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INVESTMENT UNDER FIRE: FIRM RESPONSES TO WAR IN UKRAINE

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ABSTRACT

Investment under fire: Firm responses to war in Ukraine

How do firms adapt their decision-making about strategic investments during a war? We examine this question in the context of Russia's full-scale invasion of Ukraine, combining data on almost 500,000 Ukrainian firms from 2017 to 2023 with detailed conflict data. We argue that war reshapes firm investment through three related mechanisms: exposure to violence, changes in the strategic value of firm resources, and sectoral alignment with wartime demand. Our results show that firms exposed to war strongly reduce their investment, and that this negative investment response is amplified by conflict intensity. Moreover, war reconfigures the strategic value of firm resources: financial resilience preserves firm investments, whereas the investment advantages associated with firm size and leverage weaken as larger firms have more resources at risk and debt creates financial rigidity. Firms in war-related industries increase investment during war, indicating that productive capabilities aligned with wartime demand may create strategic opportunities even under extreme uncertainty. These findings contribute to research on violent conflict and firm strategy by showing that war is not simply a uniform negative shock, but also creates a strategic context in which firms adapt depending on how risks, resources, and opportunities are reconfigured.

JEL CLASSIFICATION: D22, D25, D91, F51

KEYWORDS: Firm investment, War, Ukraine

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Abstract

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Non-technical summary

Focus

This paper studies how firms adapt their strategic investment decisions during a war, using Russia's full-scale invasion of Ukraine as the setting. We combine financial data on almost 500,000 Ukrainian firms from 2017 to 2023 with detailed, geographically disaggregated conflict data to examine how geographic exposure to war, local conflict severity, firm resources and resilience, leverage, and alignment with wartime-related sectors shape firms' investment decisions.

Contribution

The paper contributes to research on violent conflict and firm strategy by showing that war reshapes firm investment through three related mechanisms: exposure to violence, changes in the strategic value of firm resources, and sectoral alignment with wartime demand. Unlike much of the existing literature, which largely studies multinational firms or treats war as a uniform negative shock, this study documents that domestic firms respond to war heterogeneously, depending on their location, resources, and business focus.

Findings

Firms located in areas exposed to war reduce their investment substantially, and the reduction is larger where local conflict is more prolonged or intense. War also changes how firm resources matter for investment: financial resilience helps firms sustain investment under war exposure, while the advantages usually associated with larger firm size and higher leverage weaken. In contrast, firms operating in war-related industries increase their investment during the war, suggesting they see strategic opportunities aligned with wartime demand. Overall, war is not simply a uniform negative shock to investment: it reshapes the strategic context in which firms make capital-allocation decisions.

1. Introduction

War creates extreme uncertainty and firms face elevated challenges in predicting demand, inputs, infrastructure, financing conditions, and asset security. This uncertain environment can reduce the willingness of managers to invest, causing firms to delay or reduce investments as future returns become less certain (Bloom, 2009; Julio and Yook, 2012; Trigeorgis and Reuer, 2017). War can also reduce the ability of firms to invest by damaging assets, disrupting economic activity (Abadie and Gardeazabal, 2003), and limiting access to finance (Shpak et al., 2023). In short, war puts pressure on firms to postpone, reduce, or abandon their investment projects.

The responses of firms to war are hardly uniform. Some firms retrench, while others preserve, redirect, or expand investment when they have the resources to absorb disruption or capabilities aligned with wartime demand (Guidolin and La Ferrara, 2007; Barger, Denis, and Lehn, 2018; Blair, Christensen, and Wirtschafter, 2022). These strategic differences in war responses raise the question of why firms facing the same shock make divergent capital commitments.

This firm-level heterogeneity in war responses remains largely unexplored. Existing research in strategy and international business examines how violent conflict shapes the intervention strategies of multinational enterprises (Getz and Oetzel, 2010), stakeholder responses (Oetzel and Getz, 2012), foreign subsidiary exit (Dai, Eden, and Beamish, 2017), and subsidiary-level investment and expansion (Oh and Oetzel, 2017). We know less about how domestic firms adapt their strategic investment decisions during a war, especially when firms differ in geographic exposure to war, local conflict severity, resources, and sectoral alignment with wartime demand.

So how do firms adapt their strategic investment decisions during a war period? More specifically, how do geographic exposure, local conflict severity, firm resources, resilience, leverage, and sectoral alignment with wartime demand shape firms' capital commitments?

We argue that war reshapes firm investment through three related mechanisms. First, there is uneven geographic exposure of firms to war, as occupation, fighting, and strikes increase local threats to assets, employees, supply chains, and expected returns. Second, war changes the strategic value of firm resources. Under extreme uncertainty,

size, liquidity, and debt may shape investment differently. Third, war creates sector-specific opportunities when a firm's productive capabilities are aligned with wartime demand, giving some firms incentives to ramp up investment even as others retrench. Together, these mechanisms suggest that war does not uniformly contribute to reducing investment, but significantly changes the conditions under which firms reduce, preserve, or expand their capital commitments.

