European Bank
for Reconstruction and Development

The impact of armed conflict on firms' performance and perceptions

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Abstract

This study is the first to explore the short-run impact of armed conflict on firms' performance and their perceptions of the business environment. We focus on the August 2008 conflict between Georgia and Russia and use the Business Environment and Enterprise Performance Survey data before and after this armed conflict. We can exploit the variation in armed conflict exposure to identify these relationships. The difference-in-differences estimates suggest that despite the short duration, armed conflict had a significant and negative impact on exports, sales and employment for at least a subset of firms. Perceptions of a few business environment obstacles were also affected, but not necessarily negatively. The results suggest that young firms experienced a scarring effect, which could lead them to close down prematurely. Longer-term impacts of the conflict on firms' performance and local economic development can therefore not be ruled out.

Keywords: Armed conflict, Georgia, business climate, firm performance

JEL Classification Number: D74, O17, O43, R30

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The authors would like to thank Givi Melkadze for help with assigning firms to districts and to Jennifer Alix-Garcia, Mahir Babayev, Cagatay Bircan, J. Michelle Brock, Nino Butkhuzi, Ralph De Haas, Mariam Dolidze, Yevgeniya Korniyenko, Olga Kuzmina, Jean-Francois Maystadt, Elena Nikolova, Alexander Pivovarsky, Alexander Plekhanov, Pedro L. Rodriguez, Paolo Zacchia, Jeromin Zettelmeyer and participants of the 9th Midwest International Economic Development Conference for helpful comments and discussions.

Working Paper No. 152 **Prepared in December 2012**

1 Introduction

Armed conflict has been a part of every generation's existence since the beginning of the 20th century. From the first and second world wars to colonial wars in Africa to the Cold War and the proxy wars that were fought in its name, to territorial and religious wars, war has occurred around the world for various reasons across years without fail. Major interstate and civil wars have declined dramatically in the last decade (World Bank, 2011a), but for the countries involved in the armed conflicts, the devastation to life, infrastructure and the economy are still significant, though they are not equal across or even within countries. This distinction in severity is directly related to the intensity of fighting within an area, consisting of person-to-person combat and, with potentially larger impact area, bombings.

Armed conflicts destroy physical infrastructure and human capital, both of which can have a devastating impact on both individuals and firms. Firm level productivity is influenced by technology, capital, organisational structure, management practices (Bloom and Van Reenen, 2010) and the number of workers as well as their skills (Iranzo et al., 2008). All of these could be affected by armed conflict. This in turn may influence aggregate productivity and growth and on firm dynamics. There is extensive research on the impact of armed conflict on aggregate outcomes, such as investment, income, growth, foreign direct investment, poverty, consumption, literacy levels,[1] as well as education, health and labour market outcomes of birth cohorts affected by the armed conflict[2] – an overview is provided by Blattman and Miguel (2011). However, only a few studies have analysed the impact of armed conflict on firm activity. Armed conflict can have an impact on incumbent firms' sales, exports, profitability and investment decisions[3] – impacting the allocation of inputs and outputs across the existing firms – as well as on firm entry and exit (Camacho and Rodriguez, 2010). Our paper contributes to this stream of research by analysing the impact of the August 2008 armed conflict between Georgia and Russia on the short-run changes in the performance of Georgian firms and their perceptions of the business environment.

To preview results, we find that the armed conflict reduced exports on average by over 15 per cent. The magnitude of this impact was particularly large for small and medium-sized enterprises (SMEs) and young firms when compared with their average exports prior to the armed conflict. We also find that old firms had on average almost 6 per cent fewer permanent, full-time employees due to the armed conflict, while both total and national sales decreased by over 10 per cent for large firms. Estimates are not significant for other firm performance measures, but most of them are negative. Armed conflict also affected perceptions of the severity of several business environment obstacles, but not necessarily in a negative direction. Often, small or young firms were less likely to perceive an obstacle as a major or very severe obstacle after the conflict: examples are access to finance and practices of informal competitors. Tax rates, on the other hand, were more likely to be perceived as a major or very severe obstacle after the armed conflict, overall and for medium-sized firms. We present possible explanations for the results, including measures taken by the Georgian government and the response of the international community.

We contribute to the literature in three important dimensions. First, our findings reflect the average impact on: the non-agricultural, non-financial private sector, rather than being

[1] For example, Alesina and Perotti (1996), Stewart et al. (1997), Collier (1999), Mancuso et al. (2010), Miguel and Roland (2011), Davis and Weinstein (2001), Brakman et al. (2004), Abadie and Gardeazabal (2003).
[2] For example, Akbulut-Yuksel (2010), Shemyakina (2011), Chamarbagwala and Moran (2011), Justino et al. (2010), Bundervoet et al. (2009), Akresh et al. (2011), Galdo (2010), Kondylis (2010).
[3] See Abadie and Gardeazabal (2003), Guidolin and La Ferrara (2007), Ksoll et al. (2010).

focused on publicly listed companies (as Abadie and Gardeazabal, 2003); on particular sectors (as Ksoll et al., 2010, and Camacho and Rodriguez, 2010); or both (as Guidolin and La Ferrara, 2007). We use data from the EBRD and the World Bank Business Environment and Enterprise Performance Survey (BEEPS), a firm-level survey of a representative sample of all firms in the economy's private sector except agriculture and finance, with a focus on the manufacturing and services sectors. It covers registered firms with at least five employees, and the sample is stratified by geographical location.

Second, our data allow us to analyse the impact of armed conflict by firm size and age. Small, young firms might find it more difficult to deal with the aftermath of armed conflict than large, established firms for a number of reasons: they are more likely to have fewer suppliers or customers and less experience in dealing with an adverse business climate, and may not be aware of remedial measures available from the government or other institutions. What happens to them can have important consequences for the economy: several studies show that young firms contribute substantially to job creation (Haltiwanger et al. (forthcoming), Lawless (2012), Ibsen and Westergaard-Nielsen (2011)).

Third, this is the only paper to our knowledge that looks at the impact of armed conflict on perceptions of business environment rigorously. We do not need to rely on the ability of respondents to accurately recall their perception of the business environment before the armed conflict once the armed conflict has already occurred: the regular round of BEEPS for Georgia was mostly completed just before the start of the armed conflict, and the same firms were re-interviewed in February and March 2009. The evidence on the empirical relationship between firm performance and (perceptions of) business environment is inconclusive.[4] However, perceptions of the business environment could influence firms' investment decisions and firm dynamics.[5]

The armed conflict in Georgia was exogenous to firm performance and perceptions of business environment and, crucially, unexpected but the firms have not been assigned to districts with armed conflict and those without randomly, so we can think of it as a quasi-natural experiment.[6] However, there are two potential complications: (i) locations that were bombed or where major battles took place were not selected randomly and (ii) the global financial crisis began developing shortly after the August 2008 armed conflict. We deal with the first issue by exploiting the variance in the intensity of fighting across districts to identify the short-term impact of the armed conflict on measures of firm performance (sales, exports and employment) and perceptions of business environment. We use a difference-in-differences estimator, comparing districts directly affected by armed conflict with districts that were affected only indirectly. We cannot address the second complication completely. However, we argue that the base impact of the global financial crisis (including the liquidity

[4] See Commander and Svejnar (2011) for an overview of studies at the country, industry and firm level. Commander and Svejnar (2011) argue that business environment constraints seem to have effects on firm performance in line with expectations when constraints are analysed individually, but not if they are analysed jointly or when country-, year- and sector-fixed effects are introduced. This could be because the use of country-fixed effects, while accounting for possible omitted variables, absorbs information that would otherwise be attributed to country-level differences in various business constraints, or because some perceived constraints are correlated across countries.

[5] Indeed, 40 per cent of companies interviewed in the Business Optimism Survey conducted in Georgia by the IFC in November 2008 said that they had suspended their decision to expand operations in Georgia and a further 42 per cent were reconsidering their decision.

[6] Armed conflict in Georgia consisted mostly of bombing. The only major ground battle of the war took place in Tskhinvali, the capital of South Ossetia, which is part of a district in which the BEEPS was conducted. A smaller battle took place in Abkhazia while a naval skirmish occurred off the Abkhaz coast (Allison, 2008).

of banks in the area) is the same in all districts in Georgia and that any differential impacts vary predominantly by the firms' specific conditions.[7] We control for those we can observe in the estimation.

The remainder of the paper is organised as follows. Section 2 provides background information on the tensions between Georgia and Russia over South Ossetia and a concise overview of how the financial crisis hit Georgia. Section 3 includes description of the data, descriptive analysis and identification strategy, while Section 4 discusses the difference-in-differences estimates. Section 5 concludes.

[7] We substantiate the claim that the base impact of the global financial crisis is the same in all districts in Georgia by calculating a measure of district-specific bank balance sheet conditions following Popov and Udell (2012).

2 Background of the August 2008 Georgia-Russia conflict and financial crisis

2.1 The August 2008 conflict and its background[8]

South Ossetia is located in the north of Georgia and borders the Russian region of North Ossetia. From the 1920s until the collapse of the Soviet Union, Georgia and South Ossetia existed with little conflict, with inter-marriages common and Georgian and Russian spoken as the official languages in South Ossetia (Toal, 2008). Conflict started to appear in 1989, in the run-up to the fall of the Soviet Union.

In November 2006 the government of South Ossetia held a referendum on independence from Georgia in which 95 per cent of the vote was in favour of independence. Since then, both Russia and Georgia have made provocative moves towards one another, and in the weeks before the August 2008 conflict both sides participated in their own war-games exercises.

The Independent International Fact-Finding Mission on the Conflict in Georgia (IIFFMCG), headed by Ambassador Heidi Tagliavini, was mandated by the Council of the European Union to investigate the origins and the course of the conflict. The Georgian government claims to have discovered that Russia was secretly moving more troops and artillery into South Ossetia and to maintain the sovereignty of Georgia they attacked the Russian forces in the capital of South Ossetia, Tskhinvali (IIFFMCG, 2009). The Georgian army began its attack on the night of 7 August and by the afternoon of 8 August they were in the vicinity of Tskhinvali, where they started to come under retaliatory fire (IIFFMCG, 2009). The fighting between both sides continued through the day and into 9 August, and on 10 August the Georgian government declared a ceasefire and the withdrawal of its troops from South Ossetia (IIFFMCG, 2009). However, the Georgian withdrawal was met with the continued advancement of Russian troops into Georgia from South Ossetia and Abkhazia.[9]

On 12 August French President, Nicolas Sarkozy, visited both governments, obtaining a six-point ceasefire. In total the conflict lasted five days, although some Russian troops remained in Georgian territory till 9 October 2008 when the full withdrawal was confirmed (IIFFMCG, 2009). In addition, President Medvedev of Russia announced in a speech on 26 August 2008 Russia's recognition of the sovereignty of South Ossetia and Abkhazia, much to the criticism of the United States, the European Union and Georgia (Levy, 2008). The presence of EU observers did not put an end to all violence as the one-year anniversary of the conflict witnessed acts of violence from both sides, including accusations of mortar fire and attacks on checkpoints (Barry, 2008).

The way the August 2008 conflict unfolded was, despite a history of tensions between Georgia and Russia, unexpected – at least from the point of view of the civilian firms. However, the bombing by the Russian military did not occur randomly. In fact it was highly correlated with the location of military and transportation installations (Georgian Ministry of Defence, 2008), and the bombing was very precise. In our analysis we will take the cross-district variation in armed conflict as exogenous once we control for the location of military

[8] More details are provided in Appendix A.

[9] For a detailed review of the five days of fighting, including the run-up to the conflict, see the Report by the Independent International Fact-Finding Mission on the Conflict in Georgia (2009).

installations. The infrastructure tends to be good near the military installations, so we also use them as a proxy for transportation installation.

2.2 Impact of the armed conflict

As a result of the five-day armed conflict in August 2008, over 100,000 people were displaced and there was substantial damage to roads (US$ 150 million), destruction of civilian infrastructure and property (US$ 350 million) and lost fiscal revenues (US$ 300 million) in the second half of 2008 (Phillips, 2008). This amounts to about 6.3 per cent of Georgia's GDP in 2008 – a substantial amount for such a short duration.[10]

2.3 Confounding factor: the financial crisis

In addition to the damage caused by the conflict, the economy of Georgia was simultaneously affected by the global economic crisis. The collapse of Lehman Brothers, viewed as the trough of the financial crisis, occurred less than one month after the end of the conflict between Georgia and Russia. The combination resulted in poor market conditions for a speedy recovery and thus Georgia's economy was not back to pre-conflict levels until the end of 2010.

From the second quarter to the third quarter of 2008, real GDP fell by 7.2 per cent. One year after the conflict, GDP had fallen by 9.1 per cent year-on-year. The combination of property and infrastructure damage had a devastating effect on the Georgian economy as evident by the GDP, as well as the imports and exports of the country. In nominal US dollar terms, the value of exports from Georgia increased by over 45 per cent year-on-year in the first two quarters of 2008 and still increased by more than a third year-on-year in the third quarter of 2008 (see Chart 1).[11] However, exports dropped by around 30 per cent year-on-year in each of the four subsequent quarters and only started to recover in the fourth quarter of 2009; imports followed a similar path, although they started to recover only in the first quarter of 2010. Georgia's main export partners were Azerbaijan, Armenia, Russia, Turkey and the United States; exports to Russia and the United States declined by over 30 per cent in 2008. Additionally, foreign direct investment (FDI) fell from US$ 1.67 billion in 2007 to US$ 659 million in 2009. Chart 2 gives a more nuanced picture of FDI flows into Georgia from its major sources. Although each country varies in its patterns, one can observe a general trend of increasing FDI flows in the years prior to the conflict, followed by a sharp drop in 2009 and movement towards recovery in 2010. Individual households also felt the effects as remittances from abroad fell sharply – most notably from Russia, where many Georgian immigrants have gone in search of work (WTO, 2009) and which also experienced a recession.

[10] To put this into perspective: the 11-week NATO bombing campaign over Kosovo was estimated to cost (the then) Yugoslavia US$ 64 billion in lost infrastructure (specifically targeted by the bombing) and contraction of GDP (Economist Intelligence Unit, 1999). In Kenya, ethnic violence following the election results in December 2007 was estimated by the Finance Ministry to cost nearly US$1 billion (*The Economist*, 2008). Violence following the referendum on independence in Timor-Leste in 1999 saw GDP drop by more than 30 per cent (USAID, 2008).

[11] Georgia's exports are dominated by minerals, metals and metal waste.

3 Data and estimation

3.1 Data

Our main data source for the analysis is the EBRD and World Bank Business Environment and Enterprise Performance Survey (BEEPS) for Georgia which was conducted in 2008, with a follow-up in 2009. BEEPS is an enterprise survey whose objective is to gain an understanding of firms' perception of the environment in which they operate in order to be able to assess the constraints to private sector growth and enterprise performance.[12]

In Georgia, the fourth round of BEEPS was in the field from 15 April to 8 August 2008 – a day after Georgian troops were deployed to South Ossetia and on the day on which Russia began bombing Tbilisi. A total of 373 interviews were completed, covering six regions (mkhare): Tbilisi, Kvemo Kartli, Kakheti, Mmtskheta-Mtianeti, Imereti and Shida Kartli. Abkhazia, Adjara, Guria, Racha-Lechkhumi and Kvemo Svaneti, Samegrelo and Zemo Svaneti, Samtskhe-Javakheti were not covered by the survey. Most of the interviews were completed in May and June 2008.

