

# Civil conflict and firm recovery : Evidence from post-electoral crisis in Côte d'Ivoire

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# PLAN

- 1 Introduction
  - Motivation
  - A brief overview of the paper
  - Contributions
- 2 Context
- 3 Methodology
- 4 Results
- 5 Conclusion

## INTRODUCTION : MOTIVATION

- Political violence is common in sub-Saharan Africa, esp. during elections
- Civil conflicts negatively affect activity in the short run
  - Demand : Disruption of economic activity and access to output markets
  - Supply : Access to and cost of inputs (labor, intermediate goods, capital)
- But the long-run impacts of conflicts on economy is largely unknown
  - Theory : Possible rebound after a shock
  - Inconclusive evidence (almost none for firms)
  - This question is of prime interest
    - Policymakers : Identify vulnerable groups and design effective policies
    - Academics : Better understand how conflicts disrupt economic activity

- Theory

Weak effect	Strong effect
<ul style="list-style-type: none"> <li>• Reconstruction</li> <li>• Cleansing effect</li> <li>• Local effect</li> </ul>	<ul style="list-style-type: none"> <li>• Loss of specific inputs</li> <li>• Uncertainty and long-term agents' behaviors</li> <li>• Indirect effect on human capital, trust, preferences, institutions, etc.</li> </ul>

- Empirical evidence

### ① Macroeconomic works provide mixed findings

- Impact of civil conflicts on growth : Partial recovery (e.g., Cerra and Saxena, 2008)
- Historical events : No impact of bombing in the long-run (WWII, Vietnam)

## ② Microeconomic papers

- Households : Strong impact on social outcomes (education, health) or trust
- Firms : Focus mainly on short-run effects (during the conflict)

Our paper examines how firms recover after a short but severe civil conflict

## INTRODUCTION : A BRIEF OVERVIEW OF THE PAPER

This paper investigates firm recovery after the 2011 Ivorian crisis because

- ❶ A relevant context : Ivorian 2011 post-electoral crisis
  - Short episode : 4 months (Jan-April)
  - But very severe : +3,000 deads, +700,000 refugees
  - And followed by a quiet period ▶ 2011 crisis
- ❷ Rich firm-level data on formal firms operating in Côte d'Ivoire
  - We obtain data on all formal firms operating in Côte d'Ivoire from 2006 to 2014 (i.e., three years after the crisis)
  - Rich information on surviving firms
- ❸ This question is of prime importance today
  - Elections in 2020 with the same actors (Konan Bédié, Soro, Ouattara, Gbagbo)

## INTRODUCTION : A BRIEF OVERVIEW OF THE PAPER

What do we do?

- We follow a cohort of firms operating during and after the crisis
  - ❶ Investigate the total impact of crisis on labor productivity
  - ❷ Study heterogeneity across firms with special attention to inputs
    - Labor : Quantity and "quality" (share of skilled workers)
    - Access to capital (use and cost of debt)
- We exploit heterogeneity in input usage across firms within industry

What do we find ?

- ❶ Global impact of the crisis : Partial recovery
  - Decrease of labor productivity by 20% in the year of the crisis
  - Imperfect rebound (half of loss is recovered after 3 years)
- ❷ Heterogenous impact (difference across firms)
  - ❶ Labor intensive firms are more able to recover
  - ❷ But reliance on skilled workers impedes firm resilience
  - ❸ Importance of credit access to explain differences in recovery

## INTRODUCTION : LITERATURE AND CONTRIBUTIONS

- Literature on the consequences of conflicts on firms focuses mainly on short-term impact of violence (civil war, criminality)
- Two exceptions focus on firm resilience with mixed findings
  - Collier and Duponchel (2013, CD) : Absence of recovery
    - Employ a survey to compare firms' performance in Sierra Leone after the war
    - Firms located in the most affected areas still lagged 5 years after the war
    - Explanation : *"forgetting by not doing effect"*
  - Ksoll, Macchiavello and Morjaria (2016, KMM) : Rapid recovery
    - Follow firms operating in flower industry during the 2007 Kenyan electoral crisis
    - Sharp decrease of activity during the crisis (due to worker absenteeism)
    - Recovery within one month
- How can we explain differences between both papers?
  - Industry coverage (one sector for KMM, all industries for CD)
  - Conflict duration (few months for KMM, several years for CD)

# INTRODUCTION : LITERATURE AND CONTRIBUTIONS

## Our contributions

### ① More robust evidence

- Exploit information on firms before, during and after the crisis (as KMM)
- Consider all industries (as CD)