To examine these mechanisms, we study Russia's full-scale invasion of Ukraine. Russia's full-scale invasion in February 2022 profoundly disrupted Ukraine's economic environment. The grinding war since has destroyed infrastructure and productive assets, disrupted trade routes and supply chains, reduced agricultural and industrial activity, and created exceptional uncertainty across regions and sectors. Firm investment responses, we argue, play a critical role in the face of such ongoing disaster. They determine whether firms maintain operations, adjust productive capacity, and thus strengthen the overall economic resilience. This paper examines how Russia's full-scale invasion has reshaped the strategic investment decisions of firms in Ukraine.

Ukraine provides a suitable empirical setting to investigate the economic consequences of warfare on firm-level investment for two reasons. First, the conflict is ongoing, which allows us to study firm responses during an active full-scale invasion. This unique setting makes it possible to capture immediate firm responses and provide valuable policy insights for wartime economic management and post-war reconstruction. Second, the availability of highly granular firm-level and conflict data allows us to examine how firms respond to war conditions. We use financial data on almost 500,000 Ukrainian companies from 2017 to 2023 and merge them with geographically disaggregated war data from the VIINA 2.0 database (Zhukov and Ayers, 2023). These data allow us to identify firms located in territories affected by occupation or contestation and to measure local conflict severity through the duration of occupation or contestation and the intensity with the number of nearby war events, fights, and strikes. We use a difference-in-differences framework to compare changes in investment before and during the war across firms with different levels of geographic exposure, resources, resilience, leverage, and sectoral alignment with wartime demand.

Our results show that war has heterogeneous effects on firm investment. Overall, firms exposed to war because of their location more aggressively reduced investment.

During the war, investment is lower among firms facing longer occupation or contestation and more nearby war events, fights, and strikes. War exposure also changes how firm resources shape investment. Geographic exposure makes liquidity more valuable for preserving capital commitments, while the investment advantages associated with firm size and leverage weaken as larger firms have resources at risk and financial rigidity due to debt. Unsurprisingly, firms in war-related industries increase investment during war, suggesting that sectoral alignment with wartime demand creates investment opportunities even under extreme uncertainty.

Overall, our findings provide a comprehensive view of how an active war shapes firm-level strategic investment decisions. By showing that investment depends not only on geographic exposure to war, but also on local conflict severity, firm resources, and sectoral alignment with wartime demand, our study highlights the heterogeneous effects of war on firms' capital commitments. These findings have implications for policymakers and managers seeking to support business continuity and resilience under extreme uncertainty, while also emphasizing the substantial economic costs of war for firms exposed to violence and occupation.

Our research complements four strands of the literature. First, we contribute to strategy research on violent conflict and firm investment by showing how the severity of local wartime conditions shapes firms' capital commitments. Prior research shows that conflicts vary in several dimensions (Getz and Oetzel, 2010) and that exposure to violence shapes firm responses (Collier and Duponchel, 2013; Blair, Christensen, and Wirtschafter, 2022). We extend this literature by distinguishing whether firms are exposed to war and how severely their local environment is affected. Using daily geocoded data on the Russian invasion of Ukraine, we measure local conflict severity through the duration of occupation or contestation and the intensity with the number of nearby war events, fights, and strikes around each firm. This allows us to show that firm investment declines not only with geographic exposure to war, but also with the severity of local wartime conditions.

Second, we extend resource-based research and the literature on firm vulnerability in violent conflict by showing that war changes how firm resources shape strategic investment decisions. Prior research views resources as sources of strategic advantage (Barney, 1991), while later work suggests that their value depends on context, especially

when firms are exposed to severe external threats (Le Breton-Miller and Miller, 2015; Dai, Eden, and Beamish, 2017). We add to this literature by showing that war changes how firm resources shape investment decisions. As noted above, liquidity can support a firm's financial resilience under geographic exposure, and the investment advantages associated with firm size and leverage weaken as larger firms have more resources at risk and debt's role shifts from financing capacity toward financial rigidity. This reorients the analysis from whether firms possess resources to how war changes the strategic value of those resources for capital commitments.

Third, our study contributes to research on strategic opportunities under adversity by showing that war can promote reallocation of investment opportunities toward firms whose productive capabilities are aligned with wartime demand. Prior research shows that violent conflict effects are uneven across firms exposed to violence (Blair, Christensen, and Wirtschafter, 2022) and across industries that may benefit from conflict-related conditions or wartime demand (Guidolin and La Ferrara, 2007; Barger, Denis, and Lehn, 2018). We add to this literature by identifying sectoral alignment with wartime demand as a mechanism through which war can increase investment. Firms in war-related industries may increase their investment if their productive capabilities have become more valuable in the wartime economy. We consider that war creates a strategic context that reallocates demand and changes the investment value of firms' capabilities, rather than being a negative uniform shock.