A survey company hired by the EBRD revisited most of the enterprises that participated in the fourth round of BEEPS between 24 February and 25 March 2009, to be able to assess the impact of the conflict on the business environment (see Chart 3 for visual timeline). On average, 282 days (roughly nine months) passed between the two interviews.[13] The same regions were covered as during the fourth round in 2008, but one of the cities covered in 2008 had to be left out because it was controlled by Russia at the time of the survey.[14]

We had access to otherwise confidential information on the location of the firms in our sample, which we were able to link to the survey responses on the basis of a unique firm identifier. This allowed us to assign a district to each firm. We also assigned a district to firms based in Tbilisi based on their address.[15] Chart 4 shows the location of the firms that participated in the follow-up BEEPS Georgia survey, as well as the districts that were directly affected by armed conflict.

A total of 286 interviews were completed, 215 of them with the same respondent as during the regular fourth round.[16] We restrict the sample to firms whose interviews were completed before 7 August 2008 in the regular round of BEEPS, which reduces the sample to 282 follow-up interviews (see Table 1 for more details). The response rate ranged from 40 to 100 per cent (with the exception of Akhalgori, which is a special case, and Marneuli, where only one firm was surveyed in 2008) and it was on average higher for firms in districts directly exposed to armed conflict than in districts that were not (93.9 per cent versus 85.2 per cent). The latter also experienced more than twice as high a refusal rate as the districts that were

[12] It covers topics related to infrastructure, sales and supplies, degree of competition, land and permits, crime, finance, business-government relations, labour and establishment performance. BEEPS is implemented by private contractors, using face-to-face interviews in the country's official language(s).

[13] Minimum time between the two interviews was 208 days and maximum 329 days, with the 25th percentile of 252 days and 75th percentile of 295 days.

[14] This affected four firms located in Akhalgori (Mtskheta-Mtianeti).

[15] Districts in Tbilisi are Didgori, Didube-Chugureti, Gldani-Nadzaladevi, Isani-Samgori, Old Tbilisi and Vake-Saburtalo. Our sample does not contain firms located in Didgori.

[16] The main reason for not being able to speak to the same respondent as in 2008 was that they were not available for an interview. Apart from a couple of cases, they were still with the same company, but had no time to participate in the interview and directed us to speak with their deputies or accountants or with the second respondent from the original interview in 2008.

directly exposed to direct conflict. The percentage of firms that discontinued their business, were actually a private household or were in an industry not eligible for the survey[17] was higher in the armed conflict districts (9.8 per cent versus 7.2 per cent in districts that were not directly exposed to armed conflict), but the percentage of those that discontinued their business was actually lower in armed conflict districts: 80.0 per cent versus 95.2 per cent of firms in the districts that were not directly exposed to armed conflict.

The above figures do not suggest large differences between the non-participation of firms in armed conflict districts and districts that were not directly affected. In order to rule out attrition as a source of bias, we checked the characteristics of the firms that were ultimately re-interviewed versus those that were not as well by running a series of t-tests for differences in means of several variables from the baseline survey (see Table 2). Attritors were significantly more likely to be located in Tbilisi (1 per cent level of significance), to be 50 per cent or more state-owned and on average had more permanent, full-time employees (10 per cent level of significance). We control for these characteristics in our estimation.

To rule out exit as a source of bias, we also looked at those that discontinued their business in 2008 compared with those that did not.[18] Large companies were less likely to discontinue their business (10 per cent significance), as were those that purchased a fixed asset in 2007 (5 per cent significance). They were more likely to perceive quality of skills as a major or very severe obstacle than those that did not discontinue their business (5 per cent significance) – this could be due to their inability to pay sufficient wages to attract qualified workers.

3.2 Identification strategy

Our aim is to shed more light on how the armed conflict affected Georgian firms in the short run. Destruction of physical infrastructure, such as a firm's premises, machinery and equipment, as well as roads, bridges, railroads and airports, may make it more difficult for firms to have access to supplies, reach their customers and honour their contractual obligations, as well as for workers to get to work, all of which can have an impact on firm performance. During the armed conflict itself, workers might be killed, be forcibly displaced or decide to leave the area, and in the longer run, human capital accumulation may be further affected by damages to schools and educational facilities and expected returns to schooling may fall (see Chamarbagwala and Moran, 2011). Lastly, armed conflict may influence firms' investment decisions and firm dynamics. For this reason, it is important to understand how firms perceive the business environment in a post-conflict country because this can have an impact on their behaviour and possibly on their (and their country's) performance in the long run.

One could argue that by being located in Georgia, all firms were affected by the armed conflict. However, some parts of Georgia were impacted by the conflict in a very direct manner, by being either bombed or having had a strong army presence and ground battles taking place, while other parts were not exposed to the conflict directly at all.

We assume, on the other hand, that the base impact of the global financial crisis on Georgian firms is the same in all districts in Georgia and any differential impacts vary predominantly by the firms' specific conditions and not by district. For example, a firm that needed to renew a bank loan may find itself in a lot more trouble than a firm that had sufficient capital and did

[17] Such as education, government, finance and agriculture.
[18] Results are available on request.

not need a bank loan. Firms that have bought new machinery or equipment before the armed conflict with a view to expanding their operations and increasing sales in Georgia or abroad, and firms with a large proportion of their sales paid after delivery are also likely to be more vulnerable than firms that benefited from the post-conflict reconstruction efforts or that do not need external financing at all. We substantiate our assumption by looking at the data on bank branches by bank ownership type in Georgia available in the EBRD Banking Environment and Enterprise Performance Survey (BEPS), conducted in 2012. Following Popov and Udell (2012), we construct a measure of district-specific bank balance sheet conditions by aggregating balance sheet information from Bureau van Dijk's Bankscope. We focus on the Tier 1 capital ratio and ratio of total equity to total assets, and use two different weighting criteria in constructing the measure: giving equal weight to each bank in the district and weighting each bank's financial position by the number of branches it has in the district. The null hypothesis of the equality of means of these two measures in armed conflict and no armed conflict districts cannot be rejected, both in 2007 and in 2008.[19]

Our identification strategy exploits the variation in the armed conflict's intensity across districts. It is a difference-in-differences-type strategy,[20] where the "treatment" variable is an interaction between the armed conflict variable measured at the district level and dummy variable for the year after the armed conflict:

$$Y_{idt} = \propto + \beta(ArmedConflict_d * YearAfter_t) + \gamma ArmedConflict_d + \theta YearAfter_t + \rho\ MilitaryInstallations_d + \delta_r + \mu' X_{ijt} + \varepsilon_{idt} \quad (1)$$

Y_{idt} is the outcome of interest for firm i in district d in year t. We define $ArmedConflict_d$ in two ways: first as a dummy variable equal to 1 in district d that has experienced bombing or where major battles took place in August 2008 and second as the number of times a district was directly exposed to armed conflict. $YearAfter_t$ is a dummy variable equal to 1 for survey data from the follow-up survey which took place in 2009. $MilitaryInstallations_d$ is a dummy variable equal to 1 if there is a military installation in the district (refer to Appendix C for details). δ_r are region-specific fixed effects, controlling for the fact that regions may be systematically different from each other – including them removes all observed and unobserved district characteristics that are constant across firms from the same region.[21] X_{ijt} is a vector of firm characteristics including size, age, ownership, exporting status, location in the capital and industry fixed effects. In order to control for observable vulnerability to the global financial crisis, some of the specifications in addition include indicators for having bought fixed assets and having a loan before the armed conflict. ε_{idt} is a random,

[19] The difference in means is significant at 10 per cent for the ratio of equity to total assets calculated giving equal weight to each bank in the district, but the mean is actually higher in the armed conflict districts.
[20] Many other studies have relied on similar sub-national variation in armed conflict intensity to measure the impact of war on individual outcomes: see, for example, Akbulut-Yuksel (2010), Justino et al. (2010), Bundervoet et al. (20008), Shemyakina (2011), Chamarbagwala and Moran (2011).
[21] We cannot control for district fixed effects because 17 districts out of 36 have fewer than 5 firms located there, and a further 6 districts have fewer than 10 firms.

idiosyncratic error term. All standard errors are clustered by district, and we exclude outliers in all specifications.[22]

The coefficient of interest is the coefficient on the interaction of $ArmedConflict_d$ with $YearAfter$, β. In order to interpret it as the average effect of armed conflict we must assume that had the armed conflict not occurred, the difference in firm performance and perceptions of business environment between the firms located in districts directly exposed to the 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. One way to get an insight into this is to compare pre-conflict trends. The BEEPS survey has been administered in Georgia since 1999, but the panel component is rather small due to attrition: only 68 enterprises participated in both the 2005 and 2008 rounds and out of these only 51 enterprises participated in the 2009 round as well, with 19 located in districts that were directly exposed to armed conflict and 32 in districts that were not; the number of firms with non-missing firm-performance measures in all rounds is smaller still (value of exports is available for less than 20 per cent of firms and value of total and national sales for just over 50 per cent of firms). With these limitations in mind, growth rates between 2005 and 2008 of the majority of outcomes mostly do not exhibit statistically significant differences between the two district types for the 51 establishments participating in all three rounds or 68 establishments participating in 2005 and 2008 rounds, apart from sales and exports.[23] The surveys were representative of the economy in the 2005, 2008 and 2009 rounds, so we also look at the averages of the outcome variables.[24] Chart 5 shows the charts for selected variables – while "trends" do not seem to be exactly the same (we cannot test whether they are statistically different in this larger sample), averages did tend to move in the same direction prior to the armed conflict.

We look at the following firm performance measures: total and national sales, exports and number of permanent and temporary, full-time employees. Sales and exports refer to 2007 and 2008 as a whole, and number of employees is measured at the end of 2007 and end of 2008. The nominal values for 2008 are adjusted for inflation, so sales and exports are measured in 2007 constant Georgian lari.

Perceptions of the business environment are based on the business obstacles questions, which are in the following form: "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 firm?" The answers to obstacles questions correspond to an ordinal scale, which describes order, but not the degree of difference between the items measured. In our analysis, we look at whether the likelihood of firms ranking a particular aspect of the business environment as a major or very severe obstacle has changed in the follow-up survey

[22] To identify outliers, the outcome variable was regressed on dummy variables for medium (20-99 employees) and large (100+) enterprises, industry and district fixed effects. Outliers were identified as those observations that fulfil the following criteria: $abs(DFITS) > 2*\sqrt{\frac{df_m+1}{N}}$ and $abs(COVRATIO-1) > 3*\frac{df_m+1}{N}$, where N is the number of observations and df_m degrees of freedom of the model.

[23] Results are available from the authors on request. Differences are statistically significant for sales and national sales (at 5 per cent for firms present in all three rounds and at 1 per cent for firms available in 2005 and 2008) and exports (at 10 per cent). Given that the panel of firms participating in the 2005, 2008 and 2009 survey is rather small, we cannot control for trends in the regression ((an approach used by Chamarbagwala and Moran, 2011, on a much richer dataset) or do more rigorous tests for the equality of trends before the armed conflict.

[24] We cannot assign district to 46 non-panel firms from the 2005 round located in Tbilisi because we do not have any information on their names and addresses.

compared with the regular round before the armed conflict. We look at 16 aspects of the business environment: electricity, transportation, customs and trade regulations, practices of competitors in the informal sector, practices of formal competitors, access to land, crime, theft and disorder, access to finance, tax rates, tax administration, business licensing and permits, political instability, corruption, courts, labour regulations and inadequately educated workforce. In contrast to the firm performance measures, these variables refer to the perception of the respondent at the time of the interview. For each firm, we have one observation before and one observation after the armed conflict.

Some of the business environment aspects are largely defined at the national level rather than at the level of regions or districts and as such should not be affected by the armed conflict, unless there were changes in the regulations after the armed conflict. Examples are customs and trade regulations, tax rates, tax administration, labour regulations, access to finance. Others, such as electricity, transportation, practices of competitors in the informal sector, access to land, crime, theft and disorder, business licensing and permits, corruption, inadequately educated workforce could be more influenced by the region or district, and could thus be affected by the armed conflict. However, it is possible that aspects of business environment largely determined at the national level and not changed at all during this time are perceived as more or less binding in regions directly exposed to armed conflict after the conflict because of a shift in perceptions and priorities.

Despite scepticism among some economists about their reliability,[25] subjective measures have been utilised in various studies across disciplines and they provide useful information. This includes the increase of subjective measures in the area of the economics of happiness, where subjective wellbeing, not utility, is the unit of analysis. Subjective measures have also been employed in firm level analysis.[26]

Lastly, armed conflict might affect different types of firms differently. Firms in certain industries might benefit from it, such as for example the listed diamond mining firms with operations in Angola (Guidolin and La Ferrara, 2007), whereas others might suffer and decide to shut down. In a Schumpeterian world, armed conflict may improve resource allocation in the economy by accelerating the exit of less productive firms. On the other hand, it could allow less productive incumbent firms with established connections with business partners in the country or abroad to prosper and force more productive young firms to close down prematurely.[27] We are particularly interested in the differential impact of armed conflict by size and age of firm, and we allow the coefficients β and γ of to vary by firm size (small, medium and large) and by age (young - <10 years old, old – 10+ years old) in alternative specifications. Experience in the business and financial buffers may allow firms to weather any sort of crises better than newly established or young firms. We also allow the coefficients β and γ of to vary by industry (manufacturing and services).[28]

[25] See, for example, Bertrand and Mullainathan (2001) and Gelb et al. (2007).
[26] Pierre and Scarpetta (2006) investigate the perception of firms regarding labour regulation and the extent to which they match the actual labour laws. In this case the authors find that the perception of labour regulation as an obstacle increases with the restrictiveness of the law. In an effort to unwrap the spill-over effects of foreign direct investment, Javorcik and Spatareanu (2005) examine the perception of firms on how the presence of foreign firms affects their performance.
[27] Ouyang (2009) presents a model which shows that recessions have a scarring as well as cleansing effect on resource allocation in an economy. The scarring effect can dominate the cleansing effect and give rise to lower average productivity during recessions.
[28] Not reported, but available on request.

3.3 Descriptive statistics

Table 3 shows the descriptive statistics by the two types of districts (that is, those directly affected by armed conflict and those not directly affected). There is significant variation in virtually all variables, but the t-test for differences between the firms in the two types of districts is significant at 10 per cent or higher only for foreign ownership, the share of direct exporters, the location of firms in Tbilisi, and for two of the proxies for vulnerability to financial crisis: the share of firms where 50 per cent or more of their goods or services are paid for after delivery and the share of firms that have purchased fixed assets in 2007. Direct exporters and firms with the latter two characteristics are more likely to be located in the districts that were not directly exposed to armed conflict. Total sales have on average decreased (mostly due to a drop in national sales) in 2008 compared with 2007, while exports have on average actually increased.[29] The number of permanent, full-time employees decreased in firms located in districts directly exposed to armed conflict, but increased a bit in other districts. The number of temporary, full-time employees, on the other hand, decreased in both types of districts, somewhat more in the armed conflict districts. However, the differences between the two types of districts are not statistically significant.

