War Exposure and Loan Default: Evidence from Kosovo

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Abstract

This paper examines the influence of borrower exposure to war atrocities on loan default probability in post-war Kosovo from 2003 to 2011. We do so based on a sample of 172,108 loans granted by a commercial development-oriented bank. We find that a higher degree of war exposure is associated with a higher probability of loan default. However, this effect is largely driven by repayment behavior during the global financial crisis in 2009/2010. Thus, our results lend support to the view that initially most people having been exposed to traumatic events show a high degree of resilience. However when facing renewed adverse conditions resilience evaporates leading to a belated impact of the war trauma experience triggering repayment behavior that is significantly different compared to the behavior of people with a low degree of war exposure.

JEL codes: D22, G41, L26

Keywords: repayment behavior, war exposure, entrepreneurship

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1. Introduction

Does borrower exposure to war atrocities influence loan repayment in the post-conflict period? We answer this question by providing evidence from Kosovo where a short but intensive war was waged between March and June 1999. The evidence is based on a dataset covering 172,108 loans provided by a commercial development-oriented bank over the period 2003-2011 in post-war Kosovo. The dataset provides information on borrower characteristics, firm size and performance, as well as on loan characteristics which we use as control variables in our probit regressions explaining the likelihood of loan default. We match loan-level information with data on war events and war casualties. Concretely, we test whether clients from districts with a higher intensity of war activities show a higher likelihood of default than clients from districts that were less exposed to war atrocities. In doing so we also control for cross-district variation in other variables that might influence loan default, namely the size of war damages on the stock of housing and local infrastructure as well as for regional economic development in the post-war period, the latter measured by nightlight intensities depicted by satellite images (Henderson et al., 2011, 2012).

Making use of concepts and evidence developed in the psychological loss, trauma and resilience literature (e.g. Bonanno, 2004), our analysis contributes to a large literature on the impact of war and war exposure on the individual's psychological stance and health (Cardozo, 2000; Begic, 2001; Lasko et al., 1994; Catani et al., 2008; Miguel et al., 2011; Akbulut-Yuksel, 2017) and hence on economic and financial behavior (Kondylis, 2010; Kim and Lee, 2014; Islam et al., 2016).[3] Moreover, it relates to the literature analyzing the impact of other forms of traumatic events (Shahriar, 2016) as well as of different views on morality and fairness (Guiso et al.,

[3] More general, our paper contributes to the "deep impact literature" which aims at explaining economic and financial behavior not only by accounting for proximate determinants, but also by including more fundamental factors (Friehe et al., 2015; Becker et al., 2016; Burchardi and Hassan, 2013; D'Acunto et al., 2015; Bucciol and Zarri, 2015).

2013; Jin et al., 2017) on loan repayment. Finally, we contribute to the literature on entrepreneurship, adversity and resilience (Bullough et al., 2014; Miller and Le-Breton Miller, 2016; Williams and Shepherd, 2016) and provide insights into the challenges of post-conflict activities aimed at supporting private and financial sector development (Alldén, 2009; Demirgüç-Kunt et al., 2011; Jebarajakirthy and Lobo, 2014). Such efforts have become a standard instrument employed by national governments as well as international donors and financial institutions in post-conflict periods. Thus, our results are of policy relevance as they indicate whether and to what extent lending activities are affected by short-, medium and long-term effects of the conflict on borrower repayment behavior.

We find that war exposure has a negative impact on loan quality. However, this effect is largely driven by repayment behavior during the global financial crisis. Our results are robust with respect to the use of various proxies measuring war atrocities and war activity, the definition of loan default, changes in sample size and composition, as well as changes in methodology. There is also no evidence that results are driven by a possible selection bias.

We interpret our findings as evidence suggesting that financial institutions operating in post-conflict periods are able to build up high-quality loan portfolios even in areas where war activities and war atrocities were widespread and intensive. This is good news for programs and institution building projects set up after the end of hostilities. However, borrowers with a higher degree of war exposure seem to be more sensitive to negative shocks occurring in the reconstruction period than borrowers less exposed to atrocities. Thus, our findings are consistent with the view that adverse conditions trigger a belated effect of trauma experiences on behavior. In our case this is expressed by a lower ability and willingness of high war exposure borrowers to deal with these conditions.

The paper is organized as follows. After this introduction we present the conceptual framework of our analysis and link it to the existing literature on the effects of exposure to war activities and other traumatic events on individual economic behavior and outcomes (Section 2). Section 3 introduces our data and the methodology we use. Results and robustness checks are shown in Section 4. We conclude with a discussion of our findings and some policy implications (Section 5).

2. Conceptual framework and literature review

We explore the effects of war exposure on the probability of borrower default based on a framework developed by Guiso et al. (2013). We do so taking into account the pecularities of the unconventional individual lending technology used in micro and small business lending (Armendáriz and Morduch, 2010) as our data is provided by a bank applying this technology to a large extent over the observation period.[4] In essence, the technology represents a form of relationship lending as discussed by Petersen and Rajan (1994) combining it with several elements of consumer lending. Thus, the loan officer accounts for borrower's total business and non-business revenues/incomes and costs/expenditures when deriving the free cash flow the bank lends against to. Moreover, loans are granted primarily as installment loans, with monthly installment payments largely determined by the size of the monthly free cash flow.[5]

A borrower will decide defaulting today if this is better than postponing the decision and possibly defaulting tomorrow. This trade-off is largely determined by two factors, namely

a) the net benefits of non-defaulting, K. The net benefits reflect monetary and non-

4 The technology has by now surpassed group lending as the most widely used technology applied by microfinance institutions (de Quidt et al., 2016).

5 Calculating a free cash flow that is basically independent from the size of project returns is essential because it allows the bank to forego monitoring whether the borrower has made use of the loan in the way indicated when applying for the loan. By doing so the bank economizes in monitoring costs which are extremely high given the small loan sizes involved (Helms, 2006).

monetary benefits and costs. For example, by non-defaulting the borrower can continue with his business he is familiar with and which he enjoys working for. By contrast, default implies that the borrower bears pecuniary costs, such as the loss of collateral as well as higher cost of borrowing in the future. Moreover, the borrower faces non-pecuniary costs, such as social stigma associated to defaulting and the psychic cost of doing something immoral (Morvant-Roux et al., 2013).

b) expectations about future returns. The likelihood of default rises if returns become negative, for example because the economy enters or remains in a recession.

Thus, the value of not defaulting (V) at time t is

$$V_t = h_t - m_t + K_t + (1 - \pi_t)E_{max}\{V_{t+1}, 0\} \quad (1)$$

where h_t is the net income from operating the business at time t, m_t is the installment to be paid at t, K_t represents the net benefits of non-defaulting in t, π_t is the probability of entering or staying in a recession and E is the expectation operator.[6]

The difference between h_t and m_t is assumed to be unrelated to the personal characteristics of the borrower. As just explained it is the job of the loan officer to identify this difference via a proper credit assessment. By contrast the size of the pecuniary and non-pecuniary costs of defaulting as well as the option value of non-defaulting mainly reflect personal characteristics of the borrower. The degree of war exposure is such a personal characteristic and hence likely to affect repayment behavior in a post-conflict environment.[7]

War exposure "either in the form of direct experience (e.g. seeing others get killed or in-

6 In the framework developed by Guiso et al. (2013) for analyzing defaults in US subprime mortgage lending, π captures the probability of becoming unemployed.

7 Implicitly the credit technology aims at assessing these benefits and costs as loan officers conduct a socioeconomic analysis of borrowers in order to assess the willingness of loan applicants to repay their loans. This is often illustrated by the conventional wisdom that "troubled homes often become troubled borrowers" (Churchill, 1999, p.56 – quoted from Armendáriz and Morduch, 2010).

jured, being shot at), or indirect experience (e.g., exposure to aversive details of the traumatic event, or learning that the traumatic event occurred to a close family member or friend)" (de Rond and Lok, 2016, p.1967) is known to cause psychological injury. Such injury includes "negative cognitions and mood (feelings that range from a distorted sense of blame to estrangement), and arousal (aggressive, reckless, or self-destructive behaviors)." (de Rond and Lok, 2016, p.1967). In short the experience of war "can dislocate people's institutionalized sense of the meaningful, the good, and the normal" (de Rond and Lok, 2016, p.1967). Thus, people with a high degree of exposure to war atrocities are likely to behave differently than people not (or less) exposed to such atrocities, and this difference in behavior has an impact on the assessment of costs and benefits of defaulting. This is the key hypothesis our paper is built upon.

The hypothesis has been confirmed in several studies exploring the effects of war exposure on economic and financial activity and behavior in other settings than loan repayment and default. For example, Voors et al. (2012) find that individuals exposed to the civil conflict in Burundi are more risk seeking, have higher discount rates and are more prone to behave altruistically towards their neighbors. In contrast, Callen et al. (2014) document that recalling fearful events leads to higher preference for certainty among those who were exposed to violence in Afghanistan, while Kim and Lee (2014) show that even five decades after the Korean War individuals experienced its peak in early childhood remain more risk averse. Kondylis (2010) shows that population displacement during the war in Bosnia and Herzegovina had negative consequences for labor market development resulting in higher unemployment for men and lower labor market participation for women. Islam et al. (2016) complement this finding by documenting the long-term adverse effects of civil conflicts on individuals' labor productivity and earnings through schooling disruption. Bellows and Miguel (2009) find that higher exposure to war violence leads

to higher local political and community activity including contribution to local public goods such as schooling. However, Cassar et al. (2013) document a negative and persistent effect of the violence during the Tajik civil war on trust and participation in local markets.

Moreover, there is a sizeable literature on the effects of traumas and shattered moral norms on repayment behavior. For example, Shahriar (2016) provides evidence based on data from a Bangladeshi microfinance institution that women borrowers experiencing physical or sexual violence are more likely to default compared to women borrowers who do not experience abuse. Guiso et al. (2013) show that views about fairness and morality have an impact on the default likelihood of subprime borrowers. Jin et al. (2017) find that banks operating in regions with a higher degree of social capital saw fewer failures during the global financial crisis than banks in low social capital regions.[8]

We conclude from this literature that war exposure will be associated with a higher probability of default as it triggers aversive emotions which result in "short-sighted trade-offs between immediate and delayed rewards" (Shahriar, 2016), i.e. between the costs of default now and default later, and selfishness. Thus, K_t is negatively influenced by war exposure.

However, the literature also exposes the view that most people are fairly resilient when facing traumatic events, exhibiting "a stable trajectory of healthy functioning, …, in both personal and interpersonal spheres across time" (Westphal and Bonanno, 2007). Indeed, stressful events, like wars (Bullough et al., 2014) or the 9-11 attacks (Fredrickson et al., 2003), might even be followed by positive emotions, such as "we, our family survived" or "the country won the war", which help in shaping activities successfully in the post-crisis period, often referred to as posttraumatic growth (Tedeschi and Calhoun, 2004). In particular entrepreneurs have been

[8] In addition, there is a literature discussing other fundamental factors impacting loan repayment, such as religion (Georgarakos and Fürth, 2015; Baele et al., 2014).

found to show high degrees of resilience compared to non-entrepreneurs (Markman et al., 2005) explaining why entrepreneurship might even thrive in the face of adversity (Branzei and Abdelnour, 2010; Miller and Breton-Miller, 2017). Some studies show mixed or inconclusive evidence on the impact of war exposure on economic activity and behavior. For example, there is evidence that when controlling for unobserved individual heterogeneity OLS results suggesting a negative impact of psychological trauma measures on wages in post-conflict Bosnia and Herzegovina turn insignificant or even positive (Searing et al., 2013). Overall, this implies that K_t is unrelated to war exposure.

This leads us to two conflicting hypotheses about the static impact of war exposure on loan repayment.

H1a: Borrowers with a higher exposure to war atrocities show a higher likelihood of default than borrowers with a lower exposure.

H1b: Borrowers with a higher exposure to war atrocities show the same likelihood of default as borrowers with a lower exposure.

Divergent hypotheses can also be derived with regard to the effect of war exposure on loan repayment over time. For example, the impact of traumatic events on human behavior is likely to be most strong in the immediate post-conflict period. However, despite evidence that the effect can last for a long time (Tedeschi and Calhoun, 2004; Kim and Lee, 2014), only a small percentage of people facing aversive events show chronic and enduring signs of disruptions in normal functioning (Bonanno, 2004). Many recover from traumatic experiences, i.e. they enter a "pathway characterized by observable elevations in psychological symptoms coupled with relatively poor functioning before returning to baseline, pre-trauma levels." (Westphal and Bonanno, 2007). Thus, over time the negative impact of war exposure on K_t can be expected to

vanish.

Alternatively, people showing a high degree of resilience initially might not sustain this behavior over time as resilience and posttraumatic growth are not a given but an ongoing process influenced by "life wisdom and the development of the life narrative" (Tedeschi and Calhoun, 2004, p.1), i.e. by "the interaction between entrepreneurs and their environment" (Ayala and Manzano, 2014, p.127). For example, "positive illusions" initially helping people in adjusting to traumatic events might evaporate when people experience a loss in (access to) human, social, and material capital, and when they experience setbacks to their growth, competence or expertise (Sutcliffe and Vogus, 2003). This may hold in particular for entrepreneurs given evidence that they are more exposed to regretful thinking in case of failure or outcomes that are below expectations (Markman et al., 2005).

As a result, following traumatic events disruptions in normal functioning may emerge in the course of time (Bonanno, 2004), in particular when resource losses and disappointments reduce resilience. Empirical evidence for this proposition is provided by Hobfoll et al. (2011) and Freitag et al. (2017). The former paper, based on data collected among Palestinians in the West Bank and Gaza, shows that posttraumatic stress disorder trajectories depend on the occurrence of negative shocks, here measured by the degree of political violence Palestinians have been subject to, and the degree of resource losses. The latter analysis, making use of data from Kosovo, finds that war victims are more likely to participate in non-institutionalized forms of political participation, such as protests, in the post-war period, but that the intensity of such behavior depends on the personal economic developments: Political participation of war victims economically successful in the postwar period show the same kind of political protest behavior as people with low or no war exposure.

Recessions and financial crises are periods where borrowers experience resource losses and disappointments at a significant scale. Thus, these periods are likely to be associated with a decline in resilience and persistence (Cardon and Kirk, 2015). Within the Guiso et al. (2013) framework this suggests that the impact of war exposure on K_t depends on π. Since the observation period of our analysis includes the years of the global financial crisis, we can test for such an interaction effect.

Overall, the literature on dynamic effects of traumatic events yields the following conflicting hypotheses on loan repayment in the post-conflict period:

H2a: Over time default probabilities of borrowers with a higher exposure to war atrocities converge to levels observed for borrowers with a lower exposure to atrocities.

H2b: Default probabilities of borrowers with a higher exposure to war atrocities diverge from levels observed for borrowers with a lower exposure to atrocities over time, in particular when facing adverse conditions, such as a recession or crisis.

We test these hypotheses based on a large loan-level dataset provided by commercial development-oriented bank in Kosovo and on information on district (interchangeably municipality) level about the degree of war activities and war atrocities during the war in Kosovo, March – June 1999.

3. Data and empirical approach

3.1. Data

Ethnical tensions and violence have a long tradition in Kosovo. In February 1998 armed conflict between the Kosovo Liberation Army (KLA) and Yugoslav forces broke out. In March 1999, the North Atlantic Treaty Organization (NATO) intervened by engaging in a three month

airstrike campaign. Hostilities ended on 10 June 1999. Ten days later all Yugoslav forces had left the country.

Hostilities and war had a severe impact on mental health, social functioning and attitudes of people. Cardozo et al. (2000) find that a significant share of the population, about 17%, could be diagnosed as having symptoms of mental disorders, i.e. posttraumatic stress disorder (PTSD) symptoms. This is largely in line with the evidence reviewed in section 2.

We do not have data on war exposure and trauma experiences on borrower level. Thus, we measure borrower exposure to war and war atrocities on district level. In doing so, we rely on information provided by the American Association for the Advancement of Science (AAAS), the American Bar Association - Central and East European Law Initiative (ABA-CEELI) and the Human Rights Data Analysis Group (HRDAG) as well as on information extracted from the report on civilian deaths in the NATO air campaign by Arkin (2000) for Human Rights Watch (HRW). The data covers core dimensions of the military conflict such as casualties, war activities by the KLA and Yugoslav forces as well as NATO airstrikes (see also Table 1).

- Insert Table 1 -

Our main variable capturing war exposure depicts the number of Kosovar Albanian women and children casualties in the respective districts. We focus on women and children casualties as studies suggest that the impact of war exposure on mental health is most pronounced when it relates to the death of children (de Rond and Lok, 2016). The data is derived from 3,848 interviews conducted by the American Bar Association/Central and East European Law Initiative (ABA-CEELI), Human Rights Watch (HRW), and the Organization for Security and Coopera-

tion in Europe (OSCE).[9] In total 382 women and 719 children were killed during the war. The average value of casualties per district corresponds to 38. However, there is substantial cross-district heterogeneity (Figure 1) as the number of casualties reported by district ranges from 0 in Strpce/Shterpce to 119 in Srbica/Skenderaj.[10] On average, women and children represent 36% of people killed, with the lowest share observed in Strpce / Shterpce (0%), while the highest share (75%) was recorded in Novo Brdo / Novoberde and Leposavic / Leposavik.

- Insert Figure 1 -

The remaining variables on war activities and war atrocities are employed in our robustness checks (Tables A2-A4 in the Annex). This applies to data on the total number of Kosovar Albanians killings documented over the period, i.e. men, women and children, which in total amounts to 3,277. In addition, we make use of information about the incidence of armed confrontations between the KLA and Yugoslav forces[11]. It is based on interviews and non-governmental documents summarized by the International Criminal Tribunal for the Former Yugoslavia (ICTY), listing 83 battles defined as incidents of fire exchange between the KLA and Yugoslav forces in 16 municipalities and 443 casualties of Yugoslav forces from March 20, 1999

9 The data is provided in the AAAS/ABA-CEELI/HRDAG database of killings in Kosovo (Ball et al., 2002). Following a call of the respective website we would like to stress that data is based on reports provided by international organizations and might be subject to a selection bias.

10 The ABA-CEELI conducted 1,674 interviews of refugees in Albania (35% of interviews), Macedonia (16%), the US (10%), Kosovo (38%), and Poland (<1%). Except for Kosovo, the interview collection period lasted from May until June 1999. In Kosovo the data collection process started after the end of the conflict in August 1999 and ended in August 2000. HRW ran 337 interviews primarily conducted in Kosovo (60%) from June until December 1999. During the conflict period from March until June 1999 HRW personnel also interviewed refugees in Albania (25%), Macedonia (11%), and Montenegro (3%). The OSCE ran 1,837 interviews in Albania (37%) and Macedonia (61%) over the period from March until June 1999. Over 80% of the interviews were taken in OSCE-KVM offices in refugee camps, while the rest of the survey was conducted in private homes or public gathering places. ABA-CEELI and OSCE used standardized questionnaires that allowed for a narrative description of events. HRW conducted open interviews to elicit open narratives of interviewee's experience. The interview data were compared and cross-checked. Additionally, witness testimonies were cross-checked using the exhumation records reported by international teams on behalf of the ICTY. For more details on data generating and matching process see Ball et al. (2002). Ball et al. (2002) also report data on deaths documented in exhumation reports. We do not use this data since the geographic location of killings might differ from the location where exhumations took place. However, the impact of war atrocities on survivors is most direct where casualties were actually observed. Moreover, exhumations were conducted in 24 of Kosovo's 29 municipalities only and were not evenly spread across Kosovo, which could lead to biased estimates of war exposure.

11 The data on the incidences of armed confrontations between the KLA and Yugoslav forces and casualties of Yugoslav forces is provided by HRDAG's database of NATO airstrikes, geographic coding, and KLA activity in Kosovo (referred to as HRDAG, 2002).

to June 22, 1999. The average intensity of KLA fighting (per municipality) is 2.86 battles. Fighting was particularly severe in Suva Reka / Suhareke, where 27 battles are reported.[12] Yugoslav forces' casualties are reported in 25 municipalities. The highest number (71) is documented for Pristina / Prishtina.

