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Impact of armed conflict on firms' performance and perceptions

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European Bank for Reconstruction and Development

ISET, Tbilisi, May 14, 2015

Armed conflicts

- Destruction of physical infrastructure and human capital
- Impact on:
  - Aggregate outcomes, such as investment, income, growth, poverty etc.
  - Individuals
  - Firms face higher uncertainty in production, higher operating costs; political instability discourages private investment

Existing studies

- Aggregate outcomes:
  - Alesina and Perotti (1996), Stewart et al. (1997), Collier (1999), Miguel and Roland (2011), Davis and Weinstein (2001), Brakman et al. (2004), Abadie and Gardeazabal (2003)

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- Education, health and labor market outcomes of birth cohorts affected by the conflict:
  - Akbulut-Yuksel (2010), Shemyakina (2011), Chamarbagwala and Moran (2011), Justino et al. (2010), Galdo (2010), Kondylis (2010)

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- Firm activity:
    - Abadie and Gardeazabal (2003), Guidolin and La Ferrara (2007), Camacho and Rodriguez (2010), Ksoll et al. (2010)
    - Noe and Shiferaw (Ethiopia, 2013), Klapper et al. (Côte d'Ivoire, 2013)

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Research question

1. How did the August 2008 armed conflict between Georgia and Russia affect performance of Georgian firms and their perceptions of the business environment?

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Contribution

1. Based on a broader set of firms: manufacturing and services, at least 5 employees

2. Impact of armed conflict by firm size and age

3. Unique survey conducted prior to and after the armed conflict $\Rightarrow$ no need for reliance on accurate recall

Results preview

- Results preview:
  - Negative and significant impact on the share of exports in sales and number of employees for a subset of firms
  - Scarring effect on average productivity of young firms
  - Not always negative impact on the perceptions of the severity of several business environment obstacles - can mostly be explained by the measures taken by the Georgian government and the international community
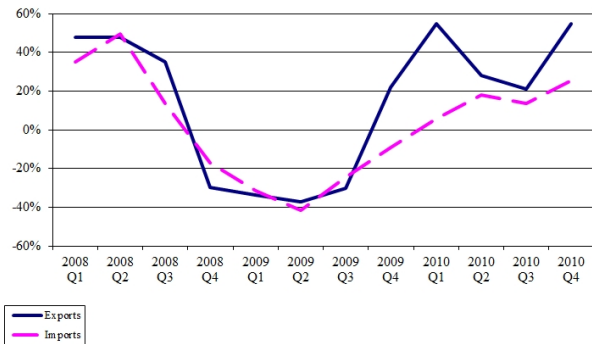
Background on Georgia-Russia conflict

- Soviet Union (SU) declared South Ossetia an Autonomous Oblast on 20 April 1922
- Little conflict until the late 1980s and the break-up of the Soviet Union
- Fights started in 1991, with peace negotiated in 1992 (Sochi Agreement)
- Tensions were increasing after 1992 and became stronger after November 2006, when 95 per cent of South Ossetians voted in favour of independence from Georgia
- This culminated in the August 2008 armed conflict, which lasted 5 days
- Over 100,000 displaced people, damage to roads, destruction of civilian infrastructure and property, lost fiscal revenues

Confounding factor: The financial crisis

- Collapse of Lehman Brothers in September 2008
- From Q2 to Q3 2008, GDP dropped by 7.2 per cent y-o-y
- FDI fell from USD 1.67 billion in 2007 to USD 659 million in 2009

