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Online Appendix

Electoral Violence and Supply Chain Disruptions in
Kenya's Floriculture Industry

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A   Theoretical Framework

This section presents a theoretical framework to understand how firms were affected by, and reacted to, the violence. The model focuses on the aspects that are most salient to understand the particular episode we study and is not meant to portray a comprehensive treatment of how firms might be affected by violence. In particular, we take a short-run perspective in which a firm's capital and other input decisions are fixed, we assume an exogenous price for output not affected by the violence, and abstract from how the violence might increase uncertainty. The model derives predictions which are tested in the main empirical section.

A.1   Setup

Consider a firm with the production function

$$q = \theta N^{\beta} \left[\int_{i \in N} l_i^{\frac{1}{\alpha}} di \right]^{\alpha}, \tag{4}$$

where, with some abuse of notation, N is the set as well as the measure of hired workers, i.e., $i \in N$; l_i is the hours worked by each worker i; and θ is a firm-specific parameter. The production function allows for productivity gains due to specialization through the term N^{β}, with $\beta \geq 0$. Note that we abstract from other inputs, such as materials and capital, since those are fixed over the short-run period during which the violence occurred.

Worker $i's$ utility function is given by $u(\cdot) = y_i - \frac{l_i^{1+\gamma}}{1+\gamma}$, where y_i denotes her income and $\gamma > 0$. Each worker has a reservation utility $\overline{u}$. The firm sells flowers in a foreign market taking the world price p as given.

In practice, firms in the flower industry hire and train workers at the beginning of the season − September to October. Since we are interested in studying a short episode of ethnic violence which happened in the middle of the season, we take the pool of hired and trained workers N as given and focus for now on the firm's choice of hours worked l_i, which can be adjusted throughout the season.[22] When studying the firm's reaction to the ethnic violence, we will allow the firm to partially adjust the labor force as well.

The profits of the firm can be written as

$$\Pi(\theta) = p\theta N^{\beta} \left[\int_{i \in N} l_i^{\frac{1}{\alpha}} di \right]^{\alpha} - \int_{i \in N} w_i l_i di. \tag{5}$$

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[22]It is straightforward to relax this assumption, and show that the optimal N is an increasing function of θ. Considering this would not alter the predictions obtained below.

The firm offers a contract to each worker which specifies the amount of hours to be worked, l_i, and a wage per hour, w_i. We assume a large pool of identical workers from which the firm can hire and, therefore, each contract offered by the firm satisfies the worker's participation constraint with equality. Since a worker's income is equal to $y_i = w_i l_i$, the binding participation constraint implies $w_i l_i = \frac{l_i^{1+\gamma}}{1+\gamma} + \bar{u}$. It is easy to check that the profit function of the firm is concave and symmetric in l_i and, therefore, the optimal solution entails $l_i = l_j$, $\forall i, j \in N$. For convenience, we set $\bar{u} = 0$ and denote $\eta = \beta + \alpha$, with $\eta \in (\frac{1}{1+\gamma}, 1)$.[23] The profit function can then be rewritten as

$$\Pi(\theta) = p\theta N^\eta l - N\frac{l^{1+\gamma}}{1+\gamma}. \tag{6}$$

The firm chooses the optimal l taking as given N, θ, and p. The following statement characterizes a firm production, wages and profits in normal times.

Observation: *Denote by $R^* = (p\theta N^{\eta-1})^{1+\frac{1}{\gamma}}$ the revenues per worker in normal times. Then, total production is $q^* = \frac{R^*}{p}N$, profits are $\Pi^* = \frac{\gamma}{\gamma+1}R^*N$, and hours worked are $l^* = (R^*)^{\frac{1}{1+\gamma}}$.*

A.2 Ethnic Violence: Workers' Absence

The main channels through which firms were differentially affected across regions by the violence have been (i) the absence of workers, and (ii) transportation problems.[24] In our context, it might take up to 400 workers to pluck, cut, arrange, and pack an amount of flowers that fills up one single truck. Once the truck is ready to take the flowers to the airport, it only takes one driver and, during the violence, a security guard to operate it. The interviews in the field reveal that firms paid fixed costs (e.g., hired security) to ensure they could safely deliver flowers to the airport. Generally speaking, however, respondents report

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[23]The production function thus allows for imperfect substitution across workers who might be involved in different tasks ($\alpha < 1$) and for gains from specialization ($\beta \geq 0$). Provided overall returns to scale guarantee the second order conditions are satisfied, the model can accommodate the special case with perfect substitution, and no gains from specialization.

[24]The sudden electoral violence would also lead to more uncertainty in the business climate. Since our survey was retrospective we lack detailed information on the firms' perceptions of risk during the events and we thus abstract from this channel. In the empirical section, however, we also explore firms' behavior ahead of the subsequent presidential election in 2013, a time in which the risk of supply-chain disruptions increased and firms adopted precautionary measures in response.

that increases in transport costs were small and not a major impediment to exporting.[25] For these reasons, this section focuses on the worker absence channel. An extension of the model that deals with transportation problems is further explored below.

In line with interviews conducted in the field, we assume that the shock was completely unanticipated by firms. Since violence was not targeted towards firms but rather individuals in the general population, we model the violence as an exogenous shock to the reservation utility of workers. In particular, assume that worker i faces a cost $c_i \geq 0$ of coming to work during the period of violence. The costs c_i are independently drawn from a distribution with continuous and differentiable cumulative function $F(c, \mathbf{C})$, where $\mathbf{C}$ parameterizes the intensity of the violence at the firm's location. The cost c_i captures, in a parsimonious way, various reasons why many workers found it harder to go to work − e.g., (i) psychological and expected physical costs due to the fear of violence during the commuting and/or on the farm, (ii) the opportunity cost of leaving family and properties unguarded while at work, and (iii) the opportunity cost of fleeing to the region of origin for security reasons or to be closer to family members that were experiencing violence.

Given cost c_i, a worker offered a wage w_i^v to work for l_i^v hours comes to work if

$$w_i^v l_i^v - \frac{(l_i^v)^{1+\gamma}}{1+\gamma} \geq c_i, \tag{7}$$

where the superscript v makes explicit that the firm re-optimizes the wage policy at the time of the violence and might choose to compensate workers for the costs of coming to work.

In adjusting the labor force to the new circumstances, the firm keeps the "cheapest" workers − i.e., an interval of workers that have low realizations of the shock c_i. Furthermore, due to the symmetry of the production function, it is optimal for all workers kept at the farm to work l^v hours. The optimal policy for the firm, therefore, consists of choosing (i) the threshold c^v such that workers with $c_i \leq c^v$ come to the farm, and (ii) the hours worked by each worker, l^v. For simplicity, we maintain the assumption that the firm can offer different

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[25]Firms also coordinated convoys to increase security and, indeed, ensuring that trucks could go to the airport was one of the government priorities during the violence. Media reported that the police dislodged roadblocks along the main routes from the flower farms to the airport.

wage contracts w_i^v to each worker i.[26] The problem of the firm can then be rewritten as

$$\max_{c,l} \Pi^v = p\theta \left(N \times F(c, \mathbf{C})\right)^\eta l - \left(N \times F(c, \mathbf{C})\right) \frac{l^{1+\gamma}}{1+\gamma} - N \int_0^c s dF(s, \mathbf{C}) - K. \tag{8}$$

Assuming an interior solution in which the share of workers that come to work during the violence is $\sigma_v = F(c^v, \mathbf{C}) < 1$, the first order conditions imply

$$l^v = l^* \sigma_v^{\frac{\eta-1}{\gamma}} > l^* \text{ and } c^v = \eta \left(R^*\right)^{\frac{\gamma}{1+\gamma}} \left(\sigma_v\right)^{\eta-1} l^v - \frac{(l^v)^{1+\gamma}}{1+\gamma}. \tag{9}$$

