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Evidence from Microdata

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Economic and Health Impacts of the 2011 Post-Electoral Crisis in Côte d'Ivoire: Evidence from Microdata[*]

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Abstract

Past studies have shown that income shocks can trigger women to embark on commercial sex. This paper studies some microeconomic effects of the Cote d'Ivoire's political instability in 2011 after the presidential election. We use a unique dataset, collected right before and after the crisis, on individuals sampled in health centers, which, coupled with biomarkers on HIV, allows to evaluate the consequences of the conflict. We first use subjective measures of exposure to document the entity of the crisis. We then analyze the consequence of the crisis on income and consumption during and right after the crisis. We show that individuals engage in transactional sex to make up for income loss. In particular, women who are young, unmarried and without a stable source of income increased their number of sexual partners by 26% and received 44% higher amounts of transfers right after the crisis. In the same line, we also find that the incidence of HIV grew to around 1.2% for women and 0.8% for men in conflict-intensive regions.

Keywords: HIV/AIDS; Sexual Behavior; Conflict; Income Shock

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1. Introduction

The presidential election organized in 2010 in Cote d'Ivoire ended up with a post-electoral crisis[1]. The incumbent Laurent Gbagbo contested the results that declared Alassane Ouattara, his long-time rival, the winner. The crisis caused the death of over 3,000 civilians and the displacement of over half a million people in just over five months between the end of 2010 and the beginning of 2011. During the short-lived crisis, individuals were exposed to robbery and faced drastic income loss and most markets were disrupted. In the absence of formal safety nets and insufficient informal systems of risk-coping strategies, some individuals changed behavior and engaged in risky activities to make up for the sharp drop in income, to maintain consumption and to mitigate vulnerability.

The literature suggests that income shocks have an impact on a variety of outcomes. In poor countries or poor families, it leads to a reduction of food consumption (Bhattacharya *et al.*, 2003), to a rise of infant mortality and to a drop of school enrollment and nutrition (Ferreira and Schady, 2009). The deterioration in nutrition, in particular for children, has important long-term consequences on economic productivity (Maluccio *et al.*, 2009; Haddinott *et al.*, 2008). Dupas and Robinson (2012) show that, to make up for income drops, women who supply transactional sex engaged in higher-risk sex.

This study uses unique micro-data to document the economic and non-economic impacts of the Ivorian violent conflict. It is based on a sample of 2,017 individuals surveyed shortly before the crisis in 2010 and subsequently re-contacted for a follow-up survey two years after the end of the crisis. During the follow-up survey, data was collected retrospectively to provide detailed information for the period January 2010 to May 2013. The sample consists of individuals selected during voluntary counseling and testing (VCT) for HIV/AIDS in four different regions. About two third of the sample are from Lagunes where conflict was intense and the toll in terms of casualties high. The conflict in the other regions consisted of social unrests, market disruptions, robberies, etc. These events have severe economic consequences on households and might further imply long-term hidden costs.

We start by documenting the effect of the conflict on income and consumption through subjective and objective measures. During the first quarter of the crisis, the income of

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[1] Sub-Saharan Africa (SSA) experienced more than 66 presidential elections between 2006 and 2016, and pre-electoral violence occurred in 40 percent of them and post-electoral violence in 26 percent. Some of these crises were expected (Zimbabwe's 2008 presidential run-off) while others not (post-electoral violence in Kenya in early 2008).

individuals dropped by 13% compared to pre-crisis levels. This drop was still observed in the quarter following the crisis. Consumption fell along with the drop in income. Based on subjective measures, individuals estimated that their consumption dropped by 20% compared to the average during the quarter of the actual crisis. The perceived drop in consumption was still apparent in May-August 2011 (8%) but disappeared during subsequent periods. We then look at the health consequences of the conflict as suggested by De Walque *et al*. (2014) and Dupas and Robinson (2012). We find that, while the number of sexual partners and the amount of transfers received from them decreased during the crisis, they increased in the aftermath of the conflict. Women, in particular poor unmarried women, increased their number of sexual partners and transfers received from these partners (from 16 to 44%). Given that having concurrent sexual partners has health implications (Luke, 2006; Swidler and Watkins, 2007), we also find that the incidence of HIV in our sample grew significantly from 0 to 10 ‰ which is almost sixteen times higher than the HIV incidence rate of the adult population (0.6 ‰) in Cote d'Ivoire (UNAIDS 2016).

The contribution of this paper to the literature is threefold. First, many past studies have focused on women and sex workers who undertake riskier behaviors to overcome economic shocks (Dupas and Robinson, 2012; Robinson and Yeh, 2011; Robinson and Yeh, 2012). Our study sample include women who are more educated, single and sexually active compared to the average population. They were enrolled on an HIV prevention program shortly before the crisis and were tracked immediately after the end of the conflict for a follow-up interview. They are also different from sex workers on observables such as education, sexual activity and marital status. Besides, given their enrollment in the HIV prevention program, they also have a good knowledge of HIV/AIDS; more than 95% of them report that HIV/AIDS is transmitted through sexual partners and that the condom is a way of preventing it. The extent of the paper's generalizability is hence supported by an analysis of demographic difference between the study sample and two other surveys: commercial sex workers (CSW) and the population-based survey, the Knowledge, Attitude and Behavior Survey (KABS).[2] Past literature has shown that conflicts affect human capital accumulation through the destruction of health and education, and this paper shows how conflict could have important negative economic and health impacts, in particular on HIV infection among the well-informed sub-population.

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[2] The former is specific to commercial sex workers while the latter is the KAB survey on knowledge, attitudes and behavior related to HIV/AIDS. We use reports released from INS to compare our sample and with respect to information on the link between conflict and entry into the sex market we use first hand data from the CSW to support our findings.

Second, a unique feature of this paper is the biomarker on HIV since individuals were tested at both baseline and follow-up two years later. We observe an incidence rate of 1.1% for women and 0.8% for men over two years. These are extremely high incidence rates given the prevalence of HIV in Cote d'Ivoire, which was less than 4% in 2009. For comparison, incidence rates in countries with much more dramatic epidemics, such as Zimbabwe in the early 1990s and Uganda in the late 1990s, were estimated to be at most 0.5 per year (Oster, 2010).