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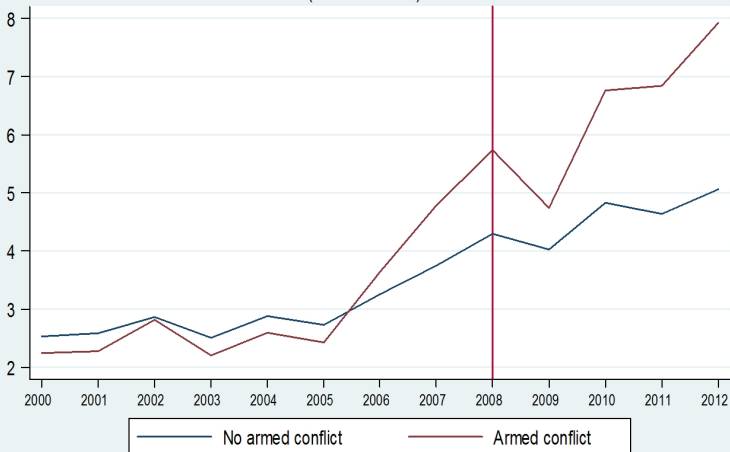ooooooooooo

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Monthly exports and imports

- Drop in August due to the armed conflict, before recovering in September and then dropping again due to the global financial crisis
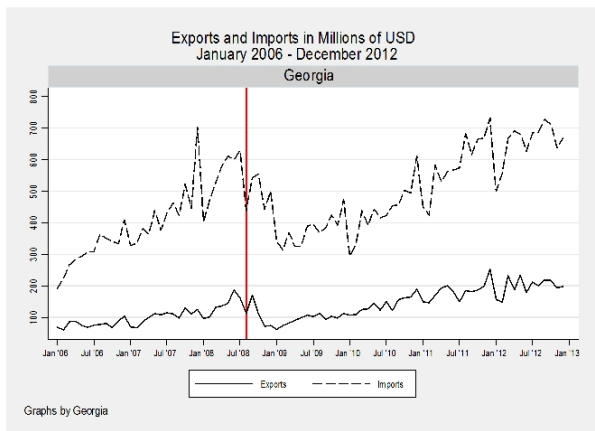
Nighttime lights imagery

Average luminosity in Georgian districts (2000-2012)

EBRD and WB Business Environment and Enterprise Performance Survey (BEEPS)

- Enterprise survey with an objective to gain an understanding of firms' perception of the business environment in order to be able to assess the constraints to private sector growth and enterprise performance
- Representative sample, stratified by sector, size and region
- First conducted in 1999, fifth round completed in 2014

BEEPS Georgia

- Baseline (BEEPS IV): 15 April to 8 August 2008, 373 interviews
- Follow-up: 24 February to 25 March 2009, 286 interviews (215 with the same respondent)
- ≈9 months between the interviews

	Number of completed interviews		
Region	**2008**	**2009**	**Same respondent**
Tbilisi	103	69	56
Kvemo Kartli	45	32	27
Kakheti	63	54	39
Mtskheta-Mtianeti	39	24	17
Imereti	60	55	42
Shida Kartli	63	52	34
Total	373	286	215

BEEPS Georgia and armed conflict timeline

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BEEPS IV coverage in Georgia

Firm location
- Not Tbilisi
- Tbilisi

Regions
Abkhazia and South Ossetia

Districts
Covered in BEEPS, armed conflict
Covered in BEEPS, no armed conflict
Not covered in BEEPS, armed conflict
Not covered in BEEPS, no armed conflict

Note: Circle size is proportional to the number of BEEPS firms in the locality

Evaluation problem

- "Treatment": armed conflict
- Armed conflict: direct impact on some locations (bombing, battles, army presence), others only indirectly
- Financial crisis:
    - Baseline impact the same in all locations, differential impact varies predominantly by the establishments' specific conditions
    - No significant differences in district-specific bank balance sheet conditions: following the approach by Popov and Udell (2012), using data from EBRD BEPS and Bankscope

Identification strategy

- Cross-district variation in bombing is assumed to be exogenous once we control for the location of military and transport installation

- Assume that had armed conflict not occured, the difference in performance and perceptions of business environment between the firms located in districts directly exposed to armed conflict and the firms located in districts not directly exposed to armed conflict would have been the same across the two types of districts

- Include measures that proxy as indicators for vulnerability of each firm to financial crisis:
  - 50%+ of the firm's products paid for after delivery, purchased fixed assets in 2007, has a line of credit or loan in 2007