Finally, our study contributes to the emerging literature on the economic and organizational consequences of Russia's full-scale invasion of Ukraine. Existing research shows that the war has affected the access of firms to financing through collateral damage (Shpak et al., 2023), reduced local economic activity in contested areas and places exposed to intense shelling (Zhukov, 2023), reshaped social capital (Hoch, Pondorfer, and Shkola, 2025), and disrupted research productivity within Ukrainian institutions (Guariglia et al., 2025). Closely related, Onyshchenko, Tsapin, and Yaremko (2026) use firm-level balance-sheet data to document asymmetric effects of short-term versus long-term military occupation on sales and employment of Ukrainian firms, with little evidence of recovery until liberation from prolonged occupation. We extend this literature by examining how the war affects strategic investment decisions at the firm level. By combining firm financial data with granular

measures of occupation, local conflict severity, and sectoral exposure, we show that Russia's invasion did not only reduce investment on average. It also influenced which firms have become more vulnerable, which resources supported or constrained capital commitments, and which sectors faced new investment opportunities under wartime demand.

The remainder of the paper is organized as follows. We first develop our theoretical framework and hypotheses. We then describe the data and methodology, present and discuss the results, and conclude.

2. Literature and hypotheses

2.1. Investments under war uncertainty

Investment is a forward-looking strategic commitment: when firms invest, they commit resources today in expectation of future returns. The investment becomes less appealing when uncertainty and reversal costs continue to increase. In such situations, real options theory argues that firms may delay or reduce investment in order to preserve flexibility and avoid committing resources until conditions clarify (Bowman and Hurry, 1993; Trigeorgis, 1996; Trigeorgis and Reuer, 2017). Consistent with this logic, political uncertainty has been shown to reduce corporate investment because it increases the value of waiting and weakens the willingness of managers to commit capital (Julio and Yook, 2012).

War represents an extreme form of uncertainty for firms. It threatens employees, physical assets, supply chains, infrastructure, demand, and access to finance, while making future operating conditions hard to predict. As a result, firms amidst war must decide whether to reduce, delay, maintain, redirect, or expand their capital commitments. Consistent with this view, research on violent conflict shows that war is not just an external shock; it creates a strategic context in which firms must adapt their operations and protect assets in response to conflict risk (Getz and Oetzel, 2010; Oetzel and Getz, 2012), or adjust their investment and expansion decisions depending on the nature of the threat and their capabilities (Oh and Oetzel, 2017). These studies suggest that the strategic consequences of war depend on the conditions firms face.

2.2. Geographic exposure and conflict severity

A central characteristic for our analysis is the geographic exposure of firms to war. Although war affects the national business environment, firms experience differing levels of threat within their local operating environments. Getz and Oetzel (2010) argue that firm responses to violent conflict vary with conflict characteristics, including intensity, geographic scope, and duration. Among these characteristics, the geographic dimension is central. Within the same country, the exposure of a firm to war depends on how directly its local environment has been affected by violence. Prior literature shows that geographic exposure to conflict shapes foreign subsidiary survival (Dai, Eden, and Beamish, 2013), and increases firm exit (Camacho and Rodriguez, 2013). Geographic exposure is particularly relevant for investment as greater exposure increases threats to assets, employees, infrastructure, suppliers, and customers, thereby reducing the feasibility of committing resources. Blair, Christensen, and Wirtschafter (2022) extend this logic to investment by showing that firms' investment responses to armed conflict depend on their proximity to violence. This geographic logic is consistent with research showing that firms may respond to risks or institutional changes beyond the exact location in which they operate. Fremeth and Shaver (2014) further show that firms may respond strategically to developments in jurisdictions where they do not operate if such developments foreshadow future constraints on their own environments. Blake and Jandhyala (2019) demonstrate that political risk shocks can spill over to locations not directly affected by the original event. In our context, this suggests that war-related risks may matter at the exact location of violence as well as in nearby areas where firms face heightened uncertainty, disrupted local markets, or expectations of future exposure. We therefore first examine whether geographic exposure to war reduces firm investment.

H1: Geographic exposure to war reduces firm investment.