The two first order conditions deliver several implications.[27] First, by increasing the cost of coming to work for the worker, the impact of violence on production is negative. This is our first prediction. The reduced form effect of the violence on production, $\Delta^v = \ln\left(\frac{q^v}{q^*}\right)$, is given by

$$\Delta^v = \underbrace{\eta \ln \sigma_v}_{\text{retained workers}} + \underbrace{\ln\left(\frac{l^v}{l^*}\right)}_{\text{extra hours worked}} = \frac{\eta(1+\gamma)-1}{\gamma} \ln\left(\sigma_v\right). \tag{10}$$

The effect of the violence on production can be decomposed into two effects: the negative effect coming from a reduction in the number of workers coming to work, $\eta \ln \sigma_v < 0$, is partially offset by a positive effect on the hours worked, $\ln\left(\frac{l^v}{l^*}\right) > 0$. [28]

Second, the model provides guidance on how to quantify the impact of the violence on firm profits. Defining $\mu = \frac{\eta(1+\gamma)-1}{1+\gamma}$ and substituting Δ^v and l^v in the first order condition for c^v, we obtain, after some manipulation,

$$c^v = \mu R^* \times \sigma_v^{-\frac{(1-\eta)(1+\gamma)}{\gamma}} = \mu R^* \times e^{-\frac{1-\eta}{\mu}\Delta^v}. \tag{11}$$

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[26]None of the qualitative results are affected by allowing the firm to offer worker specific wages w_i^v. In practice, firms arranged transportation and accommodation for the workers that had problems coming to the farm. Some part of the costs, therefore, have been worker specific. If, however, firms had to pay a common wage, infra-marginal workers would earn rents. This does not mean they benefited from the violence since, presumably, overall utility would be lower through other channels. As we have no data on individual workers, we refrain from exploring how the violence affected them.

[27]We assume that the second order condition is satisfied − i.e., $\frac{\partial^2 \Pi^v}{\partial l^2} < 0$, $\frac{\partial^2 \Pi^v}{\partial c^2} < 0$ and $\frac{\partial^2 \Pi^v}{\partial l^2} \cdot \frac{\partial^2 \Pi^v}{\partial c^2} - \left(\frac{\partial^2 \Pi^v}{\partial l \partial c}\right)^2 > 0$. It is straightforward to check that $\frac{\partial^2 \Pi^v}{\partial l^2} < 0$ holds. The remaining conditions hold, e.g., when $F(\cdot)$ is either uniform or exponential for reasonable parameterizations of the production function.

[28]Since the share of workers coming to work during the violence is endogenously chosen by the firm, a reduced form regression of $\Delta^v \ln \sigma_v$ gives a biased estimate of η, i.e., $\frac{\eta(1+\gamma)-1}{\gamma} < \eta$.

The estimated effect of the violence on production, Δ^v, therefore, can be combined with information on revenues per worker during normal times, R^*, to recover a bound to the extra costs incurred by the firm at the time of the violence.[29]

A.3 Heterogeneity in the Reduced Form Effects

This section discusses two comparative statics suggesting heterogeneous reduced form effects of the violence on production, Δ^v, depending on firm's size and marketing channel.

Size Effects: Consider first a proxy for the size of the firm, given by the quantity produced in normal time, q^*. The equation (11) can be rewritten as

$$(c^v \times \sigma_v, \mathbf{C})^{\frac{(1-\eta)(1+\gamma)}{\gamma}} = \frac{\mu p q^*}{N}. \tag{12}$$

Straightforward implicit differentiation of equation (12) gives $\frac{\partial c^v}{\partial q^*} > 0$ and, by equation (10), $\frac{\partial \Delta^v}{\partial q^*} > 0$.[30] This means that the effect of the violence on production and worker loss is greater for smaller firms.

Marketing Channels: Some firms in the industry export flowers through direct relationships with foreign buyers. In such case, the firm receives a unit price p_d which is agreed upon at the beginning of the season for delivering a prespecified quantity q^*. In these relationships, firms might suffer a penalty for failing to deliver the agreed quantity. We are not interested in explicitly deriving the penalty schedule. We think of the penalty as arising from reputation losses, rather than stemming from an enforceable clause stipulated in a contract. Macchiavello and Morjaria (2015) document that these relationships are typically not governed by written contracts. In the unlikely event parties had stipulated a contract with enforceable penalties, the foreign buyers would likely have suspended any penalties for failing to deliver the contracted quantities during this period (e.g., most contracts allow for exceptions due to *acts of God*). Indeed, Macchiavello and Morjaria (2015) find evidence that exporters

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[29]In order to recover c^v, knowledge of the parameters γ and η is required. Note, however, that the share of the wage bill in revenues, which can be obtained from the survey, is equal to $\frac{1}{1+\gamma}$, and that, for a given γ, an estimate of η can be recovered from the relationship between the effects of the violence on production, Δ^v, and the share of workers coming at the firm, σ_v, as suggested by equation (10).

[30]While implicit differentiation of equation (12) implies $\frac{\partial \Delta^v}{\partial N} < 0$, if N was endogenously chosen by the firm, the model would predict a positive correlation between Δ^v and N. Since export data are available for all firms in the sample while labor force is available only for surveyed firms, it is convenient to measure size in terms of export volumes and avoid the unnecessary complication of endogenizing N in the model.

strategically responded to the violence to maintain a reputation for being a reliable supplier with their main customers.

For simplicity, we assume that if the firm delivers a quantity $q < q^*$ to the buyer, the firm incurs a reputation loss worth $\Omega(q^* - q) > 0$. The reputation loss is zero otherwise.[31] The firm can always sell flowers to the spot market at a price p. Therefore, a *necessary* condition on the shape of the penalty function $\Omega(\cdot)$ to induce the firm to ship flowers to the buyer is

$$p_d \geq p - \frac{\partial \Omega}{\partial q}, \tag{13}$$

if $q < q^*$.[32] Inspection of equation (12) when p is replaced by $p_d - \frac{\partial \Omega}{\partial q}$ shows that, in responding to the violence, a firm engaged in a contract with a direct buyer has stronger incentives to retain workers and keep producing relative to a firm which takes prices as given on the spot market. The model thus suggests that, during the violence, firms that sell through direct relationships might end up being worse off than firms that sell at exogenous prices to the international market as they incur additional costs to avoid the penalty.[33]

A.4   An Extension: Transportation Problems

We now turn to the second mechanism through which the ethnic violence has affected firms' operation: transportation problems. The model is modified as follows. In order to export in any given day, firms face a fixed cost of transportation T.[34] Firms can, however, store flowers for some days. If a flower is stored for d days, it reaches the final market in good condition with probability $\delta^{d/2}$. Given the data in our sample, we focus on the case in which firms must ship at least once a week — i.e., after $D = 6$ days, flowers are worthless.

In normal times, the firm chooses the optimal frequency of shipment, and then adjusts its labor inputs accordingly. The firm's profits when harvesting flowers that are sent after d day, are $\delta^d \Pi^*$, where Π^*, derived in the main text, now incorporates the transportation costs

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[31]One could imagine that the violence provides an opportunity for firms to prove their worth. What matters for incentives, however, is the slope, rather than the level, of the payoffs function.

[32]Note that $\frac{\partial \Omega}{\partial q} < 0$ allows for $p_d < p$. If this condition was violated at q^*, the firm would prefer to reduce the shipment to the buyer and obtain higher prices on the spot market.

[33]These firms also suffer lower revenue losses, but in the absence of the penalty they would have (optimally) chosen a lower production.

[34]The focus on fixed costs, as opposed to variable costs, deserves some justification. The major component of variable transportation costs for the firm are the freight charges. These were not affected by the ethnic violence and, therefore, can be absorbed in the price p. Fixed costs in transportation arise, instead, to send one truck to the airport.

Td. It is straightforward to show the following:

Lemma

During normal times, the firm ships every day of the week if $\frac{1-\delta}{T}\Pi^* \geq 1$. The firm ships $n \in \{2,3,4\}$ times per week if $\frac{1}{(1+\delta)^{4-n}} \geq \frac{1-\delta}{T}\Pi^* \geq \frac{1}{(1+\delta)^{5-n}}$. Otherwise the firm ships once per week.

