resulted in casualties and in the displacement of people (particularly in 1992 and 1997), those disturbances were nowhere near the scale of the 2007 election (Dercon and Gutiérrez-Romero, 2010; Human Rights Watch, 2008; Kenya National Commission on Human Rights, 2008). Moreover, the previous election (in 2002, in which Kibaki was originally elected) was marked by relative peace. While people might have expected some disruption in advance of the 2007 election, it seems reasonable

[6] In a more general framework in which households have a precautionary motive for savings, the results would not be quite so stark. However, given empirical estimates of the magnitude of the precautionary motive, it is still generally the case that the effect of a transitory shock would be "small" and that of a permanent shock would be "large." For more, see Jappelli and Pistaferri (2010).

to assume that the severity and length of this crisis were unanticipated by most people.[7]

Our data comes from Busia District in Western Province. Its market center, Busia town, is a semi-urban border town on the main trucking route between Nairobi and Kampala, Uganda. Busia was only marginally affected by outright violence, but fires, road blockades, and market closures were common during the crisis. In particular, roadblocks on the main transportation artery (the Nairobi-Kampala road) led to shortages in many items, and prices skyrocketed. The price of basic food items as well as other essential items such as cell phone cards and soap increased by 20–30% in the two weeks following the election (Fig. 1). Some prices remained high even after the power-sharing agreement was signed in late February.

4. Sample, data and empirical methodology

4.1. Sample

The data we use is drawn from three distinct samples from Western Kenya: women who supply transactional sex in Busia town; self-employed individuals from nearby Bumala town; and shopkeepers from 18 market centers in the area. These three particular samples are used out of convenience: the respondents in all three samples had been participating in other projects before the election crisis. This made it possible to track them soon after the crisis was over (in comparison to, for example, a representative sample of households). We describe below in detail how these samples were initially constructed, and how they were traced and surveyed for this specific study.

4.1.1. Sample 1: "women who supply transactional sex" in Busia town

As a border town on a major highway, Busia has a very large number of sex workers, and is considered a "hotspot" for commercial sex activity. However, while transactional sex is prevalent in the area, it is difficult to identify women who provide sex. First and most obviously, sex work is illegal in Kenya and women are hesitant to identify themselves to an outside organization. Another, less obvious, complication is that transactional sex is very common in a variety of relationships in Kenya, as it is in other parts of sub-Saharan Africa. For example, Swidler and Watkins (2007) show that transactional sex is present even between married couples in Malawi. Since sex-for-money is relatively common, this creates a related problem that many women who provide transactional sex do not self-identify as "sex workers." Lastly, the market for sex-for-money in Busia is very decentralized. For example, very few women work in brothels or other centralized locations — it is much more common to find clients in bars or nightclubs.

To overcome these challenges and identify a relatively representative sample of sex workers, in 2005 Robinson and Yeh (2011), henceforth RY, partnered with the Strengthening STD/HIV Control Project (SHCP) in Kenya, a Kenyan organization that supported thousands of formal and informal sex workers across the country by organizing them into peer groups. The peer groups were intended to meet regularly to discuss health and other issues relevant to sex workers. To deal with the hazy distinction between a "sex worker" and a woman who has multiple concurrent sexual partners, SHCP employed a very loose definition of a sex worker: any single, widowed, divorced, or separated woman, aged 18 or older, who had multiple concurrent sex partners. SHCP's field staff was tasked with identifying women who met these criteria to inform and enroll them into the peer groups. By 2005, SHCP had enrolled approximately 400 women into 30 peer groups in the Busia area.

For their original study, RY visited each of these peer groups in the 2005 and asked each member to list all the women she knew who met SHCP's definition of a sex worker (whether they were in a peer group or not). They identified 1205 women in this way. Since the estimated population of Busia was about 44,196 (Central Bureau of Statistics, 2001) around that time, this amounts to an estimated 12.5% of women aged 15–49 (and 29.7% of unmarried women aged 15–49). This extremely high percentage of women engaged in transactional sex (as defined by SHCP) is not likely to be representative of Kenya as a whole, and again is driven by Busia being a border town on a major highway.

Of these 1205 women who were identified, 248 were randomly selected for the RY study that took place in 2005/2006. Forty-five percent of this sample were members of a peer group, whereas the other 55% were identified outside of the groups. The RY data revealed that the definition of sex workers used by SHCP was pertinent: all 248 women did in fact have sex for money (or for in-kind payments). This could be because women in the peer groups implicitly used a stricter definition when identifying other women, effectively screening out women fitting the SHCP definition but not involved in sex work.

In March 2008, we attempted to trace all 248 women in that sample in order to administer our post-election survey. Note that this includes all of the women originally sampled for RY, whether they had enrolled in the RY study or not.[8]

4.1.2. Sample 2: self-employed entrepreneurs from Bumala town

Our second sample is composed of self-employed entrepreneurs (mostly female market vendors and male bicycle taxi drivers) who had been sampled for a previous study by Dupas and Robinson (forthcoming). To draw a sample for that study, enumerators were assigned specific areas in and around Bumala town, and asked to identify market vendors and bicycle-taxi drivers operating there. A background survey was administered to consenting individuals identified this way, and those who did not have a bank account (over 97% of those identified) were enrolled in the study. This sampling procedure was repeated in three waves, conducted in 2006, 2007 and 2008. At the time of the present study (March 2008) we only had access to the sample identified through the first two waves (230 people in total). We attempted to trace all of them for the post-election survey.

4.1.3. Sample 3: shopkeepers from 18 market centers in Western Kenya

The shopkeeper sample was drawn between 2005 and 2007 for Kremer et al. (2010). To draw the sample, a census was conducted in 18 market centers in Western Kenya. The census included a total of 325 shops. In March 2008, we attempted to follow up and administer our post-election survey to all of these shops (whether or not they were eligible for or actually participated in the Kremer et al. study).

4.2. Data

4.2.1. Background information

Individuals in each of the three samples in the study had been administered a background survey in the years prior to the 2007 election, as part of the independent studies mentioned above. Specifically, background information on Sample 1 (women who supply transactional sex) was collected in 2005, while information for the other 2 samples (small-scale entrepreneurs and shopkeepers) was collected in 2006–2007. For each sample, the background data collected included basic demographic information as well as assets and education levels. We use this data to provide background summary statistics on the samples under study in Table 1, and to control for basic demographic characteristics in the regression analysis.

4.2.2. Post-election survey

We attempted to visit each individual in these three samples in the aftermath of the crisis (March 2008). We found 240 (97%) of

[7] We are not aware of any studies which had asked for people's expectations about the election before it occurred.

[8] In total, 192 of the 248 sampled women participated in the RY study.