Finally, we also make use of data on civilian casualties (Arkin, 2000) and the number of airstrikes (Yugoslav government sources) during the NATO bombing campaign[13]. HRW documents 90 incidents of the NATO air campaign that involves civilian deaths and injuries (Arkin, 2000). 32 of these incidents are in the Kosovo area. The data contains geographic location and the number of casualties for each airstrike. Airstrikes involving civilian casualties are recorded in 18 Kosovo municipalities. According to HRW estimates, the air campaign in Kosovo resulted in 437 civilian deaths[14]. The largest number of victims related to airstrikes is recorded in Djacovica / Gjakova (87), while the district average of people killed in the NATO bombing campaign amounts to 15. The Yugoslav government sources document 364 airstrikes all over Kosovo. There is a large variation in the number of airstrikes across municipalities. 54 bombing incidents are documented in the capital Pristina / Prishtina, while there is only 1 recorded airstrike in the municipalities of Novo Brdo / Novoberde and Vitina / Viti.

Correlation analysis reveals that the variables capturing war events are (significantly) positively correlated with each other (Table 2). Casualties among women and children are positively correlated with all other war exposure variables with the exception of casualties in NATO bombing.

12 The total number of battles between the KLA and Serbian forces is 83.

13 The data on the number of NATO airstrikes is provided by HRDAG's database of NATO airstrikes, geographic coding, and KLA activity in Kosovo (referred to as HRDAG, 2002).

14 In several incidences Arkin (2000) indicated only a range of the number of casualties. In these cases we used the the middle of the range as the estimate of the number of casualties.

- Insert Table 2 -

War activities imply damages of houses and infrastructure. Thus, our second source of data refers to information compiled by the International Management Group (IMG) on behalf of the European Commission (IMG, 1999). The data is based on a field inspection of housing stock and local village infrastructure after the end of hostilities in July 1999, the latter including water, health, education, and electricity distribution facilities. For each category the degree of damage is assessed on a scale from 1 to 4. Cost estimations are based on the analysis of labour and material costs in the region. The estimate of total damage on housing stock reaches 1,118.343 mln EUR, while the damage on local infrastructure is estimated at 38.761 mln EUR (of which about 52% reflected damages of school buildings).[15]

The respective averages at the municipality level average are 39,940.82 kEUR and 1,384.32 kEUR respectively (Table 3). The Rec / Reja municipality shows the largest damages, as the estimated costs of housing damage and local village infrastructure reach 134.95 mln EUR and 3.37 mln EUR respectively. The least affected municipality is Gora / Dragash, in which no infrastructure costs are documented and damage on housing is just 33 kEUR.

- Insert Table 3 -

There is a strong correlation among cost estimates of housing and infrastructure damages (Table 4)[16]. However, all damage measures are uncorrelated with the measures of war atrocities. Thus, the degree of destruction of houses and infrastructure is a poor indicator of the number of casualties and the intensity of war activities.

15 The assessment covers the whole area of Kosovo. However, according to the report no housing damages were assessed in the Leposavic / Leposavik municipality (IMG, 1999, p. 21). The reason is not explicitly stated. Thus, we exclude the municipality from the analysis which leads to a sample reduction from 174,504 loans (94,673 borrowers) to 172,108 loans (93,423 borrowers).

16 In order to avoid multicollinearity issues resulting from the high correlation between costs of ruined housing stock and components of infrastructure damage, we generate one measure of war financial costs by calculating the total costs observed.

- Insert Table 4 -

The literature on trauma and resilience suggests that resilience is not a static concept but a process, i.e. it might change over time and changes might be triggered by external conditions. Moreover, numerous studies show that loan quality is strongly influenced by economic developments (Bonfim, 2009; Ahlin et al., 2011). Against this background, we control for overall trends in economic activity. We do so nationwide via time fixed effects. In addition, we take into account economic developments on district level. As GDP, production or consumption data on municipality level are not available, we follow the literature (Henderson et al., 2011, 2012; Brown et al., 2015) and study local developments via satellite images of night-time light emissions.[17] Calculations are based on the stable lights, which refer to an annual cloud-free composite of average digital brightness value for the detected lights.[18] We calculate the average yearly nightlight intensity in the area of five square kilometers surrounding the municipality's administrative center. After retrieving the image, we identify the composition of colors present on the image (64 colors from black to white are considered, which implies that the nightlight intensity variable captures the brightness of the nightlight image on a scale from 0 to 63 with a greater value indicating a higher light intensity) with corresponding percentages of space occupied and calculate the weighted average brightness of the image. The average value is 11.77, with districts showing values in the range from 0.05 in Novo Brdo / Novoberde to 39.07 in Pristina / Prishtina.

17 Mellander et al. (2015) show that nightlight intensity provides a robust measure for both population density and regional economic activity even at a fine-grained geographical level. For Kosovo, correlation coefficients for nightlight intensity and population densities, collected by the Kosovo population census in 2011 and 1990 respectively, are 0.63 and 0.70. Correlation between nightlight intensity and consumption levels taken from the World Bank "Living Standards Measurement Survey" performed in 2000 (http://microdata.worldbank.org/index.php/catalog/77) and calculated as district averages is 0.58. Thus, nightlight intensities seem to be a good proxy for developments in population density and economic activity across Kosovar municipalities over time

18 The image data was retrieved from the Interactive Map of the US Air Force Defense Meteorological Satellite Program's (DMSP) Operational Linescan System (OLS) Global Composites.We use stable lights recorded by satellite F15 over 2000-2008, F16 in 2009, and F18 in 2010. Since the nightlight data comes from different satellites with different settings of sensors and the DMSP OLS does not perform on-board calibration, we intercalibrated nightlight intensity figures using the parameters from Elvidge et al. (2014).

The latter is substantially lower than what has been found for the capitals in the neighbouring region, Albania, Bulgaria, FYR Macedonia and Serbia (Brown et al., 2015).

Finally, we make use of a loan-level dataset provided by a commercial development-oriented bank which started lending to micro and small businesses in Kosovo in April 2000, i.e. less than one year after the end of hostilities. Fast branch expansion allowed the bank issuing loans to clients located in all 29 Kosovar municipalities from 2003 onwards. The dataset includes information on personal, business, and loan characteristics. Thus, we are able to control for most factors identified in the literature as having an impact on the probability of default, namely demographic determinants (Agarwal et al., 2011), characteristics of the bank-borrower relationship (Drexler and Schoar, 2014; Canales and Greenberg, 2016), business characteristics (Bonfim, 2009) as well as – likely endogenous – loan characteristics (Jiménez and Saurina, 2002).

In the early years of operation the bank recorded rapid growth in terms of number of loans issued (Figure 2), in particular with regard to sole proprietors running micro and small enterprises (MSEs). Following the global financial crisis, loan disbursements dropped significantly, also because the bank adopted new guidelines implying a withdrawal from lending to sole proprietors.

- Insert Figure 2 -

Our analysis is restricted to finalized loans, i.e. loans that are either repaid or written-off. Moreover, we exclude loans to businesses registered as legal entities.[19] There are two reasons for this. First, as just mentioned, lending to sole proprietors constitutes the main activity of the bank for most of the observation period while lending to legal entities starts to take off in 2005/2006

[19] In addition, we do not consider energy efficiency loans as this type of credit product was introduced in 2009 only, representing 0.88% of total number of loans.

only. Second, identifying decision-making parties in legal entities is almost impossible given the available data. However, this is crucial for assessing the resilience of organizations facing adverse events (Van der Vegt et al., 2015). We also drop loans for which there is no information on the client's address (8.16 % of the sole proprietor sample) or the client became a resident in the course of the relationship with the bank, i.e. was not likely to be resident of Kosovo during war time (0.13% of the sample). We also do not account for loans to clients where the dataset provides unreasonable information, such as negative equity of the client, i.e. debts larger than total assets (for 0.65 % of the sample overindebtedness refers to borrowings from the Bank, for 1.38% of the sample overindebtedness is caused by borrowings from other financial institutions). We also exclude loans to clients younger than 15 years (0.03%) and older than 70 years (0.89%), as well as loans to clients with reported negative balance sheet values (<0.01% of the sample) and grace periods (<0.01% of the sample). Finally, we control for outliers in terms of total assets (in EUR adjusted for inflation), income to assets and fixed assets availability defined by 1 and 99 percentile borders (3.38% of the sample).[20]

We focus on the time period from the beginning of 2003 until the end of 2011. Thus, our observation period broadly coincides with the definition of a post-conflict period which refers to the first decade after the outbreak of peace (MacSweeney and Tanburn, 2008). Loans observed in 2000 – 2002 are excluded due to the absence of loan default events prior to 2002. This precludes running a probit model with time fixed effects for the years 2000 and 2001. Moreover, there is only a minimal number of defaults (3!) in 2002. Given these restrictions, the loan dataset consists of 174,504 credit contracts over the period 2003-2011.

Following other studies on the impact of war exposure on individual economic behavior

[20] A robustness test reveals that our results do not change when we do not drop outliers from the sample (Table A10 in Annex).

and outcomes, we match the four datasets on the basis of the borrower's registration address at the moment of the last loan application. The matching is performed at the municipality level.

3.2. Methodology

We explore the impact of borrowers' war exposure on the subsequent default probability by estimating a probit model with a panel structure,[21] i.e. depending on maturity and time of loan issuance within a given year a loan can enter the analysis in more than one year.[22] On average a loan is observed for 2.40 years. Concretely, we estimate

$$Prob\left(Default_{i,j,b,m,t} = 1 \middle| X\right) = \Phi(\beta X) \tag{2}$$

with the latent function

$$\beta X = \beta_0 + \beta_1 War\ Exposure_m + \beta_2 Damage_m + \beta_3 Nightlight_{m,t} + \sum_{p=1}^{P} \beta_{4p}\, Borrower_j + \sum_{r=1}^{R} \beta_{5r}\, Business_b + \sum_{s=1}^{S} \beta_{6s}\, Loan_i + Year\ FE + \varepsilon_{i,j,b,m}$$

where

$Default_{i,j,b,m,t}$ is a binary variable identifying the default in year *t* of the loan *i* granted to borrower *j* owning business *b* and registered in the municipality *m*,

$War\ Exposure_m$ and $Damage_m$ represent measures of war exposure and estimates of war damages in the respective municipality,

$Nightlight_{m,t}$ refers to the nightlight intensity in the municipality *m* in year *t*,

$Borrower_j, Business_b,$ and $Loan_i$ are matrices of borrower, business, and loan contract characteristics when receiving loan *i*,

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21 In the baseline model, the conditional loan default probability is modeled under the normality assumption. As robustness checks we employ alternative functional forms such as logit, linear probability, and complementary log-log functions.

22 To illustrate this: a loan granted in October 2004 with a nine month maturity enters the regression twice, namely for 2004 and 2005.

$Year\ FE$ refers to fixed effects for observed years 2003- 2011,

and $\varepsilon_{i,j,b,m}$ is the error term.

We include loan characteristics in some specifications only as they are likely to be endogenous (Jiménez et al., 2006; Behr et al., 2011; Menkhoff et al., 2012), i.e. the probability of loan default influences loan characteristics, such as collateral. Besides, we include year time fixed effects (*Year FE*) in order to control for the overall development of the Kosovo economy after the war. Table 5 offers a complete list of the variables employed in the analysis.

- Insert Table 5 -

We test whether a higher degree of exposure to war atrocities is associated with a significantly higher probability of default (H1a), i.e. that β_1 is positive, or insignificant (H1b). We do the same with regard to war damages in terms of housing stock and infrastructure but do not have clear expectations about the sign of β_2. On the hand, war damages might also cause mental stress and disorder, which – via a negative effect on K_t – would imply a positive coefficient. On the other hand, areas with a higher degree of damage are likely to benefit from stronger reconstruction efforts providing a boost to economic activity. Hence h_t and V_t rise, implying a negative coefficient. As nightlight intensities are supposed to measure regional economic activity, we expect β_3 to be significantly negative.

With regard to personal characteristics of the borrower the theoretical and empirical literature on loan default suggests that female borrowers (D'Espallier et al., 2011), married borrowers (Van den Berg et al., 2014) and borrowers with a larger household size are less likely to default than male borrowers, single borrowers and borrowers living in households of smaller size. The effect of borrower age on default has been found in some studies to be non-linear while other studies have not found any effect of borrower age on default (Agarwal et al., 2011).

For business characteristics we expect that larger and more profitable firms show a lower probability of default, even though the empirical evidence on size effects on default probability is mixed (Bonfim, 2009). Loans granted to firms with a higher fixed asset ratio are also expected to show a lower default probability as fixed assets can be pledged as collateral which limits the willingness to default strategically (Rajan and Zingales, 1995; Hall, 2012). By contrast, higher levels of indebtedness are associated with a higher probability to default (Fidrmuc and Hainz, 2010). Default rates are also expected to vary with the sector of operations (McCann and McIndoe-Calder, 2012). Reputation and social capital effects suggest that borrowers in rural areas show a lower probability of default than borrowers in urban areas (Agarwal et al., 2011).[23] For similar reasons we expect that loans to clients exhibiting a longer lending relationship with the bank have a lower probability of default (Fiordelisi et al., 2014; Bolton et al., 2016). By contrast, loans to initially rejected borrowers are likely to show a higher default probability. With regard to the effect of loan characteristics on default probabilities endogeneity concerns loom large. For example, higher levels of collateralization might indicate a higher rather than a lower probability of loan default as the bank is likely to reduce collateral requirements for the most creditworthy borrowers (Menkhoff et al., 2012).

3.3. Descriptive statistics

Descriptive statistics (Table 6) reveal that default rates are very low. On average, the probability that a loan defaults in a given year is less than 1%. Portfolio quality is also high when defining default by a loan not being served for more than 30 days (PAR 30).[24] On average, the

[23] This expectation is reinforced by arguments suggesting that dynamic incentives are likely to be more powerful in rural than in urban areas as financial development and bank competition is lower in rural than in urban areas (Lopez and Winkler, 2017). Thus, net benefits of non-defaulting, *K*, are higher in rural than in urban areas.

[24] This is the most widely used indicator of loan quality used in microfinance. In traditional banking loans overdue for more than 60 days are widely identified as loans in default (Agarwal and Hauswald, 2010)

probability that a loan is not served by a client for more than 30 days in a given year is 1.9%. There is substantial heterogeneity of default rates across districts (Figure 3). Several districts show default rates – on average – even below 0.5%, while Klina/Kline and Suva Reka/Suhareke show rates close to 2.5%.

- Insert Table 6 -

Loans are associated with average war exposure and war damages that are in most cases somewhat larger than the averages recorded in Tables 1 and 3. This indicates that loan issuance has been more prominent in districts with higher casualties as well as more intensive war activities and war damages. For nightlight intensity the median value is somewhat lower than the mean (15.54 vs. 16.49) indicating that loan issuance is more intensive in districts with lower levels of economic activity.

- Insert Figure 3 -

Most observations relate to loans extended to male (83%) and married (84%) borrowers. On average loans are granted to borrowers 39.58 years of age living in a household with 5.39 members. Finally, 4% of loans are obtained by Serbian borrowers. 39% of observations represent repeated loans, i.e. the second (22%), third (10%) or fourth and more loan (7%) of the respective borrowers. Only 2% of loans represent cases where an initial loan application by the respective borrower was rejected.

Borrowers' micro and small businesses show asset volumes which on average are less than EUR 10,000 (inflation adjusted). Median asset size is substantially lower (about EUR 3,700) indicating the dominance of micro firms in the portfolio over the observation period. On average fixed assets are about 2.38 times higher than the loan amount borrowers applied for and

client's income to total assets stands at 30% (14%) on average (median).[25] Moreover, on average indebtedness of clients is very low, amounting to just 4% of total assets with regard to debt incurred by borrowing from the bank and 3% of total assets with regard to debt outstanding to other financial institutions. The low average reflects the fact that 70% of all loans in the sample are granted to clients without any debt to a formal financial institution. For the remaining 30% the average debt corresponds to 21.15% of total assets (16.24% with regard to debt via the bank, 26.73% of total assets with regard to debt via other financial institutions). Finally, about one fourth of the sample represents loans to borrowers operating in the agricultural sector, which is a major contributor to the Kosovo economy (Arcotrass-Consortium, 2006). In addition, housing and consumption represent major activities funded by loans in our sample.

In line with the business characteristics just reviewed the average loan volume clients applied for corresponds to 3,417 EUR.[26] Again, the median is much smaller with 1,767 EUR. The average actual loan size is 2,985 EUR. 67% of loans are collateralized by chattel mortgages, while the share of loans collateralized by standard mortgages is 1% only. 62% of the loans are guaranteed by a third person. Finally, acquiring working capital (28%), fixed assets (14%) and a mix of fixed assets and working capital ((10%) represent the bulk of purposes funded by loans, followed by housing (27%) and consumer lending (21%).

4. Results

4.1. Baseline results

Table 7 reports our baseline results which are based on three specifications of the probit

25 This suggests a return on capital which is in line with the (mixed) evidence found for microbusinesses; see Karlan and Morduch (2009).

26 We refrain from including the actual loan size in the regression due to endogeneity concerns.

model.[27] For each specification we report coefficients and average marginal effects; the latter provide the basis for analyzing the economic significance of variables in explaining loan default.

The first specification (Model 1) is based on explanatory variables generated at the municipality level only, namely exposure to war atrocities, housing and infrastructural damage, population density and economic activity. Moreover, we control for economic developments over time by including year time fixed effects. In the second specification (Model 2) we extend the model by taking into account socioeconomic characteristics of borrowers, business characteristics (including sector fixed effects) as well as characteristics of the bank-borrower relationship. The final specification (Model 3) covers the full set of explanatory variables by also including loan contract characteristics. The explanatory power rises from 18.9% (Model 1) to 27.2% (Model 3).

- Insert Table 7 -

Results support our hypothesis 1a: a higher degree of war exposure is associated with a significantly higher probability of default. Extending the list of control variables has little impact on the size and significance of the war exposure coefficient. The estimates of marginal effects imply that the effect of borrowers' exposures to war atrocities is highly economically significant. A one standard deviation increase in the number of casualties (29.08) is associated with a 17.45 basis points (bps) rise in default probability, which corresponds to 18.76% of the overall average default rate.

In line with expectations the size of economic and financial losses caused by the war does

27 We cluster standard errors at the municipality level, as war exposure measures, which are the main variables of interest, are calculated at this level. Besides, this clustering method provides for a reasonable number of clusters and a relatively balanced distribution of observations per cluster. 7 municipalities contain more than 5% of the sample observations. Prishtina / Pristina accouinst for the largest share of o observations (12.85%)

not have any effect on the probability of loan default. This suggests that emotional stress and losses related to the damage of houses and infrastructure do not influence the net benefits of non-defaulting today, K, or that the negative influence is more than compensated by recovery efforts taking place in areas with a high level of physical destruction boosting the net income from operating the business, h_t. From the perspective of a financial institution operating in a post-conflict environment our results imply that credit operations in a highly destroyed city with relatively few casualties is less risky than credit activities in an area where material damage was rather low but many people, notably women and children, were killed.

All other significant effects on default probability are in line with expectations. Positive economic development, measured by a rising nightlight intensity, lowers default probability. Results of Model 3 suggest that a one standard deviation increase of nightlight intensity (9.78) leads to a 22.79 bps reduction in default probability (24.50% of average default rate).

In line with most findings of the microfinance literature female clients are characterized by a 36.97 bps lower default probability than male borrowers, which corresponds to 39.75% of the average default rate. Moreover, loans granted to borrowers with a larger household size are less likely to default. Finally, there is evidence that borrowers of Serbian nationality on average repay the debt with 47.16 bps higher probability. Borrowers whose loan applications were rejected before receiving the first loan represent higher credit risk. Even after controlling for other borrower and business characteristics a prior rejection from the bank decreases the likelihood of loan repayment by 63.84 bps. Somewhat surprisingly repeated borrowers are not less likely to default.