Conditional on the number of shipments, the firm tends to equalize the amount of flowers exported in every shipment. For this reason, the firm either exports every day of the week, or four times or less per week. On any particular day d, the quantity therefore exported by the firm can be decomposed as

$$q_d = \underbrace{\mathbf{I}_d}_{\text{prob. of exporting}} \times \underbrace{\Sigma_{i=0}^{D^*}\delta^i q^*}_{q\,|\,\text{on exports}} \, ,$$

where $\mathbf{I}_d = 1$ is an indicator of whether the firm exports in day d and D^* is the number of days since the previous shipment.

We model the violence as having increased T for a few days. In response, firms readjust i) their export frequency and ii) the quantity exported. The effect of the violence on the likelihood of exporting on any given day is negative, since $\frac{1-\delta}{T}\Pi^*$ decreases. This implies that, on average, $D^v > D^*$. The quantity of flowers exported in each shipment, however, might either increase or decrease. The quantity of flowers exported in each shipment decreases if firms do not reduce their export frequency i.e., if $D^v = D^*$. For these firms, the only effect is $q^v < q^*$. For firms for which $D^v > D^*$, however, the quantity of flowers exported in each shipment might increase, since $\Sigma_{i=0}^{D^v}\delta^i q^v \leq \Sigma_{i=0}^{D^*}\delta^i q^*$. For firms that do not suffer from workers' absence, transportation problems cause (i) a decrease in the likelihood of exporting, and (ii) conditional on exporting, an increase in the export volumes.

A.5   Summary of Predictions

The framework delivers a set of testable predictions on the short-run effects of the violence on the firms which we bring to the data in the main paper. To summarize, the model suggests:

1. Export volumes decrease due to the violence. Furthermore: (i) the likelihood of exporting on any given day also decreases because of the violence, but (ii) export volumes

A.8

conditional on exporting might either increase or decrease as a consequence of the violence depending on the relative importance of the reduction in the number of workers coming to work versus transportation problems.

2. The reduced form effect of the violence on production is greater for smaller firms and firms selling mainly to the auctions.

3. The mechanism works through the reduction in the number of workers coming to work. Smaller firms and firms selling mainly to the auctions, therefore, lose a higher proportion of their workers. Furthermore, if the proportion of workers who do not show up for work is directly controlled for, those firms *do not* suffer larger reductions in exports.

# B *Additional Figures*

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Figure B1: **Timeline of Events**

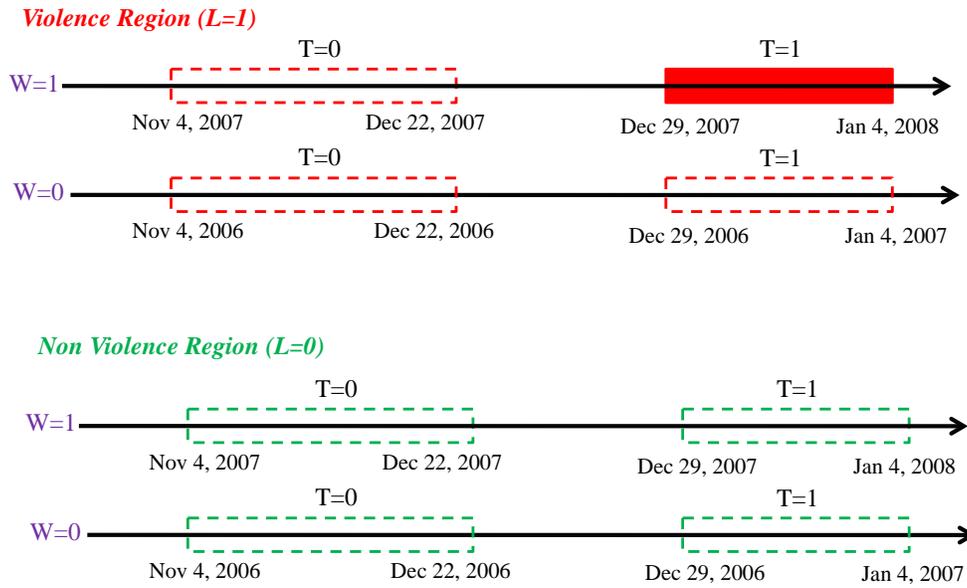|	Sunday	Monday	Tuesday	Wednesday	Thursday	Friday	Saturday
DECEMBER	23	24	25	26	27 Election Day	28	29 Outbreak of Violence
	30 Inauguration of Kibaki	31					
JANUARY			1	2	3	4	5
	6	7	8	9	10	11	12
	13	14	15	16	17	18	19
	20	21	22	23	24	25 Outbreak of Violence	26
	27	28	29	30	31		
FEBRUARY						1	2
	3	4	5	6	7	8	9
	10	11	12	13	14	15	16
	17	18	19	20	21	22	23
	24	25	26	27	28 Power Sharing Agreement		

Note: The figure illustrates the timeline of events leading to the two outbreaks of violence in the aftermath of the fourth multi-party general elections in Kenya held on December 27, 2007. The challenger (Odinga, ODM party) led on the first day of counting (December 28, 2007) leading them to declare a initial victory (December 29, 2007). However on December 29, 2007 the head of the Electoral Commission of Kenya declared Kibaki the winner, by a margin of 2%. The hasty inauguration of Kibaki on the afternoon of December 30, 2007 resulted in Odinga accusing the government of fraud. Within minutes of the announcements of the election results, a political and humanitarian crisis erupted nationwide. Targeted ethnic violence broke out in various parts of the country where ODM supporters, targeted Kikuyus who were living outside their traditional settlement areas of the Central province. This first outbreak of violence, which lasted for a few days, was followed by a second outbreak of violence between January 25 and January 30, 2008 when mediation efforts failed. This second phase of violence happened mainly in the areas of Nakuru, Naivasha and Limuru as a revenge attack on members of ethnic groups perceived to be ODM supporters. Sporadic violence and chaos continued until a power-sharing agreement was reached on February 29, 2008.

A.11

Figure B2: **Location of Flower Firms' and Violence**
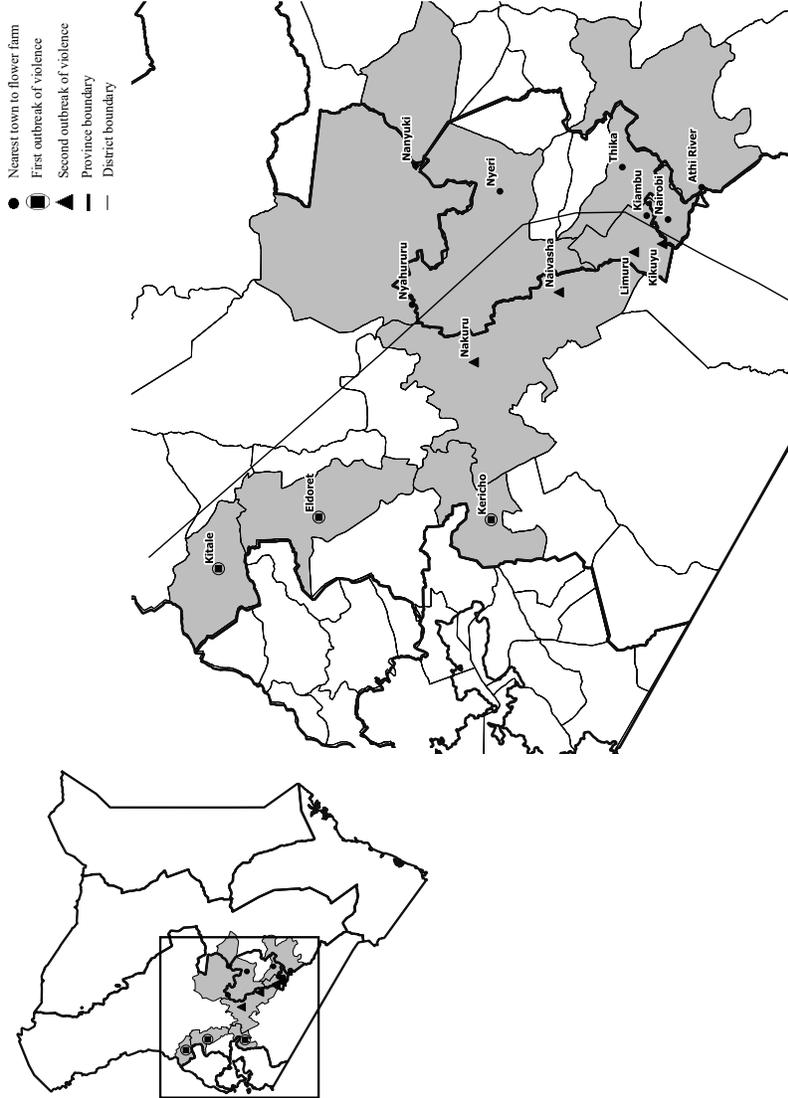
Note: The figure displays the spatial distribution of the nearest main towns to the flower firms as well as whether the relevant locations had been involved in either the first or the second outbreak of violence. Administrative boundaries for districts are depicted by thin black lines and provinces are in thick black lines. The figure is for illustrative purposes only. GIS data source obtained from `https://data.humdata.org/dataset/ken-administrative-boundaries`, accessed October 2012.