The top obstacles faced by firms before the armed conflict in 2008 remained the top obstacles in 2009, as shown in Chart 6. Of all the firms in the survey, slightly over 20 per cent cited access to finance as the largest obstacle of the business environment in Georgia; this climbed to 30 per cent in the following year. In 2007 political instability was already the major concern for almost 20 per cent of firms, but this almost doubled in 2008 with 38 per cent of firms selecting it as the main obstacle of the business environment. However, certain obstacles decreased in importance, specifically corruption, electricity and tax rates. This does not necessarily indicate that corruption improved; instead it could signify that other obstacles have taken precedence after the armed conflict.

Chart 7 looks at the perception of obstacles by the type of district. Firms located in districts not directly exposed to armed conflict (Panel A) have, on average, perceived political instability, access to finance, practices of formal and informal competitors, and telecommunications as dimensions that have become more serious obstacles to their operations after the armed conflict. Panel B shows a similar picture for firms in armed conflict districts, with political instability, access to finance, and the practices of formal and informal competitors all increasing in severity as obstacles.

In addition to perceptions, the survey also tried to assess the tangible impact of some of the obstacles on firms. In districts not directly exposed to armed conflict, 70 per cent of firms cited delays in production due to theft, robbery, vandalism or arson, compared with 85 per cent of firms in armed conflict districts. The next two most cited reasons included the blockage of domestic transport routes and supply routes. Both issues are cited more frequently by firms in armed conflict districts, although the difference is only statistically significant for domestic routes. In addition, a statistically significantly higher percentage of firms in armed conflict districts reported power outages and damage to fixed assets than firms in districts not directly exposed to armed conflict.

[29] This may to some extent be driven by outliers, which we exclude in the estimation.

4 Results

4.1 Armed conflict measured as a binary variable

We first look at the impact of armed conflict on firm performance and perceptions of business environment using a binary measure of armed conflict. Table 4 presents OLS regressions results for Equation (1) using firm performance measures as dependent variables, while Table 5 does the same for perceptions of business environment. The difference-in-differences estimates are coefficients of the interaction between $ArmedConflict_d$ with $YearAfter$. Both tables report estimates of the difference-in-differences coefficient β and standard errors clustered at the district level. Odd-numbered columns do not include controls for vulnerability to financial crisis, whereas even-numbered columns do. In Panel A, the coefficient is estimated for the entire sample. In Panels B and C, it is allowed to vary by firm size and firm age, respectively. All regressions include industry and region fixed effects.

First we discuss the results for firm performance measures in Table 4. Controlling for the vulnerability to financial crisis has an impact on the magnitude and in a few cases sign of the coefficient for all firm performance measures, and we focus on specifications which include these controls. The difference-in-difference estimate is negative and significant at 5 per cent for total sales of large firms only (panel B, column (2)), indicating that total sales decreased on average by over 10 per cent compared with 2007 total sales by large firms due to the armed conflict. This was due to a more than 10 per cent drop, on average, in national sales by large firms (panel B, column (4)). The difference-in-difference estimates for small and medium-sized firms are different from estimates for large firms at 1 per cent level of significance. The difference-in-differences estimate for exports is negative for small and medium-sized firms, but significant only for small (at 10 per cent level of significance, panel B, column (6)) and young firms (at 5 per cent level of significance, panel C, column (6)), suggesting that they were least prepared to find alternative ways for their exports to reach their customers. The magnitude is equivalent to more than six-times the average exports by small firms in 2007 and almost a quarter of the average exports by young firms in 2007. The coefficients in panels B and C are not statistically different from each other at the usual level of significance.

The difference-in-difference coefficient for employment, either permanent (columns (7)-(8)) or temporary (columns (9)-(10)), is always negative, except for small firms and young firms in case of permanent employment and small firms in case of temporary employment. However, it is significant at 5 per cent level of significance only for permanent employment in old firms, indicating that the number of permanent, full-time employees decreased by more than 5 per cent relative to the average number of permanent employees in large firms in 2007 due to the armed conflict. The coefficients for small and young firms are statistically significantly different from each other at 1 per cent level of significance.

Lack of more significant results in Table 4 could be explained by the relatively small sample and the fact that firm performance results for 2008 cover only about four months after the conflict and we only observe them for the firms that agreed to participate in the follow-up survey and that did not go out of business. It may take longer than four months for the firms to feel the full impact of the conflict on sales (including exports). Depending on the industry, sales and exports may be predetermined by contracts which need to be fulfilled.

With that in mind, it is interesting to see that most of the difference-in-differences coefficients are negative. The positive difference-in-difference coefficients could be

explained by excluding firms that have been severely affected by the armed conflict or potential differences in characteristics that we cannot observe: the firms that were still active at the time of the follow-up survey and willing to participate in it may be intrinsically better at adapting to the changed environment (this could be due to, say, better management practices or better products/services).

We next turn to the impact of armed conflict on perceptions of the business environment. Table 5 presents the OLS results for Equation (1).[30] The aspects of business environment are ordered from those that are largely determined at the national level to those that are largely determined at the regional/district/local level; perception of access to finance will be closely linked to each firm's characteristics and needs as well as local supply of credit.

The majority of the difference-in-differences coefficients in Table 5 cannot be estimated with a great level of precision. But apart from corruption, political instability, inadequately educated workforce and courts, each have at least one coefficient significant at the 10 per cent level of significance or higher in at least one of the panels.

The difference-in-differences estimate for tax rates suggests that the probability of perceiving tax rates as a major or very severe obstacle on average increased by about 0.14 as a result of armed conflict (Panel A). While the estimates are positive for all types of firms in Table 5, they are particularly binding and significant for medium-sized as well as both young and old firms (Panels B and C, respectively). They are also statistically different from the estimates for small and large firms at 1 per cent level of significance. There were no actual changes in tax rates after the armed conflict, so this finding suggests that the firms perceived tax rates as more strenuous as at least some of their revenues have decreased. A possible explanation can be found in the Tax Code 2005: firms need to pay tax in advance quarterly payments, each instalment equal to 25 per cent of the tax paid for the previous year.[31]

On the other hand, the difference-in-differences estimate for tax administration suggests that the probability of perceiving it as a major or very severe obstacle decreased by about 0.11 due to the armed conflict (Panel A). This was driven to a large extent by perceptions of small as well as both young and old firms (Panels B and C); the former are statistically different from estimates for medium and large firms at 1 per cent level of significance. Again, there were no reforms of the tax administration taking place after the armed conflict.

Probability of perceiving practices of informal competitors as a major or very severe obstacle decreased by almost 0.14 after the armed conflict (Panel A). Our finding is in contrast to previous research by Mills and Fan (2006), who find that informal sector activity is wide-spread in post-conflict situations. However, it can be explained by the informal sector firms not having access to the same government measures and international help as the formal sector firms to overcome the impact of the armed conflict and thus disappearing, at least temporarily. In addition, since the Rose Revolution in 2003 the government has made reforms[32] towards formalising the economy and now states that the size of the informal economy is significantly less than the astonishing 64 per cent of GDP in 1998-99 (Schneider

[30] Results are robust to using probit (available on request). The sample size is reduced significantly in some cases when using probit because some of the dependent variables are perfect predictors of either failure or success and such observations are dropped in estimation. More of the probit estimates are statistically significant, or statistically significant at a lower level of significance.

[31] The Tax Code of Georgia was updated in 2009 and again in 2011. This particular requirement remains part of it.

[32] This includes the instatement of a flat rate profit tax for all businesses, and was decreased from 20 per cent to 15 per cent (WTO, 2009).

and Enste, 2002). Estimates in Panels B and C reveal that the estimate in Panel A is driven by small and old firms less likely to perceive practices of informal competitors as a major or very severe obstacle after the armed conflict. The estimate for small firms is statistically different from the estimate for large firms at 5 per cent level of significance. Medium-sized firms, on the other hand, were statistically significantly less likely to perceive practices of formal competitors as a major or very severe obstacle – probability decreased after the armed conflict (Panel B, column (4)).

A couple of additional difference-in-difference estimates are statistically significant in panels B or C only. Access to finance results are particularly interesting: the difference-in-differences estimate suggests that the probability of perceiving access to finance as a major or very severe obstacle on average *decreased* by almost 0.28 for small as well as young firms as a result of armed conflict (Panels B and C, respectively, both estimates are significant at 10 per cent level). This can be explained with the measures taken by the Georgian government and the international institutions. The Georgian government adopted measures in an effort to ease the economic situation following the armed conflict. The National Bank of Georgia reacted quickly in an effort to stave off a large financial crisis by renewing commercial bank financing, reducing the basic interest rate from 12 per cent to 10 per cent, and by reducing the minimum reserve requirements for commercial banks from 15 per cent to 5 per cent (Papava, 2008). This also included efforts to stabilise the currency, which appear to have worked. Significant losses of international currency reserves were experienced, but by mid-2009 the reserve level returned to pre-conflict levels (WTO, 2009).

The Georgian government did not provide any lines of credit or make special concessions (such as tax breaks, for example) to support the enterprises after the armed conflict or during the financial crisis. Lines of credit were, however, provided by international institutions. United Nations Development Programme (UNDP) teamed up with seven local microfinance institutions to assist the displaced, women entrepreneurs and small start-up businesses, with the funding provided by the European Union. The programme ran in the Shida Kartli, Samegrelo and Mtskheta-Mtianeti regions, which have suffered the most from the armed conflict with Russia.[33] The EBRD has provided new credit lines via the country's leading banks, together with the Netherlands Development Finance Company (FMO) and the International Finance Corporation (IFC).

Chart 8 provides an overview of loan or line-of-credit-related statistics. Panel A of Chart 8 shows the percentage of firms that applied for a loan by the type of districts. Overall, a lower percentage of firms applied for a loan or a line of credit in 2008 than in 2007, and firms in the armed conflict districts were somewhat less likely to have done so. Panel B of Chart 8 shows that there were no major differences in the share of those whose application was successful between the two types of districts in 2007 and between January to July 2008 (when 80 per cent of all applications were successful), but after that, firms in armed conflict districts were much less successful, with only 25 per cent of them securing loans, compared with 43.6 per cent in the districts that were not directly exposed to armed conflict.

It is also interesting to note that while the ranking of the reasons for not applying for a loan or line of credit is roughly the same between the two types of districts, there are some differences in the percentage of firms that identify a particular reason as the main reason (Panel C of Chart 8). In 2007, firms in districts that were not directly exposed to armed

[33] For more details, see http://undp.org.ge/index.php?lang_id=ENG&sec_id=26&info_id=1014 (last accessed: 29 August 2012). There were no bombing or battles in Mtskheta-Mtianeti region. However, several camps for internally displaced persons were located there.

conflict mostly stated that they had sufficient funding (80.2 per cent), while only 41.0 per cent of firms in districts that were eventually bombed, claimed that. By 2008, the differences decreased (51.7 per cent versus 40 per cent, respectively, in the period August-December 2008).

Small firms and young firms were significantly less likely to perceive electricity, transportation and customs and trade regulations as a major or very severe obstacle after the conflict. A significant proportion of firms had their own generators, which could alleviate problems with the supply of electricity. The World Bank (2008a) cites only "modest" direct impact on the energy infrastructure and the damage that did occur was quickly repaired and hence not an issue at the time of the follow-up survey. The damage to the transport infrastructure from the conflict was minimal and the repairs needed were done quickly. The swiftness of Georgia's transport infrastructure rebuilding was also noted in Nichol (2009). There were no changes in customs and trade regulations, but our finding could be explained by the fact that exports decreased significantly in particular for small and young firms, reducing the likelihood of them having to deal with such regulations.

The difference-in-difference estimates, albeit mostly positive, are not significant for political instability. This could be explained by the tide of national-unity during and immediately following the conflict (Mikhelidze, 2009).[34] The difference-in-differences estimates for labour regulations are mostly positive, but not significant. Georgia has some of the most flexible labour regulations in the world in terms of difficulty of hiring and firing, rigidity of hours and cost of firing indices (World Bank, 2008b – ranked 4th in the world).

4.2 Armed conflict measured as the number of occurrences

We have so far only distinguished between armed conflict districts and districts without any armed conflict. We now extend the analysis to take into account the number of times armed conflict took place – 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.[35] Our sample contains 9 districts directly affected by armed conflict: ranging from one occurrence in Bolnisi, Dedoplistskaro, Kutaisi and Marneuli to 14 occurrences in Gori. In what follows, we only report the results for specifications controlling for vulnerability to financial crisis.[36]

As shown in Table 6, the number of significant estimates increases and most of the difference-in-difference estimates that were significant in Panels B and C of Table 4 remain significant. The coefficients in columns (4) and (5) of panel B suggest that armed conflict caused the number of permanent, full-time employees in large firms to decrease by 1.9 (this is the coefficient multiplied by the average number of armed conflicts per district, 0.95). Compared with districts not directly exposed to armed conflict, the coefficient in columns (4) and (5) suggests the number of permanent, full-time employees in large firms in Gori decreased by almost 29 employees. The impact on exports is significant for small and medium-sized enterprises as well as young enterprises.

[34] Data collected by the Caucasus Resource Research Centers found that trust in Georgian national institutions increased markedly from 2007 to 2008 (2009). Trust in the President characterised 51 per cent of the population in 2008 compared with 32 per cent in 2007, and 31 per cent trusted the government in 2008 while only18 per cent trusted the government in 2007 (Caucasus Resource Research Centers, 2009). Although the effect appears to taper off, this is only after the follow-up survey was complete.

[35] This is similar in spirit to Akbulut-Yuksel (2010), who uses rubble in m^3 per capita by the end of WWII as a measure of war devastation in Germany.

[36] Results from regressions where we do not control for vulnerability to financial crisis are available on request.

Table 7 replicates results in Table 5, taking into account the number of times a district was directly exposed to armed conflict. Several difference-in-difference estimates that were significant in Table 5 are no longer significant, while several others become significant when the intensity of armed conflict is taken into account.[37] Most striking are the difference-in-difference estimates for inadequately educated workforce, which are now always negative and significant. The estimates suggest that the probability of perceiving inadequately educated workforce as a major or very severe obstacle on average decreased by about 0.02 overall, and by almost 0.04 for medium-sized and young firms as a result of the intensity of the armed conflict. The estimates are statistically significantly different from the estimates for small and large as well as old firms, respectively. Following the conflict and the global financial crisis unemployment rate rose significantly: from 13.3 per cent in 2007 to 16.9 per cent in 2009. One policy pursued by the Georgian government in the aftermath of the conflict was to persuade donor countries to provide temporary work permits for 100,000 Georgians (World Bank, 2008a). The policy was an effort by the government to ease the labour supply surplus created by the shock to the business environment. However, this may have provided an avenue of exit for highly educated and skilled labour. On the other hand, skilled workers may have lost their jobs at other firms in the bombed districts which had to close down or scale back their operations. This could make it easier for the firms that remained open and either had to replace workers that left the area or decided to expand their operations because of new opportunities to find skilled workers. Another possible explanation is that firms in armed conflict districts were no longer thinking of expanding and hence had no need for additional workers.

Difference-in-difference estimates for tax rates remain positive and significant for medium and young firms. The latter were more likely to perceive practices of formal competitors as a major or very severe obstacle after the armed conflict, while the reverse was true for old firms. Experience and resources may have played a role in this.