### ② Reconciliation of previous findings

- Even a short-term shock (as KMM) could have a long-run impact (as CD)
- Both papers insist on labor factor with different implications
  - Relationship between labor and recovery is complex
  - Importance of the composition of workforce

### ③ New findings regarding capital

- Access to capital is of prime importance after the conflict



# PLAN

1 Introduction

**2 Context**

3 Methodology

4 Results

5 Conclusion

- ### ► Fatalities

- ▶ Maps

# PLAN

- 1 Introduction
- 2 Context
- 3 Methodology**
  - Dataset
  - Empirical model
  - Variables
- 4 Results
- 5 Conclusion

## DATASET

### Register of firms

- Formal firms from 2006 to 2014
- Two types of information
  - 1 General information : city, sector, year of creation, employees, etc.
  - 2 Financial information from balance sheets and income statements
- Limitations
  - Identification of some firms → Applied corrections
  - Coverage increases over time → Hard to control for firm birth
  - Data discrepancies (e.g., nb of employees in 2013)

### Filters applied

- 1 Keeping firms operating from 2009 to 2014
  - Focus on recovery (and therefore on surviving firms)
  - Pre-crisis period shouldn't overlap the first crisis post-period
- 2 Excluding firms with more than 100 employees in 2009
  - Endogeneity for large firms (local impact, political connections)
  - Problem with the number of employees in 2013 (unexplained hike)
- 3 Focus on private non-financial corporations

► Fatalities

## EMPIRICAL MODEL

We employ a simple FE model with interactions as follows

$$\text{Log}(LP)_{ijt} = \alpha_i + \beta_1 \text{AFTER}_t + \beta_2 \text{AFTER}_t \times X_{ij(t_0)} + \beta_3 \text{AFTER}_t \times C_{ij(t_0)} + \varepsilon_{ijt}$$

- With

- $\text{Log}(LP)_{ijt}$  : Labor productivity for firm  $i$  in sector  $j$  at year  $t$
- $\alpha_i$  : firm fixed effect
- $\text{AFTER}_t$  : A dummy taken value one after the crisis (2011-14) and 0 before
- $X_{ij(t_0)}$  : Input dependence defined in the following slides
- $C_{ij(t_0)}$  : Control variables (age, size, sector, Abidjan, foreign)

- Some remarks about modelling

- 1 Crisis is captured through a time indicator
  - Account for all events occurring after 2011
  - We cannot exploit spatial dimension because >90% of firms in Abidjan
- 2 We employ only initial value ( $t_0$ )
  - Avoid changes due to the crisis (pre-crisis condition)
  - Improve identification with the inclusion of firm FE and control interactions

## VARIABLES : LABOR PRODUCTIVITY

- Productivity is a measure of firm performance
  - Wide variation even within sector
  - Differences in productivity explain a lot of differences between developed and developing countries
- Labor productivity
  - Lack information on capital to compute total factor productivity
  - Defined as the (deflated) value added per worker
    - We refer to total workers (permanent and temporary workers)
    - Temporary workers account for a large share of employment in Africa
  - Also investigate its components : value added and number of workers

## VARIABLES : INPUT USAGE (1/2)

### ① Labor

- Quantity : staff cost (ratio of labor cost to total sales)
- Labor composition ("skilled workforce")
  - ① Share of managers to total workers
  - ② Average wage (total payroll divided by workers)

### ② Capital

- Quantity
  - ① Ratio of formal debt to total assets (+)
  - ② Trade credit to total funds (-)
- Cost of formal debt
  - ① Financial cost : financial expenses to revenues (-)
  - ② Implicit interest rate : financial expenses to total debt (-)

## VARIABLES : INPUT USAGE (2/2)

- Existing literature often focuses on differences across sectors but
  - Input usage differs across sectors
  - But also across firms within sector
- Analysis of data shows that variation across firms within the same sector accounts for a large share of total variation
  - Sector dummies account for less than 5% of total variation in input usage in 2009 with one exception (staff cost [8%])  $\triangleright R^2$
- We exploit differences across firms in the same sector
  - We create a dummy equals to one if a firm relies more on a specific input than other firms in the same sector

$$X_{ij(t_0)} = \begin{cases} 1, & \text{if } x_{ij(t_0)} - \bar{x}_{.j(t_0)} > 0; \\ 0, & \text{otherwise.} \end{cases}$$