While geographic exposure captures whether firms are directly affected by war, exposed firms may still face different levels of local wartime severity. In line with the argument of Getz and Oetzel (2010) that firm responses vary with conflict

characteristics, we distinguish the duration of direct territorial exposure from the intensity of nearby violence. Prolonged occupation or contestation extends the period during which firms operate under direct threat and uncertainty. More frequent war events, fights, and strikes increase the likelihood of disruptions to assets, infrastructure, supply chains, employees, and market access. Consistent with this view, Collier and Duponchel (2013) show that firms located in areas more intensely affected by Sierra Leone’s civil war were smaller after the conflict. Similarly, Onyshchenko, Tsapin, and Yaremko (2026) show that Ukrainian firms under long-term military occupation experience large, persistent declines in sales and employment, whereas firms under short-term occupation recover fully after liberation, underscoring occupation duration as a key dimension of local conflict severity. We therefore expect firm investment to decrease as local conflict severity increases. This emphasis on local conflict severity is consistent with evidence that the effects of war-related shocks vary geographically and over time. Guriev and Melnikov (2016), for example, use high-frequency regional data to show that conflict intensity in Ukraine affected social capital differently across Russian regions depending on their proximity to the conflict zone.

H2: Firm investment decreases with the severity of local conflict.

2.3. Vulnerability: Resources at risk, resilience, and financial rigidity

While conflict directly increases the risks associated with investment, it can also change the value and cost of the resources firms rely on to invest. The resource-based view generally treats firm resources as sources of strategic advantage (Barney, 1991). However, the vulnerability framework developed by Dai, Eden, and Beamish (2017) shows that resources can take on different significance amidst severe external threats. They argue that firm vulnerability depends on exposure to threat, resources at risk, and resilience. We extend this framework from foreign subsidiary exit to the investment decisions of domestic firms by examining how war changes the relationship between firm resources and capital commitments. We focus first on firm size as a source of resources at risk.

Firm size can support investment by giving firms a broader resource base, greater diversification, and better access to external finance. Larger firms may therefore face fewer financial constraints and have a greater capacity to undertake capital commitments. This indicates a positive relationship between firm size and investment under normal conditions.

When a firm is exposed to war because of its geographic location, however, the same organizational scale may place more resources at risk. Larger firms may have more physical assets exposed to harm, higher fixed costs, more employees to protect, and more complex operations to reorganize. War exposure may therefore increase the costs of protecting and adapting the resources associated with firm size. Consequently, firm size is expected to remain a source of investment capacity, but its investment advantage might weaken when firms are exposed to war.

H3: Geographic exposure to war weakens the positive relationship between firm size and firm investment.

Firm resilience is defined as its capacity to absorb external threats and maintain activity after exposure (Dai, Eden, and Beamish, 2017). Therefore, unlike resources at risk, resilience is expected to have stabilizing effect on investments during the war. In war environments, this resilience capacity is particularly important because exposed firms may face damaged infrastructure, interrupted supply chains, revenue disruptions, and more uncertain access to external finance.

We capture resilience by liquidity. In stable environments, the resources underlying resilience may relate differently to investment. Liquidity may be negatively associated with contemporaneous investment when firms draw down cash to finance capital expenditures or retain it as a precautionary reserve.

Under geographic exposure to war, these resources acquire a common strategic function. Higher liquidity contributes to financial resilience as firms have immediately available internal funds when external financing becomes uncertain (Gamba and Triantis, 2008; Denis and Sibilkov, 2010). It is therefore expected to help exposed firms preserve capital commitments. Geographic exposure should weaken the negative relationship between liquidity and investment.

H4: Geographic exposure to war strengthens the role of firm resilience for investment.

We further extend Dai, Eden, and Beamish's (2017) vulnerability framework by examining how war exposure changes the strategic value of leverage. In stable environments, leverage is often positively associated with investment because firms with access to debt can use external funds to finance capital commitments. Debt may also signal creditors' confidence in the firm. Moreover, leverage and investment may be jointly determined when firms borrow specifically to finance investment. Thus, leverage may reflect financing capacity rather than financial rigidity under normal conditions.

Debt commits future cash flows to repayment and increases a firm's exposure to financial distress. Existing obligations can lead to underinvestment when they reduce financial flexibility or make additional financing more difficult to obtain (Myers, 1977; Lang, Ofek, and Stulz, 1996). These constraints become more consequential when firms experience financial stress (Gebauer, Setzer, and Westphal, 2018).

Geographic exposure to war is expected to shift the strategic role of leverage from financing capacity toward financial rigidity. Exposed firms may face disrupted revenues, greater working-capital needs, and more uncertain access to external finance. War-related damage may also weaken collateral values and debt capacity (Gan, 2007; Chaney, Sraer, and Thesmar, 2012). Under these conditions, firms must service existing debt while having fewer resources available for new capital commitments. We would thus expect geographic exposure to weaken the positive relationship between leverage and investment.

H5: Geographic exposure to war weakens the positive relationship between financial leverage and firm investment.

2.4. Strategic opportunities in wartime

War does not only create threats, it can also reallocate demand and change the value of firms' productive capabilities. In most sectors, war increases uncertainty,

disrupts operations, and reduces incentives to commit capital. However, firms whose activities are aligned with wartime needs may face a different investment environment. For these firms, war results in increased demand for specific goods, equipment, infrastructure, repair, transport, or logistical capabilities, making investment more valuable even when the broader economy contracts.