It is also interesting to note that the difference-in-difference estimate for access to finance is positive and significant for large and in particular old firms, indicating that they are more likely to perceive access to finance as a major or very severe obstacle as a result of armed conflict. Most measures introduced to improve access to finance targeted small and medium-sized enterprises (SMEs). Large firms were on average also more likely to perceive corruption as a major or very severe obstacle as a result of the armed conflict. It may be that dealing with the aftermath of the armed conflict required the use of bribes or other incentives to get things done faster, such as re-establishing electricity connection.

4.3 Implications for average productivity

In the empirical analysis, we control for region and industry effects, as well as for unobservable firm effects using a difference-in-difference approach. We include measures that proxy as indicators for vulnerability of each firm to financial crisis. We cluster standard

[37] The following difference-in-difference estimates are no longer significant in specifications controlling for vulnerability to financial crisis: tax rates – overall and old firms, tax administration – old firms, customs and trade regulations – small firms, business licensing and permits – old firms, access to finance – small and young firms, crime, theft and disorder – large firms, access to land – medium firms, practices of informal competitors – old firms, practices of formal competitors – medium firms.

errors at the district level and exclude outliers.[38] We also checked whether the armed conflict had differential impact by industry (manufacturing versus services).[39]

We find some evidence that the exports of small and young firms, particularly when taking into account the intensity of armed conflict, were affected more than the exports of large and old firms. Large firms, on the other hand, were more negatively affected in terms of total and national sales and number of employees. Similar to a recession, armed conflict could either have a cleansing or scarring effect on average productivity. We can draw inferences about the impact on the average labour productivity of incumbent firms in our data. Summary statistics indicate that average labour productivity in 2008 was only 56.9 per cent of the 2007 level. For small and young firms, this ratio stood at 34.8 and 43.0 per cent, respectively. Young firms were three times more productive than old firms, while small firms were about a third more productive than medium and large firms. Table 8 contains the difference-in-differences estimates for the impact of armed conflict on total sales per employee (a measure of labour productivity). The estimates are not significant for a binary measure of armed conflict (column (1)), but several are significant when taking the number of occurrences into account (column (2)). They suggest that armed conflict had a positive impact on labour productivity of small, medium and old firms, but a negative impact on young firms – all of them significant at 1 per cent level of significance. While the difference-in-differences estimates suggest a positive overall effect of armed conflict on labour productivity, in line with the cleansing effect story, they also suggest that young firms experienced a scarring effect. This is important, because it might lead them to premature exit, meaning that they do not realise their potential fully, which has implications for job creation and aggregate productivity growth in the future (see, for example, Haltiwanger et al. (forthcoming)).

[38] The difference-in-difference estimates in our preferred specification controlling for vulnerability to financial crisis remain significant when we cluster standard errors by firm in majority of cases, although the level of significance changes in most cases – results are available on request.

[39] We also allow the coefficient to vary by industry – manufacturing or services (available on request). The difference-in-difference estimates are not statistically significantly different at this level, and the only estimate statistically significant at the 10 per cent level of significance is on exports by the service sector firms. The probability of perceiving access to finance as a major or very severe obstacle decreased and the probability of perceiving tax rates as a major or very severe obstacle increased for manufacturing firms, while the probability of perceiving tax administration as a major or very severe obstacle decreased for firms.

5 Summary and conclusion

This study uses data from BEEPS Georgia 2008 and 2009 to evaluate the short-term impact of the August 2008 armed conflict between Georgia and Russia on the performance of Georgian firms and their perceptions of the business environment. We find that the impact of the armed conflict was not always negative and that it varied by the size and age of firms.

Our results suggest that armed conflict had a negative and significant impact on exports and sales for at least a subset of firms. Particularly worrying is the scarring effect of armed conflict on average labour productivity of young firms, which may lead them to premature exit. Armed conflict also had an impact, not always negative, on the perceptions of the severity of several business environment obstacles. The findings can mostly be explained to some extent by the measures taken by the Georgian government and the response of the international community (see Appendix D for details). Specifically, we find that tax rates were more likely to be perceived as a major or very severe obstacle after the armed conflict, in particular for medium-sized and young firms. Inadequately educated workforce and customs and trade regulations are less likely to be perceived as a major or very severe obstacle after the armed conflict, especially so when the intensity of armed conflict is taken into account. Old firms were, in contrast to young firms, less likely to perceive practices of formal competitors as major or very severe, and more likely to perceive corruption as such as a result of the armed conflict.

There are a couple of important policy implications. First, 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 of the firms to close down sooner than they would have otherwise. It is important to adopt measures that would help the firms alleviate the impact of the armed conflict. Second, armed conflict has a significant impact on at least some aspects of the business environment – exactly which those are is likely to be country-specific. The impact is not necessarily always negative – depending on the quality of the pre-conflict business environment and the measures taken by the government and the international community in response to the conflict, it might be positive.

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Table 1: Overview of interview status by district

District	Bombed	Sample	Completed interviews	Refusals	Ineligible	Impossible to contact	Discontinued business	Response rate, %	Refusal, %	Ineligible, %	Impossible to contact, %	Discontinued business, %
Imereti		**61**	**55**	**1**	**5**	**0**	**3**	**90.2**	**1.6**	**8.2**	**0.0**	**4.9**
Chiatura	0	3	3	0	0	0	0	100.0	0.0	0.0	0.0	0.0
Kharagauli	0	1	1	0	0	0	0	100.0	0.0	0.0	0.0	0.0
Khoni	0	1	1	0	0	0	0	100.0	0.0	0.0	0.0	0.0
Kutaisi	*1*	*46*	*40*	*1*	*5*	*0*	*3*	*87.0*	*2.2*	*10.9*	*0.0*	*6.5*
Sachkhere	0	2	2	0	0	0	0	100.0	0.0	0.0	0.0	0.0
Terjola	0	4	4	0	0	0	0	100.0	0.0	0.0	0.0	0.0
Tkibuli	0	1	1	0	0	0	0	100.0	0.0	0.0	0.0	0.0
Tskaltubo	0	2	2	0	0	0	0	100.0	0.0	0.0	0.0	0.0
Zestaponi	0	1	1	0	0	0	0	100.0	0.0	0.0	0.0	0.0
Kakheti		**63**	**54**	**4**	**5**	**0**	**5**	**85.7**	**6.3**	**7.9**	**0.0**	**7.9**
Akhmeta	0	6	4	0	2	0	2	66.7	0.0	33.3	0.0	33.3
Dedoplistskaro	*1*	*2*	*1*	*0*	*1*	*0*	*1*	*50.0*	*0.0*	*50.0*	*0.0*	*50.0*
Gurjaani	0	9	8	0	1	0	1	88.9	0.0	11.1	0.0	11.1
Kvareli	0	8	7	0	0	0	0	87.5	0.0	0.0	0.0	0.0
Lagodekhi	0	6	5	0	0	0	0	83.3	0.0	0.0	0.0	0.0
Sagarejo	0	6	5	1	0	0	0	83.3	16.7	0.0	0.0	0.0
Sighnagi	0	2	2	0	0	0	0	100.0	0.0	0.0	0.0	0.0
Telavi	0	24	22	3	1	0	1	91.7	12.5	4.2	0.0	4.2
Kvemo Kartli		**43**	**31**	**9**	**3**	**0**	**3**	**72.1**	**20.9**	**7.0**	**0.0**	**7.0**
Bolnisi	*1*	*1*	*1*	*0*	*0*	*0*	*0*	*100.0*	*0.0*	*0.0*	*0.0*	*0.0*
Dmanisi	0	1	1	0	0	0	0	100.0	0.0	0.0	0.0	0.0
Gardabani	*1*	*3*	*2*	*1*	*0*	*0*	*0*	*66.7*	*33.3*	*0.0*	*0.0*	*0.0*
Marneuli	*1*	*1*	*0*	*0*	*1*	*0*	*1*	*0.0*	*0.0*	*100.0*	*0.0*	*100.0*
Rustavi	0	37	27	8	2	0	2	73.0	21.6	5.4	0.0	5.4
Mmtskheta-Mtianeti		**40**	**25**	**2**	**7**	**6**	**6**	**62.5**	**5.0**	**17.5**	**15.0**	**15.0**
Akhalgori	0	4	0	0	0	4	0	0.0	0.0	0.0	100.0	0.0
Dusheti	0	12	9	1	2	0	2	75.0	8.3	16.7	0.0	16.7
Kazbegi	0	3	2	0	1	0	1	66.7	0.0	33.3	0.0	33.3
Mtskheta	0	21	14	1	4	2	3	66.7	4.8	19.0	9.5	14.3
Shida Kartli		**61**	**51**	**2**	**6**	**2**	**5**	**83.6**	**3.3**	**9.8**	**3.3**	**8.2**

Gori	*1*	*33*	*28*	*1*	*3*	*1*	*3*	*84.8*	*3.0*	*9.1*	*3.0*	*9.1*
Kareli	*1*	*5*	*2*	*0*	*2*	*1*	*2*	*40.0*	*0.0*	*40.0*	*20.0*	*40.0*
Kaspi	*1*	*10*	*9*	*0*	*1*	*0*	*0*	*90.0*	*0.0*	*10.0*	*0.0*	*0.0*
Khashuri	0	13	12	1	0	0	0	92.3	7.7	0.0	0.0	0.0
Tbilisi		**99**	**66**	**21**	**10**	**2**	**10**	**66.7**	**21.2**	**10.1**	**2.0**	**10.1**
Didube-Chugureti	0	13	9	2	0	2	0	69.2	15.4	0.0	15.4	0.0
Gldani-Nadzaladevi	0	11	11	0	0	0	0	100.0	0.0	0.0	0.0	0.0
Isani-Samgori	*1*	*14*	*9*	*3*	*2*	*0*	*2*	*64.3*	*21.4*	*14.3*	*0.0*	*14.3*
Old Tbilisi	0	39	24	10	5	0	5	61.5	25.6	12.8	0.0	12.8
Vake-Saburtalo	0	22	13	6	3	0	3	59.1	27.3	13.6	0.0	13.6
Total		**367**	**282**	**39**	**36**	**10**	**32**	**76.8**	**10.6**	**9.8**	**2.7**	**8.7**

Notes: Ineligible stands for firms that discontinued their business, changed their activity to an ineligible activity (education, agriculture, finance, government), moved outside of the covered regions or abroad or addresses where there are private households. Impossible to contact denotes cases where the firm could not be reached after having called on different days of the week and during different business hours, line was out of order, there was no tone or fax/data line was reached, answering machine, firm moved away and new references could not be found or the firm was located in a place under the control of the Russian army during the follow-up survey in 2009.

Source: Final progress report for the follow-up BEEPS survey in Georgia.

Table 2: Descriptive statistics by attrition/non-attrition

	Only in 2008 survey			Participate in 2008 and 2009 survey			
	Obs.	Mean	SE	Obs.	Mean	SE	p-value
20-99 employees	85	0.3647	0.0525	282	0.3688	0.0288	0.946
100+ employees	85	0.1765	0.0416	282	0.1312	0.0201	0.296
Firm age	85	10.1412	0.8343	280	10.8786	0.6208	0.479
50 per cent or more foreign private ownership	85	0.1059	0.0336	282	0.0532	0.0134	0.148
50 per cent or more state owned	85	0.0588	0.0257	282	0.0106	0.0061	0.071*
Direct exporter	85	0.1529	0.0393	282	0.1206	0.0194	0.435
Located in Tbilisi	85	0.3882	0.0532	282	0.2305	0.0251	0.004***
Firm part of a larger firm	85	0.0588	0.0257	282	0.0284	0.0099	0.271
Shareholding company with shares traded in the market	85	0.0941	0.0319	282	0.1348	0.0204	0.323
50 per cent or more of the firm's goods or services paid for after delivery	85	0.2706	0.0485	282	0.2872	0.0270	0.766
Purchase of fixed assets in 2007	85	0.4000	0.0535	282	0.4255	0.0295	0.677
Have a line of credit or a loan in 2007	85	0.4235	0.0539	282	0.4113	0.0294	0.842
Introduced new products/services in the last 3 years	84	0.3810	0.0533	280	0.3321	0.0282	0.410
2-5 competitors	22	0.3182	0.1016	282	0.2553	0.0260	0.519
5+ competitors	22	0.4091	0.1073	282	0.5532	0.0297	0.193
Total sales in 2007	49	7219804	3071747	210	4580091	1740940	0.499
National sales in 2007	49	5599654	2449141	209	4147281	1655279	0.624
Exports in 2007	81	980091	583484	276	341704	116036	0.286
Number of permanent, full-time employees, 2007	84	169	68	279	53	8	0.091*
Number of temporary, full-time employees, 2007	83	36	24	275	13	3	0.342

Notes: * = significant at the 10% level, ** = significant at the 5% level * = significant at the 1% level. Differences in sample-means for firms in districts that were bombed or where major battles took place and firms in districts that were not bombed and where no major battles took place. Total sales, national sales and exports are in 2007 Georgian lari.

Source: BEEPS Georgia 2008 and 2009.

Table 3: Descriptive statistics by district type

	No armed conflict			Armed conflict			
	Obs.	Mean	SE	Obs.	Mean	SE	p-value
20-99 employees	190	0.3789	0.0353	92	0.3478	0.0499	0.613
100+ employees	190	0.1421	0.0254	92	0.1087	0.0326	0.438
Firm age	189	10.2646	0.4886	91	12.1539	1.6166	0.266
50 per cent or more foreign private ownership	190	0.0684	0.0184	92	0.0217	0.0153	0.052*
50 per cent or more state owned	190	0.0053	0.0053	92	0.0217	0.0153	0.310
Direct exporter	190	0.1474	0.0258	92	0.0652	0.0259	0.025**
Located in Tbilisi	190	0.3000	0.0333	92	0.0870	0.0295	0.000***
Firm part of a larger firm	190	0.0316	0.0127	92	0.0217	0.0153	0.621
Shareholding company with shares traded in the market	190	0.1368	0.0250	92	0.1304	0.0353	0.883
50 per cent or more of the firm's goods or services paid for after delivery	190	0.3368	0.0344	92	0.1848	0.0407	0.005***
Purchase of fixed assets in 2007	190	0.4895	0.0364	92	0.2935	0.0477	0.002***
Have a line of credit or a loan in 2007	190	0.4421	0.0361	92	0.3478	0.0499	0.132
Introduced new products/services in the last 3 years	188	0.3511	0.0349	92	0.2935	0.0477	0.338
2-5 competitors	190	0.2368	0.0309	92	0.2935	0.0477	0.308
5+ competitors	190	0.5526	0.0362	92	0.5543	0.0521	0.978
Total sales in 2007	138	6214773	2634343	72	1446951	382072	0.075*
Total sales in 2008	164	5290707	2310114	88	1112611	208996	0.074*
National sales in 2007	137	5628761	2511201	72	1328353	381106	0.093*
National sales in 2008	164	4659958	2289965	88	1012465	208058	0.115
Exports in 2007	184	466149	171665	92	92816	50232	0.038**
Exports in 2008	188	550228	242180	92	95792	47890	0.067*
Number of permanent, full-time employees, 2007	187	57	10	92	46	9	0.454
Number of permanent, full-time employees, 2008	188	59	12	92	40	7	0.167
Number of temporary, full-time employees, 2007	184	12	4	91	14	6	0.706
Number of temporary, full-time employees, 2008	186	11	4	91	11	4	0.926

Notes: * = significant at the 10% level, ** = significant at the 5% level * = significant at the 1% level. Differences in sample-means for firms in districts that were bombed or where major battles took place and firms in districts that were not bombed and where no major battles took place. Total sales, national sales and exports are in 2007 Georgian lari.