- with  $x_{ij(t_0)}$  the value for input  $x$  for firm  $i$
- $\bar{x}_{.j(t_0)}$  the average value for firms in the same sector
- We refer to the initial period (i.e. 2009) to avoid a change due to the crisis



# PLAN

## 1 Introduction

## 2 Context

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## 4 Results

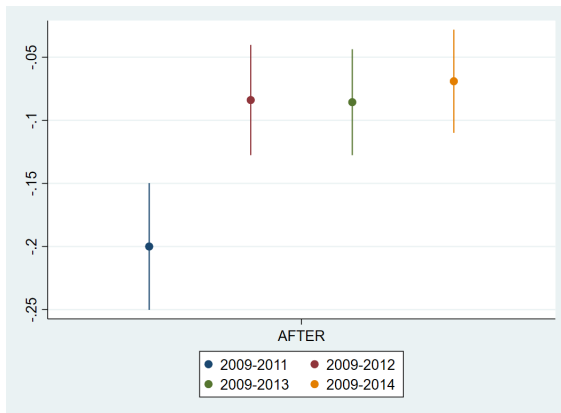
- The net impact of the crisis
- The heterogenous impact of the crisis
- Extensions
- Robustness checks

## 5 Conclusion

## THE NET IMPACT OF THE CRISIS

- We run a simple model with firm fixed effect and  $AFTER_t$  dummy
- We add year by year

FIGURE – Coefficient associated with AFTER dummy (w/ CI)



## FIRM'S CHARACTERISTICS AND FIRM RECOVERY

- We begin by examining the impact of usual firm's characteristics
  - Ambiguous impact of the size
    - Employment : Negative
    - Sales : Positive
  - Negative impact on foreign firms
  - Positive impact of limited liabilities
  - No effect of location, age
  - No diff. between industries, except extractive (-), trade (-) and tourism (+)
- These results (size, ownership) are in line w/ Klapper et al. (2013) investigating the impact of the first Ivorian crisis

## INPUT USAGE AND FIRM RECOVERY

TABLE – Baseline results

Input →	Labor			Capital			
	Staff (1)	Manager (2)	Avg wage (3)	Debt (4)	Trade C. (5)	FinCost (6)	IntRate (7)
AFTER	-5.701*** (0.291)	-5.628*** (0.291)	-6.456*** (0.316)	-5.370*** (0.295)	-1.808*** (0.298)	-1.808*** (0.159)	-5.968*** (0.310)
AFTER × Input	0.555*** (0.0397)	-0.142** (0.042)	-0.351*** (0.042)	0.140*** (0.052)	-0.073* (0.038)	-0.030 (0.021)	-0.154*** (0.045)
Firm fixed effect	Yes	Yes	Yes	Yes	Yes	Yes	Yes
Control (interactions)	Yes	Yes	Yes	Yes	Yes	Yes	Yes
Obs	11833	11670	11521	11990	11861	11407	11155
# firms	2608	2509	2478	2585	2556	2488	2417
R <sup>2</sup> (within)	0.21	0.19	0.20	0.19	0.19	0.18	0.18

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→ Firms relying more on labor were more able to rebound

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→ Firms relying more on labor were more able to rebound

→ Firms dependent to skilled workers were less able to recover

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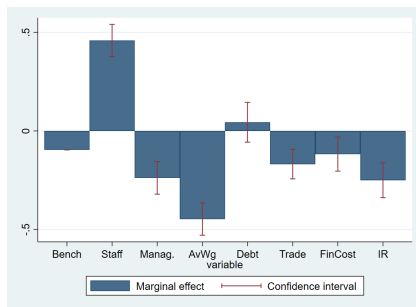
→ Firms relying more on labor were more able to rebound

→ Firms dependent to skilled workers were less able to recover

→ Credit constrained firms suffered more

## INPUT USAGE AND FIRM RECOVERY

- Marginal effect for an hypothetical (average) firm



→ MEs are particularly important for labor



## INPUT USAGE AND FIRM RECOVERY

### Extension 1 : Decomposition of labor productivity

- Labor-intensive firms
  - Increase of value added
  - Contraction of employment  
→ Gains in efficiency
- "Skilled workers"
  - Contraction of value added
  - Increase of employment  
→ Substitution effect?
- Capital
  - Debt : Increase of value added and employment
  - Trade credit and IR : Contraction of value added