Prior literature shows that conflict can generate uneven economic effects across firms and industries. Some firms may benefit from conflict-related conditions, as Guidolin and La Ferrara (2007) show for diamond firms during the Angolan civil war, while firms may expand investment when war increases demand (Bargeron, Denis, and Lehn, 2018). Building on this literature, we argue that war-related industries may benefit from a wartime reallocation of demand toward their productive capabilities.

We therefore expect firms in war-related industries to increase investment during the war relative to firms in other industries. This does not imply that these firms are insulated from war uncertainty or geographic exposure. Rather, sectoral alignment with wartime demand may partly offset the negative pressures created by war by increasing the investment value of firms' productive capabilities.

H6: Firms in war-related industries increase investment during war relative to firms in other industries.

3. Data and methodology

3.1. Data

To examine how war reshapes firm strategic decisions on investments, we merge firm-level financial data with geocoded war data. Firm-level data come from the Orbis database, which contains comprehensive information on public and private companies of different sizes in Europe, including Ukraine. This database is well-suited for our analysis, continuously reporting firm-level data even during wartime, and thereby allowing us to construct a panel of firm-level observations covering the period 2017–2023. In addition to financial information from balance sheets and profit and loss accounts, Orbis displays firm-level information concerning the industry in which the firm operates, as well as administrative information such as the location of firm

headquarters. Our dataset includes unconsolidated financial statements only to avoid duplicating firms. These data allow us to measure firms' capital commitments, resources, resilience, leverage, and sectoral alignment with wartime demand.

We match the firm-level data with datasets on the war in Ukraine based on firm location. Although Orbis often lacks full address information, it typically provides city and postal code, which allows us to construct a precise address. We apply an algorithm using this address as input in Google Maps to scrape the firm's geographic coordinates. Geocoding allows us to identify the precise firm location within Ukraine's administrative divisions and to retrieve its corresponding oblast, raion and populated place. To minimize the potential geocoding errors from address scraping, we retain firms whose scraped location matches the oblast indicated in Orbis, which provides oblast information for all firms, and exclude those with conflicting geographic information. To better isolate the impact of Russia's 2022 invasion on firm investment in Ukraine, we exclude firms located in the oblasts and raions that were already under Russian occupation before the full-scale war started in February 2022.¹

We use the scraped geographic coordinates of firms to merge the firm-level data with the war data coming from the VIINA (Violent Incident Information from News Articles) 2.0 database (Zhukov and Ayers, 2023). To our knowledge, this database is the most comprehensive available on the war in Ukraine and has been used in prior research (Van Dijcke, Wright, and Polyak, 2023; Zhukov, 2023; Hoch, Pondorfer, and Shkola, 2025). The VIINA database is a near-real time tracking system for Russia's invasion in Ukraine, which is updated daily and freely available.² VIINA collects and processes news reports from Ukrainian and Russian media using machine learning to track reported changes in territorial control for every populated place in Ukraine, as well as classify war events into standardized categories (firefights, tank battles, artillery shelling, etc.) while georeferencing them. The geocodes of war information from VIINA database enable us to match them with the geocoded locations of firms.

To measure geographic exposure to war, we identify Ukrainian territories affected by occupation or contestation based on VIINA information on controlled and

¹ We exclude firms located in the Crimea and Sevastopol oblasts, along with firms located in the Alchevskiy, Rovenkivskiy, Dovzhanskiy, Luhanskiy, Horlivskiy, Donetsk, and Kalmiushkiy raions. These areas are shown in gray in Figures 1, 2, and 5.

² The VIINA 2.0 database can be found at <https://github.com/zhukovyuri/VIINA>.

contested populated places. The dummy variable *Occupied territory* equals one when the populated place where the firm is located is a territory that has ever been controlled or contested by Russian forces during the war, and zero otherwise. Identifying occupation at the level of populated places provides highly granular data, since the VIINA dataset distinguishes 33,141 such locations. Figure 1 displays the distribution of the occupied territories across Ukraine, along with firms' location. As expected, occupied territories are mostly located at the border, in Eastern territories. Our firm sample is well-suited for this analysis as it includes firms located across all regions of Ukraine, both in occupied and non-occupied territories. This spatial variation allows us to compare firms facing different levels of geographic exposure within the same national war.

To identify the impact of the war, we create a dummy variable *War years* equal to one during war years i.e., for the period 2022-2023. This enables us to construct our main explanatory variable, the interaction term *Occupied territory* $\times$ *War years*, which captures whether firms exposed to occupation or contestation changed their investment behaviour in comparison to non-exposed firms after the invasion.