Third, the results complement what has been observed in the context of Kenya's two-month long political crisis two years earlier (Dupas and Robinson, 2012). In addition to documenting the link between income shocks on transactional sex on the extensive margin,[3] the paper discusses how negative shocks can trigger entry into transactional sex among poor and unmarried women (De Walque *et al*., 2014; Burke *et al*., 2012; Dinkelman *et al*., 2008; Wilson, 2012; Oster, 2012). Consistent with this, Burke *et al*. (2012) also found that HIV incidence rates in rural areas of the African continent follow drought patterns. In contexts where gender inequality prevails, women use sexual partners as insurance when faced with income shocks (Swidler and Watkins, 2007).

The remainder of the paper is as follows. Section 2 provides some background on the Ivorian crisis, section 3 describes the sample and data, and section 4 presents main findings. The final conclusion is laid out in the last section.

2. Political Instability in Cote d'Ivoire

Côte d'Ivoire has a population of around 22 million people as of 2013 and gained its independence from France in 1960. It was relatively stable until the mid-1990s and has been highly unstable since then. The first military coup took place in 1999 followed by the relatively peaceful election of Laurent Gbagbo in 2000. A second unsuccessful coup took place in September 2002 which ended with an armed conflict between a rebel group and government officials. This latter conflict lasted five years and it was concentrated in specific areas of Abidjan (the largest city), Bouaké in the center (the second largest city) and Korhogo in the north.

The 2002-2007 conflict was a long and non-intensive conflict with approximately 600 battle fatalities per year (UCDP/PRIO, 2009). For an average civilian, the conflict caused lack of

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[3] Informal sex workers engaging in more frequent and riskier transactional sex (Robinson and Yeh, 2012, 2011; Wilson, 2012; Oster, 2012; Dinkelman *et al*., 2008).

health services and school equipment in certain regions (see for example Beyrer et al. (2007) and Sany (2010)). Its negative impact on the health status of children in the long-term is also documented by Minoiu and Shemyakina (2012).

No elections took place between 2000 and 2010 as the supposed election of 2005 was postponed until October 2010 when the incumbent, Gbagbo, ran against his long-time rival, Alassane Ouattara. The results of the first round was contested and accusations of fraud led to a second round of elections in November 2010. When the Independent Electoral Commission announced Alassane Ouattara as the winner of the presidential race and when Gbagbo refused to step down, five months of violent military conflict took place that ended with the arrest of Gbagbo in late April 2011.

Violence during the post-electoral conflict was mainly in the Lagunes regions, the Duékoué (Region des Montagnes) and other neighboring rural areas. During the first three months it was concentrated in Abidjan and consisted in the abduction of political leaders, beatings, informal checkpoints enforced by murder and executions by gunshot. From March to April 2011 the crisis shifted to a full-scale armed conflict and extended to the western part of the country (notably the Montagnes region) resulting in hundreds of civilian deaths (Human Rights Watch Report 2013).

By the end of conflict, it was reported that over 3000 civilians died as a result of clashes, more than 500,000 Ivoirians were displaced and 94,000 individuals fled to neighboring Liberia for fear of violence (Human Rights Watch Report 2013). Evidence suggests that the intensity, duration and geographical distribution of the final post-electoral crisis was unanticipated. In particular, since international observers and the UN Mission in Côte d'Ivoire (ONUCI) were closely monitoring the elections, the expectation of an abrupt conflict was very low.

The negative shock of the political crisis is likely to have affected women's sexual behavior in different ways and with different intensity over time. Individuals were less likely to sneak around and look for potential sexual partners given the intensity of the conflict. We therefore focus on women's behavior before, during and after the conflict.

3. Data

Sample Description

We use data collected before and after the electoral crisis in 2010-2011. The first wave of the data took place a few months before the violence erupted at the end of 2010. The sample, which

is not representative of the population, consists of 3603 individuals who were all HIV negative, aged 15-to-49, from 60 urban and semi-urban health centers.[4] Individuals were selected during Voluntary Counseling and Testing (VCT) for HIV/AIDS in health centers where VCTs took place. Compared to the general population, our sample consists of people who are younger, more educated and more sexually active. [5] The health centers were stratified over four regions: Lagunes, Savannes, Montagnes and Sud Comoe, which are themselves subdivided in sub-administrative units (départements) as highlighted in the left panel of Figure 1.

The second wave was organized after the end of the conflict and between December 2012 and May 2013. All study participants were tracked and administered a follow-up survey and tested for HIV/AIDS. In Figure 1 we show spatial distribution of study participants in the aftermath of the conflict. Individuals from the Lagunes region were the most displaced due to the crisis where clashes between supporters of the two candidates took place. At the first stage of tracking, 1752 individuals (49% of the sample) were successfully traced and either interviewed or identified as deceased (12 cases). Among the 1,848 remaining, 23% were randomly sampled, stratified by area and quality of contact information, in order to conduct an intensive follow-up. Out of these 425, 62% were successfully interviewed by May 2013. Hence a total of 2,017 individuals were surveyed with success by the end of the data collection. This brings the effective tracking rate (in the terminology of Orr *et al*. (2003); Baird *et al*. (2011)) to $0.49 + 0.51 \times 0.62 = 80.6\%$. Sampling weights are used in all the analyses to correct for this two-step methodology.

[insert fig 1]

Table 1 presents summary statistics of the study sample in 2010 and in 2012. These summary statistics are also compared with the report from the 2011 CSW data collected by the NIS on individuals who supply transactional sex. The CSW survey includes mostly female sex workers but also some male sex workers surveyed at commercial sex "hotspots", themselves identified using a snowball sampling strategy. Individuals from the CSW survey entered the sex market very young and while most point to poverty as the main reason for engaging in transactional

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[4] They were recruited for an HIV prevention campaign led by the Ministry of Health. The idea was to test the effectiveness of a health program based on HIV/AIDS prevention clubs whereby people discussed on a monthly basis issues related to sexual behavior, negotiation of condom use among couples, HIV testing, blood transfusions, and so on. While health centers were randomized into treatment and control groups, few of the facilitators in charge of the clubs in treatment health centers were able to lead the meetings due to the crisis.