In line with the view that fixed assets might serve as collateral and hence prevent borrowers from engaging in moral hazard, we find that borrowers covering a higher share of the loan

amount applied for with fixed assets are less likely to default. By contrast, the effect of business size on default probability is inconclusive. It is positive when excluding loan characteristics from the analysis, notably the size of the loan the client applied for (Model 2). However, when accounting for the applied loan size (Model 3), the coefficient becomes significantly negative. As expected, higher indebtedness is associated with a higher probability of default. This finding holds in particular for debt originating from the Bank, as the marginal effect is substantially higher than the effect of debt funded by other institutions. Finally, results suggest that the presence of a loan guarantor reduces the probability of loan default.

4.2. The war exposure effect over time

We expand our analysis of the impact of war exposure on loan default probability by testing hypothesis 2, i.e. whether and how its size and significance vary over time. We do so by employing interaction terms between the war exposure variable and year fixed effects. Results (Table 8) provide a clear rejection of hypothesis 2a: the effect of war exposure on the probability of default is not observed in the immediate post-conflict period, i.e. when memories about atrocities and other war events are still fresh and alive, and do not decline over time. By contrast, we find support for hypothesis 2b: in 2009 and 2010, i.e. the years representing a recession period triggered by the global financial crisis, the interaction terms become highly significant.

- Insert Table 8 -

The global financial crisis had a strong impact on the Kosovar economy (Odenius and Domi, 2012; IMF, 2013). GDP growth rates declined substantially in 2008 and 2009 even though they remained in positive territory (Figure 4). Moreover, financial conditions deteriorated as pri-

vate credit growth dropped from more than 40% p.a. in March 2008 to less than 10% p.a. in March 2010 (IMF, 2010).

- Insert Figure 4 -

The recession and the credit crunch imply a significant loss in access to resources. While all borrowers are affected by the crunch, in line with expectations default rates among borrowers with a higher degree of war exposure show a significantly more pronounced increase in default probability. Concretely, our estimates show that war exposure effects account for approximately a third of the average default rates observed over the crisis. A one standard deviation increase in war exposure is associated with a 21.23 bps higher propensity to default in 2009, while a similar increase in war exposure is associated with a 108.47 bps increase in default probability in 2010. Thus, the war exposure effects captured by the interaction terms amount to 30.48% and 33.63% of average default rates in the respective years.

Figure 5 illustrates the result by depicting the dynamics of default rates in municipalities grouped by the level of war exposure. The first group represents municipalities with a high exposure to war atrocities, which we define as districts where the number of female and children casualties is larger than the median value of the distribution. The second group covers municipalities with a low level of war exposure, i.e. districts where the number of female and children casualties is below the median value. For both groups we calculate the average default rate per year.

In years 2003 - 2007 the default rates in municipalities with high and low exposure to war atrocities are basically identical. However, in 2008 they start to diverge. Divergence becomes more pronounced in 2009 and reaches its peak in 2010, even though default rates rise in both groups. In 2010, the default rate in the high exposure group is more than twice as large as in the low exposure group. In 2011 the trends on default rates start converging again.

- Insert Figure 5 -

We further explore the crisis-war exposure-default nexus by asking whether the relevance of war exposure for default probabilities during the global financial depends on the degree with which municipalities were hit by the crisis. In terms of our conceptual framework: we test whether cross-district differences in resource losses make a difference with regard to the significance of war exposure effects on loan default probability during the global financial crisis.

We answer this question by again making use of information on local economic trends extracted from the nightlight satellite images. Concretely, for each district we calculate the difference in nightlight intensity between 2007 and 2010 and use it as a proxy for the resource loss borrowers in the respective districts experienced on average during the crisis years. Our calculations indicate that Kosovka Mitrovica / Mitrovice is the district most severely hit by the crisis (-13.62) while Gora / Dragash is the municipality where the crisis impact was most subdued (+2.82). Based on these calculations, we create a dummy variable that takes the value of 1 if borrowers are located in districts where the change in nightlight intensity from 2007 until 2010 does not exceed the median value (+1.15) and zero otherwise. On average districts in the group of heavily affected municipalities ("Strong crisis impact") record a drop in nightlight intensity by -1.07 in the crisis years, while in the group of mildly affected districts ("Milder crisis impact") nightlight intensity increases by 1.92.

We continue by generating triple interaction terms between the war exposure variable, the district crisis dummy and year fixed effects for 2008 – 2010 and include them in our baseline model (Table 9). The triple interaction terms represent the absolute effect of a higher degree of war exposure in regions with a stronger and milder crisis impact during the crisis. Results show that the positive effect of war exposure on loan default probability in the crisis years identified in

Table 8 is driven by changing loan default probabilities in regions where the financial crisis has strongly negative effects.[28] In 2008 - 2010 the effect of war exposure is statistically and economically significant for the highly affected crisis regions, while the impact of war exposure is insignificant in regions where the crisis impact was more subdued. Again, the effects are of economic significance: For municipalities heavily affected by the crisis, a one standard deviation increase in war exposure is associated with an increase of default probability of 9.60 bps in 2008 (34.22% of average default rate in 2008), 38.09 bps in 2009 (54.70% of average default rate in 2009), and 213.45 bps in 2010 (66.18% of average default rate in 2010). Overall, we conclude that the detrimental effect of a higher degree of exposure to war atrocities on loan quality becomes evident when borrowers are hit by negative economic shocks.[29] This finding supports hypothesis 2b.

- Insert Table 9 -

[28] A Wald test rejects the hypothesis that the coefficients of triple interaction terms are equal for strong and milder crisis impact groups in 2009 and 2010.

[29] Changes in nightlight intensity might be perceived as an imperfect proxy for capturing cross-district differences in economic developments between 2008 and 2010. Thus, we run the same analysis summarized in Table 9 based on a different assessment of cross-district differences in crisis impact by making use of information provided by the Life in Transition Survey in 2010 (The data is provided under http://www.ebrd.com/cs/Satellite?c=Content&cid=1395236498263&d=Mobile&pagename=EBRD%2FContent%2FContentLayout; see also Freitag et al., 2017). The survey captures 38,864 households in 35 countries primarily of central, eastern and southeastern Europe. It includes a question on the subjective perception of survey participants on the severity of the global financial crisis impact on the respective households. The question was formulated as following: "As you know, an economic crisis is affecting the whole world and our country. How much, if at all, has this crisis affected your household in the past two years?" The degree of the crisis impact is measured on a scale from 1 ("A great deal") to 4 ("Not at all"). Results for Kosovo show that 575 out of 884 (65.05%) respondents stated that the crisis had a significant impact on their households (level 1 or 2).

As the survey provides information about the residence of the respondents, we are able to relate them (and their answers) to each Kosovar municipality and to calculate for each district the percentage of respondents assessing the crisis impact as significant (level 1 or 2). Results reveal that the crisis impact was very low in Stimlje / Shtime (ratio: 0), but very severe in in Vitina / Viti (ratio: 1). The median value of the ratio is 0.65. Again, we create a dummy variable that has the value of 1 if the percentage of significant impact responses exceeds the median value and zero otherwise. The average percentage of significant impact responses in the group of heavily affected municipalities corresponds to 0.82, which is substantially higher than 0.42 observed in the group of mildly affected districts.

Again, we generate triple interaction terms and run the loan default probability model. Results (Table A1 in the Annex) confirm that the positive effect of war exposure on loan default probability in the crisis years is driven by regions experiencing a strong crisis impact. In 2008 - 2010 the effect of war exposure is statistically and economically significant in the regions highly affected by the crisis, while the impact of war exposure is insignificant in regions of lower crisis impact. For municipalities heavily affected by the crisis, a one standard deviation increase in war exposure is associated with an increase of default probability of 14.54 bps in 2008 (51.85% of average default rate in 2008), 43.62 bps in 2009 (62.63% of average default rate in 2009), and 211.41 bps in 2010 (65.55% of average default rate in 2010). However, the Wald test shows that for this specification the influence of war exposure on loan default in the municipalities strongly affected by the crisis is statistically significantly higher than in the regions with lower crisis impact in 2008 only.

4.3. Selection model

A bank's decision to approve or reject a loan application leads to a nonrandom access to finance. Thus, our sample and hence our results might suffer from a selection bias. Most importantly, the loan approval decision might be related to the applicants' exposure to war atrocities.

Loan approval decision and borrower's war exposure could be connected through various channels. If an applicants' war experience impairs her moral reasoning, higher war intensity may lead to a stronger tendency towards misreporting or submitting intentionally inaccurate information.[30] In micro and small business finance misreporting is an issue of particular importance, since assets verification and valuation is difficult due to a lack of documentation. Hence, if borrowers with higher exposure to war atrocities are more prone to misreporting due to impairment in moral judgment, and the bank's loan officers are unable to detect it, these borrowers may get a loan with higher likelihood. Therefore, the influence of war exposure on loan default will be overestimated as it also captures the effect of misreporting.

On the other hand, exposure to war atrocities may worsen applicants' prospects to obtain a loan by reducing their social skills and hence their ability to interact with others (Baron and Markman, 2000; Bonanno, 2004). As documented in the literature on Post-Traumatic Stress Disorder (PTSD), war experience has a strong negative influence on social interactions leading to higher levels of aggressive and uncooperative behavior (Begic, 2001; Lasko et al., 1994; Catani et al., 2008; Miguel et al. 2011). As a result, the interaction between a loan officer and an applicant, which is of key importance in micro and small business finance (Armendariz and Morduch, 2010; Morvant-Roux et al., 2013; Van den Berg et al., 2015), is likely to be more difficult when the client has been exposed to war atrocities. If this leads to a negative bias of the loan officer

[30] Garmaise (2015) shows that misreporting is associated with an unobserved borrower risk characteristic, such as the degree of social capital.

when assessing the loan application, the selection of borrowers may be biased in favor of applicants with lower exposure to war atrocities.

We account for possible sample selection bias by using a probit model with sample selection (Van de Ven & Van Pragg, 1981) which extends the method proposed by Heckman (1979) on probit estimation. In the selection equation, we estimate a probit model which explains the application outcome, i.e. whether a loan is granted or not. To this end, our sample size increases by 9,360 which are loan applications that were considered but rejected at a later stage. Moreover, we use interaction terms of loan officer-client gender pairs in the selection equation as they are likely to affect the decision to grant a loan,[31] but are unlikely to influence subsequent loan repayment behavior (exclusion restriction).[32] The second equation is the probit model of loan default with a full set of control variables similar to baseline Model 3[33].

Table 10 presents coefficients and average marginal effects of the loan default probability model and the loan approval selection equation. The interaction terms between loan officers' and borrowers' genders in the selection equation are highly statistically and economically significant.[34] The second equation reveals that the effect of war exposure on default probability is not

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31 Byrne (1971) suggests that gender similarity among interacting parties leads to a positive bias in parties' perception which is confirmed by Golightly et al. (1972) in a borrower-investor context and by Pulakos and Wexley (1983) for performance appraisals in manager-subordinate dyads. By contrast, Saparito et al. (2009) apply status expectations state theory (Ridgeway and Correll, 2000, 2004) and show that male borrower-loan officer dyads have the highest level of satisfaction with credit, while female-female pairs show the lowest level. Thus, theory and evidence is inconclusive about the effect of gender on the borrower-loan officer relationship, including the loan disbursement decision. The similarity attraction paradigm suggests that female and male borrower-lender dyads are characterized with higher probability of loan approval, while status expectations state theory indicates a pecking order of male, mixed and female dyads.

32 To confirm this assumption, we add the interaction terms of loan officer and borrower gender to the borrower-bank relationship characteristics and rerun the baseline analysis. The estimates show that the interactions of the genders are insignificant. Besides, we add these variables to the set of control variables in both model equations, i.e. not only in the selection but also loan default equation. The estimates indicate that the gender interaction terms are insignificant in the loan default equation.

33 The design of the method does not permit a panel structure approach as the selection takes place only once, namely during the process of loan application assessment. Thus, for each loan in the sample the decision that this loan is granted or rejected is taken only in the beginning of the loan and not each year. Accordingly, we change the structure of the data from panel to quasi-panel, i.e. each loan corresponds to one observation in the sample. We use time fixed effects related to the year of loan application in order to control for overall economic developments and nightlight intensity. For consistency reasons we omit loans with the year of application prior to 2003, which reduces the sample of loans from 172,108 to 168,377, i.e. by just 2.17%.

34 The results are in line with the status expectation state theory, since applications submitted by male borrowers to male loan officers are associated with significantly higher approval probability, while the opposite is derived for female borrowers assessed by female bank employees.

driven by a selection bias as the war exposure variable remains statistically and economically significant. A one standard deviation increase in the number of women and children casualties (29.08) results in a 42.17 bps increase in default probability, which corresponds to 45.34% of the overall average default rate.

- Insert Table 10 -

Results of the loan default model with sample selection also confirm that the impact of economic damage caused by the war on subsequent repayment behavior is insignificant. Local trends in population density and economic activity continue to have a significant effect on the repayment behavior, but not on the selection process. In terms of economic significance, the effect of the nightlight intensity increases substantially compared to the baseline regression. A one standard deviation increase in nightlight intensity reduces the probability to default by 60.24 bps. The effects of other characteristics on loan default strengthen as well. For example, having repaid a loan (or several loans) significantly increases the chance of repayment. Moreover, higher borrower profitability turns significant and negative, which is in line with the intuition that borrowers with a larger income to asset ratio have a lower probability of default. The sole inconsistency with the baseline is the results that the default probability is higher (and not lower) when a loan is guaranteed.

4.4. Robustness checks

We run a series of robustness checks. First, we test whether our results depend on the use of Kosovar female and children casualties as the chosen proxy of war intensity (Tables A2-A4 in the Annex). We find that this is not the case. All measures of casualties and war activities are significantly associated with a rise in the probability of loan default. Moreover, we find that year

fixed effects interaction terms show basically the same pattern of impact over time as depicted in Table 8. By contrast, results on triple interactions are not robust when using other war exposure indicators and measuring the crisis impact on district level by changes in nightlight intensity (Table 9). [35] Overall, these results underscore the validity of hypothesis 1a and largely confirms hypothesis 2b.

Second, we run our baseline regressions with PAR 30 as the dependent variable. Thus, we test whether war exposure has an impact on the likelihood that the loan at termination date is in arrears for more than 30 days. This is the case for 7,871 loans (4.51% of all loans in the sample), of which 3,901 loans defaulted.[36] Results (Tables A5-A7) confirm our findings with loan default as a dependent variable as a higher degree of war exposure is associated with a higher likelihood of repayment problems. Moreover, the impact is again most pronounced in the crisis period. However, in contrast to our results with the write off loan default as the dependent variable, there is also some evidence of a negative impact of war exposure on loan quality in the immediate post-conflict period. Notably, we find a significant positive coefficients interaction term for the year 2003. Moreover, the evidence on the crisis-war exposure nexus when accounting for cross-district effects of the crisis by triple interaction terms is weaker. Finally, specifications with PAR30 as the dependent variable suggest that the degree of economic war damages has a dampening influence on the probability of default, which strengthens the conclusion that the loan repayment effects of war atrocities and war damages over the post-conflict period are distinctly different.

Third, we check the robustness of our findings with respect to the estimation technique. For this purpose, we run the baseline model using logistic, complementary log-log and linear

35 However, when calculating the crisis impact across district based on the LITS survey (see footnote 29, Table A1), triple interaction terms show a significant cross-district effect of the crisis irrespective of the indicator we use for measuring war exposure. Results are available from the authors on request.

36 For sake of comparison we employ the same observation period even though some loans went into arrears already in 2002 and before.

functions. The results are reported in Table A8. The estimates suggest that the effect of the borrowers' exposure to war atrocities on the subsequent repayment rates is positive and statistically highly significant. This holds for all modifications in estimation techniques used. Average marginal effects of the number of women and children casualties are positive and significant at least at 5% level. Moreover, estimates of the economic importance of the effect do not differ substantially from our baseline probit estimation as the impact of a one standard deviation increase in casualties varies from 17.45 to 22.68 bps.

Finally, we run a set of robustness checks varying the sample our analysis is based upon (Tables A9-A10 in the Annex). Concretely, we run the baseline regression excluding consumption and housing loans (Table A9) and including observations that were dropped as outliers in baseline regression (Table A10). There is no change with regard to our main result: a higher degree of war exposure is significantly associated with a higher probability of default.

5. Discussion and conclusions

Does borrower exposure to war activities influence loan repayment in the post-conflict period? Our analysis, based on conceptual framework developed by Guiso et al (2013) and on evidence from post-war Kosovo has a clear and robust answer: Yes, it does. Borrowers from districts observing a higher degree of war intensity and a higher number of casualties during the war show a higher probability of default in the post-conflict period. Thus, our analysis supports the view that war and war exposure have a strong impact on the individual's psychological stance and health (de Rond and Lok, 2016). This implies that micro and small businesses operating in regions with a high degree of war activities and borrowing in the post-war period assess the net benefits of defaulting today compared to tomorrow differently than borrowers living in districts

with no or a lower degree of war exposure. Hence, our result is in line with many other studies reviewed in section 2 showing a significant and detrimental effect of posttraumatic stress, triggered by war, other forms of violence, or natural disasters, on economic and financial behavior, including repayment behavior (Shahriar, 2016).

At the same time our findings indicate that a simple war exposure – posttraumatic stress – higher default probability narrative of post-war borrower behavior does not fit the data. For example, we find that the war exposure impact on default probability is strictly limited to variables capturing war intensity and war casualties. A higher degree of damages in housing and infrastructure measured in monetary units has no significant effect on default probability. Indeed, there are some specifications where the effect is negative, i.e. loan quality rises with larger financial losses. This finding can be interpreted in two ways: First, financial losses and damages do not impact borrowers' mental health to a degree that it influences repayment behavior. Alternatively, the result can be interpreted as indicating that the variable captures two opposing effects on repayment behavior. On the one hand it captures negative effects due to differences in terms of functioning caused by mental disruptions reflecting housing and infrastructure damage. On the other hand it reflects positive effects on the borrowers' ability to serve loans in the post-war period as areas with a higher degree of damages are likely to benefit from larger reconstruction efforts. These efforts usually imply more demand and higher levels of economic activity which improve borrowers' net income from operations. These positive effects might outweigh the negative effects of destruction and damage.

The importance of developments in the post-conflict period on the behavior of people experiencing trauma and mental stress during the war has been a recurrent theme of the respective literature (Sutcliffe and Vogus, 2003; Bonanno, 2004). With regard to loan repayment behavior

our analysis provides support for this view as most specifications of our probit regressions indicate that the war exposure effect on loan default is insignificant or economically small in the immediate post-conflict years. This suggests that borrowers show a record of resilience to war exposure for our variable of interest, i.e. loan default, possibly also due to positive emotions given that the war ended with the country achieving a long-awaited state of independence and a transition from a planned economy to a market economy, i.e. it was associated with a breakthrough in favor of free entrepreneurial activity borrowers running micro and small businesses arguably wanted to take advantage of.

However, positive emotions fade and resilience is challenged by new events that are again associated a) with emotional stress or b) with a decline in social and economic resources people have made use of when coping with the initial traumatic event. The global financial crisis fits nicely these general characteristics and hence represents a severe challenge to resilience essential for borrowers having been exposed to war atrocities. While loan default probabilities rise for all borrowers in the crisis years, they rise significantly more rapid and strongly for borrowers located in the districts with a higher degree of war exposure. This result suggests that the impact of war exposure on default probabilities depends on general economic conditions as they influence the degree of resilience of borrowers located in high war exposure districts. This line of reasoning receives additional, albeit non-robust support by the finding that the impact of a higher degree of war exposure on loan default probabilities in the crisis depends on the depth of the crisis in the respective districts. In the districts where the crisis was less severe, i.e. where resource losses and disappointments were likely contained, the war exposure effect in the crisis years is insignificant. Overall, this clearly indicates that war exposure matters for post-conflict repayment behavior but the impact is conditional on post-conflict developments.

For private sector development and financial institution-building projects set up in post-conflict periods our results yield two messages. First, given the application of an appropriate credit technology, sound and sustainable lending in post-conflict environments is possible and do not necessarily have to be negatively impacted by trauma related repayment behavior. Second, war exposure effects on repayment behavior in the post-conflict period are more pronounced when adverse (economic) conditions arise. This suggests that financial institutions conducting lending operations in the post-conflict period should be aware of negative war exposure effects on loan quality even when they do not materialize in the early post-conflict years due to a strong post-conflict recovery as they can be expected to emerge in periods of economic downturns and crises.