Difference-in-differences

$$
\begin{aligned}
Y_{idt} = \quad \alpha \quad & + \beta \left(ArmedConflict_d \times YearAfter_t \right) + \gamma ArmedConflict_d \\
& + \theta YearAfter_t + \rho MilitaryInstallations_d \\
& + \delta_r + \mu X_{ijt} + \epsilon_{idt}
\end{aligned}
$$

Variable	Definition
Y	Outcome of interest
$ArmedConflict$	Dummy variable for districts that experienced armed conflict
$YearAfter$	Dummy variable for the follow-up survey data
$MilitaryInstallations$	Dummy variable for military installations in the district
δ_r	Region-specific fixed effects
X	Vector of firm characteristics
i	Firm
d	District
t	Time

- Standard errors are clustered by district

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Firm performance

- Firm performance: sales (total, national, exports), employment (permanent, temporary), labour productivity
  - Sales refer to 2007 and 2008 as a whole, measured in 2007 constant Georgian lari
 - Employment is measured at the end of 2007 and end of 2008

Business environment perceptions

- Could have an impact on the establishments' decisions regarding investment or introduction of new products, and possibly on their performance
    - "Is/are [*aspect of the business environment*] No Obstacle, a Minor Obstacle, a Moderate Obstacle, a **Major Obstacle**, or a **Very Severe Obstacle** to the current operations of this establishment?" (Likert scale)
    - Change in likelihood of firms ranking a particular aspect of the business environment as a major or very severe obstacle

Largely determined at the national level	Influenced by the region or district
Customs and trade regulations	Electricity; Transportation
Tax rates; Tax administration	Practices of competitors in the informal sector
Labour regulations; Access to finance	Access to land; Crime, theft and disorder
	Business licensing and permits
	Corruption; Inadequately educated workforce

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Biggest obstacle

- 2008: access to finance, political instability, tax rates
- 2009: political instability, access to finance, practices of competitors in the informal sector
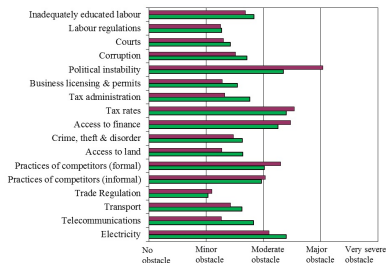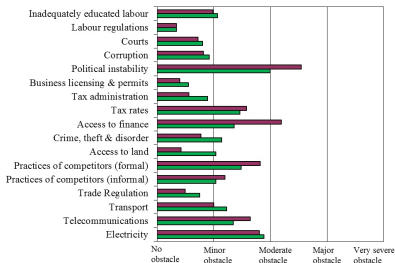
(a) No armed conflict (b) Armed conflict

Sales and employment

	Log (sales) (1)	Log (nat. sales) (2)	% exports (3)	Log (PFT empl.) (4)	Log (FT empl.) (5)
Panel A: Overall					
AR*YA	0.047	0.102	**-0.016****	-0.057	**-0.101***
	(0.126)	(0.120)	**(0.006)**	(0.040)	**(0.052)**
Adjusted R^2	0.689	0.654	0.568	0.816	0.807
Panel B: Allowing the coefficient to vary by size					
AR*YA*	0.020	0.092	**-0.017*****	0.017	-0.048
1-19 employees	(0.176)	(0.168)	**(0.006)**	(0.061)	(0.063)
AR*YA*	0.172	**0.277****	-0.014	**-0.212****	**-0.159****
20-99 employees	(0.124)	**(0.103)**	(0.009)	**(0.102)**	**(0.076)**
AR*YA*	**-0.300***	-0.632	**-0.016****	0.014	-0.188
100+ employees	**(0.164)**	(0.389)	**(0.006)**	(0.056)	(0.274)
Adjusted R^2	0.694	0.657	0.570	0.819	0.811
Panel C: Allowing the coefficient to vary by age					
AR*YA*	-0.109	-0.048	-0.008	**-0.115****	-0.067
<5 years	(0.195)	(0.182)	(0.009)	**(0.046)**	(0.183)
AR*YA*	0.081	0.133	**-0.018*****	-0.045	**-0.108****
5+ years	(0.135)	(0.138)	**(0.006)**	(0.041)	**(0.047)**
Adjusted R^2	0.690	0.654	0.573	0.816	0.807