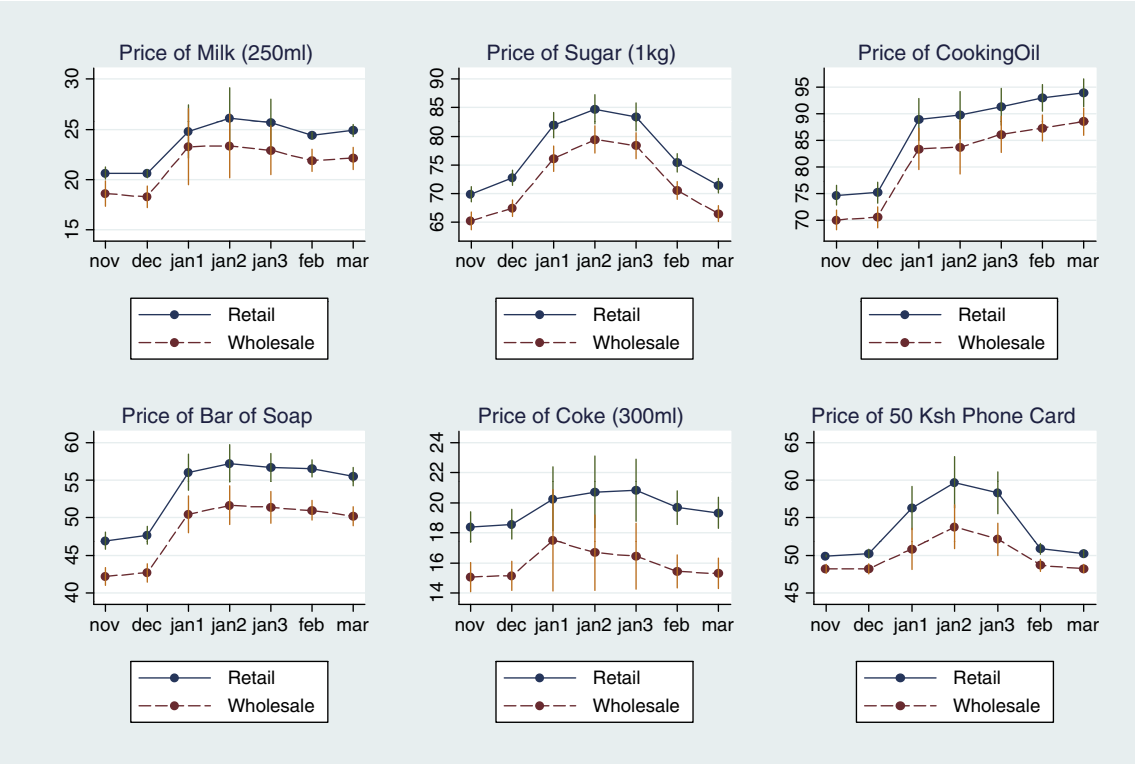

Fig. 1. Prices before and after presidential election. Notes: Figure similar to Dupas and Robinson (2010). Figure reports average prices (retail and wholesale) in Kenyan shillings reported by 220 shop owners in 18 market centers in Western Kenya for November 2007, the first three weeks of December 2007, the first week of January 2008 (jan1), the second week of January 2008 (jan2), the third week of January 2008 (jan3), February 2008 and March 2008. The Presidential Election occurred on December 27, 2007 and violence erupted in the following days. Exchange rate was roughly 70 Ksh to US $1 during the sample period.

248 women who supply transactional sex in Sample 1; 151 (66%) of the 230 small-scale entrepreneurs in Sample 2; and 220 (68%) of the 325 shopkeepers in Sample 3.[9] By the time of the follow-up (more than 2 years after first being identified), 14 women in Sample 1 had stopped supplying transactional sex and are therefore dropped from the analysis.

All those individuals that could be traced were administered a detailed post-election survey. This survey collected retrospective data on income, expenditures, various consumption measures including the number of meals consumed and the types of food consumed, and other related outcomes, over the November 2007–March 2008 period. For each outcome, respondents were asked to recall the amount for an average week in November 2007, December 2007, February 2008 and March 2008.[10] In addition, we asked for a detailed account week by week for January 2008 (since the crisis was particularly severe in early January). Given the salience of the events that occurred during the political crisis, people were able to easily remember each week of January separately.[11] Dupas and Robinson (2010) present this data in graphs, and show very drastic changes in income and consumption over the time period of the survey. The survey also asked about the risk-coping strategies employed during the crisis. To benchmark the risk-coping results, we also asked about risk-coping mechanism in the year before the crisis (January–December 2007).

For the sample of women who supply transactional sex, the post-election survey included an additional module designed to collect detailed information on sexual activities performed between November 2007 and March 2008, including information on income in the sex sector and on the number of clients seen.

Gathering detailed information on the sexual behavior of sex workers is typically very difficult, because sex workers tend to under-report their sexual behavior to enumerators. For this paper, collecting this data was made easier by the fact that most women in our sample had previously participated in the RY study. We used enumerators that were trusted by sex workers: two women trained to run SHCP peer groups, and their supervisor, a trained nurse who oversaw all the peer groups in the area. Further, two of these enumerators had collected the data in the previous RY project. Since sex workers were comfortable with the enumerators and trusted them, reporting was less likely to suffer from desirability bias. In particular, women were much more likely to report taboo activities such as anal sex than in other studies, even among similar populations within Kenya (for instance, Ferguson and Morris, 2003).

RY identified a reliable and culturally appropriate way to obtain information on sexual behavior by asking women to complete detailed daily diaries in which they could self-report their sexual activities. Since these diaries were self-recorded privately, they afforded respondents confidentiality (compared to a face-to-face interview). In addition, since they were recorded with high frequency, they did not suffer from recall bias. For the present study, collecting such diaries was not an option since the data was collected retrospectively.

[9] All of those who were found filled in information for all the periods, so that there is no issue of non-compliance across the different time periods. For those who could not be traced, most had moved out of the survey area (for marriage, work, or other reasons). Note that the violence did not cause many exits of businesses. No market vendors or sex workers appear to have exited because of the violence. Four Kikuyu-owned shops were destroyed, however, comprising about 1.4% of the shops in the sample.

[10] In an early version of the survey, we asked for each week in every month (including the pre-crisis period), but we found that asking for that level of detail provided little further information.

[11] On the one hand, salient events might increase the vividness of memory and thus the accuracy of recall. On the other hand, salient events might lead people to exaggerate how bad things were during the crisis. While we cannot rule this out, it seems unlikely that this accounts for all of our results given the price increases we observe (in which prices increased past the manufacturer's suggested retail price). In addition, much of this paper focuses on how women responded after the crisis ended.

Table 1
Background characteristics.

	Small-scale business owners		Shopkeepers		Women who supply transactional sex	
	Mean	Std. dev.	Mean	Std. dev.	Mean	Std. dev.
Male	0.50	[.5]	0.40	[.49]	0.00	[.]
Age in March 2008	32.72	[8.5]	33.63	[9.71]	30.74	[7.39]
Ethnic group						
Luhya	0.59	[.49]	0.40	[.49]	0.42	[.49]
Luo	0.41	[.49]	0.46	[.5]	0.47	[.5]
Teso	0.00	[.]	0.09	[.28]	0.05	[.21]
Kikuyu	0.00	[.]	0.01	[.07]	0.02	[.14]
Other	0.00	[.]	0.15	[.36]	0.04	[.2]
Years of Schooling	6.99	[2.76]	9.92	[2.18]	9.25	[2.66]
Can Read Swahili	0.86	[.35]	0.92	[.28]	0.96	[.19]
Number of Biological Children in March 2008	3.09	[2.16]	3.39	[2.54]	2.52	[1.58]
Total # of Dependents in March 2008	3.94	[2.39]	5.25	[3.53]	2.89	[1.75]
Married at time first enrolled in sample[a]	0.74	[.44]	0.79	[.41]	0.00	[.]
Cohabitating at time first enrolled in sample	–	–	–	–	0.13	[.34]
Widowed at time first enrolled in sample	0.12	[.33]	0.07	[.26]	0.24	[.43]
Durable assets value (Ksh) at time first enrolled in sample	13,672	[14,304]	121,208	[320,694]	21,867	[19,030]
Received loan from a formal institution or moneylender in 2007	0.07	[.26]	0.22	[.41]	0.13	[.34]
Received an informal loan (from a friend, relative, neighbor) in 2007	0.50	[.5]	0.15	[.36]	0.26	[.44]
Received gift (from a friend, relative, neighbor) in 2007	0.71	[.46]	0.47	[.5]	0.56	[.5]
Gave an informal loan (to a friend, relative, neighbor) in 2007	0.40	[.49]	0.45	[.5]	0.26	[.44]
Gave a gift (to a friend, relative, neighbor) in 2007	0.50	[.5]	0.46	[.5]	0.39	[.49]
Value of animals owned (Ksh) in March 2008						
Participates in ROSCA (Rotating Saving and Credit Association) in March 2008	0.77	[.42]	0.41	[.49]	0.58	[.49]
Additional background information for women who supply transactional sex						
Age began seeing clients	–	–	–	–	18.52	[5.2]
Number of regular clients (at time of background survey)	–	–	–	–	2.27	[1.13]
Respondent has job besides sex work	–	–	–	–	0.86	[.35]
Respondent is head of household	–	–	–	–	0.85	[.36]
Respondent is in peer group					0.45	[.5]
Observations	151		220		226	

Notes: see text for more detail on the three samples. Monetary values in Kenyan shillings. Exchange rate was roughly 70 Kenyan shillings/$1 US during study period. Standard deviations in brackets.
[a] The year of enrollment varied across the three samples. See text (Section 4.1) for details.