Finally, we acknowledge two caveats with regard to interpreting and generalizing our findings. First, the data our analysis is based upon does not provide for a measurement of the degree of war exposure on borrower level. Thus, in contrast to Shahriar (2016) we cannot directly link individual exposure to traumatic events with loan repayment behavior. At the same time, our analysis is not built on actual loan transactions, i.e. they are not generated by a field experiment. Moreover, given the many controls we make use of, on borrower as well as on district level, we are confident that our war exposure variables largely capture the degree of trauma experiences of borrowers during the war and no other variables influencing loan repayment behavior. Second, our results are derived from a case study. By definition this implies that they might not hold in other environments and circumstances. For example, from an entrepreneurship perspective the Kosovo case is characterized by the peculiarity that the end of the war was also associated with a change in economic regimes, i.e. the transition to a market economy. Thus, the allegedly positive effect of this transition on emotions of entrepreneurs, creating an additional layer of resilience, is

unlikely to occur in other settings which might have an impact on repayment patterns. Moreover, there is a debate whether and to what extent traumatic stress, i.e. the trigger for differences in repayment behavior, is culture specific (Kienzler, 2008), which would suggest that our Kosovo findings might not hold in post-conflict periods of countries in a different cultural environment.

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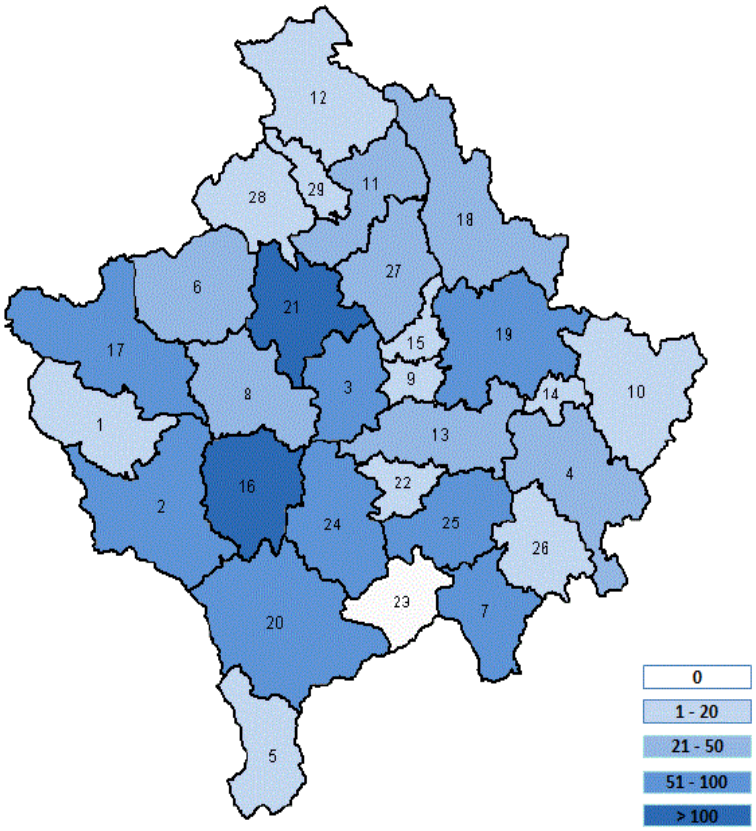
FIGURES

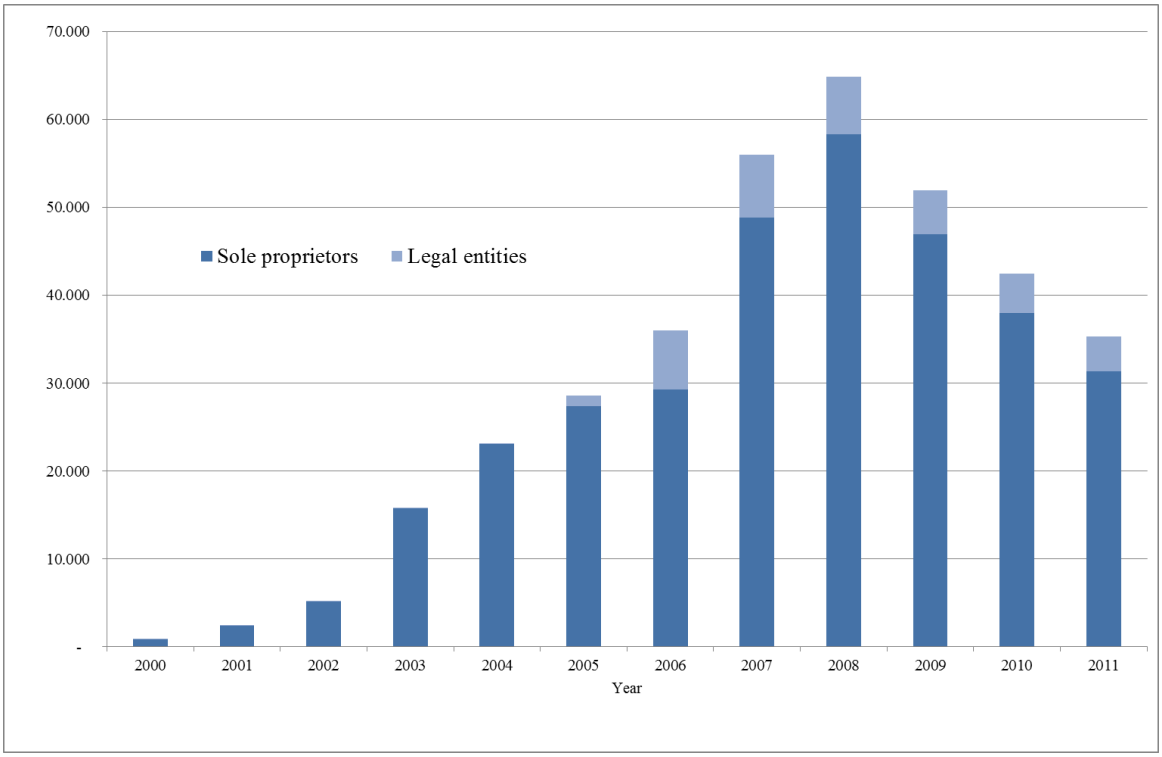
Figure 1: Number of women and children casualties per district



1 - Decani / Decane
2 - Djakovica / Gjakova
3 - Glogovac / Gllogoc
4 - Gnjilane / Gjilan
5 - Gora / Dragash
6 - Istok / Istog
7 - Kacanik / Kacanik
8 - Klina / Kline
9 - Kosovo Polje / Fushe Kosove
10 - Kosovka Kamenica / Kamenice
11 - Kosovka Mitrovica / Mitrovice
12 - Leposavic / Leposaviq
13 - Lipljan / Lipjan
14 - Novo Brdo / Novoberde
15 - Obilic / Obiliq
16 - Orahovac / Prahovec
17 - Pec / Peja
18 - Podujevo / Podujeve
19 - Pristina / Prishtina
20 - Prizren / Prizren
21 - Srbica / Skenderaj
22 - Stimlje / Shtime
23 - Strpce / Shterpce
24 - Suva Reka / Suhareke
25 - Urosevac / Ferizaj
26 - Vitina / Viti
27 - Vucitrn / Vushtrri
28 - Zubin Potok / Zubin Potok
29 - Zvecan / Zvecan

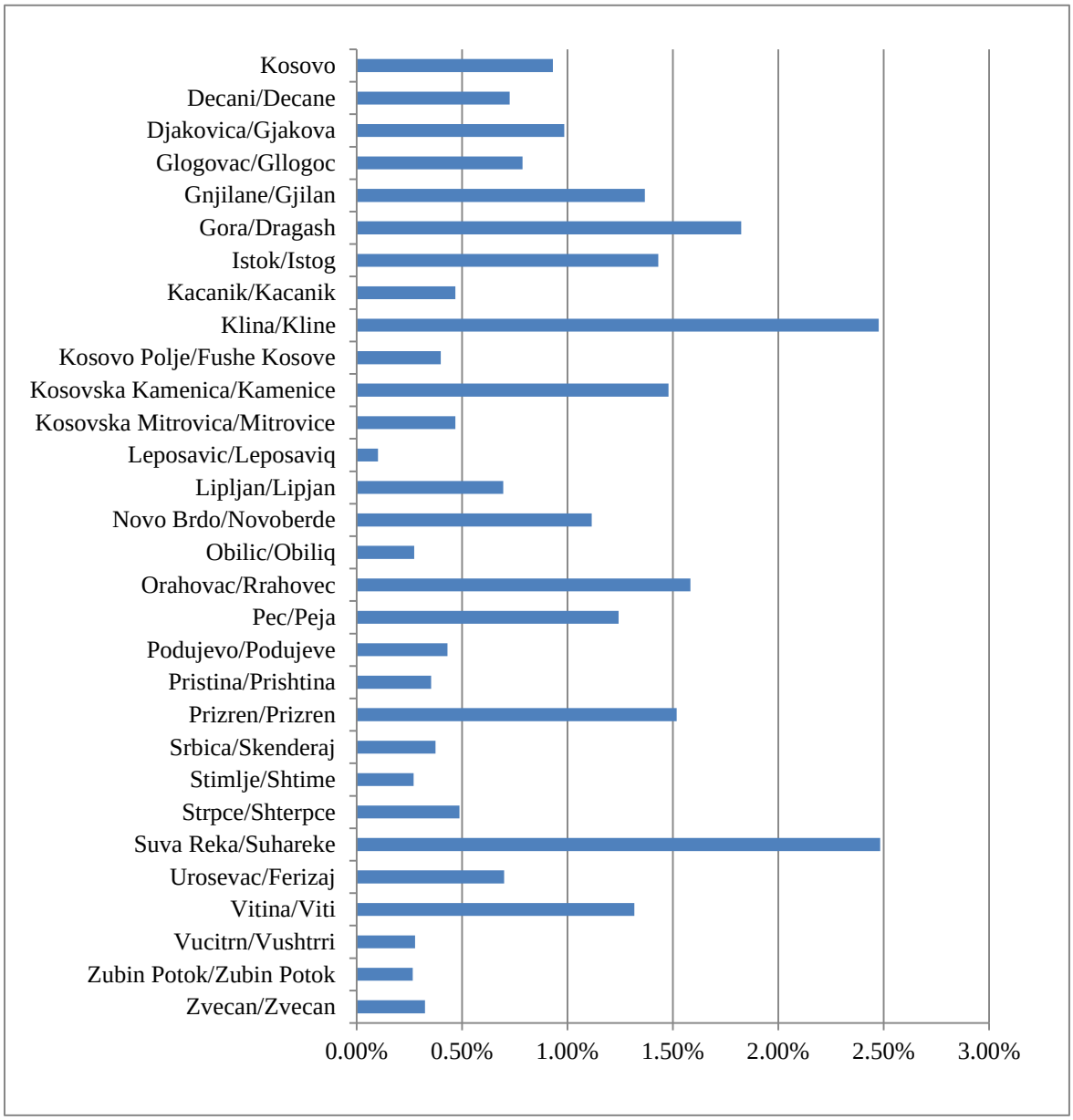
Source: Authors' calculations based on the data provided by AAAS/ABA-CEELI/ HRDAG database of killings in Kosovo (Ball et al., 2002).

Figure 2: Number of loans issued by the Bank, 2000- 2011



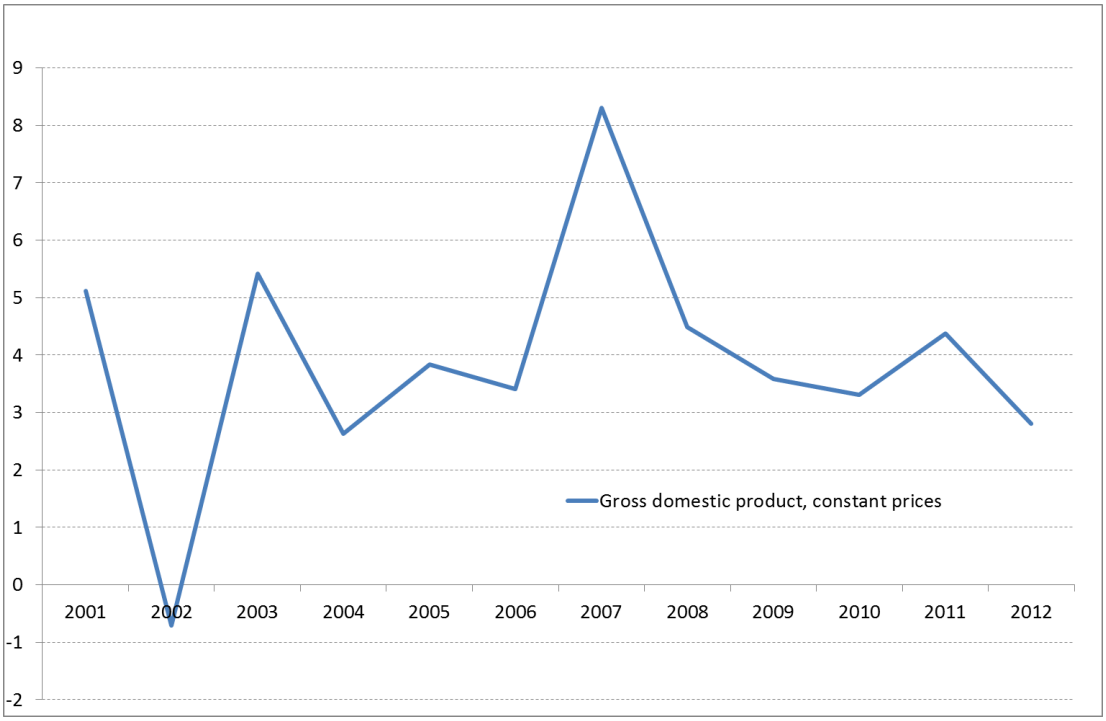
Source: Authors' calculations based on the loan portfolio dataset provided by the Bank

Figure 3: Average default rates per district, 2003-2011



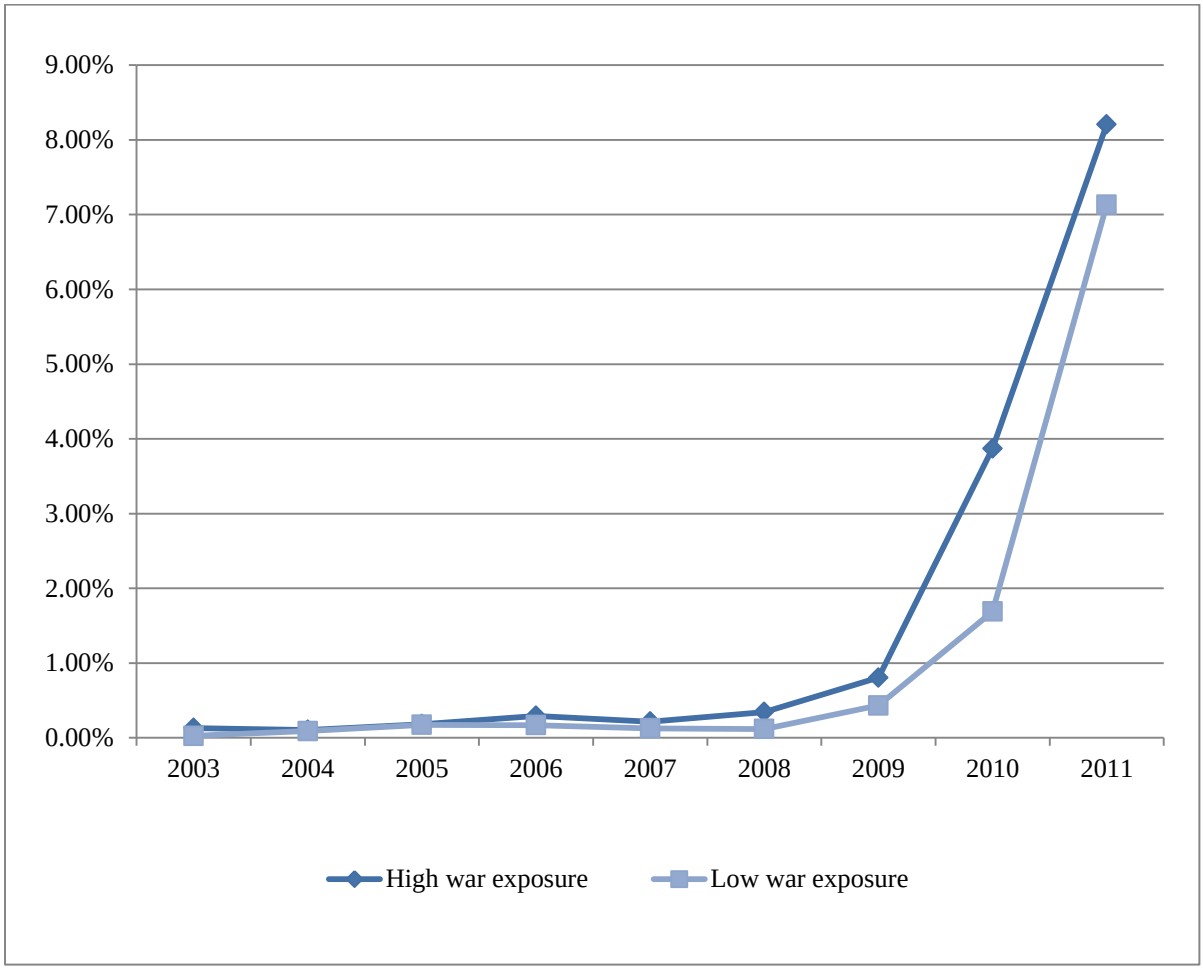
Source: Authors' calculations based on the loan portfolio dataset provided by the Bank

Figure 4: Development of GDP in Kosovo, 2001-2011



Source: IMF

Figure 5: Default rate dynamics, percentage of total loans, 2003-2011.



Source: Authors' calculations based on the loan portfolio dataset provided by the Bank

TABLES

Table 1: War casualties and activities

This table reports descriptive statistics of the measures of war casualties and activities on district level.

Variable	Obs Num	Mean	Std. Dev.	Min	Max
War Atrocities					
Women and children casualties	29	37.97	34.96	0.00	119.00
Total casualties	29	113.00	104.37	2.00	412.00
Number of KLA battles	29	2.86	5.56	0.00	27.00
Casualties of Yugoslav forces	29	15.28	18.74	0.00	71.00
Casualties in NATO bombing	29	15.09	26.90	0.00	87.00
Number of NATO airstrikes	29	12.55	11.89	1.00	54.00

Source: Authors' calculations based on the data provided by AAAS/ABA-CEELI/HRDAG database of killings in Kosovo (Ball et al., 2002) and HRDAG database of NATO airstrikes, geographic coding, and KLA activity in Kosovo (HRDAG, 2002). The information on the number of civilian casualties in NATO bombing is extracted from Arkin (2000).

Table 2: Correlation of war casualties and activities

This table reports correlation coefficients among the measures of war casualties and activities.

Variable	Obs	Women and children casualties	Total casualties	Casualties of Yugoslav forces	Number of KLA battles	Casualties in NATO bombing	Number of NATO airstrikes
Women and children casualties	29	1.000 ***	0.953 ***	0.538 ***	0.584 ***	0.241	0.384 **
Total casualties	29	0.953 ***	1.000 ***	0.513 ***	0.578 ***	0.264	0.433 **
Casualties of Yugoslav forces	29	0.538 ***	0.513 ***	1.000 ***	0.283	0.643 ***	0.831 ***
Number of KLA battles	29	0.584 ***	0.578 ***	0.283	1.000 ***	0.079	0.071
Casualties in NATO bombing	29	0.241	0.264	0.643 ***	0.079	1.000 ***	0.694 ***
Number of NATO airstrikes	29	0.384 **	0.433 **	0.831 ***	0.071	0.694 ***	1.000 ***

*** $p < 0.01$, ** $p < 0.05$, * $p < 0.1$

Source: Authors' calculations based on the data provided by AAAS/ABA-CEELI/HRDAG database of killings in Kosovo (Ball et al., 2002) and HRDAG database of NATO airstrikes, geographic coding, and KLA activity in Kosovo (HRDAG, 2002). The information on the number of civilian casualties in NATO bombing is extracted from Arkin (2000).