*** = significant at the 1% level, ** = significant at the 5% level, * = significant at the 10% level. The sample consists of all firms with available data. Dependent variables exclude outliers. All regressions are estimated by OLS, with clustered std. errors in brackets below coefficient, and include an indicator for district where armed conflict took place, indicator for medium and large firms, age of firms, indicators for state and foreign ownership, exporter status, indicator for firms located in Tbilisi, year, industry and region fixed effects as well as measures of vulnerability to financial crisis.

Intensity of armed conflict

- The cumulative impact is likely to be larger for districts that experienced bombing several times during the armed conflict than for those that only experienced bombing once or not at all

- Our sample contains 9 districts directly affected by armed conflict: ranging from one occurence in 4 districts to 14 occurences in Gori

Sales and employment (intensity)

	Log (sales) (1)	Log (nat. sales) (2)	% exports (3)	Log (PFT empl.) (4)	Log (FT empl.) (5)
Panel A: Overall					
AR*YA	0.002	-0.001	-0.001	0.002	-0.007
	(0.014)	(0.015)	(0.001)	(0.003)	(0.005)
Adjusted R^2	0.689	0.660	0.598	0.822	0.807
Panel B: Allowing the coefficient to vary by size					
AR*YA*	**0.015****	**0.019*****	**-0.001****	0.000	-0.001
1-19 employees	**(0.006)**	**(0.005)**	**(0.000)**	(0.005)	(0.003)
AR*YA*	0.008	0.021	**-0.001****	-0.005	-0.011
20-99 employees	(0.011)	(0.013)	**(0.000)**	(0.017)	(0.013)
AR*YA*	**-0.014***	-0.029	**-0.001****	0.000	**-0.045*****
100+ employees	**(0.007)**	(0.023)	**(0.000)**	(0.008)	**(0.015)**
Adjusted R^2	0.690	0.654	0.564	0.817	0.809
Panel C: Allowing the coefficient to vary by age					
AR*YA*	**-0.024****	**-0.021****	-0.001	-0.007	0.004
<5 years	**(0.009)**	**(0.009)**	(0.000)	(0.006)	(0.006)
AR*YA*	**0.016****	**0.020*****	**-0.001****	0.000	**-0.011*****
5+ years	**(0.007)**	**(0.007)**	**(0.000)**	(0.002)	**(0.004)**
Adjusted R^2	0.689	0.654	0.564	0.816	0.808

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Sales and employment (intensity, neighbours)

	Log (sales) (1)	Log (nat. sales) (2)	% exports (3)	Log (PFT empl.) (4)	Log (FT empl.) (5)
Panel A: Overall					
AR*YA	**0.025****	**0.022****	-0.001	0.001	-0.006
	(0.011)	**(0.010)**	(0.001)	(0.004)	(0.005)
Adjusted R^2	0.762	0.733	0.520	0.828	0.814
Panel B: Allowing the coefficient to vary by size					
AR*YA*	**0.024*****	**0.026*****	**-0.001***	-0.001	0.000
1-19 employees	**(0.006)**	**(0.005)**	**(0.000)**	(0.006)	(0.004)
AR*YA*	**0.019***	**0.028****	0.000	-0.008	-0.011
20-99 employees	**(0.011)**	**(0.012)**	(0.000)	(0.019)	(0.014)
AR*YA*	-0.003	-0.020	0.000	-0.002	**-0.045*****
100+ employees	(0.007)	(0.023)	(0.000)	(0.007)	**(0.015)**
Adjusted R^2	0.744	0.719	0.521	0.826	0.817
Panel C: Allowing the coefficient to vary by age					
AR*YA*	-0.015	-0.014	0.000	-0.009	0.003
<5 years	(0.009)	(0.008)	(0.000)	(0.008)	(0.008)
AR*YA*	**0.026*****	**0.027*****	**-0.001***	-0.002	**-0.010****
5+ years	**(0.007)**	**(0.007)**	**(0.000)**	(0.003)	**(0.005)**
Adjusted R^2	0.744	0.719	0.521	0.825	0.815