Instead, surveys asking women to recall their sexual activities over the previous four months were administered through face-to-face interviews.

An important question is whether this survey data is accurate, or whether it suffers from recall bias and/or under-reporting. A comparison of the RY diary data collected in 2005–2006 with the survey data we collected in the aftermath of the crisis shows lower reported levels of sexual activity (even outside the crisis period) in our survey than in the 2005–2006 diaries. Women reported making an average of US $10 per day from sex work in 2005–2006 according to the diary data, whereas women in our survey reported making only US $12 from sex work in an average week in November, 2007. Likewise the number of clients and unprotected sex acts is about 4 times larger in the 2005–2006 diary data than in our survey data. These differences are likely due to two main factors. First, studies find that diaries or more anonymous survey methods such as self-administered computer surveys yield higher levels of reported sexual activity than face-to-face interviews (Brody and Potterat, 2003). Second, it seems that by 2007–08, women in the sample had reduced the share of their income that they drew from transactional sex (though only 6% had exited sex work entirely). This is likely because women had gotten older and so many might have been transitioning away from sex work.[12]

[12] Since these women are likely less reliant on income from sex work than the average sex worker, our estimates of the impact of the crisis on sexual behavior are likely to be lower bounds. However, we cannot know this definitively as we did not resample a representative sample of women after the crisis.

4.2.3. One-year follow-up survey

In order to control for seasonal variation unrelated to the election crisis, we followed up with a subset of the women who supply transactional sex, exactly one year after the crisis (in 2008–09). We used the exact same modules, and the same team of enumerators, as we did in March 2008 to record information on income and sexual behavior over the November 2008–March 2009 period.

Out of the 226 sex workers surveyed in 2008, 147 (65%) could be traced for the follow-up in 2009. The main sources of attrition were migration out of the area (20%), dropout of sex work through marriage (5%), death (3%), and refusing to be surveyed (3%). The remaining 4% were unavailable to be surveyed during the survey period.

4.3. Final sample characteristics

Table 1 presents summary statistics on the three populations that compose our sample. Overall, 50% of the Bumala sample and 40% of shopkeepers are female. Eighty-six percent of sex workers are the heads of their households, and 86% hold jobs outside of sex work. Almost all of the people in the three samples are Luhya, Luo or Teso, the ethnic groups native to Busia town and the neighboring areas. A very small minority are Kikuyu (the group that strongly backed the incumbent, and the group which was targeted by local mobs in Western Kenya). This ethnic mix reemphasizes the point that the majority of individuals in this sample were unlikely to be directly affected by the violence.

Individuals in all three samples are about the same age and have the same number of biological children. One difference is that shop

owners have a bit more than 5 dependents on average, while the Bumala self-employed have about 4, and sex workers only about 3. The three samples are about equally likely to give informal gifts or loans, but those in Bumala are the most dependent on informal transfers (which is reasonable because they are the poorest of the three groups). However, all three samples are quite well integrated into informal networks of gifts and loans (including the women who supply transactional sex). The fact that people nevertheless suffered from the crisis might be due to the fact that the shock was felt economy-wide, affecting everybody in the network simultaneously.

Finally, while we do not have data on HIV infection rates for our three samples, we suspect that HIV rates are very high among sex workers. This is based both on evidence from other studies (i.e. National AIDS Control Council, 2005; UNAIDS, 2004), and because mortality is high among our sample of sex workers. As mentioned above, in a follow-up survey conducted in March 2009, we found that 3% of women in our sample (who were 31 years old on average in 2008) had died since March 2008. In comparison, the death rate among the other two samples was 0% over the same period. While we do not know the cause of death of those women, it is very likely that it was HIV/AIDS.

4.4. Empirical methodology

We estimate the impact of the crisis by simply comparing several dependent variables immediately pre- and post-crisis. We estimate equations of the following form:

$$\frac{y_{it}}{y_{iNov2007}} = \beta_0 + \sum_{t=Dec2007}^{Mar2008} \beta_t period_t + \mu_i + \varepsilon_{it} \quad (1)$$

where y_{it} represents the outcome of interest, $period_t$ is a dummy variable for the period in question, μ_i is an individual fixed effect, and ε_{it} is the error term. Standard errors are clustered at the individual level. In the surveys, y_{it} is measured as the average for a normal week in a given time period. For most activities, we have data on 8 periods: November 2007, December 2007, each of the four weeks in January 2008, February 2008, and March 2008.[13]

We thus estimate the impact of the violence by examining the pattern of the βs, which reflect the percentage change compared to the pre-crisis period (November 2007). If the violence had an impact, we would expect these coefficients to be negative for most income and consumption measures (except for the pre-crisis month of December 2007).

To maintain comparable samples across outcomes, we restrict the analysis to individuals for whom all the outcomes of interest are observed (income, expenditures, consumption, and sexual behavior for the sex worker sample). Since our unit of observation is at the individual-period level, an individual need not have data at each point in time to be included in the analysis. The results hold if we impose a balanced panel, however.

Though interpretation of these regressions is potentially complicated by the lack of a control group which was unaffected by the violence, the inclusion of the individual fixed effect purges the coefficients from any bias caused by time-invariant, individual-level errors. We will return to the issue of inference later, when we re-estimate regressions for the sex worker sample using a difference-in-difference approach. As we will see, the results are quite robust.

[13] For women who supply transactional sex, we also have data on the 2008–2009 period. We include this data in our analysis, along with dummies for each month-year. Results are similar if we run the regressions omitting this data.

5. The direct effects on income and consumption

5.1. Average effects on income, expenditures and consumption

Table 2 presents the results of our estimation of Eq. (1) for all three samples, with income, expenditures and consumption as dependent variables.[14] The election crisis had a sizeable effect on income for all three types of individuals. For the Bumala sample, income was 47% lower in the first week of January 2008 than it was for an average week in November 2007, and remained significantly lower throughout the month of January. Shop owners, who have much larger businesses (the mean income for the pre-crisis period is indicated at the bottom of each column), were affected even more: average incomes dropped by 59%. However, the drop in income was most precipitous for women who supply transactional sex: income from sex work went down by 89% in the first two weeks of January and remained below 50% of pre-crisis income for the rest of the month. For sex workers, their other sources of income also experienced a sharp drop during the crisis (−85%, column 4). Interestingly, other income did not recover as quickly as that of the other two samples — in the post-crisis period, they still had much lower level of income from non-sex sources (−23%), possibly because they had to eat up their working capital to smooth consumption over the crisis.

Columns 5–7 of Table 2 show a dip in expenditures in January for all three types of individuals in our sample. Here again, the decline is particularly pronounced for women supplying transactional sex (between −49% and −69% in January, and still −25% in February). Given the increase in the price of basic commodities shown in Fig. 1, this dip in expenditures implies an even larger drop in quantities purchased. This decrease in purchases was likely caused by both the large negative income shock, and the fact that markets and shops were closed for a number of days in January, making it difficult to purchase goods even if one had the cash on hand.

To test the extent to which the observed decrease in expenditure corresponds to a decrease in consumption of essential items such as food, we look more specifically at food expenditure in columns 8–10 of Table 2. We find that impacts varied somewhat across samples. Those in the Bumala sample, who tend to live in more rural areas and typically own a small farm (so that they are less reliant on the market to meet food needs even in good times), did not decrease their food expenditure over the period. Shop owners saw a significant decrease, but a relatively small one in comparison to their average food expenditures (less than 10%). In contrast, women who supply transactional sex (who live in a semi-urban area), saw a 20 to 26% decrease in their food expenditure throughout January, and were still spending 9% less on food in February 2008 than they had been in November 2007.