Table 3: Financial damages of war activities

This table reports descriptive statistics of financial damages caused by war activities on district level.

Variable	Obs Num	Mean	Std. Dev.	Min	Max
War Financial Damage, kEUR					
Housing and local infrastructure damage, kEUR	28	41,325.14	34,935.14	33.00	138,316.00
Damage on housing stock, kEUR	28	39,940.82	33,986.31	33.00	134,950.00
Damage on local infrastructure, kEUR	28	1,384.32	1,048.48	0.00	3,366.00
Damage on education facilities, kEUR	28	722.29	528.89	0.00	1,464.00
Damage on health facilities, kEUR	28	143.18	121.36	0.00	368.00
Damage on electricity distribution network, kEUR	28	344.57	293.19	0.00	895.00
Damage on water distribution network, kEUR	28	174.29	166.40	0.00	690.00

Source: Authors' calculations based on the data provided in the damage assessment report of the International Management Group (IMG, 1999).

Table 4: Correlation of war financial damages and measures of war casualties and activities

This table reports correlation coefficients among war financial damage measures and between measures of war financial damages and war casualties and activities.

Variable	Obs	Housing and infrastructure damage	Damage on housing stock	Damage on local infrastructure	Damage on education facilities	Damage on health facilities	Damage on electricity distribution network	Damage on water distribution network
Women and children casualties	28	0.059	0.075	-0.153	-0.202	-0.058	0.106	0.162
Total casualties	28	-0.048	-0.037	-0.175	-0.203	-0.063	-0.029	0.080
Casualties of Yugoslav forces	28	0.044	0.055	-0.097	-0.136	0.000	0.135	0.070
Number of KLA battles	28	0.104	0.112	-0.024	-0.069	0.035	0.152	0.146
Casualties in NATO bombing	28	0.076	0.082	-0.018	-0.057	0.044	0.114	0.124
Number of NATO airstrikes	28	-0.063	-0.059	-0.103	-0.121	0.030	-0.016	-0.034
Housing and infrastructure damage	28	1.000 ***	0.998 ***	0.726 ***	0.566 ***	0.657 ***	0.801 ***	0.669 ***
Damage on housing stock	28	0.998 ***	1.000 ***	0.687 ***	0.520 ***	0.638 ***	0.811 ***	0.679 ***
Damage on local infrastructure	28	0.726 ***	0.687 ***	1.000 ***	0.958 ***	0.700 ***	0.442 **	0.341 *
Damage on education facilities	28	0.566 ***	0.520 ***	0.958 ***	1.000 ***	0.506 ***	0.206	0.100
Damage on health facilities	28	0.657 ***	0.638 ***	0.700 ***	0.506 ***	1.000 ***	0.670 ***	0.502 ***
Damage on electricity distribution network	28	0.801 ***	0.811 ***	0.442 **	0.206	0.670 ***	1.000 ***	0.715 ***
Damage on water distribution network	28	0.669 ***	0.679 ***	0.341 *	0.100	0.502 ***	0.715 ***	1.000 ***

*** p < 0.01, ** p < 0.05, * p < 0.1

Source: Authors' calculations based on the data provided in the AAAS/ABA-CEELI/HRDAG database of killings in Kosovo (Ball et al, 2002), HRDAG's database of NATO airstrikes, geographic coding, and KLA activity in Kosovo (HRDAG, 2002), Arkin (2000), and damage assessment report of the IMG (IMG, 1999).

Table 5: Variable definition

This table lists all variables used in the analysis, their definitions and sources.

Variable	*Definition*	*Data Source*
Write off loan default indicator	Binary variable identifying loans written off by the Bank	Bank loan portfolio
PAR30 loan default indicator	Binary variable identifying loans in more than 30 days in arrears	Bank loan portfolio
War Exposure Characteristics		
Women and children casualties	Number of Kosovo Albanian female and child civilians killed from March 20, 1999 until June 19, 1999	AAAS / ABA-CEELI / HRDAG
Total casualties	Number of all Kosovo Albanian civilians killed from March 20, 1999 until June 19, 1999	AAAS / ABA-CEELI / HRDAG
Casualties of Yugoslav forces	Number of Yugoslav government casualties sustained in armed confrontation between the KLA and Yugoslav authorities from March 20, 1999 until June 22, 1999	HRDAG
Number of KLA battles	Number of battles (cases of fire exchange) between the KLA and Yugoslav forces from March 20, 1999 until June 22, 1999	HRDAG
Casualties in NATO bombing	Number of civilian deaths in NATO bombing campaign Operation Allied Force	HRW
Number of NATO airstrikes	Number of NATO airstrikes in the bombing campaign Operation Allied Force	HRDAG
Housing and infrastructure damage	Estimated damage on housing stock and local infrastructure including education, health, water and electricity distribution (in kEUR) divided by the total number of houses assessed	IMG
Population Density And Economic Activity		
Nightlight intensity	Average nightlight intensity in the radius of 5 km around the municipality's center in the previous year	DMSP OLS Global Composites
Change in nightlight intensity	Change in average nightlight intensity in the radius of 5 km around the municipality's center in the previous year	DMSP OLS Global Composites
Borrower's Characteristics		
Female borrower	Binary (dummy) variable indicating female borrowers	Bank loan portfolio
Borrower's age	Borrower's age (in years)	Bank loan portfolio
Borrower's age squared	Squared value of borrower's age	Bank loan portfolio
Marital status (married borrower)	Binary (dummy) variable indicating married borrowers	Bank loan portfolio
Household size	Number of members in borrower's household	Bank loan portfolio
Serbian nationality	Binary (dummy) variable indicating borrowers of Serbian nationality (self-reported)	Bank loan portfolio
Borrower-Bank Relationship Characteristics		
Number of repaid loans, one	Binary (dummy) variable indicating that the borrower has repaid one loan prior to the beginning of the year	Bank loan portfolio
Number of repaid loans, two	Binary (dummy) variable indicating that the borrower has repaid two loans prior to the beginning of the year	Bank loan portfolio
Number of repaid loans, three or more	Binary (dummy) variable indicating that the borrower has repaid at least three loans prior to the beginning of the year	Bank loan portfolio
Prior rejection from the Bank	Binary (dummy) variable indicating that at least one of the borrower's applications was registered as rejected by the Bank prior to the beginning of the year	Bank loan portfolio
Business Characteristics		
Business size, ln	Total assets in EUR adjusted to inflation (logarithm)	Bank loan portfolio
Income to total assets	Net business and non-business income relative to total assets	Bank loan portfolio
Fixed assets availability	Fixed assets (relative to the amount of loan application)	Bank loan portfolio
Current loans from the Bank	Amount of outstanding loans from the Bank at the moment of loan application (as a percentage of total assets)	Bank loan portfolio
Borrower's indebtedness with other FI	Amount of outstanding loans from other financial institutioons at the moment of loan application (as a percentage of total assets)	Bank loan portfolio
Sector	Binary (dummy) variables indicating the sector of economic activity (Agriculture, Construction, Consumption, Housing, Manufacturing, Other Services, Tourism, Trade, Transport)	Bank loan portfolio

continued on next page

Table 5 continued

Loan Characteristics		
Amount of loan application	Amount of loan application in EUR adjusted to inflation (logarithm)	Bank loan portfolio
Mortgage	Binary (dummy) variable indicating mortgage loans	Bank loan portfolio
Chattel mortgage	Binary (dummy) variable indicating chattel mortgage loans	Bank loan portfolio
Loan guarantor	Binary (dummy) variable indicating loans with guarantors	Bank loan portfolio
Loan purpose	Binary (dummy) variables indicating loan purpose (Consumption, Working capital, Fixed assets, Mixed, Housing, Building)	Bank loan portfolio

Table 6: Descriptive Statistics

This table reports descriptive statistics of variables used. In the regression models we use the logarithms of "Business size" and "Amount of loan application".

Variable	Obs Num	Mean	Std. Dev.	Min	P25	Median	P75	Max
Write off loan default indicator	419,666	0.0093	0.10	0.00	0.00	0.00	0.00	1.00
PAR 30 loan default indicator	416,697	0.0189	0.14	0.00	0.00	0.00	0.00	1.00
War Exposure Characteristics								
Women and children casualties	419,666	50.74	29.08	0.00	23.00	51.00	71.00	119.00
Total casualties	419,666	157.03	92.64	2.00	77.00	154.00	223.00	412.00
Casualties of Yugoslav forces	419,666	26.09	24.38	0.00	9.00	17.00	51.00	71.00
Number of KLA battles	419,666	3.51	5.34	0.00	0.00	2.00	4.50	27.00
Casualties in NATO bombing	419,666	26.52	32.32	0.00	2.00	6.00	64.00	87.00
Number of NATO airstrikes	419,666	21.12	15.85	1.00	9.00	17.00	30.00	54.00
Housing and infrastructure damage, kEUR per house	413,761	5.05	2.69	0.09	3.24	4.93	6.76	16.08
Damage on housing stock, kEUR per house	413,761	4.85	2.60	0.09	3.12	4.68	6.44	14.88
Damage on local infrastructure, kEUR per house	413,761	0.20	0.14	0.00	0.13	0.19	0.26	1.19
Damage on education facilities, kEUR per house	413,761	0.11	0.11	0.00	0.06	0.10	0.15	1.05
Damage on health facilities, kEUR per house	413,761	0.02	0.02	0.00	0.01	0.02	0.03	0.23
Damage on electricity distribution network, kEUR per house	413,761	0.04	0.02	0.00	0.02	0.04	0.06	0.12
Damage on water distribution network, kEUR per house	413,761	0.02	0.01	0.00	0.01	0.02	0.03	0.08
Population Density And Economic Activity								
Nightlight intensity	419,666	16.49	9.78	0.05	8.08	15.54	21.66	39.07
Change in nightlight intensity	419,666	-0.05	2.51	-14.73	-1.57	-0.19	1.56	6.35
Borrower's Characteristics								
Female borrower	419,666	0.17	0.38	0.00	0.00	0.00	0.00	1.00
Borrower's age	419,666	39.58	11.54	17.47	30.08	38.61	47.87	76.10
Borrower's age squared	419,666	1,699.64	976.83	305.30	905.02	1,490.88	2,291.14	5,791.83
Married borrower	419,666	0.84	0.36	0.00	1.00	1.00	1.00	1.00
Household size	419,666	5.39	2.99	0.00	4.00	5.00	6.00	96.00
Serbian nationality	419,666	0.04	0.19	0.00	0.00	0.00	0.00	1.00
Borrower-Bank Relationship Characteristics								
Number of repaid loans, one	419,666	0.22	0.41	0.00	0.00	0.00	0.00	1.00
Number of repaid loans, two	419,666	0.10	0.29	0.00	0.00	0.00	0.00	1.00
Number of repaid loans, three or more	419,666	0.07	0.25	0.00	0.00	0.00	0.00	1.00
Prior rejection from the Bank	419,666	0.02	0.14	0.00	0.00	0.00	0.00	1.00

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Table 6 continued

Business Characteristics								
Business size, EUR	409,226	8,546.53	19,687.39	83.40	1,639.34	3,731.12	8,216.31	584,397.25
Income to total assets	406,549	0.30	0.48	0.01	0.07	0.14	0.31	5.85
Fixed assets availability	413,037	2.38	3.31	0.00	0.42	1.22	2.99	43.60
Current loans from the Bank	409,226	0.04	0.11	0.00	0.00	0.00	0.00	1.00
Borrower's indebtedness with other FI	409,226	0.03	0.11	0.00	0.00	0.00	0.00	1.00
Sector Agriculture	412,560	0.25	0.43	0.00	0.00	0.00	0.00	1.00
Sector Construction	412,560	0.03	0.17	0.00	0.00	0.00	0.00	1.00
Sector Consumption	412,560	0.23	0.42	0.00	0.00	0.00	0.00	1.00
Sector Housing	412,560	0.25	0.43	0.00	0.00	0.00	0.00	1.00
Sector Manufacturing	412,560	0.01	0.12	0.00	0.00	0.00	0.00	1.00
Sector Other Services	412,560	0.11	0.31	0.00	0.00	0.00	0.00	1.00
Sector Tourism	412,560	0.01	0.09	0.00	0.00	0.00	0.00	1.00
Sector Trade	412,560	0.10	0.30	0.00	0.00	0.00	0.00	1.00
Sector Transport	412,560	0.02	0.13	0.00	0.00	0.00	0.00	1.00
Loan Characteristics								
Amount of loan application, EUR	419,666	3,416.93	6,133.19	2.68	892.06	1,766.78	4,028.20	207,468.88
Mortgage	419,666	0.01	0.12	0.00	0.00	0.00	0.00	1.00
Chattel mortgage	419,666	0.67	0.47	0.00	0.00	1.00	1.00	1.00
Loan guarantor	419,666	0.62	0.49	0.00	0.00	1.00	1.00	1.00
Consumption loan	419,666	0.21	0.41	0.00	0.00	0.00	0.00	1.00
Working capital loan	419,666	0.28	0.45	0.00	0.00	0.00	1.00	1.00
Fixed assets loan	419,666	0.14	0.35	0.00	0.00	0.00	0.00	1.00
Mixed business loan	419,666	0.10	0.30	0.00	0.00	0.00	0.00	1.00
Housing loan	419,666	0.27	0.44	0.00	0.00	0.00	1.00	1.00
Building loan	419,666	0.00	0.05	0.00	0.00	0.00	0.00	1.00

Table 7: Baseline results

This table reports coefficients and average marginal effects of the loan default probit models. The dependent variable is the Write off loan default indicator. War exposure is measured by the number of women and children casualties on district level. Model 1 contains only variables generated on district level and year time fixed effects. Model 2 includes district level variables, year time fixed effects, borrower characteristics, borrower-bank relationship characteristics, and business characteristics. Model 3 contains the full set of control variables including (potentially endogenous) loan characteristics and year time fixed effects.

	Model 1		Model 2		Model 3	
	Coeff	AME	Coeff	AME	Coeff	AME
War Exposure Characteristics						
Women and children casualties	0.003319**	0.000071**	0.003141**	0.000064**	0.002987**	0.000060**
	(0.001)	(0.000)	(0.001)	(0.000)	(0.001)	(0.000)
Housing and infrastructure damage	-0.026062	-0.000558	-0.019481	-0.000395	-0.020276	-0.000406
	(0.016)	(0.000)	(0.013)	(0.000)	(0.014)	(0.000)
Population Density And Economic Activity						
Nightlight intensity	-0.011260**	-0.000241**	-0.011205***	-0.000227***	-0.011638***	-0.000233***
	(0.005)	(0.000)	(0.004)	(0.000)	(0.004)	(0.000)
Change in nightlight intensity	0.011877	0.000254	0.005896	0.000119	0.006789	0.000136
	(0.009)	(0.000)	(0.010)	(0.000)	(0.010)	(0.000)
Borrower's Characteristics						
Female borrower			-0.186478***	-0.003778***	-0.184684***	-0.003697***
			(0.032)	(0.001)	(0.032)	(0.001)
Borrower's age			-0.006632	-0.000134	-0.006406	-0.000128
			(0.005)	(0.000)	(0.005)	(0.000)
Borrower's age squared			-0.000061	-0.000001	-0.000065	-0.000001
			(0.000)	(0.000)	(0.000)	(0.000)
Marital status (maried borrower)			0.028643	0.000580	0.022518	0.000451
			(0.019)	(0.000)	(0.018)	(0.000)
Household size			-0.010391*	-0.000211*	-0.012178**	-0.000244**
			(0.005)	(0.000)	(0.005)	(0.000)
Serbian nationality			-0.206172***	-0.004177***	-0.235563***	-0.004716***
			(0.052)	(0.001)	(0.051)	(0.001)
Borrower-Bank Relationship Characteristics						
Number of repaid loans, one			-0.021123	-0.000428	-0.028611	-0.000573
			(0.032)	(0.001)	(0.034)	(0.001)
Number of repaid loans, two			-0.036466	-0.000739	-0.044975	-0.000900
			(0.043)	(0.001)	(0.045)	(0.001)
Number of repaid loans, three or more			-0.069063	-0.001399	-0.070568	-0.001413
			(0.067)	(0.001)	(0.069)	(0.001)
Prior rejection from the Bank			0.337233***	0.006833***	0.318869***	0.006384***
			(0.037)	(0.001)	(0.037)	(0.001)
Business Characteristics						
Business size			0.172325***	0.003491***	-0.049949*	-0.001000*
			(0.021)	(0.000)	(0.027)	(0.001)
Income to total assets			0.143218**	0.002902**	-0.043714	-0.000875
			(0.057)	(0.001)	(0.078)	(0.002)
Fixed assets availability			-0.082278***	-0.001667***	-0.026292***	-0.000526***
			(0.008)	(0.000)	(0.007)	(0.000)
Current loans from the Bank			0.990015***	0.020058***	0.953471***	0.019089***
			(0.081)	(0.002)	(0.081)	(0.002)
Borrower's indebtedness with other FI			0.132416*	0.002683*	0.147916**	0.002961*
			(0.073)	(0.002)	(0.075)	(0.002)

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Table 7 continued

Loan Characteristics				
Amount of loan application, ln			0.278088***	0.005567***
			(0.016)	(0.000)
Mortgage			0.032831	0.000657
			(0.055)	(0.001)
Chattel mortgage			0.013869	0.000278
			(0.042)	(0.001)
Loan guarantor			-0.081930***	-0.001640***
			(0.030)	(0.001)
Constant	-2.926491***	-4.077406***	-5.349293***	
	(0.155)	(0.226)	(0.296)	
Number of observations	413,761	393,792	393,792	
Pseudo R-squared	0.189	0.262	0.272	
Year Fixed Effects (reference year 2003)	Yes	Yes	Yes	
Sector Fixed Effects	No	Yes	Yes	
Loan Purpose Fixed Effects	No	No	Yes	

Standard errors clustered at municipality level in paranthesis
*** p < 0.01, ** p < 0.05, * p < 0.1

Table 8: War exposure effects over time

This table reports coefficients and average marginal effects of the loan default probit model with interactions of the war exposure measure with year time fixed effects. The dependent variable is the Write off loan default indicator. War exposure is measured by the number of women and children casualties on district level. The model contains the full set of control variables, year time fixed effects as well as interactions of the housing and infrastructure damage and year time fixed effects.

	Coeff	AME
War Exposure Characteristics		
Women and children casualties * Year 2003	0.003069	0.000010
	(0.002)	(0.000)
Women and children casualties * Year 2004	-0.000533	-0.000002
	(0.002)	(0.000)
Women and children casualties * Year 2005	0.000652	0.000004
	(0.002)	(0.000)
Women and children casualties * Year 2006	0.000285	0.000002
	(0.001)	(0.000)
Women and children casualties * Year 2007	0.002297	0.000013
	(0.002)	(0.000)
Women and children casualties * Year 2008	0.002517	0.000021
	(0.002)	(0.000)
Women and children casualties * Year 2009	0.003776**	0.000073*
	(0.002)	(0.000)
Women and children casualties * Year 2010	0.005176**	0.000373**
	(0.002)	(0.000)
Women and children casualties * Year 2011	0.001342	0.000193
	(0.002)	(0.000)
Population Density And Economic Activity		
Nightlight intensity	-0.011358***	-0.000227***
	(0.004)	(0.000)
Change in nightlight intensity	0.007049	0.000141
	(0.009)	(0.000)
Constant	-3.088529***	
	(0.244)	
Number of observations	393,792	
Pseudo R-squared	0.273	
Borrower's Characteristics	Yes	
Borrower-Bank Relationship Characteristics	Yes	
Business Characteristics	Yes	
Loan Characteristics	Yes	
Year Fixed Effects (reference year 2003)	Yes	
Housing and infrastructure damage * Year FE	Yes	

Standard errors clustered at municipality level in paranthesis
*** p < 0.01, ** p < 0.05, * p < 0.1

Table 9: War exposure effects in the global financial crisis across districts

This table reports coefficients and average marginal effects of the loan default probit model with interactions of the war exposure measure, crisis year fixed effects and the crisis impact indicator. The dependent variable is the Write off loan default indicator. War exposure is measured by the number of women and children casualties on district level. The model is complemented with the Wald test results testing the hypothesis that coefficients of triple interaction terms are equal for districts grouped as districts with a strong and milder crisis impact in each crisis year (2008 - 2010). The model contains the full set of control variables, year time fixed effects as well as interactions of the housing and infrastructure damage and year time fixed effects, interactions of crisis year fixed effects and the crisis impact indicator, and triple interactions of the housing and infrastructure damage, crisis year fixed effects and the crisis impact indicator.