[5] We compare our averages with those from the KAB survey published in « Enquête connaissances, attitudes et pratiques sur les IST et le VIH/SIDA dans les régions des lagunes, des montagnes, des savanes et du sud Comoé », Rapport définitif, Novembre 2011. Département de l'organisation de l'information pour la gouvernance. Ministère d'état, ministère du plan et du développement.

sex about 15% declare that the political crisis of 2002-2007 was the main reason for entering the market for the first time.[6]

[insert Table 1]

When compared with averages from the KAB survey report, on average individuals in the baseline sample are young (27 years old on average), more likely to be single (58%) and 46% have at least some secondary education. As they were enrolled in HIV testing facilities, they have good knowledge of HIV/AIDS and most of them are sexually active (76%).

The follow-up was conducted using a two-stage strategy. Individuals were initially tracked by phone calls using numbers provided before the crisis. For the 51 percent who were untraceable through phone calls we randomly selected a sub-sample of 425, stratified over the four regions. For this sub-sample, intensive tracking through snowball and door-to-door sampling was implemented. Table 2 illustrates the difference between the two sub-samples interviewed at different steps. Overall, they are comparable across different socio-demographic outcomes except for education and marital status. Individuals from the intensive tracking are also less likely to be HIV positive. To overcome any potential bias we use sampling weights based on inverse probability and also to account for the representativeness of the baseline sample. As robustness checks we also show that results are consistent with and without the weights.

[insert Table 2]

While the baseline survey was exclusively on health behavior and knowledge of STDs, the follow-up survey was designed with the specific aim of measuring the impacts of the crisis. To this end, participants were asked to recall their levels of income, consumption as well as sexual behavior, four-month period by four-month period, in reverse chronological order, from September-December 2012 (the four-month period immediately preceding the survey) up to January-April 2010. Since the conflict lasted from December 2010 to April 2011, with a peak during the January-April period, data was collected during three periods prior to the crisis, five periods following the crisis, and the crisis itself, enabling to trace evolutions over time graphically, as well as to control for seasonal patterns in the regression analysis. Coupled with trends over time women were asked if the crisis led them to receive money from their sexual

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[6] "Analyse des connaissances, attitudes et pratiques des professionnels (LES) du sexe dans dix-huit villes de la Cote d'Ivoire". Résumé exécutif. Ministère de la Santé et de la Lutte contre le Sida. République de Cote d'Ivoire. Février 2012.

partners and if so what was the main reason that led them to have transactional sex. This information is then coupled with HIV tests collected successfully with 99% of compliance.

Another important aspect of the data is whether it is accurate or whether it suffers from recall bias. Dupas and Robinson (2012) use similar methodology to study the Kenyan post-electoral crisis and they find that their reports are consistent and comparable to outcomes from daily collected diaries in the Robinson and Yeh (2011) study. Despite the likelihood of mis-reporting, this study is not the first to rely on outcomes based on recalling. In addition to that, if the recall bias is constant over time, the within individual variation approach of our estimation strategy will attenuate its effect.

Another major challenge in these types of studies is the definition of money for sex in SSA, which could be ambiguous. Transactional sex is very common in a variety of relationships and it could be present even among married couples (Swidler and Watkins, 2007 in Malawi). If sex for money is widespread, many women who provide transactional sex might not identify themselves as sex-workers and hence the outcome of interest might be an under-or-over estimate. Besides this, the monetary transfer might also not take place in concomitance with sexual activity implying measurement error in our outcome of interest.

Attrition

A further shortcoming of the follow-up data, as mentioned earlier, is attrition, which is neither low (about 20%) nor random. Columns 1 and 2 in Table 1 compared wave 1 and wave 2. It suggests that because of attrition, the sample was reduced to 2017 and composed of individuals who are more educated and with better knowledge of HIV/AIDS who were easily tracked by phone calls. In Table 3 we study the correlates of attrition and find that younger women with lower levels of education were more likely to attrite. Given the intensity of conflict in the Lagunes regions, attrition among single men from the region was also particularly high. Hence, we suspect that our estimates are an upper-bound, under the assumption of a negative effect of conflict on human capital.

Conflict Exposure and Casualties

The survey asked individuals to self-report their exposure to violence during the conflict. Several questions were asked and summary statistics from these questions are presented in Table 4. Over a third of the study sample reported displacement as displayed in Figure 1, with an average duration of 109 days (3.5 months). Many individuals (45%) reported that their

neighborhood experienced killings and disruption of economic activities.[7] Shops and markets were closed reducing supply and generating sharp consequence on prices. Looting was also rampant and robberies and ransacking was reported by over two-thirds of the sample.

Based on reported data on killings and robberies, it indicates that the Lagunes region was the most affected, followed by the Montagnes regions. This is in line with media reports that stress that conflict was mainly concentrated in the Lagunes and Montagnes regions (Human Rights Watch). However, the type and intensity of conflict differs; while most of the crisis took place in Lagunes, displacement occurred over a longer period in the Sud Comoe region (Table 4).

4. Empirical Strategy

The conflict affected everyone at the aggregate level making it difficult to quantify its effect. We use patterns of behavior over time, pre-and post- conflict periods. Therefore, our estimate uses an equation of the following form to compare outcomes for the periods before, during and after the conflict:

$$\frac{y_{it}}{y_{t_0}} = \beta_0 + \sum_{t_1}^{t_T} \beta_t period_t + \gamma_i + \varepsilon_{it} \qquad (Eq\ 1)$$

where y_{it} takes different values depending on the outcomes of interest measuring the average over a specific four-month period and y_{t_0} takes the value of the average outcome in period 0, which corresponds to the pre-conflict period January-April 2010.

[insert Table 3]

The conflict took place in January-April 2011 and it counts three additional periods from the baseline. All the analyses include individual fixed effects to account for recalling bias and other individual characteristics that are specific to the individual. In this latter case, these individual fixed effects account for any time-invariant and individual level errors.