Source: BEEPS Georgia 2008 and 2009.

Table 4: Difference-in-differences results, firm performance measures, OLS

	Total sales		National sales		Exports		Permanent, full-time employees		Temporary, full-time employees	
	(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)	(9)	(10)
Panel A: Overall										
Armed conflict * year after	-40,993.0	-424,706.5	409,127.3	-40,536.7	-63,102.1	-75,292.8*	-1.779	-0.448	-1.651	-1.967
	(701,568.0)	(835,420.6)	(663,701.1)	(847,586.8)	(40,513.3)	(40,805.6)	(2.814)	(2.981)	(2.056)	(1.966)
Adjusted R2	0.171	0.216	0.120	0.171	0.410	0.414	0.327	0.361	0.235	0.255
Panel B: Allowing the coefficient to vary by size										
Armed conflict * year after * 1-19 employees	556,989.4	325,308.1	897,792.7	586,108.8	-66,758.7	-79,300.7*	-0.636	1.482	0.600	0.379
	(720,926.6)	(879,062.8)	(706,397.0)	(900,076.3)	(47,333.6)	(46,282.8)	(2.496)	(2.995)	(2.087)	(2.141)
Armed conflict * year after * 20-99 employees	-161,791.2	-810,495.7	488,481.0	-194,510.0	-82,564.3	-97,865.1	-5.760	-5.371	-3.100	-3.683
	(813,640.2)	(959,237.8)	(630,102.6)	(871,324.7)	(78,087.9)	(76,598.5)	(4.122)	(4.934)	(3.869)	(3.848)
Armed conflict * year after * 100+ employees	-2,550,282.0***	-3,014,114.9***	-2,356,481.8***	-2,885,800.5***	24,102.9	23,419.8	-8.594	-8.316	-13.018	-12.926
	(894,738.4)	(1,149,206.9)	(826,747.9)	(1,116,111.1)	(60,171.8)	(72,109.8)	(12.625)	(10.997)	(14.591)	(13.943)
Adjusted R2	0.169	0.213	0.118	0.168	0.406	0.410	0.556	0.572	0.240	0.257
Panel C: Allowing the coefficient to vary by age										
Armed conflict * year after * < 10 years	238,936.0	-177,510.6	612,710.2	165,028.2	-108,451.3*	-123,851.0**	*2.387*	*2.980*	-1.092	-1.608
	(687,091.1)	(790,770.9)	(674,635.1)	(804,804.8)	(55,694.5)	(51,361.2)	*(3.549)*	*(3.676)*	(3.737)	(3.856)
Armed conflict * year after *	-346,099.4	-650,996.6	150,381.5	-254,451.8	-31,185.3	-39,938.9	*-8.129****	*-6.010***	-2.534	-2.732
	(763,189.2)	(926,880.7)	(680,992.6)	(921,378.3)	(45,353.0)	(44,022.0)	*(3.112)*	*(3.046)*	(3.723)	(3.584)

10+ years										
Adjusted R2	0.168	0.212	0.117	0.167	0.408	0.412	0.349	0.378	0.237	0.257
Vulnerability to financial crisis indicators	NO	YES	NO	YES	NO	YES	NO	YES	NO	YES
Observations	390	390	388	388	518	518	534	534	522	522
Firms	195	195	194	194	268	268	267	267	261	261
Districts	30	30	30	30	34	34	30	30	30	30

Notes: * = significant at the 10% level, ** = significant at the 5% level, * = significant at the 1% level. Dependent variables exclude outliers. Monetary variables are in constant 2007 Georgian lari. All columns are estimated by OLS, with robust standard errors clustered by district in brackets below coefficient. The sample consists of all firms with available data. All regressions include an indicator for district where armed conflict took place, indicator for medium-sized (20-99 employees) and large (100+ employees) firms, age of firm, indicators for state and foreign ownership of the firm, indicator for exporter status (either direct or indirect exporter), indicator for firms located in Tbilisi, year fixed effects, industry fixed effects, and region fixed effects. Indicators for vulnerability to financial crisis include an indicator for firms that bought a fixed asset before the armed conflict, an indicator for firms that had a loan before the armed conflict, and an indicator for firms with at least 50 per cent of their sales paid after delivery.

Source: BEEPS Georgia 2008 and 2009.

Table 5: Difference-in-differences results, perceptions of business environment, coefficient on armed conflict * year after, OLS

	Panel A: Overall		*Panel B: Allowing the coefficient to vary by size*						*Panel C: Allowing the coefficient to vary by age*			
	(1)	(2)	(3)			(4)			(5)		(6)	
			1-19 employees	20-99 employees	100+ employees	1-19 employees	20-99 employees	100+ employees	< 10 years	10+ years	< 10 years	10+ years
Tax rates	0.139**	0.142**	0.027	0.305***	0.155	0.032	0.303***	0.156	0.151**	0.122**	0.152**	0.127**
	(0.055)	(0.056)	(0.060)	(0.086)	(0.103)	(0.062)	(0.086)	(0.103)	(0.063)	(0.057)	(0.064)	(0.059)
Tax administration	-0.125***	-0.114**	-0.231***	0.004	0.025	-0.216***	0.006	0.030	-0.136***	-0.113**	-0.126**	-0.100*
	(0.048)	(0.046)	(0.072)	(0.041)	(0.044)	(0.068)	(0.042)	(0.041)	(0.050)	(0.058)	(0.050)	(0.055)
Labour regulations	0.031	0.038	0.020*	0.056	-0.002	0.030	0.062	-0.000	0.004	0.057	0.010	0.065
	(0.026)	(0.031)	(0.012)	(0.062)	(0.004)	(0.019)	(0.067)	(0.009)	(0.011)	(0.043)	(0.014)	(0.048)
Customs and trade regulations	-0.037	-0.043	-0.116*	0.061	0.061	-0.118**	0.046	0.062	-0.102	0.018	-0.110	0.018
	(0.060)	(0.058)	(0.060)	(0.104)	(0.045)	(0.059)	(0.099)	(0.044)	(0.086)	(0.049)	(0.082)	(0.048)
Business licensing and permits	-0.053	-0.052*	-0.076	-0.006	-0.105	-0.074	-0.004	-0.104	-0.044	-0.057*	-0.042	-0.055*
	(0.036)	(0.031)	(0.060)	(0.027)	(0.094)	(0.053)	(0.029)	(0.094)	(0.034)	(0.034)	(0.029)	(0.030)
Courts	0.094	0.102	0.000	0.234	0.103	0.012	0.239	0.097	0.074	0.102	0.085	0.108
	(0.085)	(0.090)	(0.048)	(0.148)	(0.098)	(0.051)	(0.152)	(0.100)	(0.082)	(0.088)	(0.090)	(0.093)
Access to finance	-0.168	-0.170	-0.275*	-0.067	0.080	-0.277*	-0.073	0.080	-0.235**	-0.104	-0.237**	-0.103
	(0.116)	(0.109)	(0.157)	(0.090)	(0.071)	(0.148)	(0.087)	(0.071)	(0.100)	(0.138)	(0.095)	(0.129)
Crime, theft and disorder	0.116	0.125	0.076	0.092	0.418***	0.090	0.093	0.421***	0.014	0.184*	0.021	0.197*
	(0.095)	(0.101)	(0.117)	(0.083)	(0.152)	(0.128)	(0.087)	(0.157)	(0.079)	(0.105)	(0.085)	(0.113)
Access to land	0.014	0.015	-0.063	0.097*	0.115***	-0.059	0.094*	0.117***	0.003	0.024	0.004	0.029
	(0.083)	(0.082)	(0.137)	(0.055)	(0.035)	(0.135)	(0.055)	(0.035)	(0.073)	(0.095)	(0.072)	(0.094)
Inadequately educated workforce	-0.052	-0.042	-0.117	0.036	-0.013	-0.100	0.034	-0.008	-0.180	0.033	-0.176	0.049
	(0.152)	(0.154)	(0.092)	(0.248)	(0.166)	(0.099)	(0.245)	(0.163)	(0.146)	(0.150)	(0.146)	(0.151)
Political instability	0.075	0.076	0.108	0.008	0.149	0.111	0.005	0.150	-0.018	0.150	-0.018	0.154
	(0.095)	(0.098)	(0.095)	(0.102)	(0.204)	(0.099)	(0.102)	(0.205)	(0.085)	(0.127)	(0.087)	(0.130)
Corruption	-0.032	-0.037	-0.154	0.171	-0.086	-0.161	0.166	-0.087	-0.131	0.041	-0.136	0.036
	(0.102)	(0.103)	(0.097)	(0.171)	(0.205)	(0.100)	(0.172)	(0.203)	(0.157)	(0.072)	(0.159)	(0.073)

Practices of informal competitors	-0.127**	-0.137**	-0.221**	-0.050	0.128	-0.233**	-0.063	0.126	-0.099	-0.154**	-0.111	-0.165**
	(0.065)	(0.064)	(0.098)	(0.120)	(0.236)	(0.097)	(0.121)	(0.230)	(0.069)	(0.070)	(0.070)	(0.068)
Practices of formal competitors	-0.099	-0.116	-0.129	-0.118**	0.101	-0.147	-0.134**	0.099	0.085	-0.249***	0.071	-0.266***
	(0.088)	(0.088)	(0.125)	(0.058)	(0.235)	(0.130)	(0.060)	(0.226)	(0.158)	(0.087)	(0.161)	(0.087)
Transportation	-0.037	-0.043	-0.116*	0.061	0.061	-0.118**	0.046	0.062	-0.102	0.018	-0.110	0.018
	(0.060)	(0.058)	(0.060)	(0.104)	(0.045)	(0.059)	(0.099)	(0.044)	(0.086)	(0.049)	(0.082)	(0.048)
Electricity	-0.089	-0.086	-0.196***	0.085	-0.104	-0.188**	0.078	-0.101	-0.114*	-0.086	-0.114*	-0.077
	(0.066)	(0.066)	(0.072)	(0.087)	(0.103)	(0.074)	(0.083)	(0.103)	(0.061)	(0.069)	(0.060)	(0.070)
Vulnerability to financial crisis indicators	NO	YES	NO			YES			NO		YES	

Notes: * = significant at the 10% level, ** = significant at the 5% level, * = significant at the 1% level. Dependent variables exclude outliers and are equal to one if the firm identified a particular aspect of business environment as a major or very severe obstacle to the current operations of the firm. All columns are estimated by OLS, with robust standard errors clustered by district in brackets below coefficient. The sample consists of all firms with available data. All regressions include an indicator for district where armed conflict took place, indicator for medium-sized (20-99 employees) and large (100+ employees) firms, age of firm, indicators for state and foreign ownership of the firm, indicator for exporter status (either direct or indirect exporter), indicator for firms located in Tbilisi, year fixed effects, industry fixed effects and region fixed effects. Indicators for vulnerability to financial crisis include an indicator for firms that bought a fixed asset before the armed conflict, an indicator for firms that had a loan before the armed conflict, and an indicator for firms with at least 50 per cent of their sales paid after delivery.

Source: BEEPS Georgia 2008 and 2009.

Table 6: Difference-in-differences results, firm performance measures, OLS

	Total sales	National sales	Exports	Permanent, full-time employees	Temporary, full-time employees
	(1)	(2)	(3)	(4)	(5)
Panel A: Overall					
Armed conflict (number) * year after	-2,316.2	-3,385.7	-3,866.6	0.481*	-0.261
	(60,548.9)	(60,524.8)	(3,273.5)	(0.265)	(0.175)
Adjusted R2	0.216	0.171	0.413	0.361	0.256
Panel B: Allowing the coefficient to vary by size					
Armed conflict (number) * year after * 1-19 employees	53,300.6	69,807.4	-6,227.9*	-0.025	0.140
	(53,616.4)	(52,877.2)	(3,350.1)	(0.189)	(0.103)
Armed conflict (number) * year after * 20-99 employees	-15,332.2	17,016.2	-17,480.4***	-0.073	-0.984***
	(69,664.7)	(68,844.5)	(4,991.2)	(0.758)	(0.269)
Armed conflict (number) * year after * 100+ employees	-270,041.5***	-268,113.6***	2,021.0	-2.047**	-0.971
	(71,699.6)	(69,347.5)	(8,190.3)	(1.004)	(1.684)
Adjusted R2	0.202	0.157	0.412	0.459	0.273
Panel C: Allowing the coefficient to vary by age					
Armed conflict (number) * year after * < 10 years	-14,469.4	8,139.9	-15,090.1***	0.497	0.054
	(55,884.5)	(54,959.3)	(2,168.5)	(0.356)	(0.123)
Armed conflict (number) * year after * 10+ years	-16,340.3	-4,621.6	110.5	-0.459	-0.557*
	(63,230.7)	(62,907.2)	(4,262.0)	(0.300)	(0.304)
Adjusted R2	0.203	0.156	0.449	0.774	0.290
Observations	390	388	536	534	522
Firms	195	194	268	267	261
Districts	30	30	34	34	34

Notes: * = significant at the 10% level, ** = significant at the 5% level, * = significant at the 1% level. Dependent variables exclude outliers. Monetary variables are in constant 2007 Georgian lari. All columns are estimated by OLS, with robust standard errors clustered by district in brackets below coefficient. The sample consists of all firms with available data. All regressions include an indicator for district where armed conflict took place, indicator for medium-sized (20-99 employees) and large (100+ employees) firms, age of firm, indicators for state and foreign ownership of the firm, indicator for exporter status (either direct or indirect exporter), indicator for firms located in Tbilisi, year fixed effects, industry fixed effects, and region fixed effects as well as measures of vulnerability to financial crisis (an indicator for firms that bought a fixed asset before the armed conflict, an indicator for firms that had a loan before the armed conflict, and an indicator for firms with at least 50 per cent of their sales paid after delivery).

Source: BEEPS Georgia 2008 and 2009.