To measure local conflict severity, we construct four additional variables from VIINA for the war years. Since this database provides daily information on the occupation and contested status of populated places in Ukraine, we first create the variable *Occupied territory in days*, equal to the percentage of days on which the firm's territory was contested or controlled by Russian forces during the year. This variable was previously employed in the research of Zhukov (2023) and provides a relevant and precise insight into the extent to which a firm's territory has been affected by the conflict each year. A key feature of the VIINA database is its ability to collect and process all war-related events reported in the news by classifying each of them into different categories along with its involved actors,³ as well as event's geographic coordinates. Using the de-duplicated data file of the VIINA dataset to avoid potential duplicate event reports and based on these categories, we create three separate war intensity variables, *War events*, *Fights*, and *Strikes*, each defined by a restricted set of event classifications, provided in the Appendix. We match these events to firm-level data

³ All events categories are posted at <https://github.com/zhukovyuri/VIINA/blob/main/README.md#2022-russian-invasion-of-ukraine>.

using geographic coordinates, assigning to each firm all events that occurred within 100 kilometers of its location. To deal with extreme values affecting certain areas, each variable is defined as the natural logarithm of one plus the number of events within this 100-kilometer distance.

To measure strategic investment decisions of firms, we create our main dependent variable *Investment* with firm financials from the Orbis dataset. Based on previous research on firm investment (Kadapakkam, Kumar, and Riddick, 1998; Gebauer, Setzer, and Westphal, 2018; Shamshur and Weill, 2023), *Investment* is defined as the percentage annual change in firm net fixed assets, i.e. firm net fixed assets minus lagged firm net fixed assets, all scaled by firm total assets. We winsorize this variable at the 5th and 95th percentiles to deal with abnormal and extreme values. This measure captures changes in fixed capital and therefore reflects the capital commitments through which firms adjust productive capacity during war.

To examine how war changes the strategic value of firm resources, we construct several firm-level variables from Orbis. *Size*, measured as the natural logarithm of total assets, captures firm scale and resources potentially exposed to war. *Cash to assets* captures liquidity and financial resilience. We use two alternative variables to measure financial leverage. *Debt to assets* is defined as short- and long-term debt divided by total assets, while *Debt to equity* is defined as short- and long-term debt divided by total equity. We also include *Operating revenue growth* as a control variable capturing firms' growth opportunities. All these variables are winsorized at the 5th and 95th percentiles to deal with extreme abnormal values, following former works using Orbis financial data (e.g. Popov and Roosenboom, 2013; Lavery, Spaliara, and Tsoukas, 2023).

To capture sectoral alignment with wartime demand, we construct a dummy variable, *War industry*, equal to one when the firm operates in a war-related industry. We define war-related industries based on the firm's NACE two-digit classification code 6, following the classification from Simola (2023).

Figure 2 shows the distribution of mean firm investment between pre-war period (2017–2021) and war period (2022–2023), by raion across Ukraine. The maps indicate that mean firm investment overall decreases after the invasion, and across all raions. In the pre-war period, the highest levels of investment were dispersed throughout Ukraine, with no clear regional pattern. In contrast, the distribution changed

significantly during the war. Mean investment dropped sharply in raions under occupation, while investment remained relatively higher in non-occupied areas. This descriptive pattern suggests that strategic investment decisions varied with geographic exposure rather than only with the national war shock.

Figure 3 displays the mean level of firm investment across years for occupied and for non-occupied territories and gives another view of the impact of war on firm investment. We can observe a sharp drop in firm investment in 2022, both for occupied and non-occupied territories, showing that all firms in Ukraine, independent of their exact location, have reduced their investments after the start of the war. Prior to the full-on war (2017–2021), firm investment was slightly higher in territories that would later be occupied, but the gap relative to non-exposed territories remained stable. This pattern supports the presence of parallel pre-war trends. It changes in 2022, as investment declines more sharply among exposed firms, suggesting that geographic exposure amplified the contraction in capital commitments.

Our final sample is a panel gathering 2,057,910 firm-level observations from 500,084 Ukrainian firms over the period 2017 to 2023. Descriptive statistics of the variables are presented in Table 1. Definitions and sources of variables are provided in the Appendix.

3.2. Methodology

To test our first hypothesis H1, we run difference-in-differences regressions comparing firms exposed to war with firms not directly exposed to war before and during Russia’s full-scale invasion. This approach allows to better assess causality by isolating the impact of the treatment over time through comparison of treated and control groups, while controlling for unobserved time-invariant differences across firms and common shocks affecting all firms. We use *Occupied territory* as our treatment and *War years* as our post variable to estimate the following equation:

$$Investment_{f,t,j} = \alpha + \beta(Occupied\ territory_j \times War\ years_t) + \theta X_{f,t} + \mu_f + \lambda_{f,t} + \varepsilon_{f,t,j}, \quad (1)$$

where f denotes the firm in territory type j , at year t . X corresponds to a vector of firm financial control variables to isolate the effect of the war on firm investment and to minimize a potential omitted variable bias.