The pattern of the βs reflect the percentage change compared to the baseline period in t_0. For ease of comparability, outcomes are restricted to those whose values are recorded in all periods and for all individuals.

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[7] This is an under-estimate since displacement might have been higher among those who could not be tracked for the follow-up survey.

5. Main findings

Impacts on income and consumption

Participants were asked their level of income and consumption over a four-month period starting from the time of the survey back to 2010, which corresponds to a panel of eight periods.[8] They were asked to provide both absolute and relative values for income (individual or family) and only relative values for consumption. In relative terms, participants indicated whether they evaluated their consumption as being below average (-1), average (0) and above average (1) respectively for the specific period. We start by analyzing these relative values. Figure 3 plots the patterns of this indicator for income and consumption and how it varied as compared to the average in 2010. It shows that participants consider both their income and consumption as significantly lower than the 2010 average during the quarter January-April 2011. After this period, participants indicate a progressive recovery in the subsequent quarter. This general pattern is more acute in the Lagunes region and less pronounced in the Sud Comoe region.

[insert figure 3]

Consumption and income drops during the crisis period underline not only the unanticipated characteristics of the crisis but also the lack of coping strategies faced with income shocks. While the financial sector is still developing in Cote d'Ivoire, most of the few existing institutions were not operational during the crisis and people, in particular the non-poor, could not draw on their savings to even out consumption during the difficult times. People had to look for alternative sources of revenue to maintain some level of consumption.

In absolute terms, participants were asked to provide the amount of money they made over a specific period of four months, including all types of transfers and gifts. The amount was recorded both at the individual level and subsequently aggregated at family level to infer on the income of the household. We estimate equation 1 for both the outcomes, individual income and family income. Table 5 presents the estimated coefficients.

During the actual quarter of the crisis, individuals saw their income drop by 13% as compared to the average in the period relative to 12 months earlier.[9] The average income for that period

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[8] When the source of income is not stable it is difficult for individuals to recall variations over two years. As regards consumption we ask if within each period the level was above, the same or less than usual.

[9] The exchange rate is around 1 US $/498 FCFA. This amounts to a rough drop of 14 dollars from the average income in January-April 2010.

was 57,220 FCFA which roughly amounts to 115 US$. For ease of comparison, the 2010 GDP per capita for the same period was 2,635 US$.[10] This figure dropped to 2,211 US$ in 2011 and recovered to 2,762 US$ in 2012. This corresponds to a 2.6% decrease and suggests that individuals in our sample were particularly hit by the crisis. This comes as no surprise given that 70 percent of the study sample were from the Lagunes region.

Family income also dropped by 12,2% as compared to its reference period in 2010. The drop in individual income is higher than the aggregate suggesting a fraction of the study sample had different sources of income at the aggregate level within the household.

Income drops lasted until May-August of 2011, i.e. four months after peace was restored in the country, and were followed by recovery and growth of comparable magnitude for individual income 12 months after peace was restored (12,7% in May-August 2012). Table 5 also indicates the heterogeneity across regions. While the drop is statistically significant and more pronounced in the Lagunes region, the estimated coefficients are not significant in Sud Comoe. The difference observed between the dynamics of individual income and family income is in part explained by the composition of the family. About 60% of the sample is made up of singles without a stable source of income and income is measured as the average amount of money they made from different sources over the period of analysis.

Impacts on the Sexual Behavior of Women

During the follow-up survey, women were asked whether they were involved in transactional sex and whether the political crisis was the trigging factor. Table 6 reports descriptive statistics on qualitative data on how the conflict triggered transactional sex. As previously mentioned, the study sample were not sex workers at baseline in 2010. Women point to the crisis as the main reason why they had sex for money. Among women who were sexually active over the period of analysis, 14% had sex for money and one third of them point to the post-electoral crisis as the main factor.[11]

For 94% of the above sub-sample the economic downturn due to the crisis seems to have been the main reason for engaging in transactional sex. This is quite surprising given the characteristic of the study sample: young, more educated and with good knowledge of risks

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[10] https://data.worldbank.org/country/C%C3%B4te%20d%27Ivoire
[11] This figure is corroborated by those provided by the CSW data on sex workers collected in 2011. In fact, 18% of the sex workers began to have sex for money because of either the 2002-2007 conflicts or the 2010-2011 one. This percentage amounts to 20% among men. Refer to Table 5 for more details.

related to HIV/AIDS as compared to the average population. This suggests that sexual networking is used as a coping instrument to limit the effect of the crisis.

While women from the CSW sample started having sex for money very early, women in our study sample were between 22-23 years old when they first engaged in this type of activity (Table 6). Nonetheless the definition of sex-supply is ambiguous; it can take place formally or informally and the distinction between the two set-ups is not always very clear. For example, Robinson and Yeh (2011) estimate that 12.5% of the adult population of women in Busia, Kenya, engage in informal sex-for-money activities. This is by far the largest market and women are often tempted to exploit this demand to reduce vulnerability during hard times. Robinson and Yeh (2012) find that transactional sex provides interpersonal insurance in addition to a higher level of income and such insurance affects the decision of women to enter the market. The insurance is usually provided by the regular clientele that sex workers build consisting of one or several men. Such relationships extend beyond sex and might also end in marriage and cohabitation. Past studies have indeed underlined that transactional sex is likely to be present within many types of sexual relationships in different parts of sub-Saharan Africa (Swidler and Watkins (2007), Luke (2006)).

We now look at women's decisions in an intertemporal framework and estimate patterns of sexual partners and transfers received from these partners. Unlike Dupas and Robinson (2012), who had information on the number and type of sexual relation per partner, we only have information on the number of sexual partners over time. Also, unlike Robinson and Yeh (2012), we do not have information on the type sexual partners: regular or casual encounters. We believe that both factors are essential in determining risks associated with HIV/AIDS but our study sample are not sex workers, as in the above-mentioned studies, and the follow-up survey does not allow to collect information on specific types of sexual acts and partners, period by period up to two years earlier. Nonetheless, our analysis focuses on the number of non-cohabiting sexual partners and how it changed in the post-conflict era as opposed to the pre-crisis period. We further support our findings with qualitative information as to whether women engaged in transactional sex and whether the conflict triggered that choice.