Table 7: Difference-in-differences results, perceptions of business environment, coefficient on armed conflict (number)* year after, OLS

	Panel A: Overall	*Panel B: Allowing the coefficient to vary by size*			*Panel C: Allowing the coefficient to vary by age*	
	(1)	(2)			(3)	
		1-19	20-99	100+	< 10	10+ years
Tax rates	-0.002	-0.004	0.038***	0.003	0.011**	0.008
	(0.011)	(0.004)	(0.006)	(0.004)	(0.004)	(0.006)
Tax administration	-0.020***	-0.013***	0.005	0.006	-0.012***	-0.001
	(0.007)	(0.003)	(0.005)	(0.004)	(0.003)	(0.003)
Labour regulations	-0.008*	-0.001	-0.001	-0.001	-0.002	-0.000
	(0.005)	(0.001)	(0.002)	(0.001)	(0.002)	(0.001)
Customs and trade regulations	-0.006*	-0.001	0.001	-0.000	0.000	-0.002
	(0.003)	(0.001)	(0.003)	(0.001)	(0.001)	(0.001)
Business licensing and permits	-0.008	0.001	0.001	0.001	0.000	0.001
	(0.006)	(0.001)	(0.004)	(0.001)	(0.002)	(0.001)
Courts	-0.010*	-0.006	0.002	-0.005	-0.005	-0.005
	(0.005)	(0.005)	(0.005)	(0.004)	(0.003)	(0.003)
Access to finance	0.002	0.002	0.009	0.015*	-0.005	0.016**
	(0.007)	(0.006)	(0.007)	(0.008)	(0.005)	(0.007)
Crime, theft and disorder	-0.012	-0.008*	0.004	0.027***	-0.008	0.007
	(0.009)	(0.005)	(0.007)	(0.006)	(0.005)	(0.005)
Access to land	-0.003	0.009	0.007	0.011***	0.003	0.016***
	(0.008)	(0.007)	(0.005)	(0.004)	(0.004)	(0.004)
Inadequately educated workforce	-0.017**	-0.023***	-0.035***	-0.022***	-0.036***	-0.018***
	(0.007)	(0.004)	(0.005)	(0.005)	(0.004)	(0.005)
Political instability	-0.000	0.003	-0.012**	-0.012*	-0.005	-0.002
	(0.005)	(0.005)	(0.005)	(0.007)	(0.008)	(0.005)
Corruption	0.002	-0.006	0.006	0.017*	-0.004	0.005
	(0.006)	(0.011)	(0.006)	(0.009)	(0.017)	(0.003)
Practices of informal competitors	-0.010	-0.025***	0.011**	0.005	-0.011*	-0.011
	(0.008)	(0.008)	(0.005)	(0.018)	(0.005)	(0.008)
Practices of formal competitors	0.011**	0.004	-0.007	0.003	0.028***	-0.024***
	(0.005)	(0.007)	(0.005)	(0.018)	(0.005)	(0.008)
Transportation	-0.003	-0.010***	0.001	0.006	-0.014**	0.003
	(0.005)	(0.003)	(0.008)	(0.004)	(0.006)	(0.003)
Electricity	-0.005	-0.016**	-0.000	0.000	-0.010**	-0.010**
	(0.006)	(0.007)	(0.007)	(0.004)	(0.005)	(0.004)

Notes: * = significant at the 10% level, ** = significant at the 5% level, * = significant at the 1% level. Dependent variables exclude outliers and are equal to one if the firm identified a particular aspect of business environment as a major or very severe obstacle to the current operations of the firm. All columns are estimated by OLS, with robust standard errors clustered by district in brackets below coefficient. The sample consists of all firms with available data. All regressions include an indicator for district where armed conflict took place, indicator for medium-sized (20-99 employees) and large (100+ employees) firms, age of firm, indicators for state and foreign ownership of the firm, indicator for exporter status (either direct or indirect exporter), indicator for firms located in Tbilisi, year fixed effects, industry fixed effects, and region fixed effects as well as measures of vulnerability to financial crisis (an indicator for firms that bought a fixed asset before the armed conflict, an indicator for firms that had a loan before the armed conflict, and an indicator for firms with at least 50 per cent of their sales paid after delivery).
Source: BEEPS Georgia 2008 and 2009.

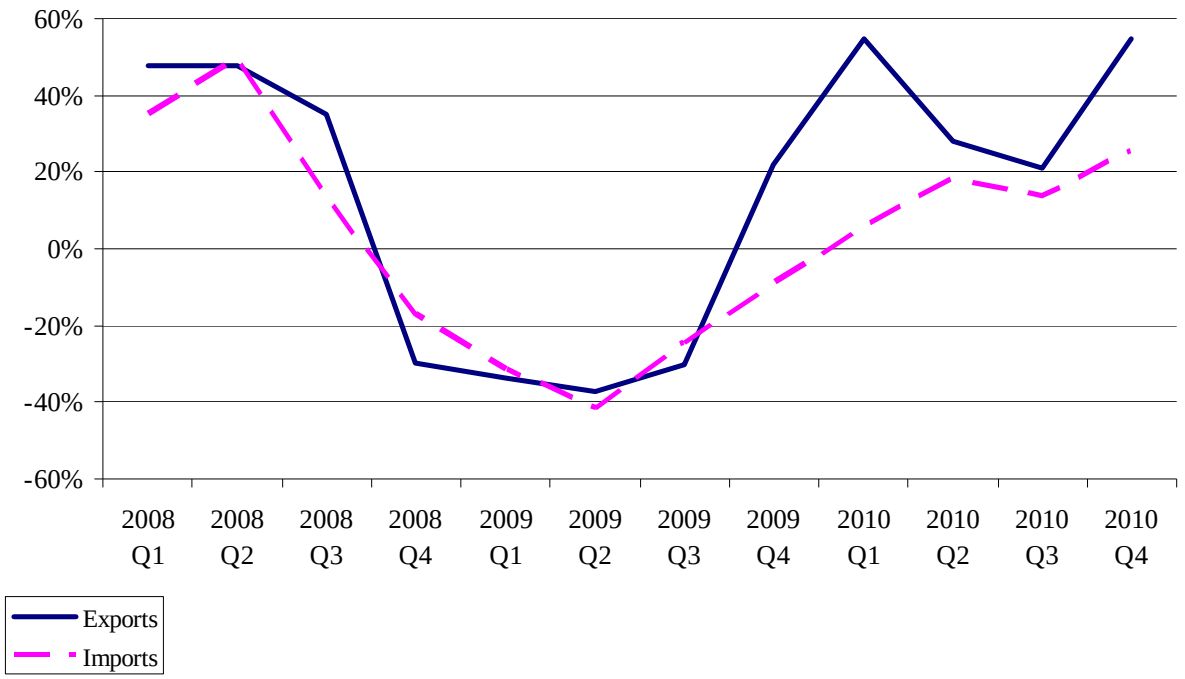
Table 8: Difference-in-differences results, sales per employee, OLS

	Armed conflict	Armed conflict (number)
	(1)	(2)
Panel A: Overall		
Armed conflict * year after	8,957.699	1,334.492*
	(11,548.072)	(795.930)
Adjusted R2	0.142	0.144
Panel B: Allowing the coefficient to vary by size		
Armed conflict * year after * 1-19 employees	14,167.709	2,404.545***
	(13,884.436)	(515.817)
Armed conflict * year after * 20-99 employees	6,681.015	1,690.856***
	(10,026.591)	(599.921)
Armed conflict * year after * 100+ employees	-11,048.305	-327.948
	(9,849.157)	(561.018)
Adjusted R2	0.142	0.133
Panel C: Allowing the coefficient to vary by age		
Armed conflict * year after * < 10 years	-8,498.729	-1,410.576***
	(8,151.015)	(499.675)
Armed conflict * year after * 10+ years	20,426.268	3,811.128***
	(19,564.637)	(706.427)
Adjusted R2	0.141	0.144
Observations	392	392
Firms	196	196
Districts	30	30

Notes: * = significant at the 10% level, ** = significant at the 5% level, * = significant at the 1% level. Dependent variables exclude outliers. Monetary variables are in constant 2007 Georgian lari. All columns are estimated by OLS, with robust standard errors clustered by district in brackets below coefficient. The sample consists of all firms with available data. All regressions include an indicator for district where armed conflict took place, indicator for medium-sized (20-99 employees) and large (100+ employees) firms, age of firm, indicators for state and foreign ownership of the firm, indicator for exporter status (either direct or indirect exporter), indicator for firms located in Tbilisi, year fixed effects, industry fixed effects and region fixed effects as well as measures of vulnerability to financial crisis (an indicator for firms that bought a fixed asset before the armed conflict, an indicator for firms that had a loan before the armed conflict, and an indicator for firms with at least 50 per cent of their sales paid after delivery).

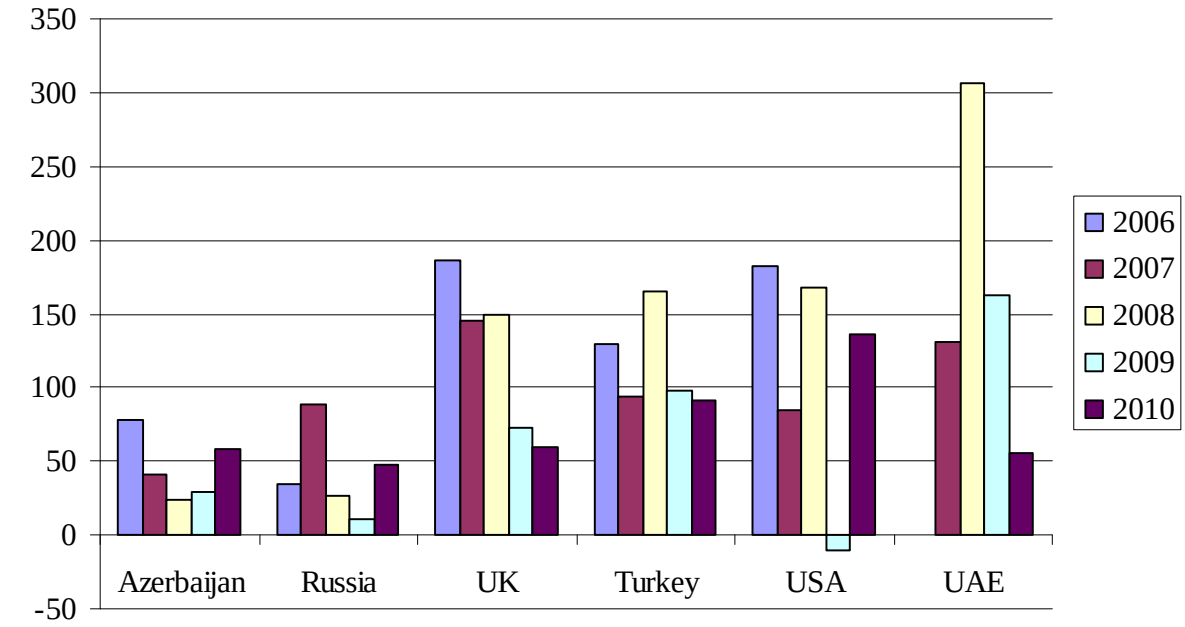
Source: BEEPS Georgia 2008 and 2009.

Chart 1: Year-on-year percentage change in Georgian imports and exports from early 2008 to late 2010



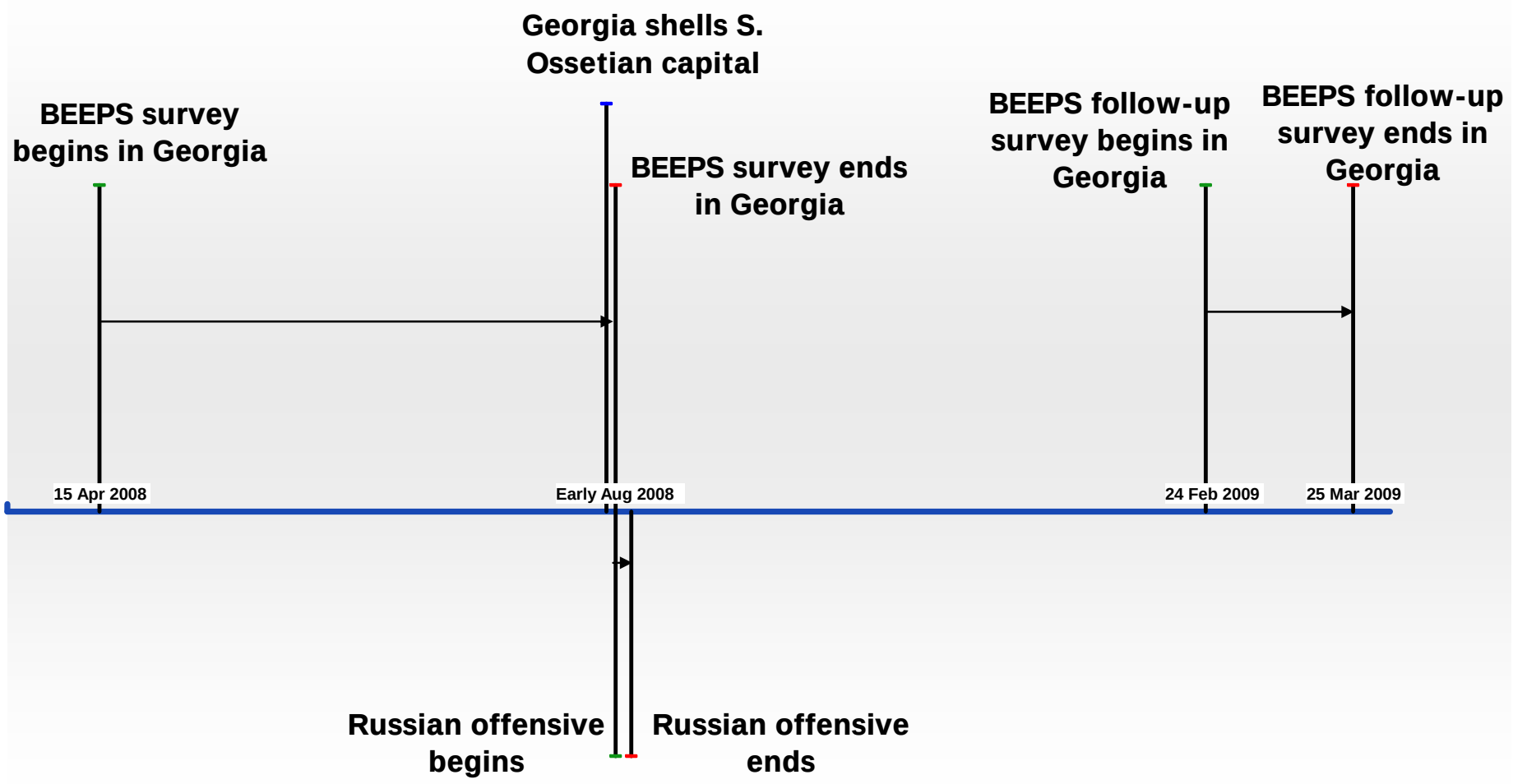
Source: World Economic Outlook Database, IMF.