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Sales and employment (intensity)

	Log (sales)	Log (nat. sales)	% exports	Log (PFT empl.)	Log (FT empl.)
	(1)	(2)	(3)	(4)	(5)
Panel D1: Allowing the coefficient to vary by sector, all districts					
AR*YA*	0.010	0.006	-0.001	0.010	**0.011*****
Manufacturing	(0.010)	(0.015)	(0.001)	(0.009)	**(0.004)**
AR*YA*	0.010	**0.015****	**-0.001****	-0.004	-0.014**
Services	(0.007)	**(0.006)**	**(0.000)**	(0.004)	**(0.006)**
Adjusted R^2	0.690	0.654	0.562	0.817	0.809
Panel D2: Allowing the coefficient to vary by sector, neighbours					
AR*YA*	0.021	0.012	0.000	0.007	**0.011***
Manufacturing	(0.012)	(0.015)	(0.000)	(0.009)	**(0.005)**
AR*YA*	**0.020*****	**0.022*****	**-0.001***	-0.006	-0.014**
Services	**(0.006)**	**(0.005)**	**(0.000)**	(0.005)	**(0.006)**
Adjusted R^2	0.745	0.719	0.519	0.827	0.817

*** = significant at the 1% level, ** = significant at the 5% level, * = significant at the 10% level. The sample consists of all firms in armed conflict districts and districts sharing a border with them with available data. Dependent variables exclude outliers. All regressions are estimated by OLS, with clustered std. errors in brackets below coefficient, and include indicators for districts where armed conflict took place and districts with military installations, indicator for medium and large firms, age of firms, indicators for state and foreign ownership, exporter status, indicator for firms located in Tbilisi, year, industry and region fixed effects as well as measures of vulnerability to financial crisis.

Sales and employment - summary

- Total and national sales increased, in particular for small and old firms as well as services firms
  - Benefiting from imports not being able to reach the Georgian market for a short period of time
  - Taking over market share from informal and exiting firms
- Number of FT and PFT employees in large and old firms decreased
- Small, old and services firms saw a decrease in their share of exports in sales

Perceptions (intensity, neighbours)

	Panel A (1) AC*YA	Panel B (2)			Panel C (3)	
		1-19 empl	20-99 empl	100+ empl	< 5 years	5+ years
Tax rates	**0.010***	0.000	**0.028***	**0.022***	0.007	**0.010**
	(0.006)	(0.005)	**(0.009)**	**(0.006)**	(0.008)	**(0.005)**
Tax	-0.008**	-0.010***	0.004	**0.007***	0.000	-0.006
administration	**(0.003)**	**(0.003)**	(0.006)	**(0.004)**	(0.008)	(0.004)
Access to finance	0.008	**0.010**	0.015	**0.023**	-0.015*	**0.018***
	(0.007)	**(0.005)**	(0.01)	**(0.01)**	**(0.009)**	**(0.005)**
Crime, theft	-0.008	-0.005	-0.001	**0.025***	-0.016	0.003
and disorder	(0.008)	(0.006)	(0.008)	**(0.007)**	(0.01)	(0.006)
Inadequately	**-0.019**	**-0.027***	**-0.031***	**-0.023***	**-0.059***	**-0.021***
educated workforce	**(0.008)**	**(0.005)**	**(0.004)**	**(0.005)**	**(0.004)**	**(0.004)**
Practices of	-0.009	**-0.024***	-0.003	0.021	**-0.025***	-0.01
informal competitors	(0.008)	**(0.007)**	(0.006)	(0.024)	**(0.005)**	(0.008)
Practices of	0.006	0.003	**-0.013***	0.000	**0.027***	-0.007
formal competitors	(0.005)	(0.006)	**(0.005)**	(0.019)	**(0.008)**	(0.006)
Transportation	-0.007	**-0.010***	-0.005	0.002	-0.009	**-0.007**
	(0.004)	**(0.003)**	(0.009)	(0.003)	(0.014)	**(0.003)**
Electricity	-0.003	**-0.014**	-0.002	0.001	**-0.014***	**-0.008***
	(0.006)	**(0.007)**	(0.008)	(0.005)	**(0.005)**	**(0.004)**