Figure B3: **Illustration of Identification Strategy**

Violence Region (L=1)

W=1 — T=0 (Nov 4, 2007 — Dec 22, 2007) — T=1 (Dec 29, 2007 — Jan 4, 2008)

W=0 — T=0 (Nov 4, 2006 — Dec 22, 2006) — T=1 (Dec 29, 2006 — Jan 4, 2007)

Non Violence Region (L=0)

W=1 — T=0 (Nov 4, 2007 — Dec 22, 2007) — T=1 (Dec 29, 2007 — Jan 4, 2008)

W=0 — T=0 (Nov 4, 2006 — Dec 22, 2006) — T=1 (Dec 29, 2006 — Jan 4, 2007)

Note: In order to estimate the impact of the violence on exports, it is necessary to control for both growth across years and the fact that exports within any year follow a seasonal pattern. Our main dependent variable is daily exports $(Y(i)_{T,W}^{L})$, i.e. exports of flowers by firm i located in location L in period T in winter W. The indicator L takes a value of $L = 1$ if the firm is in a location that is affected by the violence after the election and $L = 0$ otherwise. The indicator T takes a value of $T = 1$ during the weeks in January 2008 and early February 2008 during which violence occurred and $T = 0$ during our control period, which are the 10 weeks before the end of December. Finally, the indicator W takes value equal to $W = 1$ in the winter during which the violence occurred - that is the winter of 2007/8 - and $W = 0$ for the previous winter. With this notation, a firm was directly affected during a particular spike of violence if and only if $V = L \times T \times W = 1$.

A.13

Figure B4: **Exports of Traders and Infrequent Exporters**
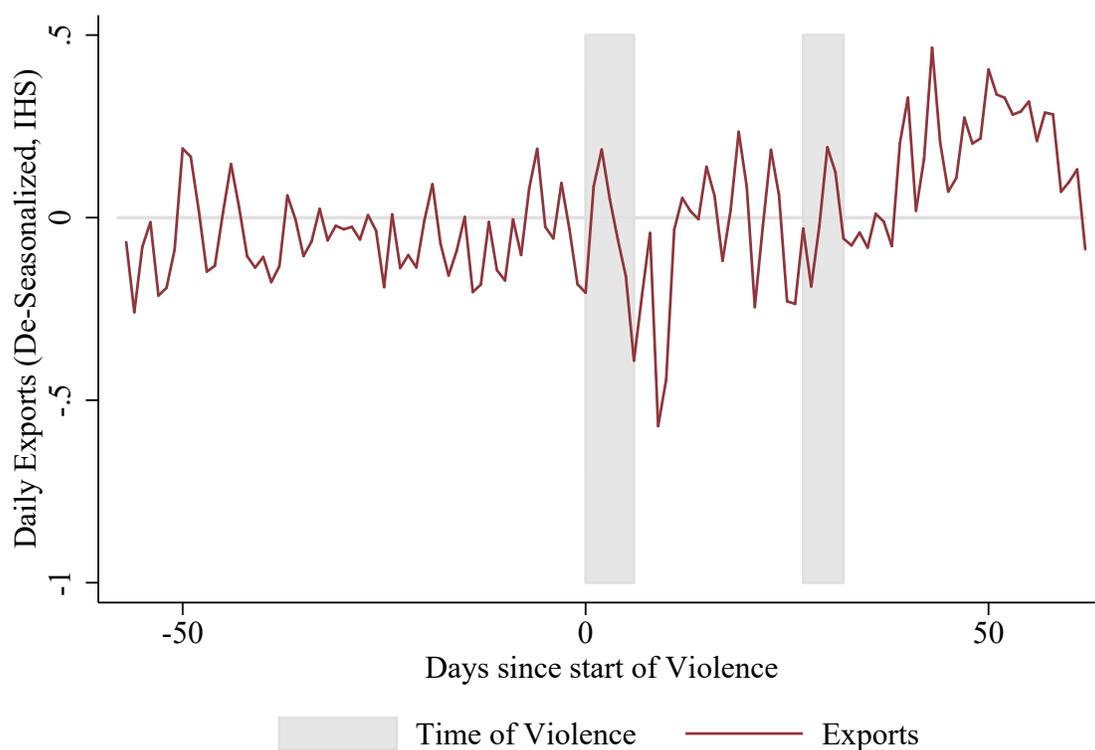
Note: The figure reports the residuals from a regression of the inverse hyperbolic sine transformation of the two-day moving average of exports (kgs) on day of year, day of week and season fixed effects. The exports are aggregated across traders (who do not know own flower farms but instead procure and export flowers) and infrequent exporters defined as all exporters who are not traders or the regular exporters analyzed in Table [2] and Table [3] around the period of the electoral violence. A two-day moving average is reported as it retains the higher variability during the violence period relative to the period before the violence while providing minimal smoothing of the daily data.

Figure B5: **Effect of Violence on Export Volumes, Medium-Run**
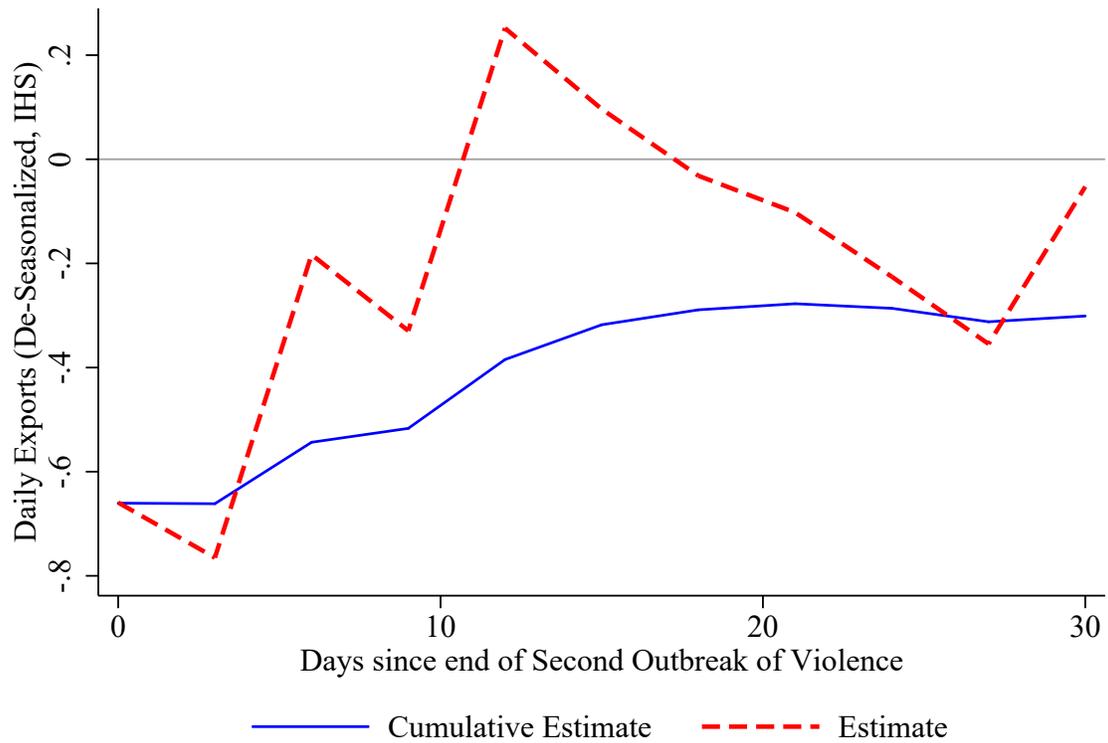
Note: The figure displays the estimated coefficients of the differential cumulative and medium-run effects of the violence following the second outbreak of violence (from Jan. 30, 2008 onwards) on daily exports (kgs, inverse hyperbolic sine transformation) using the baseline specification in column (4) of Table [3]. The estimate peaks around 14 days after the end of the second outbreak of violence reflecting firm's efforts to export for Valentine's Day.