	Coeff	AME
War Exposure Characteristics		
Women and children casualties * Year 2003	0.003070	0.000010
	(0.002)	(0.000)
Women and children casualties * Year 2004	-0.000566	-0.000002
	(0.002)	(0.000)
Women and children casualties * Year 2005	0.000677	0.000004
	(0.002)	(0.000)
Women and children casualties * Year 2006	0.000338	0.000003
	(0.001)	(0.000)
Women and children casualties * Year 2007	0.002311	0.000013
	(0.002)	(0.000)
Women and children casualties * Year 2008 * Milder crisis impact	0.000459	0.000004
	(0.002)	(0.000)
Women and children casualties * Year 2008 * Strong crisis impact	0.004238**	0.000033**
	(0.002)	(0.000)
Women and children casualties * Year 2009 * Milder crisis impact	0.001834	0.000039
	(0.002)	(0.000)
Women and children casualties * Year 2009 * Strong crisis impact	0.007559***	0.000131***
	(0.002)	(0.000)
Women and children casualties * Year 2010 * Milder crisis impact	0.003009	0.000217
	(0.002)	(0.000)
Women and children casualties * Year 2010 * Strong crisis impact	0.010310***	0.000734***
	(0.003)	(0.000)
Women and children casualties * Year 2011	0.001390	0.000200
	(0.002)	(0.000)
Population Density And Economic Activity		
Nightlight intensity	-0.012072**	-0.000240**
	(0.005)	(0.000)
Change in nightlight intensity	0.010222	0.000204
	(0.010)	(0.000)
Constant	-3.044266***	
	(0.235)	
Number of observations	393,792	
Pseudo R-squared	0.275	
Borrower's Characteristics	Yes	
Borrower-Bank Relationship Characteristics	Yes	
Business Characteristics	Yes	
Loan Characteristics	Yes	
Year Fixed Effects (reference year 2003)	Yes	
Housing and infrastructure damage * Year	Yes	
Crisis Year (2008 - 2010) * Strong (Milder) crisis impact	Yes	
Housing and infrastructure damage * Crisis Year (2008 - 2010) * Strong (Milder crisis impact)	Yes	

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Table 9 continued

Wald Test Results	
H0 : β (Women and children casualties * Year 2008 * Strong crisis impact) = β (Women and children casualties * Year 2008 * Milder crisis impact)	
HA: β (Women and children casualties * Year 2008 * Strong crisis impact) != β (Women and children casualties * Year 2008 * Milder crisis impact)	
Chi-squared	1.83
P- Value	0.1764
H0 : β (Women and children casualties * Year 2009 * Strong crisis impact) = β (Women and children casualties * Year 2009 * Milder crisis impact)	
HA: β (Women and children casualties * Year 2009 * Strong crisis impact) != β (Women and children casualties * Year 2009 * Milder crisis impact)	
Chi-squared	3.39*
P- Value	0.0656
H0 : β (Women and children casualties * Year 2010 * Strong crisis impact) = β (Women and children casualties * Year 2010 * Milder crisis impact)	
HA: β (Women and children casualties * Year 2010 * Strong crisis impact) != β (Women and children casualties * Year 2010 * Milder crisis impact)	
Chi-squared	5.04**
P- Value	0.0248

Standard errors clustered at municipality level in paranthesis
*** p < 0.01, ** p < 0.05, * p < 0.1

Table 10: Selection model

This table contains coefficients and average marginal effects of the loan default probability model estimated as a probit model with sample selection proposed by Van de Ven and Van Pragg (1981). The dependent variable is the Write off loan default indicator. War exposure is measured by the number of women and children casualties on district level. The model contains the full set of control variables and year of application time fixed effects.

	Coeff		AME	
	Approval	Default	Approval	Default
War Exposure Characteristics				
Women and children casualties	-0.000830	0.003112**	-0.000075	0.000145*
	(0.001)	(0.001)	(0.000)	(0.000)
Housing and infrastructure damage	-0.013558*	-0.020267	-0.001226*	-0.000947
	(0.008)	(0.015)	(0.001)	(0.001)
Population Density And Economic Activity				
Nightlight intensity	0.001591	-0.013185**	0.000144	-0.000616**
	(0.002)	(0.005)	(0.000)	(0.000)
Change in nightlight intensity	-0.012299	0.002970	-0.001112	0.000139
	(0.011)	(0.013)	(0.001)	(0.001)
Borrower's Characteristics				
Female borrower	0.133691***	-0.167129***	0.012090***	-0.007806***
	(0.033)	(0.030)	(0.003)	(0.002)
Borrower's age	-0.000768	-0.003132	-0.000069	-0.000146
	(0.004)	(0.005)	(0.000)	(0.000)
Borrower's age squared	0.000023	-0.000083	0.000002	-0.000004
	(0.000)	(0.000)	(0.000)	(0.000)
Married borrower	0.002700	-0.025359	0.000244	-0.001184
	(0.018)	(0.020)	(0.002)	(0.001)
Household size	0.007126**	-0.012218**	0.000644**	-0.000571**
	(0.003)	(0.005)	(0.000)	(0.000)
Serbian nationality	-0.004898	-0.292259***	-0.000443	-0.013650***
	(0.089)	(0.055)	(0.008)	(0.003)
Borrower-Bank Relationship Characteristics				
Number of repaid loans, one	0.104287***	-0.057449**	0.009431***	-0.002683*
	(0.018)	(0.029)	(0.002)	(0.001)
Number of repaid loans, two or more	0.206801***	-0.116471**	0.018702***	-0.005440**
	(0.023)	(0.051)	(0.002)	(0.003)
Prior rejection from the Bank	-0.846380***	0.144904***	-0.076541***	0.006768***
	(0.045)	(0.046)	(0.004)	(0.002)

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Table 10 continued

Business Characteristics				
Business size	0.095730***	-0.161688***	0.008657***	-0.007552***
	(0.020)	(0.033)	(0.002)	(0.002)
Income to total assets	-0.121064***	-0.295665***	-0.010948***	-0.013809***
	(0.034)	(0.106)	(0.003)	(0.005)
Fixed assets availability	-0.025075***	-0.012337*	-0.002268***	-0.000576*
	(0.002)	(0.006)	(0.000)	(0.000)
Current loans from the Bank	-0.686493***	1.289998***	-0.062082***	0.060249***
	(0.037)	(0.097)	(0.004)	(0.007)
Borrower's indebtedness with other FI	-0.937841***	0.227243***	-0.084812***	0.010613***
	(0.058)	(0.076)	(0.005)	(0.004)
Loan Characteristics				
Amount of loan application, ln	-0.332961***	0.418305***	-0.030111***	0.019537***
	(0.025)	(0.017)	(0.002)	(0.001)
Mortgage	0.078090	-0.038934	0.007062	-0.001818
	(0.094)	(0.071)	(0.009)	(0.003)
Chattel mortgage	-0.028311	-0.003732	-0.002560	-0.000174
	(0.040)	(0.047)	(0.004)	(0.002)
Loan guarantor	0.150083***	0.131748***	0.013572***	0.006153***
	(0.046)	(0.029)	(0.004)	(0.002)
Female officer * Female applicant	-0.087898**		-0.007949**	
	(0.036)		(0.003)	
Male officer * Male applicant	0.092912***		0.008402***	
	(0.034)		(0.003)	
Constant	3.882528***	-4.195528***		
	(0.200)	(0.305)		
Number of observations	169,589			
Number of observations sensored	9,360			
Pho	0.644			
Chi-sq	6.548			
P-Value	0.0105			
Year of Application Fixed Effects (reference year 2003)	Yes	Yes		
Sector Fixed Effects	Yes	Yes		
Loan Purpose Fixed Effects	Yes	Yes		

Standard errors clustered at municipality level in paranthesis
*** p < 0.01, ** p < 0.05, * p < 0.1

ANNEX

Table A1: War exposure effects in the global financial crisis across districts (LITS survey based)

This table reports coefficients and average marginal effects of the loan default probit model with the interactions of war exposure measure, crisis year fixed effects and the crisis impact indicator. The dependent variable is Write off loan default indicator. War exposure is measured by the number of women and children casualties on district level. The crisis impact indicator is based on the LITS survey data. The model is complemented with the Wald test results testing the hypothesis that coefficients of triple interaction terms are equal for districts grouped as districts with a strong and milder crisis impact in each crisis year (2008 - 2010). The model contains the full set of control variables, year time fixed effects as well as interactions of the housing and infrastructure damage and year time fixed effects.

	Coeff	AME
War Exposure Characteristics		
Women and children casualties * Year 2003	0.002753	0.000009
	(0.003)	(0.000)
Women and children casualties * Year 2004	-0.001224	-0.000004
	(0.002)	(0.000)
Women and children casualties * Year 2005	0.001008	0.000006
	(0.002)	(0.000)
Women and children casualties * Year 2006	0.000024	0.000000
	(0.001)	(0.000)
Women and children casualties * Year 2007	0.001917	0.000012
	(0.002)	(0.000)
Women and children casualties * Year 2008 * Milder crisis impact	-0.000570	-0.000005
	(0.002)	(0.000)
Women and children casualties * Year 2008 * Strong crisis impact	0.005379**	0.000050*
	(0.003)	(0.000)
Women and children casualties * Year 2009 * Milder crisis impact	0.002010	0.000035
	(0.002)	(0.000)
Women and children casualties * Year 2009 * Strong crisis impact	0.006263***	0.000150***
	(0.002)	(0.000)
Women and children casualties * Year 2010 * Milder crisis impact	0.003797	0.000283
	(0.003)	(0.000)
Women and children casualties * Year 2010 * Strong crisis impact	0.009893***	0.000727***
	(0.003)	(0.000)
Women and children casualties * Year 2011	0.000958	0.000140
	(0.002)	(0.000)
Population Density And Economic Activity		
Nightlight intensity	-0.010572**	-0.000216**
	(0.005)	(0.000)
Change in nightlight intensity	0.007667	0.000156
	(0.010)	(0.000)
Constant	-3.059425***	
	(0.232)	
Number of observations	378,099	
Pseudo R-squared	0.275	
Borrower's Characteristics	Yes	
Borrower-Bank Relationship Characteristics	Yes	
Business Characteristics	Yes	
Loan Characteristics	Yes	
Year Fixed Effects (reference year 2003)	Yes	
Housing and infrastructure damage * Year	Yes	
Crisis Year (2008 - 2010) * Strong (Milder) crisis impact	Yes	
Housing and infrastructure damage * Crisis Year (2008 - 2010) * Strong (Milder crisis impact)	Yes	

continued on next page

Table A1 continued

Wald Test Results	
H0 : β (Women and children casualties * Year 2008 * Strong crisis impact) = β (Women and children casualties * Year 2008 * Milder crisis impact)	
HA: β (Women and children casualties * Year 2008 * Strong crisis impact) != β (Women and children casualties * Year 2008 * Milder crisis impact)	
Chi-squared	3.37*
P- Value	0.0664
H0 : β (Women and children casualties * Year 2009 * Strong crisis impact) = β (Women and children casualties * Year 2009 * Milder crisis impact)	
HA: β (Women and children casualties * Year 2009 * Strong crisis impact) != β (Women and children casualties * Year 2009 * Milder crisis impact)	
Chi-squared	2.12
P- Value	0.1455
H0 : β (Women and children casualties * Year 2010 * Strong crisis impact) = β (Women and children casualties * Year 2010 * Milder crisis impact)	
HA: β (Women and children casualties * Year 2010 * Strong crisis impact) != β (Women and children casualties * Year 2010 * Milder crisis impact)	
Chi-squared	2.36
P- Value	0.1242

Standard errors clustered at municipality level in paranthesis
*** p < 0.01, ** p < 0.05, * p < 0.1

Table A2: Robustness check of baseline results. Alternative proxies of war casualties and activities

This table reports coefficients and average marginal effects of loan default probit models. The dependent variable is the Write off loan default indicator. War exposure is measured on district level by the number of total casualties (Model 1), the number of Yugoslav forces' casualties (Model 2), the number of battles between the KLA and Yugoslav forces (Model 3), the number of casualties in the NATO bombing campaign (Model 4), and the number of NATO airstrikes (Model 5). Models 1 - 5 contain the full set of control variables and year time fixed effects.

	Model 1		Model 2		Model 3		Model 4		Model 5	
	Total casualties		Casualties of Yugoslav forces		Number of KLA battles		Casualties in NATO bombing		Number of NATO airstrikes	
	Coeff	AME	Coeff	AME	Coeff	AME	Coeff	AME	Coeff	AME
War Exposure Characteristics										
War exposure measure	0.000663*	0.000013*	0.006923**	0.000138***	0.014224***	0.000285***	0.003257***	0.000065***	0.013173***	0.000264***
	(0.000)	(0.000)	(0.003)	(0.000)	(0.003)	(0.000)	(0.001)	(0.000)	(0.005)	(0.000)
Housing and infrastructure damage	-0.014126	-0.000283	-0.026631**	-0.000533**	-0.020231	-0.000405	-0.020606	-0.000412	-0.022089*	-0.000442*
	(0.013)	(0.000)	(0.011)	(0.000)	(0.013)	(0.000)	(0.014)	(0.000)	(0.012)	(0.000)
Population Density And Economic Activity										
Nightlight intensity	-0.011250**	-0.000226**	-0.022818***	-0.000456***	-0.007833*	-0.000157*	-0.015057***	-0.000301***	-0.028274***	-0.000566***
	(0.004)	(0.000)	(0.007)	(0.000)	(0.004)	(0.000)	(0.004)	(0.000)	(0.008)	(0.000)
Change in nightlight intensity	0.007026	0.000141	0.013192	0.000264	0.006025	0.000121	0.009657	0.000193	0.019721**	0.000395**
	(0.010)	(0.000)	(0.009)	(0.000)	(0.010)	(0.000)	(0.010)	(0.000)	(0.009)	(0.000)
Borrower's Characteristics										
Female borrower	-0.186434***	-0.003739***	-0.188819***	-0.003776***	-0.190024***	-0.003803***	-0.193863***	-0.003880***	-0.194622***	-0.003896***
	(0.032)	(0.001)	(0.033)	(0.001)	(0.031)	(0.001)	(0.033)	(0.001)	(0.032)	(0.001)
Borrower's age	-0.007011	-0.000141	-0.005635	-0.000113	-0.006294	-0.000126	-0.007473	-0.000150	-0.006921	-0.000139
	(0.005)	(0.000)	(0.005)	(0.000)	(0.005)	(0.000)	(0.005)	(0.000)	(0.005)	(0.000)
Borrower's age squared	-0.000058	-0.000001	-0.000074	-0.000001	-0.000065	-0.000001	-0.000056	-0.000001	-0.000061	-0.000001
	(0.000)	(0.000)	(0.000)	(0.000)	(0.000)	(0.000)	(0.000)	(0.000)	(0.000)	(0.000)
Married borrower	0.024775	0.000497	0.021591	0.000432	0.019728	0.000395	0.026946	0.000539	0.030775*	0.000616*
	(0.017)	(0.000)	(0.020)	(0.000)	(0.018)	(0.000)	(0.018)	(0.000)	(0.017)	(0.000)
Household size	-0.012011**	-0.000241**	-0.009190*	-0.000184*	-0.010692**	-0.000214**	-0.008535	-0.000171	-0.008473	-0.000170
	(0.006)	(0.000)	(0.005)	(0.000)	(0.005)	(0.000)	(0.006)	(0.000)	(0.006)	(0.000)
Serbian nationality	-0.278630***	-0.005588***	-0.207481***	-0.004149**	-0.280873***	-0.005621***	-0.237934***	-0.004763***	-0.234151***	-0.004687***
	(0.049)	(0.001)	(0.079)	(0.002)	(0.054)	(0.001)	(0.059)	(0.001)	(0.067)	(0.002)
Borrower-Bank Relationship Characteristics										
Number of repaid loans, one	-0.030225	-0.000606	-0.019312	-0.000386	-0.023048	-0.000461	-0.029807	-0.000597	-0.029326	-0.000587
	(0.034)	(0.001)	(0.032)	(0.001)	(0.035)	(0.001)	(0.031)	(0.001)	(0.033)	(0.001)
Number of repaid loans, two	-0.048888	-0.000980	-0.032023	-0.000640	-0.037438	-0.000749	-0.052008	-0.001041	-0.050463	-0.001010
	(0.046)	(0.001)	(0.040)	(0.001)	(0.046)	(0.001)	(0.043)	(0.001)	(0.045)	(0.001)
Number of repaid loans, three or more	-0.076773	-0.001540	-0.056002	-0.001120	-0.058211	-0.001165	-0.087105	-0.001744	-0.082946	-0.001660
	(0.071)	(0.001)	(0.067)	(0.001)	(0.069)	(0.001)	(0.067)	(0.001)	(0.069)	(0.001)
Prior rejection from the Bank	0.318919***	0.006396***	0.316132***	0.006322***	0.318849***	0.006381***	0.313753***	0.006280***	0.315191***	0.006310***
	(0.037)	(0.001)	(0.035)	(0.001)	(0.037)	(0.001)	(0.038)	(0.001)	(0.038)	(0.001)

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Table A2 continued

Business Characteristics										
Business size	-0.047366*	-0.000950*	-0.065785***	-0.001316***	-0.058804**	-0.001177**	-0.063906**	-0.001279**	-0.062357**	-0.001248**
	(0.028)	(0.001)	(0.021)	(0.000)	(0.026)	(0.001)	(0.026)	(0.000)	(0.029)	(0.001)
Income to total assets	-0.040514	-0.000813	-0.064093	-0.001282	-0.057280	-0.001146	-0.062841	-0.001258	-0.054226	-0.001086
	(0.080)	(0.002)	(0.072)	(0.001)	(0.080)	(0.002)	(0.078)	(0.002)	(0.079)	(0.002)
Fixed assets availability	-0.026778***	-0.000537***	-0.024598***	-0.000492***	-0.025199***	-0.000504***	-0.025001***	-0.000500***	-0.025737***	-0.000515***
	(0.007)	(0.000)	(0.007)	(0.000)	(0.007)	(0.000)	(0.006)	(0.000)	(0.007)	(0.000)
Current loans from the Bank	0.956551***	0.019184***	0.947519***	0.018950***	0.945935***	0.018931***	0.963452***	0.019285***	0.958438***	0.019187***
	(0.081)	(0.002)	(0.082)	(0.002)	(0.079)	(0.002)	(0.082)	(0.002)	(0.082)	(0.002)
Borrower's indebtedness with other FI	0.148701**	0.002982*	0.146811**	0.002936**	0.159734**	0.003197**	0.160985**	0.003222**	0.148508**	0.002973*
	(0.075)	(0.002)	(0.074)	(0.001)	(0.072)	(0.002)	(0.077)	(0.002)	(0.075)	(0.002)
Loan Characteristics										
Amount of loan application, ln	0.278122***	0.005578***	0.287650***	0.005753***	0.278541***	0.005574***	0.288868***	0.005782***	0.289103***	0.005787***
	(0.017)	(0.000)	(0.016)	(0.000)	(0.016)	(0.000)	(0.018)	(0.000)	(0.017)	(0.000)
Mortgage	0.029702	0.000596	0.038932	0.000779	0.049285	0.000986	0.032219	0.000645	0.025408	0.000509
	(0.053)	(0.001)	(0.050)	(0.001)	(0.056)	(0.001)	(0.051)	(0.001)	(0.052)	(0.001)
Chattel mortgage	0.013287	0.000266	0.035312	0.000706	0.002295	0.000046	0.037431	0.000749	0.035912	0.000719
	(0.042)	(0.001)	(0.038)	(0.001)	(0.038)	(0.001)	(0.040)	(0.001)	(0.040)	(0.001)
Loan guarantor	-0.081440***	-0.001633***	-0.080091***	-0.001602**	-0.074467**	-0.001490**	-0.082960***	-0.001661**	-0.086970***	-0.001741***
	(0.030)	(0.001)	(0.031)	(0.001)	(0.029)	(0.001)	(0.032)	(0.001)	(0.031)	(0.001)
Constant	-5.389260***		-4.992051***		-5.285769***		-5.174699***		-5.167199***	
	(0.301)		(0.225)		(0.306)		(0.304)		(0.296)	
Number of observations	393,792		393,792		393,792		393,792		393,792	
Pseudo R-squared	0.270		0.273		0.272		0.272		0.271	
Year Fixed Effects (reference year 2003)	Yes		Yes		Yes		Yes		Yes	
Sector Fixed Effects	Yes		Yes		Yes		Yes		Yes	
Loan Purpose Fixed Effects	Yes		Yes		Yes		Yes		Yes	

Standard errors clustered at municipality level in paranthesis
*** p < 0.01, ** p < 0.05, * p < 0.1

Table A3: Robustness check of war exposure effects over time. Alternative proxies of war casualties and activities

This table reports coefficients and average marginal effects of the loan default probit models with interactions of the war exposure measures with year time fixed effects. The dependent variable is the Write off loan default indicator. War exposure is measured on district level by the number of total casualties (Model 1), the number of Yugoslav forces' casualties (Model 2), the number of battles between the KLA and Yugoslav forces (Model 3), the number of casualties in the NATO bombing campaign (Model 4), and the number of NATO airstrikes (Model 5). Models 1 - 5 contain the full set of control variables, year time fixed effects as well as interactions of the housing and infrastructure damage and year time fixed effects.