Table 6 provides the estimated parameters based on equation 1. They are presented separately for married and unmarried individuals, in the sense that they are not married or are not cohabiting at the time of the interview.[12] The table is to be read as a percentage change with

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[12] We do not observe any disparity in the data between the first and the second wave of the survey.

reference to the period of the pre-conflict era. The average values for January-April 2010 are presented at the bottom of each column depending on the sample. On average, women had a little less than one non-cohabiting partner over the four-month period of analysis, showing that they were not sex suppliers at the start of data collection. From Table 6, 48% of women had at least one non-cohabiting partner over the two years following the conflict. The table reads as follows for Column 1 and 2: unmarried women had 0.85 partners while married women had 0.98 partners on average in January and April 2010. In January – April 2011, those figures decreased by 7 (insignificantly) and 13 percent respectively. In column 3 and 4, the sample is restricted to unmarried women and further distinguished by age if below or above median. The results suggest that the number of sexual partners over time for unmarried individuals increased insignificantly after only one year from the end of the crisis and by 10% in May-August of 2012. Younger women had 0.78 partners on average in January-April 2010 and this figure gradually increased to 0.85 in September-December 2011, 0.87 in January-April 2012, and 0.88 in May-August 2012. On the other hand, for married individuals, it decreased by 14% during the crisis and was restored to levels that are comparable to the pre-crisis period. The drop observed during the electoral crisis period is justified by the danger in sneaking around in unsecured areas given the majority of the study sample are from Lagunes region. For unmarried women without a stable source of income, the previous figures amount to 0.94 non-cohabiting partners in September-December 2011 and 0.98 in May-August 2012. In general, young, unmarried and poorer individuals are of particular interest when identifying the negative income shocks on transactional sex given their vulnerability in relation to entering the sex market (Chatterji *et al*., 2005; Luke, 2006; Robinson and Yeh, 2011). These latter individuals saw a steady and constant growth in the number of sexual partners, an increase of between 21-26% from the pre-conflict period, in just under three years (Column 5 in Table 6). In the post-crisis period, the unmarried individuals with a stable source of income had partners that are comparable to the pre-crisis period, as shown in Column 6 of Table 6.

We also looked at the dynamics of transfers received by these women over the period. Table 6 (Columns (7) and (8)) shows the estimated parameters for Equation (1) when the dependent variable is the amount of transfers received from sexual partners relative to the pre-crisis period. The sample is restricted to unmarried individuals and is further divided into those who have a stable source of income and those who do not. In the pre-crisis period, women without a source of income received about 17307 FCFA from non-cohabiting partners in January-April 2010. Columns (7) and (8) show that these transfers from sexual partners dropped 34%, likely driven

by the drop in the demand for sex. Both trends in transfers and number of partners increased in the same direction after the crisis for unmarried individuals, suggesting they used sexual partners as a possible option to overcome the income shock they experienced during the crisis.

[insert Table 6]

[insert Table 7]

HIV Incidence

Women in the sample were recruited voluntarily in health centers while testing for HIV. They were all HIV negative at baseline. During the wave two survey, they were tested for HIV again. HIV incidence is indicative of unprotected sex with long-lasting consequences. This information on HIV status was available only at two points in time. We cannot rely on equation 1 to assess the consequence of the political crisis on HIV incidence. Instead, we constructed an index of conflict exposure to generate some level of heterogeneity in the sample. This index is based on individual direct economic exposure to damage or induced displacement. The results presented in Table 7, although not statistically significant, show that HIV incidence is positively associated with conflict exposure as measured by the index, which is the sum of being either exposed to economic damage or displaced or both. In the Lagunes region (about 70% of the study sample), one of the two regions where conflict was intense, however, being exposed to conflict was associated with a 0.12 percentage point increase in the likelihood of infection.

[insert Table 8]

Robustness Checks

Attrition was 20% of the initial baseline in 2010. After the first tracking during follow-up, an intensive follow-up procedure was implemented on a sample of missing individuals. This random sample was drawn to be representative of all the missing individuals. The analysis presented in the paper uses the sampling weight used in this two-stage tracking framework to account for attrition. As a robustness check, we first run the regression without this weight. Results, available on request, are qualitatively similar to those presented. Ignoring the two-stage tracking, we then used a standard procedure to account for attrition. This consist of using inverse probability weights computed using first wave characteristics after the estimation of the determinants of attrition as indicated in Table 3. The results, also available on request, appear to be very similar to those presented in the paper.

6. Conclusion

The paper gives evidence of how the 2010-2011 post-electoral crisis in Cote d'Ivoire had a negative impact on the income and consumption of individuals. It further documents that the negative income shocks induced adverse health effects on vulnerable women. The analysis uses outcomes based on self-reported sexual behavior and the biomarker of HIV to establish a positive relationship between income shocks and transactional sex; I find that unmarried young women are likely to increase their number of sexual partners and receive transfers in the aftermath of conflict.

While many past studies were based on sex-workers (an exception is De Walque *et al*. (2014)), this paper underlines the vulnerability of unmarried and poor women when they encounter income shocks. The originality of these findings lies in the sample; firstly, it shows that the impact of conflict on HIV incidence is relevant. Secondly, transactional sex is used as a risk-coping mechanism among different sub-populations who are not necessarily sex-workers; thirdly, the place of recruitment for the study sample and previous knowledge on risks of HIV/AIDS does not necessarily protect individuals from risk-taking. The general conclusion is therefore that sex for money during adverse income shocks could be more widespread than previously documented.