To provide some measure of actual food consumption, we study the impact of the crisis on the number of days the household had meat in Columns 11–13 of Table 2. For all three samples, we find a sizeable decrease in meat consumption. These results suggest that consumption smoothing over the income shock was far from perfect, even among the relatively well-off sample of shop owners. We also ran regressions with whether the household had skipped a meal as the dependent variable, and obtain similar results (not shown).

Note that the dramatic decrease in consumption that we observe confirms that the crisis was at least partially unanticipated by households. As discussed in Section 2.1, if households had rationally

[14] We do not include expenditures for March 2008 in the analysis. This is because the question asking about expenditures in that month was not consistent with the other time periods. In March, respondents were asked to report expenditures over the last week (since the surveys were administered in March), rather than for an "average" week as in the other time periods. As this data is not directly comparable, we exclude it.

Table 2
Income, expenditures, and income during and after post-election crisis.

Sample	(1)	(2)	(3)	(4)	(5)	(6)	(7)
	Income from primary occupation[a]			Other income	Total expenditures		
	Small-scale business owners	Shopkeepers	Women who supply sex	Women who supply sex	Small-scale business owners	Shopkeepers	Women who supply sex
December, 2007	0.24 (0.05)***	0.47 (0.14)***	0.02 (0.05)	0.24 (0.08)***	0.11 (0.06)*	0.04 (0.02)**	0.08 (0.02)***
1st week of January, 2008	−0.47 (0.07)***	−0.59 (0.13)***	−0.89 (0.05)***	−0.85 (0.10)***	−0.02 (0.06)	−0.12 (0.02)***	−0.49 (0.03)***
2nd week of January, 2008	−0.40 (0.08)***	−0.58 (0.11)***	−0.89 (0.05)***	−0.83 (0.10)***	−0.11 (0.03)***	−0.28 (0.05)***	−0.69 (0.03)***
3rd week of January, 2008	−0.31 (0.09)***	−0.33 (0.07)***	−0.57 (0.06)***	−0.81 (0.10)***	−0.08 (0.03)***	−0.18 (0.05)***	−0.67 (0.03)***
February, 2008	0.03 (0.09)	−0.07 (0.09)	−0.03 (0.08)	−0.43 (0.08)***	0.07 (0.03)***	0.01 (0.02)	−0.25 (0.03)***
March, 2008	−0.04 (0.07)	0.19 (0.13)	0.19 (0.07)***	−0.23 (0.06)***	–	–	–
Observations	1040	1512	2282	2282	893	1297	2061
Number of individuals	151	220	226	226	151	220	226
R-squared	0.13	0.08	0.30	0.16	0.03	0.09	0.49
Mean of Dep. Var. in Nov. '07[b]	718	5201	860	957	680	2790	2456
SD of Dep. Var. in Nov. '07	589	11,707	583	1320	399	2712	1090

Notes: see text for more detail on the three samples. Self-reported values in Kenyan Shillings (Ksh) for an average week in each time period. Figures are normalized to their November 2007 mean, so the coefficients represent percentage changes. Several outcomes were not collected for the samples of small-scale entrepreneurs and shopkeepers during the 4th week of January, so we do not use the data from that week. Regressions restricted to observations with complete information on income and expenditures (except for March, since expenditures in that month were misrecorded). Coefficients estimated through OLS regressions with individual fixed effects. Standard errors clustered at the individual level in parentheses.
Exchange rate was roughly 70 Ksh to US $1 during the sample period.

* Significant at 10%.
** Significant at 5%.
*** Significant at 1%.

[a] For women who supply sex, "Income from Primary Occupation" is income from transactional sex.
[b] Means reported here are not normalized.

anticipated a crisis of this length and magnitude, they should have adjusted down consumption even before the crisis to build up buffer stocks and avoid such a massive drop in consumption in January and February. Rather than accumulate buffer stocks in cash, which can be useless when markets are shut down, they should have stocked food and other items, meaning that their expenditures prior to the crisis should have gone up, while their consumption should have gone down.[15] Even though people throughout the world have difficulty fully saving in advance of anticipated shocks (for instance, see Stephens, 2004, for evidence from the US), the magnitude of the decline we observe in the consumption of basic necessities strongly suggests that the crisis was not fully anticipated. Furthermore, there was very little heterogeneity of the impact across individuals — wealth, baseline income, and connectedness to informal insurance did not mitigate the impact of the crisis (see Appendix Table A1). If the crisis had been anticipated, those households with more assets could have sold them off in anticipation.[16]

5.2. Coping mechanisms

What coping mechanisms did people use to limit the effect of the crisis? We present some suggestive evidence in Table 3. During the post-crisis survey, respondents were asked if they had given or received loans or gifts, sold durable goods or animals, or killed animals during the crisis period. As mentioned above, because people also engage in these behaviors throughout the year, we also asked about them in the post-election survey for the pre-crisis period (January–December 2007). We estimate how abnormal the crisis period was by comparing the extent to which people engaged in those behaviors during the two months of January/February 2008 with the extent to which they engaged in those behaviors in 2007 (normalized to a 2-month average by taking the total over all of 2007 and dividing by 6). For each behavior, we present the mean, median and standard deviation observed over the Jan/Feb 2008 period, the 2007 average, and the ratio of the average in 2008 to the average in 2007. If risk-coping in Jan/Feb 2008 was at the 2007 level, the ratio should be 1; thus, we should expect ratios much greater than 1 if these methods were used to heavily smooth consumption during the crisis.

We find that informal loans and gifts were much more prevalent during the crisis than they were in 2007. Bumala small-scale entrepreneurs and Busia sex workers relied heavily on transfers from friends and relatives, while shop owners were heavily relied upon (though these effects are mitigated somewhat by the fact that those receiving transfers were also sending out transfers to others, and vice-versa).

Besides friends and relatives, another possible source of insurance for sex workers are so-called regular clients. While there is no universal definition of a regular, in general a regular is a client who sees a particular sex worker on a regular basis (in contrast to a casual client who will often see a given sex worker only once). The relationship between women and regular clients has several dimensions, one of which is that regulars are expected to provide assistance when shocks occur (Robinson and Yeh, 2012). During the crisis, however, sex workers did not receive much extra assistance from their regular clients: from Table 3, row 4, women received just 212 Ksh from clients during the crisis, which is not much more than the 156 Ksh they reported receiving over an average 2-month period in 2007. Again, this speaks to the fact that the clients themselves were adversely affected.

Individuals in all three samples were more likely to kill animals during the crisis than in 2007. The monetary values of durable goods and animals sold during the crisis are also quite large, though we do not have measures of these variables in 2007 with which to compare them. Sex workers were particularly likely to sell durable goods.

Overall, these risk-coping strategies were not nearly enough to cushion the fall in incomes. First, the distribution of the amounts

[15] While we did not collect any information on whether people had been saving in anticipation of the crisis, the magnitude of the decline in consumption afterwards suggest that saving was, at most, minimal (at least among poor rural households in Western Kenya).
[16] While supportive of the shock as being thought of as transitory, the lack of heterogeneity is something of a puzzle. Another study which finds similarly little heterogeneity is Kazianga and Udry (2006) in regards to a serious drought in Burkina Faso in 1981–1985.