C *Additional Tables*

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Table C1: **Location of Firms and Definition of Violence**

Panel A			
		First Outbreak of Violence	Second Outbreak of Violence
Flower Cluster	No. firms	Violence=1, No-violence=0	Violence=1, No-violence=0
Athi River	10	0	0
Kiambu	18	0	1
Mt Elgon	6	1	0
Mt Kenya	13	0	0
Nairobi	5	0	0
Naivasha	38	0	1
Nakuru	20	1	1
Thika	25	0	0

Panel B			
First Outbreak of Violence [29 Dec 2007 - 4 Jan 2008]			
Winter	No. Firms	Violence	No-violence
1	99	16	83
2	111	17	94
3	118	19	99
4	135	20	115
Second Outbreak of Violence [25 Jan 2008 - 30 Jan 2008]			
Winter	No. Firms	Violence	No-violence
1	99	39	60
2	111	46	65
3	118	47	71
4	135	55	80

Note: This table provides details of the location of flower firms in violence and non-violence localities (Panel A). Flower clusters are designated by industry practitioners and are geographically dispersed across various provinces. The total number of firms is 135, by provinces they are located as follows: 53 firms in Central, 18 in Eastern, 5 in Nairobi, and 60 in Rift Valley. Winter = 4 refers to the 2007/08 period, Winter = 3 refers to the 2006/07 period, Winter = 2 refers to the 2005/06 period and Winter =1 refers to the 2004/05 period.

Table C2: Placebo Test I – Effects of Violence in Previous Winters

			(A) Non-Violence Region	(B) Violence Region	(C) Violence - Non-Violence Diff
			Winter 1: # of Firms: 94	Winter 1: # of Firms: 17	Total # of Firms 111
			Winter 0: # of Firms: 94	Winter 0: # of Firms: 17	
Panel A: Regions of Violence are locations which suffered in the first outbreak of Violence					
1	Treatment Period	Winter -1: Violence Period	6.277	7.418	1.141**
		29 Dec 2005 - 4 Jan 2006	[3.142]	[1.284]	(0.446)
2a		Winter -1: Control Period	6.686	7.569	0.883**
		4 Nov 2006 - 22 Dec 2006	[2.692]	[1.193]	(0.397)
2b	Control Periods	Winter -0: Violence Period	6.537	6.433	-0.104
		29 Dec 2004 - 4 Jan 2005	[2.767]	[2.708]	(0.729)
2c		Winter -0: Control Period	6.862	7.063	0.201
		4 Nov 2004 - 22 Dec 2004	[2.463]	[2.118]	(0.585)
3a		[1]-[2a]	-0.408**	-0.15**	0.258
			(0.166)	(0.058)	(0.176)
3b	First Differences	[1]-[2b]	-0.26	0.985	1.245*
			(0.284)	(0.634)	(0.675)
4	Regional Difference	([1]-[2a])-([2b]-[2c])	-0.084	0.48	**0.563**
	in Difference		(0.191)	(0.372)	**(0.405)**
					Triple Difference
Panel B: Regions of Violence are location which suffered in the second outbreak of Violence					
1	Treatment Period	Winter -1: Violence Period	6.926	6.88	-0.045
		25 Jan 2006 - 30 Jan 2006	[2.617]	[2.614]	(0.501)
2a		Winter -1: Control Period	6.825	6.818	-0.007
		4 Nov 2005 - 22 Dec 2005	[2.492]	[2.591]	(0.486)
2b	Control Periods	Winter -0: Violence Period	6.985	7.226	0.241
		25 Jan 2005 - 30 Jan 2005	[2.57]	[2.36]	(0.501)
2c		Winter -0: Control Period	6.777	6.989	0.212
		4 Nov 2004 - 22 Dec 2004	[2.48]	[2.356]	(0.49)
3a		[1]-[2a]	0.101	0.063	-0.039
			(0.225)	(0.184)	(0.29)
3b	First Differences	[1]-[2b]	-0.059	-0.346	-0.287
			(0.427)	(0.3)	(0.52)
4	Regional Difference	([1]-[2a])-([2b]-[2c])	-0.107	-0.174	**-0.068**
	in Difference		(0.24)	(0.251)	**(0.346)**
					Triple Difference

Note: ***, **, * denote statistical significance at the 1, 5 and 10 percent levels, respectively. Columns (A) and (B) report means of average daily exports (kgs, inverse hyperbolic sine transformation) in rows 1-2(c) (standard deviations are reported in square brackets). Column (C) reports the corresponding difference-in-difference estimation, with standard errors in parentheses clustered at the firm level. Winter= 1 is defined as the period 2006/07 and Winter= 0 is the period 2005/06. In Panel A: Violence location is defined as the localities which suffered violence during the first outbreak of violence. In Panel B: Violence location is defined as the localities which suffered violence during the first and second outbreak. Appendix Table [C1] provides further details. In Panel A there are 17 firms affected by the violence, while in Panel B, 46 firms are located in regions affected by the second spike of violence. In both panels the sample included 111 firms.

Table C3: **Alternative Measures of Proximity and Intensity of Violence**

Dependent Variable	(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)	(9)	(10)	(11)	(12)
					Daily Exports (kgs, IHS)							
Any report of violence within 5 km	-0.577*** (0.212)			-0.378** (0.192)								
Any report of violence within 10 km		-0.394** (0.182)			-0.216 (0.165)							
Any report of violence within 20 km			-0.028 (0.184)			0.003 (0.153)						
Any record of fatal violence (5 km)							-0.307 (0.197)					
Any record of fatal violence (10 km)								-0.334* (0.186)				
Any record of fatal violence (20 km)									0.052 (0.156)			
Num fatalities (5 km)										-0.010 (0.029)		
Num fatalities (10 km)											-0.010 (0.028)	
Num fatalities (20 km)												0.013 (0.015)
Fixed Effects												
Firm	yes	yes	yes	yes	yes	yes	yes	yes	yes	yes	yes	yes
Day of year × Violence location	yes	yes	yes	yes	yes	yes	yes	yes	yes	yes	yes	yes
Day of week	yes	yes	yes	yes	yes	yes	yes	yes	yes	yes	yes	yes
Winter × Violence location	yes	yes	yes	yes	yes	yes	yes	yes	yes	yes	yes	yes
Adjusted R-squared	0.431	0.431	0.431	0.431	0.431	0.431	0.431	0.431	0.431	0.431	0.431	0.431
Observations	39,783	39,783	39,783	39,783	39,783	39,783	39,783	39,783	39,783	39,783	39,783	39,783

Note: ***, **, * denote statistical significance at 1, 5 and 10 percent levels, respectively. The dependent variable across all columns (1 to 12) is daily exports (kgs, inverse hyperbolic sine transformation). Using Google Maps and industry reports we are able to geo-code locations of flower farms and match it with geo-coded violence data from ACLED (Version 4, additional details on both data sets are provided in Appendix D). Data are as described in Table [3], specification as in column (4). The table assesses the robustness of the binary categorization of firms into conflict versus non-conflict areas by allowing for the intensity and influence area of the conflict to vary. Data period of the sample is (Nov. 3, 2004 to Jan. 30, 2008). Columns 1 to 3 investigate the effect of any report of violence *only* during the electoral period (Nov. 3, 2007 to Jan. 30, 2008) at different radii from the flower firm premises: 5 km (column 1), 10 km (column 2) and 20 km (column 3). Note in columns 1 to 3 violence at any other time outside the electoral period is set to zero. The rest of the columns (4 to 12) considers violence at *any* time during the period the sample period (Nov. 3, 2004 to Jan 30, 2008), hence *any* record of violence at the 5 km (column 4), 10 km (column 5) and 20 km radius (column 6), any record of fatal violence at 5 km (column 7), 10 km (column 8) and 20 km radius (column 9), and the number of fatalities at the 5 km (column 10), 10 km (column 11) and 20 km radius (column 12). Standard errors, clustered at the firm and winter-week-location level [see Cameron et al. (2011)] are reported in parentheses.