To test our second hypothesis H2, we examine whether investment declines with conflict severity, we restrict the analysis to the war years and replace the geographic exposure dummy with our measures of local conflict severity: *Occupied territory in days*, *War events*, *Fights*, and *Strikes*. These estimations allow us to assess whether investment is lower among firms operating during the war when the local conflict environment is more severe.

To test the hypotheses H3–H5, we estimate specifications in which *Occupied territory* $\times$ *War years* is interacted with firm-level characteristics: *Size*, *Cash to assets*, *Debt to assets*, and *Debt to equity*. We first estimate H5 using *Debt to assets* and *Debt to equity* as an alternative leverage measure. Because *Debt to assets* and *Debt to equity* are highly correlated, we include them in separate specifications to avoid multicollinearity and facilitate the interpretation of their interaction effects. These models allow us to examine whether geographic exposure to war changes the relationship between firm resources and investment.

Finally, to test H6, we examine whether firms in war-related industries changed their investment differently during the war. We estimate specifications including *War industry* $\times$ *War years*, which captures whether firms whose productive capabilities are aligned with wartime demand increased investment relative to other firms during the war. We include *War industry* $\times$ *Occupied territory* $\times$ *War years* to examine whether this sectoral effect depends on geographic exposure.

Following prior literature on the determinants of investment at the firm level (Kadapakkam, Kumar, and Riddick, 1998; Gebauer, Setzer, and Westphal, 2018; Shamshur and Weill, 2023), our estimations include the firm-level variables defined above. Descriptive statistics of the variables are presented in Table 1. Definitions and sources of all variables are provided in the Appendix.

We include in the model μ_f , corresponding to firm fixed effects, to control for all time-invariant firm-specific characteristics. $\lambda_{f,t}$ indexes *Year* $\times$ *Industry* fixed effects and account for time-varying shocks that are specific to each firm industry. Firm industry is defined with the core NACE classification codes, with our sample covering

20 distinct NACE core codes. Finally, $\varepsilon_{f,t,j}$ denotes the idiosyncratic error term. Standard errors are clustered by firm in all estimations, since there is likely serial correlation in the error terms within firms over time.

4. Results

4.1. Geographic exposure to war

We test the hypothesis H1 by examining whether firms geographically exposed to war reduced investment more strongly after Russia’s full-scale invasion began. Our identification strategy relies on the assumption that investment trends in occupied and non-occupied territories would have evolved similarly over time in the absence of war. This parallel-trends assumption is essential to the validity of our model.

First, we visually examine investment levels in the pre-war period in Figure 3. Investment by firms located in areas that would later be exposed to occupation or contestation follows a similar trajectory as those in non-occupied territories prior to 2022, suggesting that both groups would have continued to follow similar paths in the absence of war. Second, to test this assumption, we re-estimate Equation (1) by replacing the dummy *War years* with yearly time dummies. This allows us to analyze the evolution of investment differences over time by interacting the treatment *Occupied territory* with each year dummy. The year 2021 is omitted and serves as the baseline. Using the most recent pre-treatment year as benchmark ensures that differences are not influenced by earlier economic shocks, such as the Covid-19 pandemic. Assuming the parallel trends assumption holds, we do not expect to see any statistically significant difference in investment between the two groups before 2022, while the differences should be significant during the war. Figure 4 shows the estimated coefficients along with their 95 % confidence intervals. As expected, the interaction terms for 2022 and 2023 are negative and statistically significant, indicating a drop in investment in exposed territories during war. All interactions between the pre-war years and the treatment variable are non-significant, providing evidence that there was no break of trends in the pre-war period, i.e. that investment trends in occupied and non-occupied

territories were parallel. These findings provide further support to the validity of our identification strategy and to the causal interpretation of our results.

Table 2 reports the results of the difference-in-differences estimations. We consider four different specifications based on the inclusion of fixed effects and control variables to test the sensitivity of our results. In column (1), we regress *Investment* on *Occupied territory* $\times$ *War years* with only firm and year fixed effects. In column (2), we regress *Investment* on *Occupied territory* $\times$ *War years* with region and year fixed effects, and all controls. Our preferred specifications are in columns (3) and (4): they include firm fixed effects and all controls, differing on the addition of year fixed effects in column (3) and year $\times$ industry fixed effects in column (4).

We first observe that the estimated coefficient for *War years* is negative and significant in all estimations, indicating that firm investment declined in Ukraine during the war period. This confirms that Russia's full-scale invasion created a broad national shock for Ukrainian firms. However, this decline was not uniform across territories. With the difference-in-differences design, the key finding is the negative coefficient of *Occupied territory* $\times$ *War years*. This result is observed in all specifications, confirming that it does not depend on the chosen explanatory variables. This result supports hypothesis H1 (geographic exposure to war reduces firm investment), suggesting that direct exposure to occupation or contestation increases the perceived risk and expected cost of capital commitments, thereby leading firms to pull back on investment more aggressively in wartime.