Table 2 (*continued*)

Sample	(8)	(9)	(10)	(11)	(12)	(13)
	Food expenditures			# Days household had meat		
	Small-scale business owners	Shopkeepers	Women who supply sex	Small-scale business owners	Shopkeepers	Women who supply sex
December, 2007	0.20 (0.12)*	0.05 (0.02)**	0.14 (0.05)***	0.19 (0.07)***	0.17 (0.03)***	0.15 (0.03)***
1st week of January, 2008	0.08 (0.10)	−0.06 (0.02)**	−0.22 (0.02)***	−0.38 (0.08)***	−0.45 (0.05)***	−0.55 (0.04)***
2nd week of January, 2008	−0.01 (0.04)	−0.09 (0.02)***	−0.26 (0.02)***	−0.38 (0.07)***	−0.45 (0.05)***	−0.59 (0.04)***
3rd week of January, 2008	0.02 (0.03)	−0.07 (0.02)***	−0.20 (0.02)***	−0.35 (0.07)***	−0.37 (0.05)***	−0.46 (0.04)***
February, 2008	0.12 (0.03)***	0.01 (0.02)	−0.09 (0.02)***	−0.13 (0.06)**	−0.03 (0.04)	−0.28 (0.04)***
March, 2008	–	–	–	−0.05 (0.07)	0.13 (0.04)***	−0.12 (0.04)***
Observations	893	1297	2061	1040	1498	2183
Number of individuals	151	220	226	151	218	223
R-squared	0.01	0.05	0.38	0.12	0.27	0.23
Mean of Dep. Var. in Nov. '07[b]	343	945	577	1.00	1.47	1.93
SD of Dep. Var. in Nov. '07	194	831	239	1.06	1.12	1.15

(in Kenyan shillings) is heavily skewed — for all measures, the median respondent in each sample gave and received no money and received no income from the sale of assets. Second, even at the mean, the total amount received from these strategies could cushion at most a week or two of lost income. On the whole, the evidence in Table 3 supports the large consumption declines reported in Table 2 — informal risk-coping sources were not sufficient to cope with this crisis.

6. A hidden cost: impact of the crisis on the supply of unprotected transactional sex

In this section, we present evidence that the crisis led to an increase in the supply of unprotected transactional sex. We do not have data on entry into sex work and therefore cannot estimate whether women began supplying transactional sex to cope with the crisis.[17] However, we have information on the sexual behavior of women who were already involved in transactional sex prior to the crisis.

6.1. Impact on sexual behavior of women who supply transactional sex

Fig. 2 and Table 4 present estimates of the impact of the crisis on the sexual behavior of women who supply transactional sex. We consider two types of outcomes: the number of sex acts per client, and the total number of acts per week. These regressions are in levels, instead of percentage changes.

The table reads as follows. Taking column 1 as an example, the coefficient at the bottom of the column shows that the average number of unprotected sex acts per client was 0.41 in November 2007. The first coefficient estimate suggests that this decreased (insignificantly) to $0.41-0.01=0.40$ in December 2007. In contrast, the second coefficient estimate implies that the frequency of such acts increased to $0.41+0.24=0.65$ in the first week of January, corresponding to a 40% increase compared to November, significant at 5%. The third and fourth coefficient estimate shows that the frequency increased further, up to $0.41+0.42=0.83$ in the third week of January, a more than 100% increase compared to November.

While overall levels of risky sex declined during the crisis, we find that, in large part, women responded to the negative income shock by significantly increasing the amount of unprotected sex they had, conditional on being able to find clients (left panel of Fig. 2 and columns 1–4 of Table 4). As described above, the number of unprotected sex acts per client went up from 0.41 prior to the crisis, to 0.83 in the middle of January (over a 100% increase).

The total number of weekly unprotected sex acts was lower in January than before the crisis, however, since women were not able to find clients during the height of the crisis (right panel of Fig. 2 and columns 5–8 of Table 4). The decrease in the demand for sex also led to a shift in the composition of clients: during the crisis, the clients that women could find were disproportionately likely to be regulars rather than casual clients (column 9). Since unprotected sex is more common with regular clients (whom the sex worker usually knows better) than with casual clients (Robinson and Yeh, 2012), the increase in the number of unprotected sex acts per client while the crisis was ongoing was in part driven by the effect on client composition (however, we still observe significant increases even conditional on client composition — results available on request).[18] In any case,

[17] It is possible that the crisis triggered some women to enter the transactional sex market. Multiple newspaper articles reported on this phenomenon during and after the crisis. As we will discuss later, we have some evidence that more women were in the market in the post-election period. However, we cannot know if this increase was purely due to the intensive margin effects we uncover below, or whether there was also an increase on the extensive margin. In surveys, women report large income shocks as a main reason why they enter the market (Robinson and Yeh, 2012), so we would not be surprised if there was an effect on the extensive margin.

[18] Another possible issue is that the price paid by regulars is not directly tied to sex in the same way that it is for casuals. However, Robinson and Yeh (2011, 2012) find no evidence that the price paid at the time of sex differ between regulars and casuals (conditional on activities). They also find no evidence that the premia for specific activities differ between regulars and casuals.

Table 3
Risk coping strategies used during January/February 2008.

	(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)	(9)	(10)	(11)	(12)
	Small-scale business owners				Shopkeepers				Women who supply sex			
	Jan–Feb 08		2007	Ratio of 08 to 07 Mean	Jan–Feb 08		2007	Ratio of 08 to 07 Mean	Jan–Feb 08		2007	Ratio of 08 to 07 Mean
	Mean	Median	Mean		Mean	Median	Mean		Mean	Median	Mean	
Inflows												
Formal loans received	5 (58)	0	149 (892)	0.03	793 (8624)	0	4427 (13,628)	0.18	129 (1212)	0	308 (1174)	0.42
Informal loans from friends/family	402 (1171)	0	181 (480)	2.23	1929 (7150)	0	418 (1483)	4.61	446 (1730)	0	88 (307)	5.06
Gifts from friend/Family	338 (1101)	0	125 (570)	2.70	298 (2206)	0	263 (1000)	1.13	209 (1274)	0	57 (203)	3.68
Gifts from regular clients	–	–	–	–	–	–	–		212 (787)	0	156 (364)	1.36
Outflows												
Informal loans to friends/family	249 (820)	0	101 (281)	2.47	2129 (11,579)	0	912 (1863)	2.33	113 (719)	0	77 (275)	1.46
Gifts to friend/Family	183 (696)	0	51 (119)	3.58	401 (1301)	0	82 (253)	4.89	123 (530)	0	83 (177)	1.49
Income from selling or liquidating assets												
Durable goods sold	54 (326)	0	–	–	77 (924)	0	–	–	889 (1799)	0	–	–
Animals sold	446 (1602)	0	–	–	549 (3548)	0	–	–	95 (376)	0	–	–
Animals killed	82 (185)	0	35 (62)	2.31	170 (366)	0	126 (314)	1.35	64 (166)	0	19 (44)	3.28
Total (net) amount received	894				1287				1807			
Total lost income[a]	1037				12,232				2933			
Number of Observations	145				208				225			

Notes: see text for more detail on the three samples. All values in Kenyan Shillings. For each sample, the figures in the first 2 columns are means (standard deviations in parentheses) and medians for each variable during the crisis period. The next column is the mean for the same variable for all of 2007, divided by 6. Thus, this is the average for a normal 2 month period in 2007. If the average amounts observed over the two crisis months in 2008 were equal to the average for 2007, the figures in columns 4, 8 and 12 would be 1. Exchange rate was roughly 70 Ksh to US $1 during the sample period.
Mean total transfers do not exactly add up to the sum of mean inflows and outflows because some variables are missing for some individuals.
[a] Lost income is the estimated in regressions similar to those presented in Table 2. Lost income in the 4th week of January (which was not recorded — see Table 2) is estimated from the monthly average for January.

since client composition returned to normal after the crisis, increases in unprotected sex acts per client in February and March cannot be due to client composition.

While the drop in the demand for sex led to a decline in total sexual activity during the crisis, including a decline in total unprotected sex (despite the increase in the rate of unprotected sex), women increased the total amount of unprotected sex they had after the crisis ended: in February and March, the total number of unprotected sex acts went up dramatically, by 0.24 acts per week in February and 0.39 acts in March.[19] These are big effects, compared to the baseline of 0.72 acts in November.[20]

Even more troubling is that the number of unprotected anal sex acts per week increased by 0.12 in February and 0.14 in March, compared to a base of just 0.03 acts per week in November 2007 (column 8). Unprotected anal sex is extremely risky: though reliable numbers are hard to come by, the risk of HIV transmission from unprotected anal sex has been estimated to be as high as 0.5–1% per act (i.e. Mastro and de Vincenzi, 1996).[21]

To examine whether some women were less susceptible to the crisis than others, we also tested for heterogeneity in whether women increased their supply of risky sex. As with the expenditure results presented in Appendix Table A1, we find small and typically insignificant differences by background characteristics, with the general pattern being one of relative homogeneity in the effects of the political crisis (results available upon request).