Table C4: Placebo Test II – Effect on the Period Prior to the 2007 Election

Dependent Variable	(1)	(2)	(3)	(4)	(5)	(6)
			Daily Exports (kgs, IHS)			
Panel A: Violence and Non-Violence Region, Triple Differences						
Placebo Period	-0.080	0.014	0.056	-0.114	-0.215	0.056
	(0.140)	(0.144)	(0.116)	(0.130)	(0.163)	(0.130)
Placebo Period × Violence location	0.182	0.014	-0.062	0.241	0.279	-0.062
	(0.246)	(0.226)	(0.162)	(0.180)	(0.278)	(0.170)
Violence location	-0.245					
	(0.477)					
Panel B: Violence Region Only, Difference In Difference						
Placebo Period	0.127	0.127			0.099	0.127
	(0.146)	(0.131)			(0.137)	(0.136)
Panel C: Non-Violence Region Only, Difference In Difference						
Placebo Period	-0.114	-0.114			-0.260**	-0.114
	(0.104)	(0.136)			(0.115)	(0.138)
Fixed Effects						
Firm	no	yes	yes	yes	yes	no
Winter	yes	yes	no	no	yes	no
Day of year	yes	yes	yes	no	yes	yes
Day of week	yes	yes	yes	yes	yes	yes
Day of year × Violence	no	no	no	yes	no	no
Winter × Violence	no	no	yes	yes	no	no
Firm × Week	no	no	no	no	yes	no
Firm × Winter	no	no	no	no	no	yes
Adjusted R-squared (Panel A)	0.026	0.470	0.470	0.471	0.482	0.532
Adjusted R-squared (Panel B)	0.026	0.492			0.502	0.547
Adjusted R-squared (Panel C)	0.030	0.441			0.455	0.512
Observations (Panel A)	22,687	22,687	22,687	22,687	22,687	22,687
Observations (Panel B)	12,691	12,691			12,691	12,691
Observations (Panel C)	9,996	9,996			9,996	9,996

Note: ***, **, * denote statistical significance at 1, 5 and 10 percent, respectively. The dependent variable across all columns (1 to 6) is daily exports (kgs, inverse hyperbolic sine transformation). Placebo period is a dummy variable taking a value of 1 if the date of export is four weeks prior to Christmas in 2007 i.e. Dec. 1, 2007 to Dec. 21, 2007. Violence location is a dummy variable taking a value of 1 if the firm locality suffers from violence and 0 otherwise. The full sample period includes: Nov. 3, 2004 to Dec. 21, 2004, Nov. 3, 2005 to Dec. 21, 2005, Nov. 3, 2006 to Dec. 21, 2006, and Nov. 3, 2007 to Dec. 21, 2007. Standard errors are obtained by two-way clustering at firm and location level [see Cameron et al. (2011)] and reported in parentheses.

Table C5: **Controlling for Location-Specific Growth and Seasonality**

Dependent Variable	(1)	(2)	(3)	(4)	(5)	(6)
			Daily Exports (kgs, IHS)			
Panel A: Violence and Non-Violence Region, Triple Differences						
Days of Violence First Outbreak	-0.152	-0.203			-0.217	-0.123
	(0.129)	(0.154)			(0.141)	(0.154)
Days of Violence First Outbreak × Violence Location	-1.354***	-1.016			-1.106	-1.549
	(0.432)	(0.906)			(0.925)	(1.188)
Days of Violence Second Outbreak	-0.173	-0.023			-0.117	-0.170
	(0.144)	(0.194)			(0.204)	(0.195)
Days of Violence Second Outbreak × Violence Location	-0.338	-0.711**			-0.601*	-0.347
	(0.266)	(0.287)			(0.349)	(0.288)
Violence Location	-0.812					
	(1.207)					
Panel B: Violence Region Only, Difference In Difference						
Days of Violence Second Outbreak	-0.548***	-0.548***			-0.513**	-0.548**
	(0.121)	(0.210)			(0.256)	(0.216)
Panel C: Non-Violence Region Only, Difference in Difference						
Days of Violence Second Outbreak	-0.033	-0.033			-0.170	-0.033
	(0.191)	(0.220)			(0.260)	(0.180)
Fixed Effects						
Firm	no	yes			yes	no
Winter	yes	yes			yes	no
Day of year × Location	yes	yes			yes	yes
Day of week × Location	yes	yes			yes	yes
Winter × Location	no	no			no	no
Firm × Week	no	no			yes	no
Firm × Winter	no	no			no	yes
Adjusted R-squared (Panel A)	0.053	0.464			0.481	0.516
Adjusted R-squared (Panel B)	0.045	0.487			0.504	0.531
Adjusted R-squared (Panel C)	0.077	0.441			0.459	0.503
Observations (Panel A)	41,207	41,207			41,207	41,207
Observations (Panel B)	23,051	23,051			23,051	23,051
Observations (Panel C)	18,156	18,156			18,156	18,156

Note: ***, **, * denote statistical significance at 1, 5 and 10 percent levels, respectively. The dependent variable across all columns (1 to 6) is daily exports (kgs, inverse hyperbolic sine transformation). Specifications are as in Table [3], but include location-specific interactions with day-of-year and day-of-week. Violence location is a dummy variable taking a value of 1 if the firm locality suffers from violence and 0 otherwise. Days of Violence First Outbreak are defined as Dec. 29, 2007 to Jan. 4, 2008, and Days of Violence Second Outbreak are defined as Jan. 25, 2008 to Jan. 30, 2008. Panel A includes both violence and non-violence region. Panel B only the firms in the violence region and Panel C firms in the non-violence region only. Standard errors are obtained by two-way clustering at the firm and location level [see Cameron et al. (2011)] and reported in parentheses.