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Figures

Figure 1 : Spatial Distribution of Sample by Region
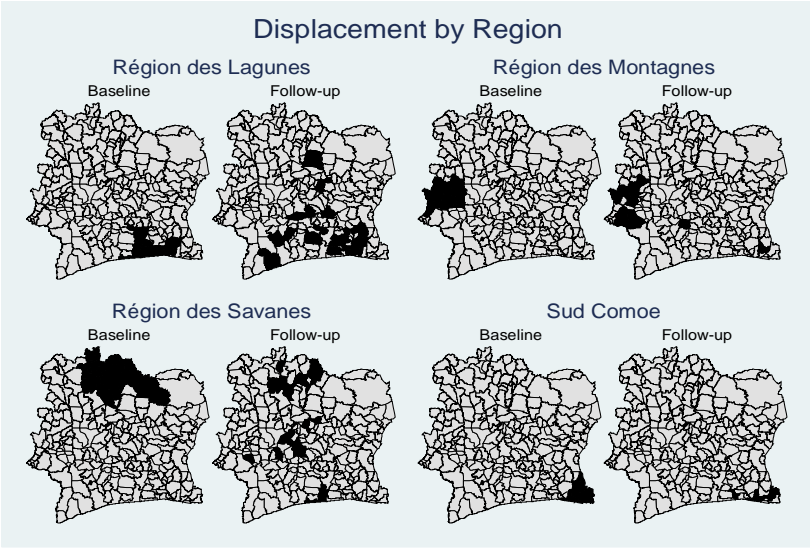
Notes: The figure shows spatial distribution of baseline and follow-up by region. Participants were tracked in different parts of the county more than 18 months from when data was first collected in 2010.

Figure 2. Relative Income and Consumption, by quarter

Notes: Figure reports mean relative income and consumption by quarter. Relative income/consumption takes the value -1 if reported as below average, 0 if average and +1 if above average in a given quarter. They are to be read with reference to Jan-April 2010.

Tables

Table 1. Characteristics of Study Sample and Comparison to CSW

	WOMEN		MEN	
Sample:	Baseline	Followup	Baseline	Followup
Survey Year:	*2010*	*2013*	*2010*	*2013*
Age	26.91	28.42	28.81	29.26
	[7.55]	[8.02]	[7.76]	[7.7]
Biological mother deceased	0.2	0.22	0.26	0.25
	[0.4]	[0.41]	[0.44]	[0.43]
Single	0.58	0.56	0.64	0.59
	[0.49]	[0.5]	[0.48]	[0.49]
Maried	0.23	0.27	0.16	0.21
	[0.42]	[0.44]	[0.37]	[0.41]
Common-law	0.17	0.16	0.19	0.19
	[0.37]	[0.36]	[0.39]	[0.39]
Divorced/widow	0.02	0.02	0.01	0.01
	[0.14]	[0.15]	[0.09]	[0.08]
Any children	0.53	0.54	0.43	0.45
	[0.5]	[0.5]	[0.49]	[0.5]
If any children: # of children	2.46	2.62	2.75	2.9
	[1.88]	[1.97]	[2.16]	[2.31]
No education	0.24	0.21	0.16	0.15
	[0.43]	[0.41]	[0.37]	[0.36]
Primary education	0.27	0.25	0.17	0.15
	[0.45]	[0.43]	[0.37]	[0.36]
Secondary education	0.33	0.34	0.39	0.38
	[0.47]	[0.48]	[0.49]	[0.49]
Higher level	0.13	0.16	0.23	0.26
	[0.34]	[0.37]	[0.42]	[0.44]
Sexual activity and HIV Awareness				
Never had sex	0.24	0.24	0.36	0.37
	[0.43]	[0.42]	[0.48]	[0.48]
Knows HIV is an STD	0.95	0.97	0.96	0.97
	[0.22]	[0.17]	[0.2]	[0.18]
Healthy looking can have HIV	0.77	0.82	0.84	0.87
	[0.42]	[0.39]	[0.36]	[0.34]
Condoms can prevent HIV	0.92	0.92	0.94	0.94
	[0.27]	[0.26]	[0.23]	[0.24]
# of observations	2071	967	1532	850

Notes: CSW sample is a sample of commercial sex workers. See text for more detail on the dataset.

Table 2: Mean difference between the two-stage sampling

	2nd Stage	1st Stage	(2)-(1)	Sign.	P-Val	Obs(1)	Obs(2)
	(1)	(2)	(3)	(4)	(5)	(6)	(7)
Female	0.54	0.52	-0.02		0.321	251	1760
Age	27.14	28.87	1.74		0.999	245	1709
Mother had died	0.20	0.24	0.04		0.905	250	1748
Single	0.66	0.56	-0.10	***	0.002	251	1760
Married	0.15	0.25	0.10		1000	251	1757
Cohabitant	0.19	0.17	-0.01		0.313	251	1757
Divorced	0.00	0.02	0.01		0.937	251	1757
Head of household	0.51	0.61	0.11		0.999	251	1760
Individual Income	3.37	3.28	-0.09		0.159	205	1760
Family Income	2.04	2.09	0.06		0.711	251	1571
Fertility							
Children	0.44	0.51	0.08		0.987	244	1713
Number of Children	2.11	2.83	0.71		1000	107	882
Education							
No Education	0.10	0.21	0.11		1.000	251	1755
Primary	0.22	0.22	-0.01		0.407	251	1755
Secondary	0.42	0.35	-0.07	**	0.014	251	1755
Higher	0.24	0.19	-0.05	**	0.025	251	1755
Sexual Behavior and Awareness							
Ever had sex	0.26	0.29	0.02		0.784	247	1716
Knows HIV is an STD	0.98	0.96	-0.01		0.139	250	1753
Healthy looking can have HIV	0.84	0.82	-0.02		0.229	249	1753
Condoms can prevent HIV	0.94	0.93	-0.02		0.179	250	1753
HIV status	0.00	0.01	0.01		0.845	251	1760