Overall, these results suggest that the crisis had major impacts on the behavior of sex workers, who are, as noted above, a substantial fraction of the female population in Busia. Though this specific crisis lasted only two months, such behavioral responses, if seen during other crises, could have important effects on the spread of HIV and other STIs.

6.2. Controlling for seasonal variation: difference-in-difference estimates

An obvious shortcoming of our analysis is that we cannot know the counterfactual — what the income, consumption and labor supply patterns of households in our study area would have been, had the crisis not taken place. This is an important issue since there are several possible seasonal factors at play. Most obviously, Busia District is heavily Christian and Christmas falls in this time period. In addition, this part of Kenya has two growing seasons per year, and the harvest for the shorter, less productive season is typically around January. While this would tend to increase, rather than decrease, incomes (and to the extent that sex work is a normal good, demand for sex) in January, there could be other seasonal effects driving our results.

One way to control for possible seasonal variation would be to test whether the changes observed between November 2007 and January–March 2008 were similar to those between November

[19] Note that this is not because condoms were unavailable during this time period. While we did not collect data on the price or availability of condoms during or after the crisis, we received no reports that condoms were harder to come by. The price of condoms is quite low, relative to sex worker incomes: 10 Ksh ($0.13) for a pack of 3.
[20] While the crisis was associated with an increase in rapes in some parts of Kenya, it is important to note that all of the sexual activities we report here were consensual. We did not receive reports of rapes from the women in our sample.
[21] Note that this is not because condoms were unavailable during this time period. While we did not collect data on the price or availability of condoms during or after the crisis, we received no reports that condoms were harder to come by. The price of condoms is quite low, relative to sex worker incomes: 10 Ksh ($0.13) for a pack of 3.

Fig. 2. Impact of crisis on sexual behavior of women who supply transactional sex. Notes: Weekly averages collected among 226 informal sex workers from Busia Town. See Figure 1 notes for details of timing. The vertical bars represent 95% confidence intervals. The standard errors are large for the "per client" figures in January because many women saw 0 clients during those weeks.

Table 4
Sexual activities for women who supply transactional sex.

	(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)	(9)
	Ave. sex acts per client				Total sex acts				Share of clients which are "regulars"
	# of unprotected sex acts per client	# of unprotected vaginal sex acts per client	# of anal sex acts per client	# of unprotected anal sex acts per client	Total # of unprotected sex acts	Total # of unprotected vaginal sex acts	Total # of anal sex acts	Total # of unprotected anal sex acts	
December, 2007	−0.01 (0.03)	−0.02 (0.03)	0.02 (0.02)	0.00 (0.01)	−0.04 (0.05)	−0.05 (0.05)	0.00 (0.03)	0.01 (0.01)	0.01 (0.04)
1st week of January, 2008	0.24 (0.11)**	0.25 (0.10)**	−0.02 (0.04)	−0.01 (0.02)	−0.62 (0.07)***	−0.61 (0.07)***	−0.15 (0.04)***	−0.01 (0.02)	0.13 (0.08)
2nd week of January, 2008	0.36 (0.14)***	0.32 (0.14)**	−0.02 (0.07)	0.05 (0.06)	−0.57 (0.07)***	−0.56 (0.07)***	−0.15 (0.04)***	0.00 (0.02)	0.24 (0.08)***
3rd week of January, 2008	0.42 (0.10)***	0.40 (0.10)***	−0.01 (0.04)	0.02 (0.03)	−0.22 (0.08)***	−0.25 (0.07)***	−0.04 (0.04)	0.03 (0.02)	0.17 (0.06)***
4th week of January, 2008	0.36 (0.10)***	0.33 (0.10)***	0.02 (0.04)	0.03 (0.03)	−0.15 (0.09)*	−0.18 (0.08)**	−0.05 (0.04)	0.02 (0.02)	0.14 (0.05)***
February, 2008	0.16 (0.05)***	0.12 (0.05)**	0.06 (0.03)**	0.05 (0.02)**	0.24 (0.09)***	0.12 (0.08)	0.21 (0.06)***	0.12 (0.04)***	0.01 (0.04)
March, 2008	0.09 (0.05)*	0.05 (0.04)	0.05 (0.02)**	0.04 (0.02)**	0.39 (0.09)***	0.25 (0.08)***	0.24 (0.06)***	0.14 (0.04)***	0.04 (0.04)
Observations	1662	1662	1662	1662	2477	2477	2477	2477	1662
Number of women	226	226	226	226	226	226	226	226	226
R-squared	0.06	0.05	0.05	0.02	0.08	0.07	0.08	0.03	0.05
Mean of Dep. Var. for Nov. 2007	0.41	0.39	0.09	0.02	0.72	0.69	0.18	0.03	0.48
Share with (Dep. Var for Nov 2007) > 0	0.48	0.48	0.17	0.04	0.48	0.47	0.17	0.04	0.90

Notes: self-reported weekly averages. Coefficient estimated through OLS regressions with individual fixed effects. Standard errors clustered at the individual level in parentheses.
Columns 1–4 and column 9: sample restricted to weeks for which at least one client was seen.
* Significant at 10%.
** Significant at 5%.
*** Significant at 1%.

and January–March in other years.[22] To examine this, we collected data between November 2008 and January–March 2009, exactly one year after the crisis. As mentioned above, we were able to trace 147 women for this survey. Using this additional data for these 147 women, we can estimate the following equation:

$$y_{imt} = \beta_0 + I_{t=2007/08} + \sum_{m=Dec}^{Mar} \gamma_m period_m * I_{t=2007/08} + \mu_i + \varepsilon_{it} \quad (2)$$

where $I_{t=2007/08}$ is a dummy indicating the crisis year. The coefficients of interest are the γ_ms: if the estimates of the βs in the previous Tables were only picking up usual seasonal variation, the estimates of the γ_m coefficients should be zero.

Estimates of Eq. (2) for the sample of sex workers are presented in Table 5. The estimates of the γ_m coefficients are highlighted for ease of reading. The first column presents the percent change in expenditures with respect to November, rather than level changes (the levels look very similar). Thus column 1 reads as follows: while in a normal year women in the sample spend 11% less in January than in the previous November, in January 2008 they spent $(11+49)=60\%$ less than in the previous November (2007).

We first note that the estimates of the β_m coefficients are often significant, suggesting that there are important seasonal variations in sexual activity for sex workers. However, these seasonal variations do not explain the effects of the crisis. The estimates of the γ_m coefficients are still very large and significant, suggesting that the responses estimated in the simple-difference analysis above were "real", and possibly even larger than estimated in Table 4, since some of the β_m coefficients are negative for February and March (columns 6–7). Of course, the difference-in-difference numbers are estimated on a much smaller number of women and therefore these specific coefficients should not be considered as definitive, but the pattern of results strongly suggests that the crisis itself was responsible for the changes observed in 2008, rather than some other seasonal fluctuation in the market.

6.3. Alternative explanations

Our preferred explanation for why sex workers increased their supply of risky sex during and especially after the crisis is that they needed to make up for lost income. In this section, we consider some alternative explanations for this result.