Table C6: **Effect of Violence on Other Firm Outcomes**

Dependent Variable	(1) **Baseline Specification** Daily Exports (kgs, IHS)	(2) **Extensive Margin** Export=1 if firm exports in the day	(3) **Intensive Margin** Daily Exports (kgs, IHS), conditional on exporting	(4) **Prices** Log (Unit Value, KShs)	(5) **Unit Weight** Log (Unit Weight, kgs per Stem)
Days of Violence First Outbreak	-0.147	-0.020	0.030	0.110**	-0.011***
	(0.125)	(0.015)	(0.048)	(0.050)	(0.004)
Days of Violence First Outbreak × Violence location	-1.245	-0.149	-0.098	0.008	0.006*
	(1.067)	(0.126)	(0.065)	(0.080)	(0.004)
Days of Violence Second Outbreak	-0.108	-0.012	-0.036	0.127***	0.004
	(0.138)	(0.018)	(0.069)	(0.048)	(0.013)
Days of Violence Second Outbreak × Violence locations	-0.506**	-0.052*	-0.096	0.066	0.003
	(0.245)	(0.031)	(0.096)	(0.082)	(0.020)
Fixed Effects					
Firm	yes	yes	yes	yes	yes
Day of week	yes	yes	yes	yes	yes
Day of year × Violence location	yes	yes	yes	yes	yes
Winter × Violence location	yes	yes	yes	yes	yes
Observations	41,207	41,207	25,153	25,153	25,164
Adjusted R-squared	0.455	0.372	0.638	0.582	0.054

Note: ***, **, * denote statistical significance at 1, 5 and 10 percent levels, respectively. All columns report results from OLS regressions for different dependent variables. Column (1) is daily exports (kgs, inverse hyperbolic sine transformation), as in our baseline specification in Table [3]. Column (2) is a dummy variable taking a value of 1 if a non-zero amount is exported on a given day, 0 otherwise. Column (3) is daily exports (kgs, inverse hyperbolic sine transformation) in those days in which a non-zero amount was exported. Column (4) is the unit value in Kenyan shillings (log). Column (5) is unit weight per stem (kgs, log). Data are as described in Table [3], specifications as in Table [3], column (2). Days of violence first outbreak are defined as Dec. 29, 2007 to Jan. 4, 2008, and Days of violence second outbreak are defined as Jan. 25, 2008 to Jan. 30, 2008. Violence location is a dummy variable taking a value of 1 if the firm locality suffers from violence and 0 otherwise. Standard errors are reported in parentheses are obtained by two-way clustering at firm and winter-week-location level [see Cameron et al. (2011)] and reported in parentheses.

Table C7: Effects of Violence on Firm Operations from Survey Evidence

Dependent Variable	(1) Did violence affect at all the operations of your firm?	(2) Were there any days in which members of your staff did not come to work because of the Violence?	(3) What was the highest proportion of workers absent due to the violence?	(4) To what extent did worker absence cause a loss in production?	(5) Did you experience any transportation problem to ship flowers to the airport?	(6) Did you hire extra security?
Violence location	0.479**	0.613***	44.36***	1.945***	0.374**	0.313***
	(0.142)	(0.119)	(8.811)	(0.300)	(0.127)	(0.077)
Dep. Var. in No-Violence location (Mean)	0.393	0.259	4.222	0.321	0.286	0.077
R-squared	0.253	0.382	0.337	0.384	0.131	0.119
Observations	75	74	72	73	75	67

Note: ***, **, * denote statistical significance at 1, 5 and 10 percent, respectively. Dependent variables across all columns (1)-(6) are responses from the firm survey. Dependent variables in column 1, 2, 5 and 6 are dummy variables which take a value of 1 if the response is affirmative and 0 otherwise. The dependant variable in column 3 is the highest percentage of workers lost by the firm during and following the violence, i.e., the first six weeks of 2008. Dependent variable in column 4 is production loss because of worker absence and is captured by a categorical variable taking values from 0 (not at all) to 4 (severe). Violence location is a dummy variable taking a value of 1 if the firm locality suffers from violence and 0 otherwise. Observations refer to the number of firms surveyed for whom information is available. Standard errors, clustered at the location level are reported in parentheses.

Table C8: **Worker and Transportation Problems**

Dependent Variable	(1)	(2)	(3)	(4)	(5)
			Daily Exports (kgs, IHS)		
Week of Violence × Violence location	-0.637*			-0.296	
	(0.355)			(0.327)	
Workers Absent (%)		-1.103**		-0.456	-1.271**
		(0.541)		(0.514)	(0.602)
Transportation Problems suffered by firm			-0.705**	-0.418	
			(0.340)	(0.321)	
Fixed Effects					
Firm × Winter	yes	yes	yes	yes	yes
Firm × Week	yes	yes	yes	yes	yes
Observations	24,030	24,030	24,030	24,030	12,638
R-squared	0.445	0.445	0.445	0.445	0.474

Note: ***, **, * denote statistical significance at 1, 5 and 10 percent levels, respectively. The dependent variable across all columns (1 to 5) is daily exports (kgs, inverse hyperbolic sine transformation). Sample period for the data set is four winters (2004 to 2008) over the period Nov. 3, 2004 to Jan. 30, 2008 for the 73 firms surveyed. Week of violence is a dummy variable taking a value of 1 if the date falls within the first (Dec. 29, 2007 to Jan. 4, 2008) or second outbreak of violence (Jan. 19, 2008 to Jan. 30, 2008. Workers Absent (%) is the highest percentage of workers absent reported by the firm throughout the violence period, i.e., during the first six weeks of 2008. Violence location is a dummy variable taking a value of 1 if the firm locality suffers from violence and 0 otherwise. Transportation Problems suffered by firm is a dummy variable taking a value of 1 if the firm responded of suffering transportation problems. Column (5) is a reduced sample as the analysis is only on firms that reported transportation problems (37 firms). Standard errors are obtained by two-way clustering at firm and winter-week-location level [see Cameron et al. (2011)] and reported in parentheses.

D   Data Sources and Construction

This appendix section provides information supplementary to Section 2 on the various data sources used in the paper.

Transaction-level Export Data of Flower Firms in Kenya
Custom records on exports of flowers were obtained from the Kenya Horticultural Development Authority (HCDA) for the seasons 2004-2013. Each transaction invoice contains the following information: name of exporter, name of the foreign consignee/client, type of produce, weight (kgs), units, unit value, total value, date, destination, currency and the agreement on freight (C&F, FOB).

Transaction-level Export Data of Flower Firms for Ethiopia
Customs records on exports of flowers were obtained from the Ethiopian Horticultural Development Agency (EHDA) for the seasons 2007-2010. Each transaction invoice contains the following information: name of exporter, name of the foreign consignee/client, type of produce, weight (kgs), units, unit value, total value, date, destination, currency and the agreement on freight (C&F, FOB). For additional details on the Ethiopian context and data see Antić et al. (2021).

Firm-level Survey
A firm survey was designed by the authors which covered (i) general questions about the firm (history, farm certification, ownership structure, vertical integration, location of farms, etc.), (ii) contractual relationships in export markets and marketing channels (direct wholesaler and/or auction houses), (iii) firm production (covering detailed information on labor force, input use, and assets), (iv) operations during violence period (effect on operations, absence of workers by week, issues on transportation and air-freight, financial losses and extra-costs incurred). The survey was administrated and implemented by two of the authors between July and September 2008.

      The sampling frame was constructed combining multiple sources of information: the list of exporters in the customs records, and the members of relevant firms' associations (Kenya Flower Council [KFC], Fresh Produce Exporters Association of Kenya [FPEAK], and Kenya Private Sector Alliance [KEPSA]. The membership lists of the flower associations included contact information for the firms, although the list from FPEAK had several instances of contacts that were out-of-date and were generally of lower quality than the KFC list. Customs records do not include contact details for the firms. We thus complemented the

search of contacts for firms through a variety of other sources, including internet searches, snowball interviews and our extensive time in the field.

We attempted to contact and survey all the firms for which we obtained contact details. The first contact was done by the authors over the phone. We would then set up an appointment for a face-to-face interview. Firms' responses to this type of contact request is often low. Initially, this was not different in our case. After initial setbacks, we were able to interview a firm whose owner was a active member of the KFC. The respondent took interest in the project and then facilitated access to other members of KFC, our presence on the ground further enabled access. Finally, for firms we still could not reach over the phone to set up appointments, we contacted firms directly through in-person visits at the premises of their flower farms. This last effort was mostly targeted towards firms in the conflict location.

Overall, our response rates are high for this type of firm survey. We were able to interview 75 firms out of 122 (61%) for which we had confirmed a location for the farm.[35]

Administrative-level Data

We established contacts with the HCDA, KFC and KEPSA to assist us in obtaining the location of all firms in the sample. Further, the names of the directors of the firms were obtained from the Registrar of Companies at the Attorney General's Office. These pieces of information allow us to classify the owner's nationality (Kenyan indigenous, Kenyan Indian or Foreign). For the firms which are under the ownership of Kenyan indigenous persons and Kenyan Indians, we map out whether the owners are politically connected or not. The data are assembled from the biographies of Member of Parliament's, further snowballing from interviews in the field, and various sources from the internet (e.g., The Kroll Investigative Report). Given the small number of firms, it is widely known in the industry which firms are politically connected. Information for each firm is cross-checked and triangulated using at least three different sources.