Table 3: Attrition and its determinants

	Dep. Var: Attrited from Follow-up						
	All	Women	Men	Lagunes	Savanes	Montagnes	Sud Comoe
Mean of Dep. Var	*0.44*	*0.49*	*0.37*	*0.53*	*0.23*	*0.26*	*0.13*
Displace.. rate of non-attriters	0.0598	0.0652	0.0671	0.0911	0.761	-0.786	0.270
from same area at baseline	(0.0651)	(0.0773)	(0.0828)	(0.0641)	(1.070)	(0.407)	(0.359)
Completed Primary School	0.0472	0.0308	0.0747	0.0191	0.0342	0.102***	0.0246
	(0.0287)	(0.0331)	(0.0530)	(0.0336)	(0.0783)	(0.0397)	(0.0600)
Completed Secondary School	0.0241	0.00754	0.0476	0.0118	-0.0435	0.0492	0.0274
	(0.0342)	(0.0446)	(0.0484)	(0.0413)	(0.0729)	(0.0764)	(0.0242)
At least some higher education	-0.0879**	-0.0999***	-0.0768	-0.110**	0.0105	-0.102	0.0473
	(0.0397)	(0.0519)	(0.0517)	(0.0444)	(0.102)	(0.0609)	(0.0461)
Literate	-0.128*	-0.129*	-0.109**	-0.177*	0.0189	-0.137	-0.00694
	(0.0326)	(0.0417)	(0.0508)	(0.0394)	(0.0448)	(0.0879)	(0.0808)
Age	-0.00932*	-0.0131*	-0.00393***	-0.0121*	-0.00595	-0.00420	-0.00452
	(0.00142)	(0.00187)	(0.00197)	(0.00144)	(0.00610)	(0.00405)	(0.00377)
Female	0.0419***			0.0111	0.206*	0.0310	0.00349
	(0.0224)			(0.0250)	(0.0467)	(0.0401)	(0.0282)
Single at baseline	0.0401***	0.0274	0.0651**	0.0299	0.0283	0.0540***	0.0717
	(0.0207)	(0.0221)	(0.0314)	(0.0254)	(0.0453)	(0.0226)	(0.0695)
Any children at baseline	0.0400**	0.0548**	0.0106	0.0579*	0.0294	0.00300	-0.0363
	(0.0187)	(0.0266)	(0.0242)	(0.0201)	(0.0679)	(0.0657)	(0.0346)
Lagunes	0.408*	0.443*	0.375*				
	(0.0791)	(0.1000)	(0.0667)				
Savanne	0.105	0.206***	0.0294				
	(0.0911)	(0.117)	(0.0714)				
Montagne	0.0823	0.106	0.0628				
	(0.0963)	(0.121)	(0.0752)				
Constant	0.388*	0.500*	0.231**	0.932*	0.204	0.691**	0.157
	(0.0987)	(0.120)	(0.0953)	(0.0553)	(0.160)	(0.243)	(0.191)
Observations	3,588	2,060	1,528	2,551	520	317	200
R-squared	0.131	0.124	0.128	0.067	0.078	0.082	0.081

Robust standard errors in parentheses. * p<0.01, ** p<0.05, *** p<0.1.

Table 4: Self-reported exposure to 2011 Conflict

	All	Women	Men	Lag.	Sav.	Mont.	S.Com.
Displaced during the crisis	0.36	0.41	0.31	0.47	0.07	0.44	0.19
Duration of displacement (days)	109	104	116	109	107	97	146
How was your home neighborhood affected by the crisis?							
People were killed	0.45	0.47	0.42	0.61	0.12	0.39	0.14
Shops and markets were closed	0.71	0.77	0.65	0.86	0.35	0.78	0.43
Goods/Services were expensive	0.91	0.94	0.89	0.95	0.87	0.95	0.74
People were robbed	0.72	0.75	0.69	0.82	0.42	0.91	0.47
People were threatened	0.71	0.73	0.69	0.83	0.36	0.88	0.5
People were raped	0.26	0.29	0.23	0.28	0.1	0.52	0.13
Premises were ransacked	0.65	0.68	0.62	0.78	0.34	0.78	0.32
Length of the crisis in the neighborhood (days)	81	76	88	85	71	65	61
Personally a victim of theft or damage during crisis	0.16	0.14	0.19	0.17	0.09	0.34	0.09
Family member was victim of theft or damage during crisis	0.2	0.2	0.2	0.22	0.09	0.37	0.11
# of observations	2014	1056	958	1200	401	238	175

Table 5: The impact of the Conflict on Income

Dependent Variable	All		Lagunes		Montagnes		Savanes		Sud Comoe	
	Own Income	Family Income	Own Income	Family Income	Own Income	Family Income	Own Income	Family Income	Own Income	Family Income
Column	(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)	(9)	(10)
May-Aug 2010	-0.24	0.16	0.59	0.61	-0.47	-0.15	-10.09***	-4.05**	2.29	1.63
	(0.965)	(0.826)	(1.426)	(1.264)	(1.853)	(0.803)	(2.807)	(1.578)	(2.198)	(1.058)
Sept-Dec 2010	-0.75	-1.18	-0.76	-1.51	3.41	1.59	-2.69	-3.47	-6.40	-1.80
	(1.519)	(1.081)	(2.067)	(1.616)	(2.606)	(1.365)	(2.511)	(2.118)	(6.754)	(2.575)
Jan-April 2011	-13.26***	-12.22***	-19.43***	-17.50***	-4.48	-2.51	-0.75	-7.28*	-7.31	-1.66
	(2.595)	(1.560)	(3.685)	(2.259)	(3.680)	(2.140)	(8.961)	(4.160)	(8.811)	(3.558)
May-Aug 2011	-8.47***	-5.33***	-13.46***	-8.53***	5.41	5.99**	-4.79	-6.56	-9.35	-2.62
	(2.233)	(1.471)	(3.010)	(2.012)	(4.211)	(2.779)	(9.381)	(3.987)	(7.431)	(5.776)
Sept-Dec 2011	2.41	0.20	-0.07	-1.79	12.14***	10.28***	9.21	0.97	-3.48	-2.46
	(2.325)	(1.325)	(3.277)	(1.763)	(4.419)	(2.991)	(9.111)	(4.247)	(6.415)	(5.013)
Jan-April 2012	11.39***	3.01*	10.09***	0.58	24.00***	13.32***	19.08	9.76	-2.71	-1.01
	(2.702)	(1.666)	(3.531)	(2.237)	(6.582)	(3.152)	(13.535)	(6.971)	(6.192)	(5.288)
May-Aug 2012	12.71***	3.73**	12.48**	1.51	24.02***	14.58***	16.93	8.71	-2.24	-0.58
	(3.414)	(1.839)	(4.960)	(2.560)	(6.428)	(3.161)	(13.923)	(6.834)	(6.333)	(5.208)
NxT	13,816	13,816	8,040	8,040	3,008	3,008	1,592	1,592	1,176	1,176
R-squared	0.015	0.015	0.020	0.024	0.034	0.034	0.018	0.018	0.008	0.002
N	1,727	1,727	1,005	1,005	376	376	199	199	147	147
Mean Jan-April 2010	57.22	167.6	57.22	167.6	83.65	78.85	134.9	164.9	193.5	173.8
SD Jan-April 2010	84.24	203	84.24	203	123.1	95.51	198.6	199.7	284.8	210.6