Chart 2: Foreign direct investment into Georgia by country of origin (US$ millions)



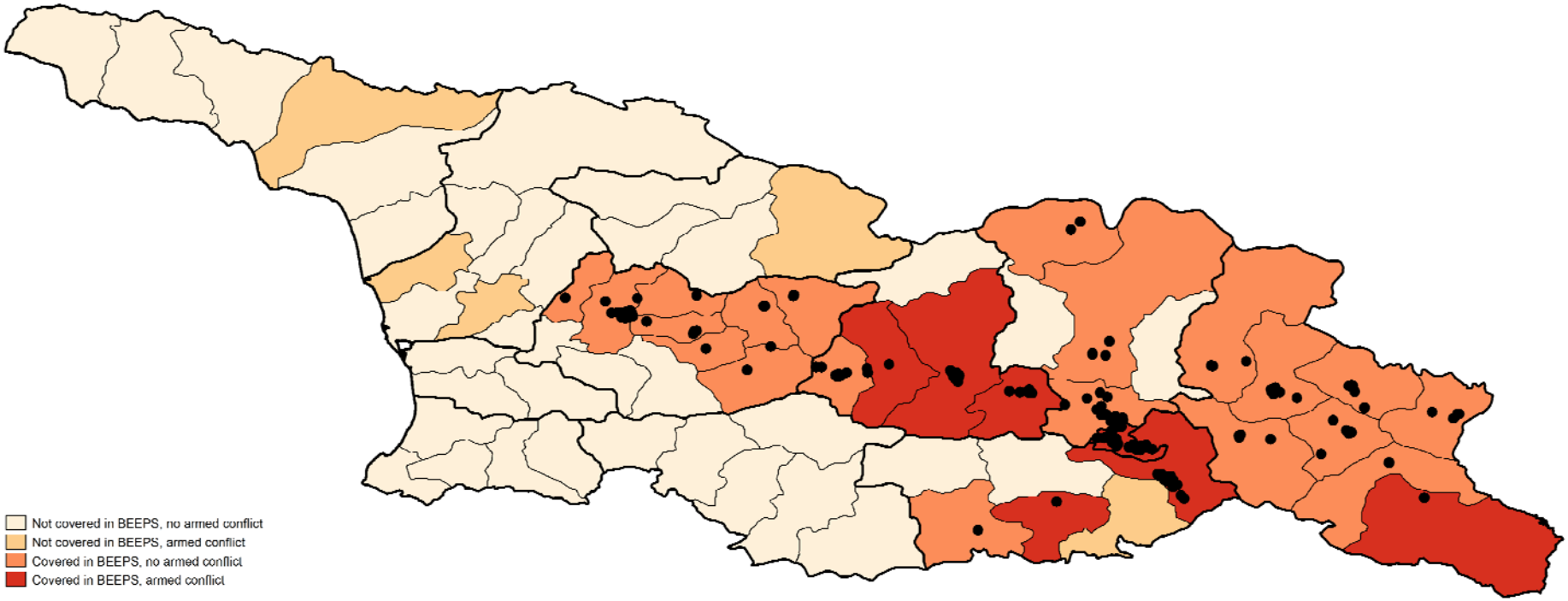
Source: National Statistics Office of Georgia and National Bank of Georgia.

Chart 3: Timeline of BEEPS survey rounds and the conflict between Georgia and Russian



Source: BEEPS Georgia 2008 and 2009.

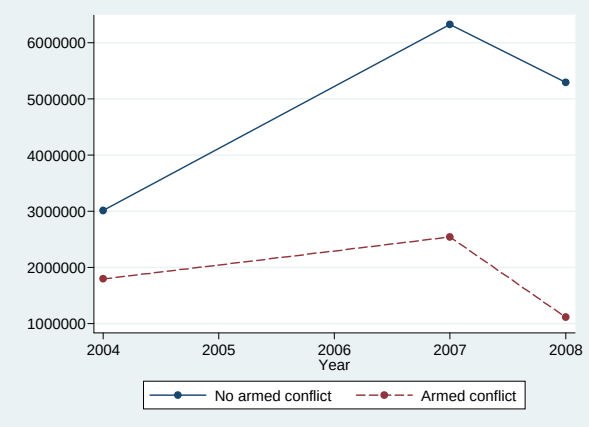
Chart 4: BEEPS Georgia coverage, location of firms participating in BEEPS Georgia, and indicating the districts that were bombed or where major battles took place and districts that were not bombed and where no major battles took place



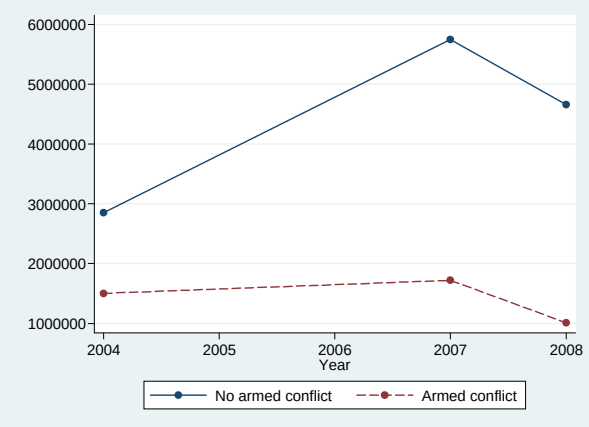
Source: BEEPS Georgia 2008 and 2009.

Chart 5: Averages for selected outcomes from BEEPS Georgia 2005, 2008 and 2009 by type of district

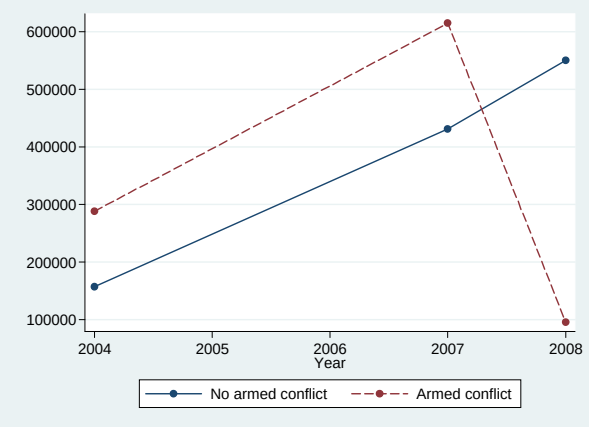
Panel A: Sales



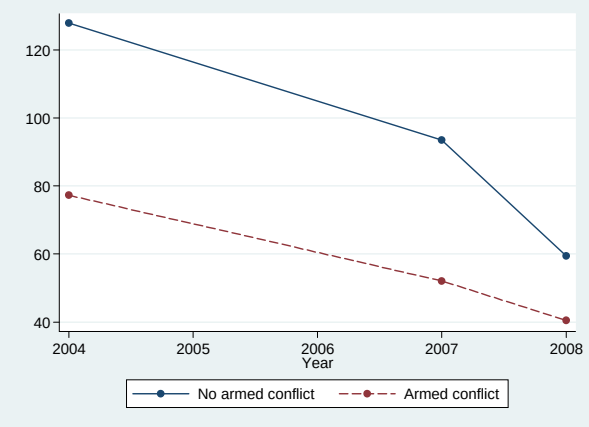
Panel B: National sales



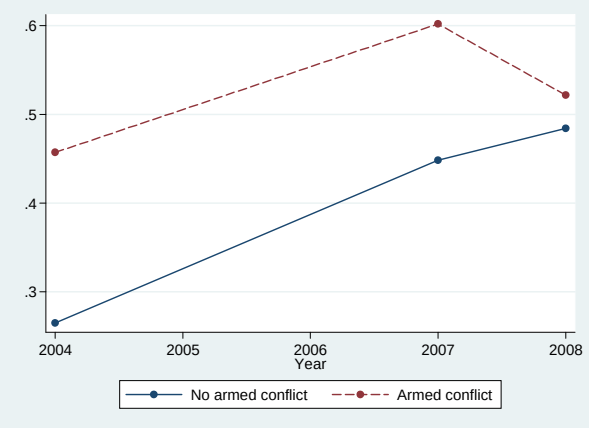
Panel C: Exports



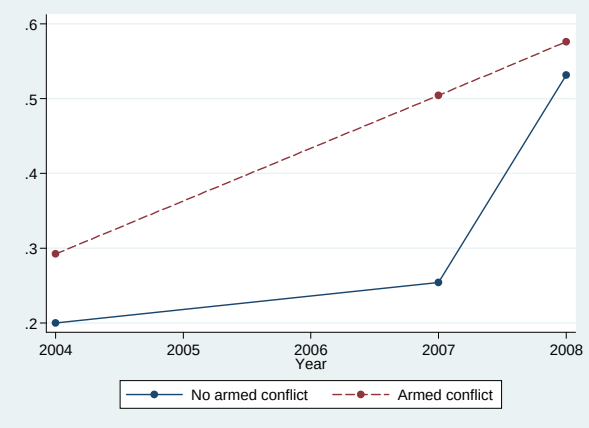
Panel D: Number of permanent, full-time employees



Panel E: Electricity



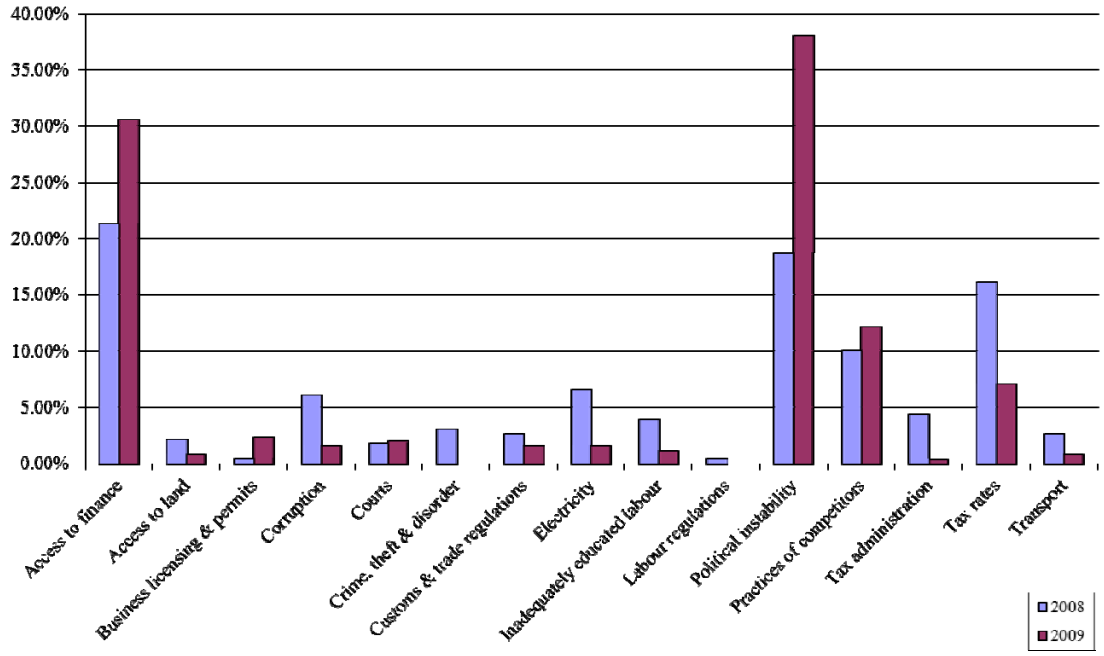
Panel F: Access to finance



Notes: Electricity and access to finance are showing the share of firms that perceived them as major or very severe obstacle to the current operations of their firm. For each year, all available observations are included, even if they only appear in that year and are not part of the panel.

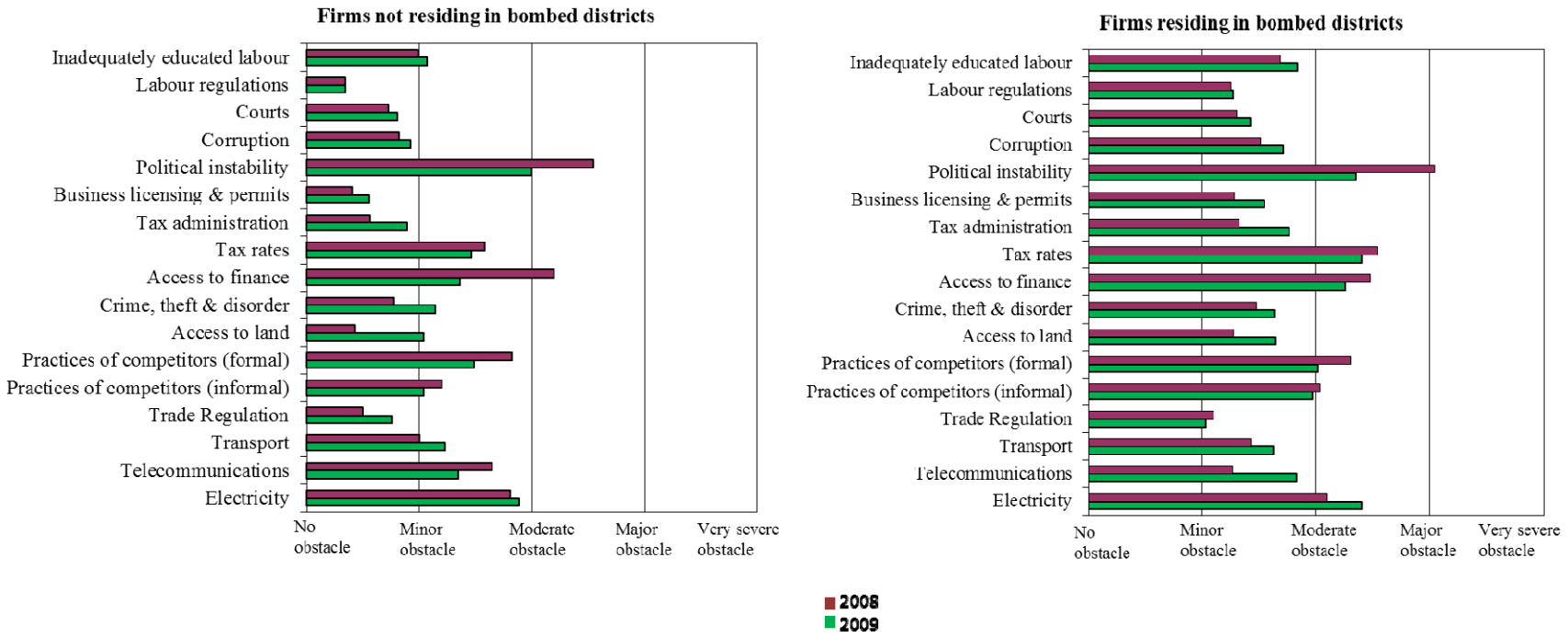
Source: BEEPS Georgia 2005, 2008 and 2009.

Chart 6: The largest obstacle of the business environment facing firms in Georgia, comparing 2008 and 2009



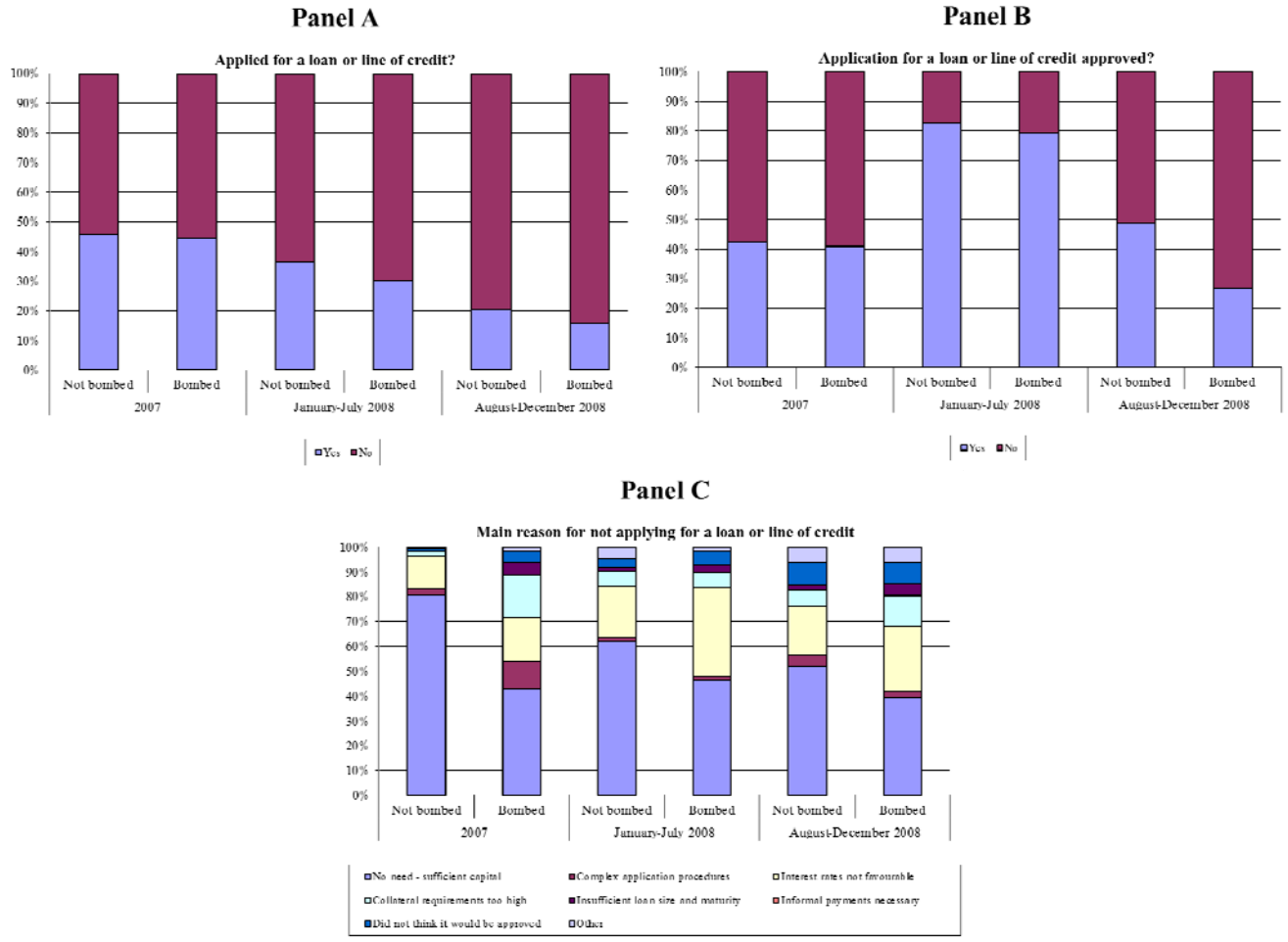
Source: BEEPS Georgia 2008 and 2009.