A first possibility is that the increase in unprotected sex was driven by a change in demand. We have shown above that changes in the regular/casual mix of clients cannot explain our results. But it is possible that the type of men within each group was affected by the crisis. For example, it is possible that the few men seeking sex workers during or right after the crisis were those more inclined to have unprotected sex. To estimate the role of these potential demand shifts, we asked women, at the end of our follow-up survey in March 2008, some descriptive questions about prices and participation in the transactional sex market. There are four questions which are useful here: (1) Was the price for protected vaginal sex higher, lower, or the same in February 2008, compared to 2007?; (2) Was the price for unprotected vaginal sex higher, lower, or the same in February 2008, compared to 2007?; (3) Did

[22] Another option would be to compare changes across regions which were more or less affected by a crisis, but in this case the crisis was felt throughout Kenya so there could not be a control group. Another possibility would be to use another country (for instance, Uganda, since Busia is on the Uganda border) as a control, but this was impossible because we had no ability to collect data there in the immediate aftermath of the crisis.

Table 5
Women who supply transactional sex: difference in differences.

	(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)	(9)	(10)
	Ave. sex acts per client					Total sex acts				
	Total expend.	# of unprotected sex acts per client	# of unprotected vaginal sex acts per client	# of anal sex acts per client	# of unprotected anal sex acts per client	Total # of unprotected sex acts	Total # of unprotected vaginal sex acts	Total # of anal sex acts	Total # of unprotected anal sex acts	Share of clients which are "regulars"
December	0.13 (0.02)***	0.00 (0.05)	0.00 (0.05)	0.00 (0.01)	0.00 (0.01)	0.21 (0.13)	0.21 (0.13)	0.00 (0.02)	0.00 (0.01)	−0.01 (0.03)
December 2007	**0.07 (0.02)*****	**−0.01 (0.04)**	**−0.01 (0.04)**	**0.02 (0.02)**	**0.00 (0.01)**	**−0.06 (0.06)**	**−0.07 (0.06)**	**0.01 (0.04)**	**0.01 (0.02)**	**0.04 (0.03)**
January	−0.11 (0.02)***	0.14 (0.08)*	0.13 (0.08)*	0.00 (0.01)	0.00 (0.01)	−0.16 (0.11)	−0.16 (0.11)	−0.02 (0.02)	0.00 (0.01)	0.05 (0.05)
January 2008	**−0.49 (0.04)*****	**0.31 (0.15)****	**0.30 (0.15)****	**−0.03 (0.03)**	**0.01 (0.02)**	**−0.24 (0.14)***	**−0.25 (0.14)***	**−0.07 (0.05)**	**0.01 (0.02)**	**0.14 (0.06)****
February	−0.08 (0.01)***	0.00 (0.06)	0.00 (0.06)	0.00 (0.01)	0.00 (0.01)	−0.28 (0.10)***	−0.28 (0.10)***	−0.03 (0.02)	0.00 (0.01)	−0.02 (0.04)
February 2008	**−0.20 (0.04)*****	**0.17 (0.09)***	**0.12 (0.09)**	**0.07 (0.04)***	**0.05 (0.03)***	**0.43 (0.14)*****	**0.32 (0.12)****	**0.24 (0.08)*****	**0.11 (0.06)***	**0.07 (0.06)**
March	−0.05 (0.01)***	0.12 (0.07)*	0.12 (0.07)	0.00 (0.01)	0.00 (0.01)	−0.12 (0.09)	−0.12 (0.09)	−0.01 (0.02)	0.00 (0.01)	0.09 (0.01)
March 2008	−	**−0.09 (0.09)**	**−0.11 (0.09)**	**0.05 (0.03)***	**0.02 (0.02)**	**0.38 (0.13)*****	**0.30 (0.13)****	**0.24 (0.07)*****	**0.08 (0.04)****	**−0.03 (0.06)**
Year = 2008/2009[a]	0.00 (0.05)	−0.16 (0.08)**	−0.14 (0.08)*	−0.08 (0.02)***	−0.02 (0.01)**	−0.14 (0.14)	−0.11 (0.14)	−0.13 (0.04)***	−0.03 (0.01)*	−0.11 (0.03)***
Observations	1310	1197	1197	1197	1197	1435	1435	1435	1435	1197
Number of women	147	147	147	147	147	147	147	147	147	147
R-squared	0.29	0.05	0.05	0.09	0.04	0.05	0.04	0.09	0.03	0.06
Mean of dep. var. for Nov. 2007	2468	0.41	0.39	0.09	0.02	0.72	0.69	0.17	0.03	0.46
Mean of Dep. Var. for Nov. 2008	2900	0.25	0.25	0.01	0.00	0.59	0.59	0.03	0.00	0.35
p-value: Jan 2008 = Dec 2007	0.001	0.001	0.001	0.339	0.446	0.001	0.001	0.026	0.641	0.001
p-value: Feb 2008 = Dec 2007	0.001	0.010	0.068	0.072	0.055	0.114	0.668	0.012	0.064	0.230
p-value: Mar 2008 = Dec 2007	0.001	0.589	0.897	0.082	0.187	0.010	0.056	0.001	0.047	0.108

Notes: sample restricted to women who could be re-interviewed in 2009. Coefficient estimated through OLS regressions with individual fixed effects and a dummy for the year following the crisis. Standard errors clustered at the individual level in parentheses.
For interpretability, the coefficients in column 1 are percentage changes on the mean in November of the previous year. Thus, column 1 reads as follows: while in a normal year women in the sample spend 11% less in January than in the previous November, in January 08 they spent (11 + 49) = 60% less than in the previous November (07). The remaining columns are level differences.
Expenditures for March 2008 were misrecorded.

* Significant at 10%.
** Significant at 5%.
*** Significant at 1%.

[a] "Year = 2008/2009" is a dummy variable equal to 0 for the data from the conflict year (November 2007–March 2008) and 1 for the year after (November 2008–March 2009).

you spend more, less, or the same amount of time looking for clients in February 2008, compared to 2007?; and (4) Were there more, less, or the same number of women looking for clients in February 2008, compared to 2007?

We present the mean responses to these questions in Appendix Table A2. The evidence suggests that, during the crisis, prices fell and participation rose. In particular, 94% of women reported that the price for protected vaginal sex fell, and 72% reported that the price for unprotected vaginal sex fell. Further, 83% of women reported spending more time looking for clients individually. While this was certainly driven in great part by a decrease in demand, there seems to have been a concomitant supply shift: 91% report that more women were looking for clients in the transactional market in January/February than in normal periods.

A second question is whether the violence affected risk attitudes directly. In other words, the violence and the intensity of the shock might have made people fatalistic. While this is difficult to rule out conclusively as we did not measure risk attitudes, we do not think this is very likely. While several studies have found that exposure to conflict or to natural disasters can affect risk attitudes, the direction of this effect differs across studies. Those studies which find a positive association between exposure to conflict or trauma and risk-taking behavior tend to involve events much more extreme than we study here: for instance, exposure to casualties in Burundi (Voors et al., 2010) or relocation due to Hurricane Katrina (Eckel et al., 2009). In this part of Kenya, the conflict was closer to a natural disaster (without as much destruction of physical capital) than to a war or a devastating hurricane, and so perhaps closer to exposure to floods or hurricanes as in Cameron and Shah (2010), who find that exposure made people more risk averse. Overall, while it is impossible to completely rule out a change in preferences, we are not able to find any evidence from other studies to suggest that a crisis such as the one we study would have affected risk-taking behavior.

There could also have been other changes in preferences or in the nature of the transactional sex market during or after the violence. Examples of preference shifts might be that women became despondent and accepted risks that they would not have otherwise, or that clients needed comfort in a time of crisis. We view this as unlikely for a few reasons. One is that the increase in sexual behavior we observe occurred only after the worst of the violence had occurred (in February and March, whereas the most violent episodes were in January). Another is that Busia was not directly affected by the violence. While it was no doubt traumatic to hear of violence in other parts of the country, it seems unlikely that this could substantially change preferences.

Another possibility is that women may have lost voice in the post-conflict period such that they were less able to impose their preferences for condoms on clients. This could have been very explicit (for instance, due to an increase in rapes) or a bit less so (women feeling less able to say no to unprotected sex). We find no evidence for either of these. We did not receive any reports of increases in rapes. We also asked women if they had refused any clients. We have 104 women who have complete information on whether they declined clients, and they report being more likely to refuse clients in the post-election period than before: only 6.7% of them declined a client in November/December, compared to 18.3% in February/March. While some of this might be explained by the fact that they were more active in February or March, it does not appear that women had less control over their sexual decisions after the conflict period.