Notes: All the dependent variables are normalized to their values in January-April 2010, so the coefficients are direct percentage changes. Incongruence between the different columns are driven by missing values on the dependent variables or variables that define the sample of analysis. The regressions include fixed effects and standard errors are clustered at the individual level in parentheses. * Significant at 10%, ** Significant at 5%, *** Significant at 1%.

Table 6: Women's entry into Commercial Sex

	ALL REGIONS		LAGUNES	
	Mean	*Obs*	*Mean*	*Obs*
Panel A. Commercial Sex Worker Survey from 2011				
Age at first Sex for Money	20.67	5462	22.26	1610
Reason Started to have Sex for Money				
2002-2007 Conflict	0.09	5673	0.04	1671
2010-2011 Conflict	0.09	5673	0.04	1671
Panel B. Study sample, 2012 Follow-up Survey				
Had at least one non-marital partner in the last two years	0.48	1021	0.52	651
If yes:				
Ever had Sex for Money	0.14	437	0.17	303
If yes:				
Age at first Sex for Money	22.56	62	23.2	49
Had first sex for money during or after 2010-2011 conflict	0.33	63	0.3	50
Reason Started to have Sex for Money				
Economic Needs	0.94	63	0.96	50

Table 7: The impact of conflict on sexual partners and transfers received by women

Dependent Variable	Number of Sexual Partners						Transfers Received	
Sample	All		Unmarried		Unmarried		Unmarried	
	Unmarried	Married	Young	Old	Without Income	With Income	Without Income	With Income
Column	(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)
May-Aug 2010	-0.02	-0.01	-0.03	0.03	-0.11	0.02	0.09	-0.22*
	[0.036]	[0.005]	[0.045]	[0.056]	[0.119]	[0.023]	[0.091]	[0.121]
Sept-Dec 2010	-0.02	-0.04*	-0.04	0.03	0.01	-0.05	-0.06	0.15
	[0.041]	[0.024]	[0.051]	[0.058]	[0.096]	[0.067]	[0.120]	[0.182]
Jan-April 2011	-0.07	-0.13**	-0.03	-0.17***	-0.06	0.00	-0.34**	-0.18
	[0.059]	[0.057]	[0.077]	[0.059]	[0.146]	[0.075]	[0.135]	[0.170]
May-Aug 2011	-0.00	-0.10***	0.04	-0.14**	0.13	0.01	-0.19*	-0.08
	[0.048]	[0.037]	[0.061]	[0.060]	[0.118]	[0.068]	[0.108]	[0.147]
Sept-Dec 2011	0.05	-0.06*	0.10*	-0.10	0.21*	0.04	0.16*	0.01
	[0.049]	[0.032]	[0.054]	[0.107]	[0.115]	[0.069]	[0.097]	[0.148]
Jan-April 2012	0.08	-0.05	0.11*	-0.01	0.15	0.02	0.32*	0.26
	[0.055]	[0.057]	[0.063]	[0.110]	[0.125]	[0.057]	[0.175]	[0.212]
May-Aug 2012	0.10*	-0.06	0.13*	0.01	0.26*	0.04	0.44**	0.08
	[0.059]	[0.060]	[0.074]	[0.083]	[0.147]	[0.080]	[0.192]	[0.173]
NxT	4,760	3,608	3,424	1,336	1,177	2,244	1,175	2,226
R-Squared	0.011	0.013	0.017	0.024	0.044	0.004	0.035	0.008
Observations	595	451	428	167	243	371	243	371
Mean Jan-April 2010	0.851	0.976	0.780	0.933	0.787	0.911	17307	11722
SD Nov	0.600	0.723	0.677	0.814	0.663	0.807	50628	45360

Notes: All the dependent variables are normalized to their values in January-April 2010, so the coefficients are percentage changes. Incongruence between the different columns are driven by missing values on the dependent variables or variables that define the sample of analysis. The regressions are restricted to women who supplied information for all time periods to avoid unbalanced panel. They include fixed effects and standard errors are clustered at the individual level in parentheses. * Significant at 10%, ** Significant at 5%, *** Significant at 1%.

Table 8: HIV Prevalence at follow-up, by self-reported conflict exposure

Panel A. Women	All regions		Lagunes	
Displacem./Theft/Damage	0.0008	0.0042	0.0110**	0.0121**
	(0.005)	(0.005)	(0.006)	(0.006)
Controls	No	Yes	No	Yes
Observations	1,054	1,054	670	670
Dep. Var. Mean	0.0114	0.0114	0.0090	0.0090
Panel B. Men				
Displacem./Theft/Damage	0.0000	-0.0005	-0.0020	-0.0029
	(0.004)	(0.005)	(0.005)	(0.006)
Controls	No	Yes	No	Yes
Observations	957	957	528	528
Dep. Var. Mean	0.0084	0.0084	0.0076	0.0076

Notes: Prevalence at baseline was 0% by construction so the prevalence rates shown are equivalent to the incidence rate between baseline and endline (33 months on average). Total exposure is the sum of the two conflict exposure measures (displaced and victim) and thus it takes value 0 if the individual was neither displaced nor a victim, 1 if she was either displaced or a victim, and 2 if she was both displaced and a victim. * Significant at 10%, ** Significant at 5%, *** Significant at 1%.