	Model 1		Model 2		Model 3		Model 4		Model 5	
	Total casualties		Casualties of Yugoslav forces		Number of KLA battles		Casualties in NATO bombing		Number of NATO airstrikes	
	Coeff	AME	Coeff	AME	Coeff	AME	Coeff	AME	Coeff	AME
War Exposure Characteristics										
War expoasure measure * Year 2003	0.001295*	0.000004*	0.005225	0.000017	0.014067**	0.000046***	0.001307	0.000004	0.014847*	0.000049*
	(0.001)	(0.000)	(0.006)	(0.000)	(0.006)	(0.000)	(0.002)	(0.000)	(0.009)	(0.000)
War expoasure measure * Year 2004	0.000244	0.000001	0.004261	0.000015	-0.010337	-0.000036	0.001887	0.000007	0.013735**	0.000048**
	(0.001)	(0.000)	(0.004)	(0.000)	(0.011)	(0.000)	(0.001)	(0.000)	(0.006)	(0.000)
War exposure measure * Year 2005	0.000159	0.000001	0.003447	0.000019	-0.000854	-0.000005	0.001704	0.000010	0.009957*	0.000056**
	(0.000)	(0.000)	(0.003)	(0.000)	(0.007)	(0.000)	(0.001)	(0.000)	(0.005)	(0.000)
War exposure measure * Year 2006	0.000160	0.000001	0.003273	0.000026	-0.001192	-0.000009	0.003721**	0.000029**	0.015676***	0.000122***
	(0.000)	(0.000)	(0.004)	(0.000)	(0.004)	(0.000)	(0.001)	(0.000)	(0.005)	(0.000)
War exposure measure * Year 2007	0.000333	0.000002	0.009228***	0.000053***	0.007290*	0.000042	0.005055***	0.000029***	0.018884***	0.000109***
	(0.001)	(0.000)	(0.003)	(0.000)	(0.004)	(0.000)	(0.001)	(0.000)	(0.006)	(0.000)
War exposure measure * Year 2008	0.000480	0.000004	0.007891***	0.000064***	0.004347	0.000036	0.003966***	0.000032***	0.017629***	0.000143***
	(0.001)	(0.000)	(0.003)	(0.000)	(0.003)	(0.000)	(0.001)	(0.000)	(0.005)	(0.000)
War exposure measure * Year 2009	0.000831	0.000016	0.008133**	0.000157***	0.012692***	0.000245***	0.004817***	0.000093***	0.018365***	0.000354***
	(0.001)	(0.000)	(0.003)	(0.000)	(0.004)	(0.000)	(0.001)	(0.000)	(0.006)	(0.000)
War exposure measure * Year 2010	0.001195**	0.000087*	0.010185***	0.000734***	0.023466***	0.001687***	0.004344*	0.000315*	0.016084**	0.001166**
	(0.001)	(0.000)	(0.003)	(0.000)	(0.004)	(0.000)	(0.002)	(0.000)	(0.007)	(0.001)
War exposure measure * Year 2011	0.000264	0.000038	0.004008	0.000574	0.015920***	0.002286***	0.000055	0.000008	0.006928	0.000992
	(0.000)	(0.000)	(0.003)	(0.000)	(0.005)	(0.001)	(0.002)	(0.000)	(0.005)	(0.001)
Population Density And Economic Activity										
Nightlight intensity	-0.011054**	-0.000221**	-0.023270***	-0.000464***	-0.007822*	-0.000156*	-0.014969***	-0.000299***	-0.030343***	-0.000606***
	(0.004)	(0.000)	(0.007)	(0.000)	(0.004)	(0.000)	(0.004)	(0.000)	(0.008)	(0.000)
Change in nightlight intensity	0.006173	0.000124	0.018461*	0.000368*	0.003013	0.000060	0.008023	0.000160	0.014903**	0.000298**
	(0.009)	(0.000)	(0.010)	(0.000)	(0.009)	(0.000)	(0.007)	(0.000)	(0.007)	(0.000)
Constant	-3.111403***		-2.776482***		-3.086140***		-2.911188***		-2.801883***	
	(0.249)		(0.217)		(0.225)		(0.219)		(0.217)	
Number of observations	393,792		393,792		393,792		393,792		393,792	
Pseudo R-squared	0.271		0.275		0.274		0.273		0.273	
Borrower's Characteristics	Yes		Yes		Yes		Yes		Yes	
Borrower-Bank Relationship Characteristics	Yes		Yes		Yes		Yes		Yes	
Business Characteristics	Yes		Yes		Yes		Yes		Yes	
Loan Characteristics	Yes		Yes		Yes		Yes		Yes	
Year Fixed Effects (reference year 2003)	Yes		Yes		Yes		Yes		Yes	
Housing and infrastructure damage * Year FE	Yes		Yes		Yes		Yes		Yes	

Standard errors clustered at municipality level in paranthesis
*** p < 0.01, ** p < 0.05, * p < 0.1

Table A4: Robustness check of war exposure effects in the global financial crisis across districts. Alternative proxies of war activities and intensity

This table reports coefficients and average marginal effects of the loan default probit models with interactions of war exposure measures, crisis year fixed effects and the crisis impact indicator. The dependent variable is the Write off loan default indicator. War exposure is measured on district level by the number of total casualties (Model 1) , the number of Yugoslav forces' casualties (Model 2), the number of battles between the KLA and Yugoslav forces (Model 3), the number of casualties in the NATO bombing campaign (Model 4), and the number of NATO airstrikes (Model 5). The models are complemented with the Wald test results testing the hypothesis that coefficients of triple interaction terms are equal for districts grouped as districts with a strong and milder crisis impact in each crisis year (2008 - 2010). Models 1- 5 contain the full set of control variables, year time fixed effects as well as interactions of the housing and infrastructure damage and year time fixed effects, interactions of crisis year fixed effects and the crisis impact indicator, and interactions of the housing and infrastructure damage, crisis year fixed effects and the crisis impact indicator.

	Model 1		Model 2		Model 3		Model 4		Model 5	
	Total casualties		Casualties of Yugoslav forces		Number of KLA battles		Casualties in NATO bombing		Number of NATO airstrikes	
	Coeff	AME	Coeff	AME	Coeff	AME	Coeff	AME	Coeff	AME
War Exposure Characteristics										
War exposure measure * Year 2003	0.001302*	0.000004*	0.005138	0.000017	0.013918**	0.000046***	0.001380	0.000005	0.013350	0.000044*
	(0.001)	(0.000)	(0.006)	(0.000)	(0.006)	(0.000)	(0.002)	(0.000)	(0.008)	(0.000)
War exposure measure * Year 2004	0.000273	0.000001	0.004075	0.000014	-0.010343	-0.000036	0.001945	0.000007	0.012037**	0.000042**
	(0.001)	(0.000)	(0.004)	(0.000)	(0.011)	(0.000)	(0.001)	(0.000)	(0.006)	(0.000)
War exposure measure * Year 2005	0.000203	0.000001	0.003315	0.000019	-0.000975	-0.000005	0.001849	0.000010*	0.008155*	0.000046*
	(0.000)	(0.000)	(0.003)	(0.000)	(0.007)	(0.000)	(0.001)	(0.000)	(0.005)	(0.000)
War exposure measure * Year 2006	0.000210	0.000002	0.003097	0.000024	-0.001300	-0.000010	0.003860***	0.000030**	0.013631***	0.000106***
	(0.001)	(0.000)	(0.004)	(0.000)	(0.004)	(0.000)	(0.001)	(0.000)	(0.005)	(0.000)
War exposure measure * Year 2007	0.000371	0.000002	0.009059***	0.000052***	0.007147	0.000042	0.005228***	0.000030***	0.016802**	0.000097**
	(0.001)	(0.000)	(0.003)	(0.000)	(0.005)	(0.000)	(0.001)	(0.000)	(0.007)	(0.000)
War exposure measure * Year 2008 * Milder crisis impact	0.000068	0.000001	0.009684	0.000082*	-0.000873	-0.000007	0.004559***	0.000038***	0.029891***	0.000248***
	(0.001)	(0.000)	(0.007)	(0.000)	(0.013)	(0.000)	(0.001)	(0.000)	(0.006)	(0.000)
War exposure measure * Year 2008 * Strong crisis impact	0.001094*	0.000009*	0.006414**	0.000051***	0.005347	0.000042*	0.003238***	0.000026***	0.010652**	0.000084*
	(0.001)	0	(0.003)	(0.000)	(0.004)	(0.000)	(0.001)	(0.000)	(0.005)	(0.000)
War exposure measure * Year 2009 * Milder crisis impact	0.000374	0.000008	0.004314	0.000092	0.001702	0.000036	0.005461***	0.000115***	0.029906***	0.000624***
	(0.001)	(0.000)	(0.006)	(0.000)	(0.015)	(0.000)	(0.001)	(0.000)	(0.006)	(0.000)
War exposure measure * Year 2009 * Strong crisis impact	0.002295***	0.000040**	0.009449***	0.000163***	0.017821***	0.000310***	0.004527**	0.000079***	0.014329**	0.000251**
	(0.001)	(0.000)	(0.003)	(0.000)	(0.004)	(0.000)	(0.002)	(0.000)	(0.006)	(0.000)
War exposure measure * Year 2010 * Milder crisis impact	0.000763*	0.000055*	0.013047***	0.000937***	0.015616*	0.001126*	0.002763*	0.000200*	0.026468***	0.001890***
	(0.000)	(0.000)	(0.005)	(0.000)	(0.009)	(0.001)	(0.002)	(0.000)	(0.007)	(0.000)
War exposure measure * Year 2010 * Strong crisis impact	0.002811**	0.000203*	0.010365***	0.000747**	0.025358***	0.001814***	0.005172	0.000375	0.010504	0.000768
	(0.001)	(0.000)	(0.004)	(0.000)	(0.005)	(0.000)	(0.003)	(0.000)	(0.008)	(0.001)
War exposure measure * Year 2011	0.000321	0.000046	0.003871	0.000555	0.015848***	0.002275***	0.000252	0.000036	0.005209	0.000747
	(0.000)	(0.000)	(0.003)	(0.000)	(0.005)	(0.001)	(0.002)	(0.000)	(0.005)	(0.001)
Population Density And Economic Activity										
Nightlight intensity	-0.013513***	-0.000270**	-0.022704***	-0.000453***	-0.008452*	-0.000169*	-0.016273***	-0.000325***	-0.026553***	-0.000529***
	(0.005)	(0.000)	(0.008)	(0.000)	(0.005)	(0.000)	(0.005)	(0.000)	(0.008)	(0.000)
Change in nightlight intensity,	0.009763	0.000195	0.019101*	0.000381*	0.003453	0.000069	0.010124	0.000202	0.013821*	0.000275
	(0.009)	(0.000)	(0.010)	(0.000)	(0.009)	(0.000)	(0.008)	(0.000)	(0.008)	(0.000)

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Table A4 continued

Constant	-3.065742***	-2.774791***	-3.090659***	-2.894573***	-2.812968***
	(0.240)	(0.211)	(0.214)	(0.215)	(0.213)
Number of observations	393,792	393,792	393,792	393,792	393,792
Pseudo R-squared	0.273	0.275	0.274	0.274	0.275
Borrower's Characteristics	Yes	Yes	Yes	Yes	Yes
Borrower-Bank Relationship Characteristics	Yes	Yes	Yes	Yes	Yes
Business Characteristics	Yes	Yes	Yes	Yes	Yes
Loan Characteristics	Yes	Yes	Yes	Yes	Yes
Year Fixed Effects (reference year 2003)	Yes	Yes	Yes	Yes	Yes
Housing and infrastructure damage * Year	Yes	Yes	Yes	Yes	Yes
Crisis Year (2008 - 2010) * Strong (Milder) crisis impact	Yes	Yes	Yes	Yes	Yes
Housing and infrastructure damage * Crisis Year (2008 - 2010) * Strong (Milder crisis impact)	Yes	Yes	Yes	Yes	Yes
Wald Tests					
H0 : β (War exposure measure * Year 2008 * Strong crisis impact) = β (War exposure measure * Year 2008 * Milder crisis impact)					
HA: β (War exposure measure * Year 2008 * Strong crisis impact) != β (War exposure measure * Year 2008 * Milder crisis impact)					
Chi-squared	1.40	0.26	0.21	0.76	8.23***
P- Value	0.24	0.61	0.65	0.38	0.00
H0 : β (War exposure measure * Year 2009 * Strong crisis impact) = β (War exposure measure * Year 2009 * Milder crisis impact)					
HA: β (War exposure measure * Year 2009 * Strong crisis impact) != β (War exposure measure * Year 2009 * Milder crisis impact)					
Chi-squared	3.50*	0.77	1.16	0.25	5.05**
P- Value	0.06	0.38	0.28	0.62	0.02
H0 : β (War exposure measure * Year 2010 * Strong crisis impact) = β (War exposure measure * Year 2010 * Milder crisis impact)					
HA: β (War exposure measure * Year 2010 * Strong crisis impact) != β (War exposure measure * Year 2010 * Milder crisis impact)					
Chi-squared	2.44	0.18	0.92	0.45	2.38
P- Value	0.12	0.67	0.34	0.50	0.12

Standard errors clustered at municipality level in paranthesis
*** p < 0.01, ** p < 0.05, * p < 0.1

Table A5: Robustness check of baseline results. PAR30 loan default indicator

This table reports coefficients and average marginal effects of loan default probit models. The dependent variable is the PAR30 loan default indicator. War exposure is measured by the number of women and children casualties on district level. Model 1 contains only variables generated on district level and year time fixed effects. Model 2 includes district level variables, year time fixed effects, borrower characteristics, borrower-bank relationship characteristics, and business characteristics. Model 3 contains the full set of control variables including (potentially endogenous) loan characteristics and year time fixed effects.

	Model 1		Model 2		Model 3	
	Coeff	AME	Coeff	AME	Coeff	AME
War Exposure Characteristics						
Women and children casualties	0.002761**	0.000119**	0.002560**	0.000106**	0.002500**	0.000103**
	(0.001)	(0.000)	(0.001)	(0.000)	(0.001)	(0.000)
Housing and infrastructure damage	-0.026327*	-0.001136*	-0.022330**	-0.000927**	-0.022454**	-0.000927**
	(0.014)	(0.001)	(0.011)	(0.000)	(0.011)	(0.000)
Population Density And Economic Activity						
Nightlight intensity	-0.009449**	-0.000408**	-0.008999**	-0.000374**	-0.009447***	-0.000390**
	(0.004)	(0.000)	(0.004)	(0.000)	(0.004)	(0.000)
Change in nightlight intensity	0.004690	0.000202	0.000280	0.000012	0.000395	0.000016
	(0.006)	(0.000)	(0.006)	(0.000)	(0.006)	(0.000)
Borrower's Characteristics						
Female borrower			-0.141791***	-0.005886***	-0.137672***	-0.005681***
			(0.029)	(0.001)	(0.029)	(0.001)
Borrower's age			-0.012568***	-0.000522***	-0.012685***	-0.000523***
			(0.003)	(0.000)	(0.003)	(0.000)
Borrower's age squared			0.000033	0.000001	0.000034	0.000001
			(0.000)	(0.000)	(0.000)	(0.000)
Marital status (maried borrower)			-0.017564	-0.000729	-0.021671	-0.000894
			(0.015)	(0.001)	(0.015)	(0.001)
Household size			-0.007824**	-0.000325*	-0.008712**	-0.000359**
			(0.004)	(0.000)	(0.004)	(0.000)
Serbian nationality			-0.168827***	-0.007008***	-0.200552***	-0.008275***
			(0.049)	(0.002)	(0.049)	(0.002)
Borrower-Bank Relationship Characteristics						
Number of repaid loans, one			0.008136	0.000338	0.002585	0.000107
			(0.019)	(0.001)	(0.020)	(0.001)
Number of repaid loans, two			-0.006952	-0.000289	-0.010679	-0.000441
			(0.033)	(0.001)	(0.033)	(0.001)
Number of repaid loans, three or more			0.002160	0.000090	0.010082	0.000416
			(0.048)	(0.002)	(0.045)	(0.002)
Prior rejection from the Bank			0.287399***	0.011931***	0.271706***	0.011211***
			(0.032)	(0.001)	(0.032)	(0.001)
Business Characteristics						
Business size			0.115758***	0.004805***	-0.030079*	-0.001241*
			(0.017)	(0.001)	(0.017)	(0.001)
Income to total assets			0.167346***	0.006947***	0.065692*	0.002711*
			(0.034)	(0.002)	(0.038)	(0.002)
Fixed assets availability			-0.050295***	-0.002088***	-0.016596***	-0.000685***
			(0.006)	(0.000)	(0.005)	(0.000)
Current loans from the Bank			0.709039***	0.029434***	0.687089***	0.028351***
			(0.065)	(0.003)	(0.063)	(0.003)
Borrower's indebtedness with other FI			0.198393***	0.008236***	0.215659***	0.008899***
			(0.052)	(0.002)	(0.050)	(0.002)

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Table A5 continued

Loan Characteristics				
Amount of loan application, ln			0.185842***	0.007668***
			(0.014)	(0.001)
Mortgage			0.037929	0.001565
			(0.036)	(0.002)
Chattel mortgage			0.033140	0.001367
			(0.035)	(0.001)
Loan guarantor			-0.059439***	-0.002453***
			(0.020)	(0.001)
Constant	-2.610032***	-3.108929***	-4.057763***	
	(0.110)	(0.201)	(0.237)	
Number of observations	410,799	390,943	390,943	
Pseudo R-squared	0.0882	0.138	0.144	
Year Fixed Effects (reference year 2003)	Yes	Yes	Yes	
Sector Fixed Effects	No	Yes	Yes	
Loan Purpose Fixed Effects	No	No	Yes	

Standard errors clustered at municipality level in paranthesis
*** p < 0.01, ** p < 0.05, * p < 0.1

Table A6: Robustness check of war exposure effects over time. PAR30 Loan default indicator

This table reports coefficients and average marginal effects of the loan default probit model with interactions of the war exposure measure with year time fixed effects. The dependent variable is the PAR30 loan default indicator. The war exposure is measured by the number of women and children casualties on district level. Model 1 contains the full set of control variables, year time fixed effects as well as interactions of the housing and infrastructure damage and year time fixed effects.