*** = significant at the 1% level, ** = significant at the 5% level, * = significant at the 10% level. The sample consists of all firms in armed conflict districts and districts sharing a border with them with available data. Dependent variables exclude outliers. All regressions are estimated by OLS, with clustered std. errors in brackets below coefficient, and include indicators for districts where armed conflict took place and districts with military installations, indicator for medium and large firms, age of firms, indicators for state and foreign ownership, exporter status, indicator for firms located in Tbilisi, year, industry and region fixed effects as well as measures of vulnerability to financial crisis.

More likely to complain about

- Tax rates (large, old):
  - No changes after the armed conflict, but firms need to pay tax in advance quarterly payments, each installment equal to 25% of the tax paid for the previous year
- Access to finance:
  - Firms in armed conflict districts were less successful in securing loans
- Crime, theft and disorder

Less likely to complain about

- Inadequately educated workforce:
    - Unemployment rate rose significantly following the conflict and the global financial crisis
    - Firms either found it easier to find skilled workers, or were no longer thinking of expanding and hence had no need for additional workers
- Practices of informal competitors:
    - Informal firms may have disappeared, at least temporarily, as they did not have access to the same government measures and international help to overcome the impact of the armed conflict as the formal sector firms
- Transportation and electricity

Implications for average productivity

	All	Neighbours
	(1)	(2)
Panel A: Overall		
AR*YA	0.002	**0.025***
	(0.012)	**(0.008)**
Adjusted R^2	0.424	0.440
Panel B: Allowing the coefficient to vary by size		
AR*YA*	0.013	**0.023****
1-19 employees	(0.009)	**(0.008)**
AR*YA*	-0.007	0.005
20-99 employees	(0.020)	(0.021)
AR*YA*	**0.057***	**0.069***
100+ employees	**(0.014)**	**(0.013)**
Adjusted R^2	0.429	0.442
Panel C: Allowing the coefficient to vary by age		
AR*YA*	**-0.048***	**-0.037***
<5 years	**(0.011)**	**(0.012)**
AR*YA*	**0.024***	**0.035***
5+ years	**(0.008)**	**(0.007)**
Adjusted R^2	0.429	0.441

- Armed conflict overall appears to have a cleansing effect on average productivity, but a scarring effect on average productivity of young firms

Longer-term impact

- BEEPS V conducted in 2012-13, financial information referring to 2011
- Small sample, as only 81 firms participated in both BEEPS IV and BEEPS V
- Most coefficients are not statistically significant, with the exception of:
  - Number of PFT employees decreased overall and for small and medium firms
  - Total and national sales of medium and large firms increased
  - Labour productivity of medium and large firms increased

Conclusion

- Positive and significant impact on sales, particularly for small firms (less competition from informal firms, take over market share from firms that exited) and old firms

- Negative and significant impact on FT and PFT employment in large and old firms

- Negative and significant impact on share of exports in sales for small and old firms

- Scarring effect of armed conflict on average labour productivity of young firms, which could lead to premature exit

- Perceptions of the severity of several business environment obstacles: some surprising results (at a first glance)

Policy implications

- Even in the short run, and even when armed conflict does not last long, armed conflict has an impact on some firm performance measures

- This can have an impact on firm dynamics, forcing some firms to close down sooner than they would have otherwise ⟶ advisable to adopt measures that would help firms to alleviate the impact of armed conflict

- Impact of the armed conflict on perceptions of the business environment likely depends on the quality of the pre-conflict business environment, changes in the appetite for various services, and the measures taken by the government and international community in response to the conflict