► Table

## INPUT USAGE AND FIRM RECOVERY

### Extension 2 : Crisis vs. postcrisis

- Labor-intensive firms
  - Perform better during the crisis
  - And after the crisis (2012-14)
- "Skilled workers"
  - Perform lower during the crisis
  - And after the crisis (2012-14)
- Capital
  - No difference during the crisis (banks were closed)
  - Perform better after the crisis

► Table

## ROBUSTNESS CHECKS (1 / 2)

- Dependent variable (performance)
  - Alternative measure of productivity
    - Change the denominator in two ways : total payroll and nb. of permanent workers only
    - Employ variation of productivity (instead of level)
    - Compute total factor productivity (1/3 of firms)
  - Profit instead of productivity (log of profit, GOS/Sales, RoA)
- Interest variable (input dependence)
  - Dummy based on median
  - Continuous measure
- Sample period ► Period
  - Include 2008 in the pre-crisis period
  - Consider 2010 as a crisis year (began in Dec. 2010)
  - Placebo test (2007/08 : pre-crisis and 2009 crisis)

## ROBUSTNESS CHECKS (2/2)

- Sample selection issue
  - Focus on surviving firms only
  - Develop a 3-step procedure developed by Wooldridge
- Geographical heterogeneity
  - ❶ Restrict our sample to firms outside Abidjan (one tenth of firms)
  - ❷ Exploit spatial heterogeneity
    - Employ data on the number of deaths per district provided by the National Commission of Inquiry
    - The conflict variable takes the value of 0 before the crisis (in 2009 and 2010) and the number of deaths per 100,000 inhabitants after 2011

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# CONCLUSION

- Main results

- ❶ Global impact of the crisis

- Decrease of labor productivity by 20% in the year of the crisis
    - Imperfect resilience despite rapid growth

- ❷ Heterogenous impact (difference across firms)

- ❶ Labor intensive firms are more able to recover
    - ❷ But reliance on skilled workers impedes firm resilience
    - ❸ Importance of credit access to explain differences in resilience

→ Help us to explain differences in results from previous studies

- Future research

- External validity (other contexts) / additional channels (demand, uncertainty)
  - Input dependence and exit → First results show a limited impact
  - Reallocation of inputs during and after the crisis

- Policy implications

- Limit flight of skilled workers and favor their return
  - Limit depreciation of skills
  - Favor access to capital in the recovery period

Thank you for your attention  
Comments are welcome

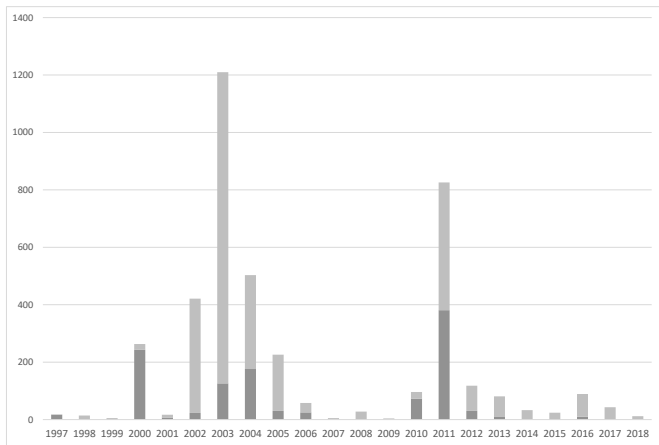
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Email : [florian.leon@gmail.com](mailto:florian.leon@gmail.com)  
twitter : [@florian\\_leon](https://twitter.com/florian_leon)