	Coeff	AME
War Exposure Characteristics		
Women and children casualties * Year 2003	0.003928***	0.000033***
	(0.001)	(0.000)
Women and children casualties * Year 2004	-0.000269	-0.000003
	(0.001)	(0.000)
Women and children casualties * Year 2005	0.001336	0.000020
	(0.001)	(0.000)
Women and children casualties * Year 2006	0.001782	0.000038
	(0.001)	(0.000)
Women and children casualties * Year 2007	0.002100	0.000058
	(0.002)	(0.000)
Women and children casualties * Year 2008	0.003254**	0.000118**
	(0.001)	(0.000)
Women and children casualties * Year 2009	0.003944**	0.000236*
	(0.002)	(0.000)
Women and children casualties * Year 2010	0.002610**	0.000280*
	(0.001)	(0.000)
Women and children casualties * Year 2011	0.000785	0.000117
	(0.001)	(0.000)
Population Density And Economic Activity		
Nightlight intensity	-0.009243**	-0.000381**
	(0.004)	(0.000)
Change in nightlight intensity	0.002404	0.000099
	(0.006)	(0.000)
Constant	-2.378726***	
	(0.210)	
Number of observations	390,943	
Pseudo R-squared	0.145	
Borrower's Characteristics	Yes	
Borrower-Bank Relationship Characteristics	Yes	
Business Characteristics	Yes	
Loan Characteristics	Yes	
Year Fixed Effects (reference year 2003)	Yes	
Housing and infrastructure damage * Year FE	Yes	

Standard errors clustered at municipality level in paranthesis

*** p < 0.01, ** p < 0.05, * p < 0.1

Table A7: Robustness check of war exposure effects in the global financial crisis across districts. PAR30 Loan default indicator

This table reports coefficients and average marginal effects of the loan default probit model with interactions of the war exposure measure, crisis year fixed effects and the crisis impact indicator. The dependent variable is the PAR30 loan default indicator. War exposure is measured by the number of women and children casualties on district level. The model is complemented with the Wald test results testing the hypothesis that coefficients of triple interaction terms are equal for strong and milder crisis impact groups in each crisis year (2008 - 2010). The model contains the full set of control variables, year time fixed effects as well as interactions of the housing and infrastructure damage and year time fixed effects, interactions of crisis year fixed effects and the crisis impact indicator, and interactions of the housing and infrastructure damage, crisis year fixed effects and the crisis impact indicator.

	Coeff	AME
War Exposure Characteristics		
Women and children casualties * Year 2003	0.003916***	0.000033***
	(0.001)	(0.000)
Women and children casualties * Year 2004	-0.000209	-0.000002
	(0.001)	(0.000)
Women and children casualties * Year 2005	0.001349	0.000020
	(0.001)	(0.000)
Women and children casualties * Year 2006	0.001780	0.000038
	(0.001)	(0.000)
Women and children casualties * Year 2007	0.002115	0.000058
	(0.002)	(0.000)
Women and children casualties * Year 2008 * Milder crisis impact	0.001396	0.000054
	(0.002)	(0.000)
Women and children casualties * Year 2008 * Strong crisis impact	0.006806***	0.000227***
	(0.002)	(0.000)
Women and children casualties * Year 2009 * Milder crisis impact	0.001286	0.000082
	(0.002)	(0.000)
Women and children casualties * Year 2009 * Strong crisis impact	0.008285***	0.000462**
	(0.003)	(0.000)
Women and children casualties * Year 2010 * Milder crisis impact	0.002852*	0.000328*
	(0.002)	(0.000)
Women and children casualties * Year 2010 * Strong crisis impact	0.004712*	0.000464*
	(0.002)	(0.000)
Women and children casualties * Year 2011	0.000804	0.000120
	(0.001)	(0.000)
Population Density And Economic Activity		
Nightlight intensity	-0.009008**	-0.000371**
	(0.005)	(0.000)
Change in nightlight intensity	-0.000166	-0.000007
	(0.004)	(0.000)
Constant	-2.367991***	
	(0.209)	
Number of observations	390,943	
Pseudo R-squared	0.147	
Borrower's Characteristics	Yes	
Borrower-Bank Relationship Characteristics	Yes	
Business Characteristics	Yes	
Loan Characteristics	Yes	
Year Fixed Effects (reference year 2003)	Yes	
Housing and infrastructure damage * Year	Yes	
Crisis Year (2008 - 2010) * Strong (Milder) crisis impact	Yes	
Housing and infrastructure damage * Crisis Year (2008 - 2010) * Strong (Milder crisis impact)	Yes	

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Table A7 continued

Wald Test Results	
H0 : β (Women and children casualties * Year 2008 * Strong crisis impact) = β (Women and children casualties * Year 2008 * Milder crisis impact)	
HA: β (Women and children casualties * Year 2008 * Strong crisis impact) != β (Women and children casualties * Year 2008 * Milder crisis impact)	
Chi-squared	4.55**
P- Value	0.0329
H0 : β (Women and children casualties * Year 2009 * Strong crisis impact) = β (Women and children casualties * Year 2009 * Milder crisis impact)	
HA: β (Women and children casualties * Year 2009 * Strong crisis impact) != β (Women and children casualties * Year 2009 * Milder crisis impact)	
Chi-squared	4.85**
P- Value	0.0276
H0 : β (Women and children casualties * Year 2010 * Strong crisis impact) = β (Women and children casualties * Year 2010 * Milder crisis impact)	
HA: β (Women and children casualties * Year 2010 * Strong crisis impact) != β (Women and children casualties * Year 2010 * Milder crisis impact)	
Chi-squared	0.42
P- Value	0.5157

Standard errors clustered at municipality level in paranthesis
*** p < 0.01, ** p < 0.05, * p < 0.1

Table A8: Robustness check of baseline results: Alternative methodologies

This table contains coefficients and average marginal effects of the loan default probability models estimated using logit (Model 1) and complementary log-log (Model 2) methods. Besides, coefficients from linear loan default probability model are reported (Model 3). The dependent variable is the Write off loan default indicator. War exposure is measured by the number of women and children casualties on district level. Models 1- 3 contain the full set of control variables and year time fixed effects

	Model 1		Model 2		Model 3
	Logit		Complementary Log-Log		Linear
	Coeff	AME	Coeff	AME	Coeff
War Exposure Characteristics					
Women and children casualties	0.006923**	0.000060**	0.006607**	0.000060**	0.000078**
	(0.003)	(0.000)	(0.003)	(0.000)	(0.000)
Housing and infrastructure damage	-0.049945	-0.000436	-0.047278	-0.000430	-0.000485*
	(0.033)	(0.000)	(0.032)	(0.000)	(0.000)
Population Density And Economic Activity					
Nightlight intensity	-0.027403***	-0.000239***	-0.026279***	-0.000239***	-0.000287***
	(0.010)	(0.000)	(0.010)	(0.000)	(0.000)
Change in nightlight intensity	0.011459	0.000100	0.011040	0.000101	0.000822
	(0.021)	(0.000)	(0.019)	(0.000)	(0.001)
Borrower's Characteristics					
Female borrower	-0.409815***	-0.003574***	-0.386448***	-0.003519***	-0.002612***
	(0.077)	(0.001)	(0.074)	(0.001)	(0.001)
Borrower's age	-0.011990	-0.000105	-0.009778	-0.000089	-0.000243**
	(0.012)	(0.000)	(0.011)	(0.000)	(0.000)
Borrower's age squared	-0.000204	-0.000002	-0.000216	-0.000002*	-0.000000
	(0.000)	(0.000)	(0.000)	(0.000)	(0.000)
Marital status (maried borrower)	0.086965**	0.000758**	0.088485**	0.000806**	0.000072
	(0.042)	(0.000)	(0.040)	(0.000)	(0.000)
Household size	-0.030702**	-0.000268**	-0.029716**	-0.000271**	-0.000261**
	(0.014)	(0.000)	(0.013)	(0.000)	(0.000)
Serbian nationality	-0.551611***	-0.004811***	-0.526601***	-0.004795***	-0.002755**
	(0.112)	(0.001)	(0.106)	(0.001)	(0.001)
Borrower-Bank Relationship Characteristics					
Number of repaid loans, one	-0.062699	-0.000547	-0.053399	-0.000486	-0.000846
	(0.073)	(0.001)	(0.066)	(0.001)	(0.001)
Number of repaid loans, two	-0.089538	-0.000781	-0.070911	-0.000646	-0.001715
	(0.097)	(0.001)	(0.089)	(0.001)	(0.001)
Number of repaid loans, three or more	-0.133171	-0.001161	-0.110956	-0.001010	-0.002327
	(0.145)	(0.001)	(0.135)	(0.001)	(0.003)
Prior rejection from the Bank	0.690425***	0.006022***	0.626261***	0.005702***	0.013658***
	(0.083)	(0.001)	(0.079)	(0.001)	(0.002)
Business Characteristics					
Business size	-0.070248	-0.000613	-0.055536	-0.000506	-0.002038***
	(0.068)	(0.001)	(0.064)	(0.001)	(0.001)
Income to total assets	-0.137648	-0.001201	-0.135884	-0.001237	-0.002148**
	(0.215)	(0.002)	(0.207)	(0.002)	(0.001)
Fixed assets availability	-0.073861***	-0.000644***	-0.074888***	-0.000682***	-0.000488***
	(0.018)	(0.000)	(0.017)	(0.000)	(0.000)
Current loans from the Bank	2.093260***	0.018257***	1.894537***	0.017251***	0.047360***
	(0.180)	(0.002)	(0.166)	(0.002)	(0.007)
Borrower's indebtedness with other FI	0.396669**	0.003460**	0.367199**	0.003343**	0.004801**
	(0.163)	(0.002)	(0.150)	(0.001)	(0.002)

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Table A8 continued

Loan Characteristics					
Amount of loan application, ln	0.603255***	0.005261***	0.556356***	0.005066***	0.006071***
	(0.048)	(0.000)	(0.050)	(0.000)	(0.001)
Mortgage	0.241588*	0.002107*	0.274800**	0.002502**	-0.001202
	(0.127)	(0.001)	(0.122)	(0.001)	(0.002)
Chattel mortgage	0.020086	0.000175	0.025333	0.000231	0.001041
	(0.100)	(0.001)	(0.094)	(0.001)	(0.001)
Loan guarantor	-0.172599**	-0.001505**	-0.152454**	-0.001388**	-0.001037
	(0.077)	(0.001)	(0.074)	(0.001)	(0.001)
Constant	-12.565254***		-12.353718***		-0.010547
	(0.733)		(0.691)		(0.007)
Number of observations	393,792		393,792		393,792
(Pseudo) R-squared	0.274		-		0.049
Year Fixed Effects (reference year 2003)	Yes		Yes		Yes
Sector Fixed Effects	Yes		Yes		Yes
Loan Purpose Fixed Effects	Yes		Yes		Yes

Standard errors clustered at municipality level in paranthesis
*** p < 0.01, ** p < 0.05, * p < 0.1

Table A9: Robustness check of baseline results. Sample without housing and consumption loans

This table reports coefficients and average marginal effects of the loan default probit models when housing and consumption loans are excluded from the sample. The dependent variable is the Write off loan default indicator. War exposure is measured by the number of women and children casualties on district level. Model 1 contains only variables generated on district level and year time fixed effects. Model 2 includes district level variables, year time fixed effects, borrower's characteristics, borrower-bank relationship characteristics, and business characteristics. Model 3 contains the full set of control variables including (potentially endogenous) loan characteristics and year time fixed effects.

	Model 1		Model 2		Model 3	
	Coeff	AME	Coeff	AME	Coeff	AME
War Exposure Characteristics						
Women and children casualties	0.003671**	0.000112**	0.003289**	0.000096**	0.003183**	0.000092**
	(0.002)	(0.000)	(0.001)	(0.000)	(0.001)	(0.000)
Housing and infrastructure damage	-0.021907	-0.000671	-0.017502	-0.000510	-0.016173	-0.000468
	(0.016)	(0.000)	(0.013)	(0.000)	(0.013)	(0.000)
Population Density And Economic Activity						
Nightlight intensity	-0.002818	-0.000086	-0.008102**	-0.000236*	-0.008017*	-0.000232*
	(0.005)	(0.000)	(0.004)	(0.000)	(0.004)	(0.000)
Change in nightlight intensity	0.013191*	0.000404*	0.016956**	0.000494**	0.017802**	0.000515**
	(0.008)	(0.000)	(0.008)	(0.000)	(0.008)	(0.000)
Borrower's Characteristics						
Female borrower			-0.100833***	-0.002939***	-0.110785***	-0.003208***
			(0.037)	(0.001)	(0.037)	(0.001)
Borrower's age			-0.000548	-0.000016	-0.000346	-0.000010
			(0.006)	(0.000)	(0.006)	(0.000)
Borrower's age squared			-0.000139*	-0.000004**	-0.000144**	-0.000004**
			(0.000)	(0.000)	(0.000)	(0.000)
Marital status (maried borrower)			0.048701**	0.001419***	0.046185**	0.001337**
			(0.020)	(0.001)	(0.019)	(0.001)
Household size			-0.009851*	-0.000287*	-0.010761*	-0.000312*
			(0.006)	(0.000)	(0.006)	(0.000)
Serbian nationality			-0.361205***	-0.010528***	-0.381945***	-0.011060***
			(0.061)	(0.002)	(0.070)	(0.002)
Borrower-Bank Relationship Characteristics						
Number of repaid loans, one			-0.038164	-0.001112	-0.045133	-0.001307
			(0.031)	(0.001)	(0.031)	(0.001)
Number of repaid loans, two			-0.076535*	-0.002231*	-0.082702*	-0.002395*
			(0.043)	(0.001)	(0.043)	(0.001)
Number of repaid loans, three or more			-0.110008	-0.003206	-0.110960	-0.003213
			(0.067)	(0.002)	(0.068)	(0.002)
Prior rejection from the Bank			0.325168***	0.009477***	0.317005***	0.009180***
			(0.048)	(0.001)	(0.045)	(0.001)
Business Characteristics						
Business size			0.198722***	0.005792***	-0.005501	-0.000159
			(0.019)	(0.001)	(0.033)	(0.001)
Income to total assets			0.007992	0.000233	-0.246354**	-0.007134**
			(0.076)	(0.002)	(0.101)	(0.003)
Fixed assets availability			-0.089362***	-0.002605***	-0.042211***	-0.001222***
			(0.009)	(0.000)	(0.009)	(0.000)
Current loans from the Bank			1.129817***	0.032929***	1.106920***	0.032054***
			(0.101)	(0.004)	(0.105)	(0.004)
Borrower's indebtedness with other FI			0.112744	0.003286	0.126425	0.003661
			(0.080)	(0.002)	(0.080)	(0.002)

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Table A9 continued

Loan Characteristics						
Amount of loan application, ln					0.242981***	0.007036***
					(0.028)	(0.001)
Mortgage					0.054147	0.001568
					(0.067)	(0.002)
Chattel mortgage					0.042378	0.001227
					(0.059)	(0.002)
Loan guarantor					-0.123311***	-0.003571***
					(0.037)	(0.001)
Constant	-2.855013***		-4.690921***		-4.773495***	
	(0.147)		(0.236)		(0.256)	
Number of observations	217,814	217,814	211,665	211,665	211,665	211,665
Pseudo R-squared	0.191		0.254		0.259	
Year Fixed Effects (reference year 2003)	Yes		Yes		Yes	
Sector Fixed Effects	No		Yes		Yes	
Loan Purpose Fixed Effects	No		No		Yes	

Standard errors clustered at municipality level in paranthesis
*** p < 0.01, ** p < 0.05, * p < 0.1

Table A10: Robustness check of baseline results. Including outliers

This table reports coefficients and average marginal effects of the loan default probit models when the sample includes outliers in terms of total assets, income to assets and fixed assets availability dropped in the baseline analysis. The dependent variable is the Write off loan default indicator. War exposure is measured by the number of women and children casualties on district level. Model 1 contains only variables generated on district level and year time fixed effects. Model 2 includes district level variables, year time fixed effects, borrower's characteristics, borrower-bank relationship characteristics, and business characteristics. Model 3 contains the full set of control variables including (potentially endogenous) loan characteristics and year time fixed effects.

	Model 1		Model 2		Model 3	
	Coeff	AME	Coeff	AME	Coeff	AME
War Exposure Characteristics						
Women and children casualties	0.003343**	0.000071**	0.003222**	0.000065**	0.002991**	0.000059**
	(0.001)	(0.000)	(0.001)	(0.000)	(0.001)	(0.000)
Housing and infrastructure damage	-0.025886	-0.000549	-0.020912	-0.000422	-0.020558	-0.000408
	(0.016)	(0.000)	(0.014)	(0.000)	(0.014)	(0.000)
Population Density And Economic Activity						
Nightlight intensity	-0.011032**	-0.000234**	-0.010215**	-0.000206**	-0.011552***	-0.000229***
	(0.005)	(0.000)	(0.004)	(0.000)	(0.004)	(0.000)
Change in nightlight intensity	0.010956	0.000232	0.003957	0.000080	0.005294	0.000105
	(0.009)	(0.000)	(0.010)	(0.000)	(0.010)	(0.000)
Borrower's Characteristics						
Female borrower			-0.185569***	-0.003744***	-0.187593***	-0.003726***
			(0.030)	(0.001)	(0.031)	(0.001)
Borrower's age			-0.005722	-0.000115	-0.005614	-0.000112
			(0.005)	(0.000)	(0.005)	(0.000)
Borrower's age squared			-0.000068	-0.000001	-0.000071	-0.000001
			(0.000)	(0.000)	(0.000)	(0.000)
Marital status (maried borrower)			0.017795	0.000359	0.015779	0.000313
			(0.020)	(0.000)	(0.019)	(0.000)
Household size			-0.009012*	-0.000182*	-0.011900**	-0.000236**
			(0.005)	(0.000)	(0.005)	(0.000)
Serbian nationality			-0.199024***	-0.004015***	-0.221814***	-0.004406***
			(0.053)	(0.001)	(0.053)	(0.001)
Borrower-Bank Relationship Characteristics						
Number of repaid loans, one			-0.015684	-0.000316	-0.023548	-0.000468
			(0.030)	(0.001)	(0.033)	(0.001)
Number of repaid loans, two			-0.025826	-0.000521	-0.036461	-0.000724
			(0.043)	(0.001)	(0.045)	(0.001)
Number of repaid loans, three or more			-0.062789	-0.001267	-0.069643	-0.001383
			(0.064)	(0.001)	(0.065)	(0.001)
Prior rejection from the Bank			0.345569***	0.006972***	0.322197***	0.006400***
			(0.035)	(0.001)	(0.036)	(0.001)
Business Characteristics						
Business size			0.127585***	0.002574***	-0.071595***	-0.001422***
			(0.014)	(0.000)	(0.015)	(0.000)
Income to total assets			0.000101**	0.000002**	-0.006808	-0.000135
			(0.000)	(0.000)	(0.010)	(0.000)
Fixed assets availability			-0.064595***	-0.001303***	-0.014575***	-0.000290***
			(0.007)	(0.000)	(0.005)	(0.000)
Current loans from the Bank			0.983014***	0.019832***	0.941232***	0.018697***
			(0.081)	(0.002)	(0.078)	(0.002)
Borrower's indebtedness with other FI			0.135815**	0.002740*	0.156964**	0.003118**
			(0.069)	(0.001)	(0.072)	(0.002)

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Table A10 continued

Loan Characteristics				
Amount of loan application, ln			0.291927***	0.005799***
			(0.018)	(0.000)
Mortgage			-0.017245	-0.000343
			(0.060)	(0.001)
Chattel mortgage			0.024612	0.000489
			(0.042)	(0.001)
Loan guarantor			-0.073114**	-0.001452**
			(0.031)	(0.001)
Constant	-2.947668***	-3.726984***	-5.368096***	
	(0.154)	(0.202)	(0.247)	
Number of observations	429,154	408,713	408,713	
Pseudo R-squared	0.187	0.256	0.269	
Year Fixed Effects (reference year 2003)	Yes	Yes	Yes	
Sector Fixed Effects	No	Yes	Yes	
Loan Purpose Fixed Effects	No	No	Yes	

Standard errors clustered at municipality level in paranthesis
*** p < 0.01, ** p < 0.05, * p < 0.1