Chart 7: Severity of obstacles faced by firms



Source: BEEPS Georgia 2008 and 2009.

Chart 8: Loan/line of credit applications, successful applications and reasons for not applying



Source: BEEPS Georgia 2008 and 2009.

Appendix A: A brief history of the Georgia-Russia conflict[40]

South Ossetia is located in the north of Georgia and borders the Russian region of North Ossetia. Although South Ossetia is contained within Georgia, the two regions are culturally and ethnically different, thus contributing to the Soviet Union declaring South Ossetia an Autonomous Oblast on 20 April 1922. This occurred a little over a year after the Soviet army attacked Georgia, whereby Georgia became a part of the Soviet Union. From the 1920s until the collapse of the Soviet Union, Georgia and South Ossetia existed with little conflict, with inter-marriages common and Georgian and Russian spoken as the official languages in South Ossetia (Toal, 2008). In the run-up to the fall of the Soviet Union, Georgians began to push for greater independence from Moscow, culminating in the killing of 19 and injuring of hundreds more Georgian demonstrators by Soviet troops on 9 April 1989 (Suny, 1994).

From that point on the Soviet authority began to lose its legitimacy in Georgia. Coupled with increasing ethnic tensions across the country, South Ossetia passed a resolution on 10 November 1989 to move from its designation of Autonomous Oblast to that of South Ossetia ASSR. The new status allowed South Ossetia to remain part of Georgia, but afforded it the right to eventually secede (Toal, 2008). However, the next day, Georgia's parliament rejected the change in South Ossetia's status. This led to demonstrations by Georgians against the actions of South Ossetia and counter-demonstrations of South Ossetians against Georgia's actions. Clashes between the sides continued and reached a boiling point when on 20 September 1990, the South Ossetian parliament declared itself a fully sovereign state within the USSR. Yet again, the Georgian parliament acted the next day to annul the decision taken by the regional parliament in South Ossetia.

In December of that same year the Georgian government decided to retract all previously granted autonomy granted to South Ossetia and began a plan to retake the region. In January of the following year, the Georgian National Guard attacked and looted the South Ossetia capital of Tskhinvali, desecrating buildings and statues (Toal, 2008). This continued for three weeks until the Georgian government pulled the militia out in the run up to a vote on independence. In March that same year, the militia was ordered back into South Ossetia to gain control of the region. However, the South Ossetians put up a strong resistance and were able to keep the Georgians from taking the capital. This was attempted a second time in September 1991, months after Georgia declared its independence from the Soviet Union, and a third time in June 1992.

At this point a change in government had occurred within Georgia and Russia stepped in to negotiate a peace between the sides. The resulting Sochi Agreement allowed South Ossetia to retain the separate-yet-part-of-Georgia status it held during the Soviet Union era. The agreement established a Joint Control Commission comprised of Georgia, Russia, South Ossetia and North Ossetia to guide the process and resolve any conflicts arising. In addition, the agreement created a Joint Peacekeeping Force with Russian, Georgian and Ossetian forces, and a "security corridor" around South Ossetia, in Georgian territory, where the peacekeeper could establish checkpoints (Toal, 2008).

In the succeeding years, tensions increased, although incidences of violence remained minimal. A possible relief from tensions came in the form of a peace plan proposed by President Saakashvili which included significant autonomy, demilitarisation and economic restoration. However, the *de facto* President Kokoity of South Ossetia rejected the plan and in

[40] For a more extensive history of Georgia, which also addresses the issues surrounding South Ossetia, see Toal (2008).

November of that year a referendum on independence from Georgia was held in the region, reasserting its stance (IIFFMCG, 2009). Since then, both Russia and Georgia have made provocative moves towards one another, including economic sanctions, military flyovers by both sides, claims that Russian jets bombed a Georgian territory, and assertions that unmanned Georgian aircraft were shot down (IIFFMCG, 2009). In July of 2009 Georgia, along with the US, Armenia, Azerbaijan and Ukraine participated in military exercises at a base just outside of Tbilisi. During the same time Russian troops also carried out military exercises close to the Russian-Georgian boarder near the Black Sea (IIFFMCG, 2009).

The actual events leading up to the breakout of the armed conflict were a combination of attacks and retaliations on both sides. The Georgian government claims to have discovered that Russia was secretly moving more troops and artillery into South Ossetia and to maintain the sovereignty of Georgia they attacked the Russian forces in the capital of South Ossetia, Tskhinvali (IIFFMCG, 2009). The Georgian army began its attack on the night of 7 August and by the afternoon of 8 August they were in the vicinity of Tskhinvali, where they started to come under retaliatory fire (IIFFMCG, 2009). During this time, a Russian military build-up was under way in the western part of the country, along the border between Georgia and Abkhazia. The fighting between both sides continued through the day and into 9 August, and on 10 August the Georgian government declared a ceasefire and the withdrawal of its troops from South Ossetia (IIFFMCG, 2009). However, the Georgian withdrawal was met with the continued advancement of Russian troops into Georgia from South Ossetia and Abkhazia. On the night of 10 August Russian soldiers crossed over from Abkhazia to Georgia and caused damage to the port city of Poti, opening up a second front of the conflict (IIFFMCG, 2009).

On 12 August French President, Nicolas Sarkozy, visited both governments, obtaining a six-point ceasefire. In total the conflict lasted five days although some Russian troops remained in Georgian territory until 9 October 2008 when the full withdrawal was confirmed (IIFFMCG, 2009). In addition, President Medvedev of Russia announced in a speech on 26 August 2008 Russia's recognition of the sovereignty of South Ossetia and Abkhazia, much to the criticism of the United States, the European Union and Georgia (Levy, 2008). The presence of EU observers did not put an end to all violence as the one-year anniversary of the conflict witnessed acts of violence from both sides, including accusations of mortar fire and attacks on checkpoints (Barry, 2008).

Appendix B: List of districts that were bombed or where major battles took place

Area	District	Region	Times
Kodori Gorge	Gulripshi	Abkhazia	9
Village Ajara	Gulripshi	Abkhazia	2
Village Chakhalta	Gulripshi	Abkhazia	6
Village Gentsvisi	Gulripshi	Abkhazia	2
Village Omarishara	Gulripshi	Abkhazia	1
Village Kapandichi	Khelvachauri	Adjara	1
Village Makho	Khelvachauri	Adjara	1
Village Sharabidzeebi	Khelvachauri	Adjara	1
Kopitnari airport	Kutaisi	Imereti	1
Shiraki Airfield	Dedoplistskaro	Kakheti	1
Bolnisi	Bolnisi	Kvemo Kartli	1
Baku-Supsa Oil Pipeline, 25 km section - Kojori	Gardabani	Kvemo Kartli	1
Baku-Supsa Oil Pipeline, 27 km section - Gachiani	Gardabani	Kvemo Kartli	1
Marneuli	Marneuli	Kvemo Kartli	1
Jechora Gorge	Oni	Racha-Lechkhumi and Kvemo Svaneti	1
Village Komandeli	Oni	Racha-Lechkhumi and Kvemo Svaneti	1
Village Tsedisi	Oni	Racha-Lechkhumi and Kvemo Svaneti	1
Poti	Poti	Samegrelo-Zemo Svaneti	1
Senaki	Senaki	Samegrelo-Zemo Svaneti	3
Village Anaklia	Zugdidi	Samegrelo-Zemo Svaneti	3
Village Ganmukhuri	Zugdidi	Samegrelo-Zemo Svaneti	1
Village Urta	Zugdidi	Samegrelo-Zemo Svaneti	1
Gori	Gori	Shida Kartli	8
Village Karbi	Gori	Shida Kartli	1
Village Sakasheti	Gori	Shida Kartli	1
Village Shavshvebi	Gori	Shida Kartli	3
Village Tkviavi	Gori	Shida Kartli	1
Village Agara	Kareli	Shida Kartli	1
Village Knolevi	Kareli	Shida Kartli	1
Village Ruisi	Kareli	Shida Kartli	1
Village Variani	Kareli	Shida Kartli	1
Kaspi, Railway station and Heidelberg cement factory	Kaspi	Shida Kartli	1
Village Okami	Kaspi	Shida Kartli	1
Village Sakorinto	Kaspi	Shida Kartli	1
Tskhinvali	Tskhinvali	Shida Kartli	battle
Leninisi radar station near Tbilisi International Airport	Isani-Samgori	Tbilisi	2
Tbilisi airplane factory	Isani-Samgori	Tbilisi	3
Vaziani airdrome	Isani-Samgori	Tbilisi	3

Source: Ministry of Defence of Georgia (2008).

Appendix C: List of military installations in Georgia

Region	District	Location	Military installation
Adjara	Batumi	Adlia	The 2nd Separate Anti-Tank Battalion, The Separate Light Infantry Battalion
		Batumi	Batumi Naval Base, smaller Coast Guard base
	Khelvachauri	Khelvachauri	Khelvachauri Military Base, 5th Infantry Brigade
	Kobuleti	Kobuleti	The Separate Technical Reconnaissance Battalion
Imereti	Khoni	Khoni	Khoni Military Base, 2nd Artillery Brigade
	Kutaisi	Kutaisi	Kutaisi Military Base, 3rd Infantry Brigade, The Engineer Brigade, the Aviation Brigade, the Air Defense Brigade
Kakheti	Sagarejo	Mukhrovani	Mukhrovani Military Base, 30th Cadre Brigade
	Telavi	Telavi	50th Cadre Brigade
Kvemo Kartli	Bolnisi	Bolnisi	Bolnisi Airbase
	Marneuli	Marneuli	Marneuli Airbase, Marneuli airfield
Mtskheta-Mtianeti	Dusheti	Kojori	10th Cadre Brigade
		Saguramo	The Separate Communications Battalion and the Medical Regiment, The Separate Pioneer Battalion
Samegrelo-Zemo Svaneti	Poti	Poti	HQ, principal Coast Guard base, Poti Naval Base
	Senaki	Senaki	Senaki Military Base, 20th Cadre Brigade, 2nd Infantry Brigade
Samtskhe-Javakheti	Akhalkalaki	Akhalkalaki	Akhalkalaki Military Base
Shida Kartli	Gori	Gori	Gori Military Base, 1st Infantry Brigade, The 1st Separate Anti-Tank Battalion, The Separate Tank Battalion
Tbilisi	Isani-Samgori	Alekseevka	Alekseevka Airbase, Alekseevka airfield
		Vaziani	Vaziani Military Base, 1st Artillery Brigade, 4th Infantry Brigade
	Old Tbilisi	Krtsanisi	Krtsanisi Military Base
	Vake-Saburtalo	Tbilisi	Army HQ, Land Forces Command Army HQ, Special Operations Main Division Ministry of Defense HQ

Source: Wikipedia (2012).

Appendix D: Donor funding and government actions in post-conflict Georgia

Immediately following the five-day conflict between Georgia and Russia, multiple donor countries and entities pledged financial support to the Georgian government. According to the UN and World Bank's Joint Needs Assessment of Georgia in June 2010, US$ 3.22 billion was pledged between August 2008 and March 2010, with US$ 1.58 billion actually disbursed. See Table C.1 for disaggregation by sectors.

Table D.1: Donor pledged and disbursed money to the Georgian government (US$ millions)

Sector	Committed money from 2008 to 31 March 2010	Disbursed money from 2008 to 31 March 2010
General Budget Support	677.6	617.7
Internally Displaced Persons	237.3	211.9
Infrastructure - Transport	672.5	136.1
Infrastructure - Energy	488.8	-
Urban and Municipal	220.5	74.7
Environment	7.2	-
Agriculture and Livelihood	13	13
Other	233.9	68.1
Banking and real sector	673.1	446.4
Total	3223.9	1567.9

Source: The United Nations and the World Bank (2010).

In addition to the monetary response of donor governments, a series of policies were enacted by the Georgian government. See Table D.2 for a description of the policies by month of announcement.

Table D.2: Policies announced and/or enacted by the Georgian government post-conflict

Month, Year	Policy announced/enacted
August 2008	The National Bank of Georgia cut interest rates
	The National Bank of Georgia sells close to one-eighth of its foreign reserves to cushion currency decline
September 2008	Government asked various donor countries to provide temporary work permits for about 100,00 Georgian workers over the next several years
	Special government subsidy to support the grape harvest
	Formation of internally displaced person (IDP) camp in Gori for 2,500 people
	Government issued decree outlining its preliminary strategy to respond to the needs of the newly displaced
	Supplementary budget submitted to and passed by the Parliament
September 2008: Speech to the United Nations, "Second Rose Revolution" Reforms	Greater parliamentary powers*
	Increase in state funding for opposition parties*
	Private property laws strengthened*
	Appointing opposition figures to institutions overseeing judicial system*
	Lifetime appointment of judges *
	Introduction of trial by jury*
	Appointment of opposition member as vice-speaker of Parliament*
	Opposition member part of the Georgian National Communications Commission*
	Opposition member chairs the Temporary Parliamentary Commission Studying the August 2008 War*
October 2008	Government has endorsed a policy of "full support to local integration of IDPs from South Ossetia and Abkhazia" including providing durable housing solutions
December 2008	Government amended National Strategy on IDPs (2007): combining the two IDP caseloads and focusing on the provision of durable housing
	Firm of the Interagency Coordinating Council for Combating Corruption for civil society organisations to be members of and active in crafting a new anti-corruption strategy and action plan

* Enactment is unconfirmed as of March 2012.
Source: World Bank (2011b), United Nations and World Bank (2010).