Days of Violence and Conflict Location

Locations are classified as having suffered conflict or not based on reports from Kenya's Red Cross Society (KRCS). The KRCS issued *Information Bulletin on the Electoral Violence* in

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[35]In subsequent work in preparation for the 2013 election, as we attempted to identify locations of new firms via Google Maps and reports produced in the interim by the industry. We were also able to identify locations of firms (often smaller firms that were not part of the established grower associations) that we had not been able to find physical locations for in the 2008 data effort. These firms are part of the estimation sample we use to investigate exports Table [3].

the early stages of the crisis daily and later on twice or so a week till the end of the crisis (see Kenya Red Cross Society (2008) for additional details). The first information bulletin (No. 1 of January 3, 2008) also contained a map which outlined locations where unrest had occurred. We further obtain access to various sources to supplement our understanding on both whether the location suffered conflict and when this took place. These are:

1. Disaster Desk of the Data Exchange Platform for the Horn of Africa (DEPHA): during the post-election violence DEPHA provided maps with hot spots on where and when the violence had occurred. DEPHA's mandate is to provide geographic information data and services to the region under the UN's OCHA. We obtained all the DEPHA maps from: `http://www.depha.org`, accessed on September 23, 2008.

2. Open source project *Ushahidi* was also launched to gather information from the general public on events occurring in near-real time. The public could pin on a online map of Kenya when and where conflict had erupted. Details on *Ushahidi*: `http://www.ushahidi.com/about`, and the Kenya project: `http://legacy.ushahidi.com/` can be found on these links (accessed on September 30, 2008).

3. Kenya National Commission on Human Rights Report (2008).

4. Independent Review Commission Report (2008), initiated by the Government of Kenya to set up a commission into post-election violence.

These sources are useful additional sources of information to make sure we are exhaustive and that smaller towns are not missed out. We use these reports to aid our understanding but are aware that there could be an inherent measurement error due to their objective.

Armed Conflict Location and Event Data Project (ACLED)
We obtain data from ACLED for Kenya to supplement our measure of both location and days of violence.[36] ACLED provide GPS coordinates for where violence occurred, and how many (if any) fatalities resulted from the violence. Based on these data, and the location of the flower firms (details below), we construct four measures of proximity and intensity of violence used in Appendix Table [C3], for three concentric circles around the firms of radius 5 km, 10 km, and 20 km:

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[36]ACLED Version 4 (1997-2013): `http://www.acleddata.com/data/version-4-data-1997-2013/`, accessed April 2014.

1. Was there any episode of violence in the *election time* within a radius of 5 km, 10 km, and 20 km around the firms' location?

2. Was there any episode of violence within a radius of 5 km, 10 km, and 20 km around the firms' location?

3. Was there any episode of violence in which at least one fatality was recorded within a radius of 5 km, 10 km, and 20 km around the firms' location?

4. What was the number of fatalities recorded within a radius of 5 km, 10 km, and 20 km around the firms' location?

Flower Farm Location

In our initial firm survey in 2007 we were unable to include a GPS module; however, in 2014 we used two sources to help us identify the GPS coordinates of flower firms. The first source we used was Google satellite imagery to geo-tag flower firms. For flower farms that were not easily identifiable on Google Maps, we used a second source, maps of flower farm locations from industry reports. Maps from industry reports showed a selection of flower firms in growing clusters. These maps do not provide any coordinate system nor any scale. We try to geo-reference the maps by using other location information on the maps, such as important main roads and natural features (e.g., mountains, lakes, rivers, and forests). In instances where we failed to accurately pinpoint the location, coordinates were then taken from a point that is relatively close to the main road and the farm's staging area.

Kenya Ethnic Census

We use the population census of 1989 (Government of Kenya, 1994) to obtain district ethnic demographics. The 1989 National Population Census was the last Kenyan census that publicly released sub-national ethnic population. The population census reports 41 ethnic classifications. In line with studies on the politics of Kenya (e.g., Burgess et al. (2015) and Morjaria (2018)), we aggregate the ethnic classifications into 13 ethnic groups from the 41 groups reported in the census. These 13 ethnic groups are Kikuyu, Kalenjin, Kamba, Luo, Luhya, Maasai, Coastal, Embu, Kisii, Meru, Somali, Turkana-Samburu, and Other (which are Other Africans, Arabs, Asians, Non-Africans).

Elections and Electoral Violence

Data on the frequency of elections and electoral violence were compiled from various country-

specific Human Rights Reports published by the U.S. Department of State. Reported incidents of election-related violence were then categorized on the basis of timing − i.e., whether they occurred before, during, or after the election period and within the same calendar year. Violence "any time" reported in Figure 1 encompasses all three categories. The Human Rights Reports are prepared by State Department officials from information provided by a variety of sources including U.S. and foreign government officials, victims of alleged human rights abuses, academic and congressional publications, press reports, and reports from relevant international organizations and nongovernmental organizations. Reports are available for each year for each country for the years 1993 through 2018. Reports provide sufficient information about the most recent election preceding the year 1993, thus allowing us to assess the years 1990-1992, as well. Consequently, our data set, contains information on the number and type of elections and electoral violence for the years 1990-2018. To classify elections as non-violent or violent, we use the definition provided in Straus and Taylor (2009).[37] We include violence before the elections (during campaigning, whether there were violent protests or harassment of political figures), during the elections (protests, harassment or other violence on election day), and after the elections (whether there was any disturbance after the results were announced). Elections can belong to one of four categories:

- No violence in connection with the election, coded as 0.

- Violent harassment: is defined by Straus and Taylor (2009) on page 10 as events "indicated by police breaking up rallies, party supporters fighting, street brawls, opposition newspapers being confiscated, and limited short-term arrests of political opponents", these type of elections are coded as 1.

- Violent repression: is defined by Straus and Taylor (2009) on page 10 as events "indicated by long-term high-level arrests of party leaders, the consistent use of violent intimidation, limited use of murders and assassinations, and torture", these type of elections are coded as 2.

- Highly violent election: is defined by Straus and Taylor (2009) on page 11 as events that are "repeated, coordinated physical attacks leading to 20 or more deaths", these type of elections are coded as 3.

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[37]Straus and Taylor (2009) lists cases with 20 or more deaths during elections. For comparison, Blattman and Miguel (2010) define civil wars as internal conflicts that count more than 1,000 battle deaths in a single year and civil conflicts as those that count at least 25 deaths per year. The International Foundation for Electoral Systems (IFES) defines "*election violence [a]s any harm or threat to any person or property involved in the election process, or to the election process itself, during the election period*" (see http://www.ifes.org).

We classify an election as violent if it is in category 1, 2, or 3 (Straus and Taylor (2009) uses only categories 2 and 3 as violent). There is no objective line between categories 0-1-2, each election has to be assessed based on the information given in the Human Rights Reports. We use our best judgement to classify the events. In some cases our assessment is different from that of Straus and Taylor (2009).

For each African country, we assess whether there was an election in the country, the type of the election (national, presidential, parliamentary, legislative, regional, local, by-election), and whether there was any electoral violence. We analyze national, presidential, parliamentary, or legislative elections only. We believe that these nationwide elections are of interest to the type of market instability our paper focuses on, also, the sub-national level elections might not be as thoroughly assessed in the Human Rights Reports, hence we are not confident that we have knowledge of all of these sub-national elections. Following Straus and Taylor (2009), presidential and parliamentary/legislative elections not held at the same time are counted as two elections for the same year if there was more than three months gap between them. If they were held within three months of each other, we count them as one election. Lastly, Human Rights Reports for 1999−2018 are available online: `https://www.state.gov/j/drl/rls/hrrpt/` (accessed October 1, 2019). Older reports are available on archived websites, for example, for 1998 see: `https://1997-2001.state.gov/global/human_rights/1998_hrp_report/98hrp_report_toc.html`.