A final concern with our approach is related to the type of data used in this study. Since we used retrospective surveys to estimate our effects, the data is potentially subject to recall bias. While it is possible that such bias could affect our results, the bias must be of a specific form. If women misremembered a constant, time-invariant proportion of their sexual behavior, this would difference out in even the simple before-after comparisons in Table 4. If women instead tend to misremember more for more distant events (such that they have forgotten some of what happened in November by March), but this forgetting is constant across years, then the difference-in-difference estimates would still be accurate. Thus, for recall bias to affect our results, it must be the case that women misremembered more in the conflict period than in other years. While this could be possible if women better remember salient events such as the crisis, we do not think this is likely given that the primary outcome we study is the response after the crisis ended, that prices dramatically increased at the same time as the income shocks women reported, and that all three samples of individuals reported major income losses.

7. Conclusion

While the violent conflict that erupted in Kenya in the wake of the 2007 presidential election surprised many, these types of conflicts are far from unprecedented. Political coups and civil conflicts around government transitions are common, especially in the developing world. This paper is an attempt to estimate how such conflicts affect households during the crisis period, and how they might affect long-term outcomes. We find that even a relatively short-lived crisis (lasting around two months) can have large detrimental impacts on income and consumption, in particular when traditional risk-coping mechanisms are mostly inter-household and therefore break down in the presence of aggregate shocks.

We further document an important hidden channel through which political unrest can potentially affect long-run outcomes: the economic downfall associated with social unrest led, in the aftermath of the crisis, to significant increases in unprotected sex by women who supply transactional sex. While our results are for one sample of sex workers during one particular crisis, they are, to our knowledge, the only evidence to date on how sex workers cope with the substantial income loss associated with a civil conflict. If sex workers living in countries which experience conflict regularly respond similarly to large income shocks (and we suspect that they might, since countries which tend to experience unrest are often poor and usually do not have developed insurance, credit, or savings markets), the channel we identify here could have long-term effects on the spread of HIV and other STIs.[23]

The disruptions we highlight are all the more striking because our study area is one that was relatively unaffected by severe violence. The effects on the lives of the (at least) 500,000 people that were displaced, or the families of the 1200 or more people that were killed are of course even more substantial than for the individuals in our sample.

While our study focuses on only one particular part of Kenya during a single political crisis, our results have implications for understanding such conflicts more generally. In any poor country in which formal insurance is rare and in which access to consumption smoothing devices is limited, large, economy-wide income shocks like the one which Kenyans experienced in 2008 will be difficult for people to manage. Our results strongly suggest that, in such an environment, social unrest is an important channel through which political instability may affect long-term development — and that it may affect development in many ways that may be difficult to quantify or to even recognize.

[23] On the other hand, the effects could be smaller if even the market for sex were to break down.

Appendix A

Table A1
Testing for heterogeneity in effect of crisis on percentage change in expenditures.

Indep. var. interacted with time periods	(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)	(9)
	Dependent variable: change in expenditures (as a % of Nov. 2007 expenditures)								
	Monetary value of animals owned in '07			Average weekly income in November '07			Value of informal gifts/loans1 received in '07		
Sample	Smallscale business owners	Shopkeepers	Women who supply sex	Smallscale business owners	Shopkeepers	Women who supply sex	Smallscale business owners	Shopkeepers	Women who supply sex
December, 2007	0.124 (0.074)*	0.035 (0.019)*	−0.052 (0.043)	−0.058 (0.113)	0.033 (0.018)*	−0.294 (0.090)***	0.118 (0.065)*	0.042 (0.018)**	−0.127 (0.048)***
Dec, 2007 * Indep. Var	**−0.094 (0.158)**	**0.016 (0.047)**	**0.775 (0.475)**	**23.601 (23.005)**	**0.114 (0.074)**	**14.102 (4.883)*** **	**−0.090 (0.168)**	**−0.008 (0.010)**	**2.321 (1.009)** **
January, 2008	−0.100 (0.028)***	−0.070 (0.047)	−0.716 (0.035)***	−0.090 (0.046)*	−0.168 (0.031)***	−0.698 (0.049)***	−0.062 (0.034)*	−0.180 (0.039)***	−0.689 (0.038)***
January, 2008 * Indep. Var	**0.298 (0.212)**	**−0.587 (0.304)***	**0.615 (0.135)*** **	**2.447 (4.348)**	**−0.470 (0.240)***	**−0.384 (1.914)**	**−0.335 (0.275)**	**−0.049 (0.027)***	**−0.442 (0.381)**
February, 2008	0.086 (0.030)***	−0.004 (0.020)	−0.370 (0.038)***	0.029 (0.047)	0.001 (0.021)	−0.354 (0.059)***	0.094 (0.029)***	0.021 (0.022)	−0.332 (0.041)***
February, 2008 * Indep. Var	**−0.085 (0.102)**	**0.063 (0.052)**	**0.491 (0.221)** **	**6.698 (5.471)**	**0.130 (0.096)**	**−0.406 (2.633)**	**−0.549 (0.257)** **	**−0.021 (0.018)**	**−0.820 (0.514)**
Observations	594	865	1623	592	853	1623	594	820	1623
Number of individuals	151	220	226	149	214	226	151	208	226
R-squared	0.04	0.21	0.34	0.05	0.13	0.36	0.04	0.12	0.36
Mean Expenditures in Nov. '07 (in Ksh)	679	2790	2456	679	2790	2456	679	2770	2456
SD of expenditures in Nov. '07 (in Ksh)	398	2712	1090	398	2712	1090	398	2708	1090
Mean of independent variable	0.13	0.22	0.02	0.01	0.04	0.02	0.04	0.23	0.05
SD of indpendent variable	0.23	0.34	0.07	0.01	0.08	0.01	0.10	0.54	0.08

Notes: see text for more detail on the three samples. All figures are self-reported weekly averages. All variables in 100,000 Kenyan shillings. There are fewer observations than in Table 2 because the weekly averages for January are collapsed into a weekly average over the whole month. Coefficient estimated through OLS regressions with individual fixed effects. Standard errors clustered at the individual level in parentheses. * significant at 10%; ** significant at 5%; *** significant at 1%.
The table reads as follows. Taking column 1 as an example: while small-scale entrepreneurs in Bumala town who did not own any animals before the crisis saw a drop in expenditures of 10% in January 2008 compared to November 2007, those who owned animals before the crisis could protect their consumption by 29.8% per 100,000 Ksh of animal value owned. Since the mean value of animals owned (in 100,000 Ksh) before the crisis among the Bumala sample was 0.09, those with the mean animal value before the crisis saw a drop in expenditures of only $-10+(0.09)*29.8=7.3\%$ in January 2008 relative to November 2007. However, this difference is not significant.
[1]There are 12 shopkeepers with missing information on informal gifts/loans. This is because that information was collected from them in a separate survey which was administered in late 2007, and some of the shopkeepers in this sample did not complete that survey.

Table A2
Mean responses to questions about the transactional sex market in the post-election period.

Was the price for protected vaginal sex higher, lower, or the same in February 2008, compared to 2007?	
Lower	0.94
Higher	0.02
Same	0.04
Don't know	0.00
Was the price for unprotected vaginal sex higher, lower, or the same in February 2008, compared to 2007?	
Lower	0.72
Higher	0.09
Same	0.17
Don't know	0.02
Did you spend more, less, or the same amount of time looking for clients in February 2008, compared to 2007?	
Less	0.12
More	0.83
Same	0.03
Don't know	0.01
Were there more, less, or the same number of women looking for clients in February 2008, compared to 2007?	
Less	0.02
More	0.91
Same	0.00
Don't know	0.06
Observations	222

Notes: the table reports mean responses to the listed questions. Questions were asked at the end of the follow-up survey which was administered in March 2008.

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