## NUMBER OF FATALITIES PER YEAR, 1999-2018 (SOURCE : ACLED)

◀ CONTEXT

◀ DATA

◀ ROBUST

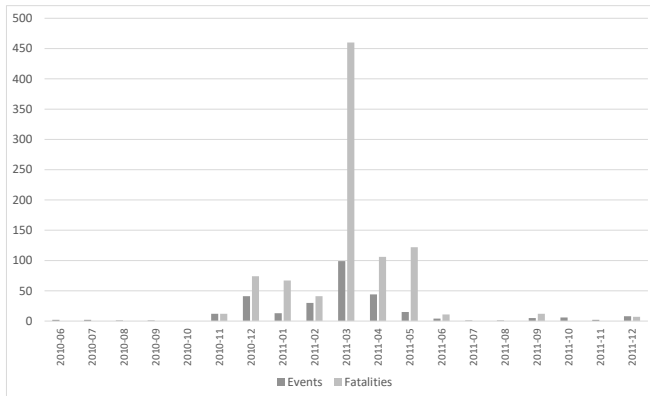




## NUMBER OF EVENTS AND FATALITIES FROM JUNE 2010 TO DEC 2011

◀ INTRO

◀ CONTEXT



## VARIABLES : APPENDIX

TABLE – Input usage, between-industry vs. within-industry variation

Input	All		Cohort (in 2009)			
	Observations		W/out control		With control	
	R <sup>2</sup>	Obs.	R <sup>2</sup>	Obs.	R <sup>2</sup>	Obs.
Staff cost	0.081	71296	0.075	4687	0.081	4684
Share of manager	0.007	72345	0.004	4818	0.006	4818
Share of permanent workers	0.008	72346	0.010	4818	0.011	4818
Average wage	0.005	70901	0.050	4732	0.129	4732
Debt ratio	0.009	80428	0.007	5147	0.004	5144
Trade credit	0.007	81369	0.111	5186	0.002	5183
Financial cost	0.018	71327	0.024	4660	0.023	4657
Interest rate	0.007	74720	0.007	4874	0.037	4871

This table reports R<sup>2</sup> of the model explaining input usage (each row) in different specifications including industry dummies (and firm characteristics in the last specification). The first specification considers all observations available. The two last specifications consider firms operating in 2009 at this year. Both differ by the inclusion or not of firm level characteristics (nb. of employees, sales (in log), age (in log), foreign ownership, dummy for Abidjan and two dummies for legal status).

## EXTENSION (1) : APPENDIX

TABLE – Extension 1 : Valued added and Nb. workers

Panel A : Value added (in log)							
Input →	Staff (1)	Manager (2)	Avg wage (3)	Debt (4)	Trade C. (5)	FinCost (6)	IntRate (7)
AFTER × Input	0.291*** (0.0406)	0.0720* (0.0405)	-0.306*** (0.0406)	0.219*** (0.0506)	-0.101*** (0.0354)	-0.136*** (0.0407)	-0.227*** (0.0415)
Obs	11833	11670	11521	11990	11861	11407	11175
# Firms	2509	2478	2443	2585	2556	2488	2417
R <sup>2</sup> (within)	0.08	0.09	0.09	0.09	0.08	0.08	0.09
Panel B : The number of workers (in log)							
Input →	Staff (1)	Manager (2)	Avg wage (3)	Debt (4)	Trade C. (5)	FinCost (6)	IntRate (7)
AFTER × Input	-0.263*** (0.0246)	0.213*** (0.0263)	0.0505* (0.0264)	0.0693** (0.0300)	-0.0302 (0.0243)	-0.120*** (0.0298)	-0.0710** (0.0311)
Obs	11833	11670	11521	11990	11861	11407	11175
# Firms	2509	2478	2443	2585	2556	2488	2417
R <sup>2</sup> (within)	0.41	0.42	0.42	0.39	0.40	0.39	0.39

◀ Return

## EXTENSION (2) : APPENDIX

TABLE – Extension 2 : Crisis vs. post-crisis

Input →	Staff (1)	Manager (2)	Avg wage (3)	Debt (4)	Trade C. (5)	FinCost (6)	IntRate (7)
CRISIS	-5.655*** (0.426)	-5.494*** (0.423)	-6.027*** (0.448)	-5.229*** (0.415)	-5.273*** (0.424)	-5.297*** (0.429)	-5.453*** (0.430)
CRISIS × Input	0.569*** (0.0522)	-0.178*** (0.0535)	-0.251*** (0.0503)	0.0587 (0.0658)	-0.0347 (0.0459)	0.0221 (0.0513)	-0.155*** (0.0534)
POSTCRISIS	-5.420*** (0.309)	-5.366*** (0.308)	-6.248*** (0.333)	-5.115*** (0.312)	-5.296*** (0.314)	-5.213*** (0.329)	-5.448*** (0.332)
POSTCRISIS × Input	0.550*** (0.0434)	-0.137*** (0.0440)	-0.361*** (0.0441)	0.164*** (0.0526)	-0.0785** (0.0398)	-0.0220 (0.0468)	-0.137*** (0.0480)
Firm fixed effect	Yes	Yes	Yes	Yes	Yes	Yes	Yes
Control (interactions)	Yes	Yes	Yes	Yes	Yes	Yes	Yes
Obs	11833	11670	11521	11990	11861	11407	11175
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◀ Return

## CONTEXT

FIGURE – March on Abidjan (source : Wikipedia)