The results are also economically significant. In the specification in column (4), we observe that all firms in Ukraine reduced on average their investment by 0.838 percentage points during the war years regardless of their location. However, firms in exposed territories experienced an additional drop of 0.372 percentage points in investment during the war years, compared to firms in non-occupied areas. Given that the mean investment is -1.073%, a drop of 0.372 percentage points represents about a third of the mean and is economically large.

Turning to the control variables, we find that larger firms tend to invest more. This is consistent with the idea that larger firms are more diversified and less prone to financial constraints, which can hinder investment. The relationship between *Cash to assets* and investment varies across specifications and is negative in our preferred

models, suggesting that firms may retain cash as a precautionary buffer rather than commit it to investment, or draw down their cash reserves when financing capital expenditures. Operating revenue growth is also significantly positive, in line with the view that growing firms are more prone to launch investment. Finally, we observe that the ratio of debt to assets is positive and significant, indicating that greater indebtedness is associated with higher investment. This may appear counterintuitive given that higher indebtedness can be associated with tighter financial constraints. However, higher indebtedness can also reflect better access to external finance, facilitating investment. Additionally, firms can borrow specifically to finance investment, in which case debt and investment are jointly determined.⁴

4.2. Local conflict severity

While previous estimations indicate that geographic exposure to war reduces firm investment, hypothesis H2 suggests that geographic exposure alone does not fully capture the severity of local wartime conditions. Firms exposed to war may face different levels of local conflict severity depending on the duration of occupation or contestation and the number of nearby war events, fights, and strikes. We therefore examine whether firm investment decreases as local conflict duration and intensity increase.

We restrict the analysis to the war years and use four measures of local conflict severity: *Occupied territory in days*, *War events*, *Fights*, and *Strikes*, defined above.

Table 3 reports the estimations related to war severity. For each war severity variable, we consider our two most comprehensive model specifications. All four measures of local conflict severity consistently yield negative and statistically significant coefficients⁵. This confirms that during the war period, investment is lower

⁴ We have checked the robustness of these results in two ways. We first estimate simple OLS regressions that include only the *War years* variable, without the treatment indicator. We have also employed an alternative variable *Occupied raion*, which is equal to 1 if the firm is located in a raion that has ever been officially classified as affected by hostilities or temporary occupation, based on the Ukrainian government Order No. 309 (22.12.2022) and its amendment, Order No. 415 (29.11.2024). We estimate our two most comprehensive model specifications. These estimations corroborate the results that firm investments are lower in the war years and they are lower in occupied raions in comparison to the other raions in Ukraine. Estimations are available on request.

⁵ In the estimations, we consider war events within a 100-kilometer distance of the firm's location. We also re-estimate our models using the same variables within 50 kilometers of each firm's location. The results remain statistically significant, confirming the robustness of our findings to alternative distance specifications. Estimations are available on request.

for firms located in areas experiencing longer occupation or contestation or more nearby war events, fights, and strikes. The coefficients are larger for *Fights* (−0.596) and *Strikes* (−0.566) than for the broader *War events* measure (−0.502). This pattern is consistent with firms making lower capital commitments when exposed to more intense forms of local conflict.

These findings support hypothesis H2: firm investment decreases with both the duration and the intensity of local conflict. Longer occupation or contestation prolongs the period during which firms operate under direct threat, while more frequent violent events increase the likelihood of operational disruption. These results confirm that the capital commitments of firms depend not only on whether the firms are geographically exposed to war, but also on how severely their local environment is affected.

4.3. Resources at risk, resilience, and financial rigidity

We next examine whether geographic exposure to war changes how firm characteristics shape investment. Hypotheses H3-H5 imply that war not only reduces investment directly, but that it also changes the strategic value of firm resources, resilience, and leverage. This analysis therefore examines whether size, liquidity, and leverage influence capital commitments differently for firms exposed to war.

Table 4 reports the results using our most comprehensive model specifications. The coefficients on the triple interaction terms show whether geographic exposure to war changes the relationship between each firm characteristic and investment.

The results support hypothesis H3. The coefficient on *Size* is positive and significant, consistent with larger firms possessing greater investment capacity under normal conditions. However, the interaction between *Size* and *War years* is negative and significant, indicating that the investment advantage associated with size weakens during the war. More importantly, the interaction between *Size* and *Occupied territory* $\times$ *War years* is also negative and significant, showing that this weakening is greater among geographically exposed firms. This pattern is consistent with the resources-at-risk mechanism: war exposure may make larger asset bases, higher fixed costs, and more complex operations more costly to protect and reorganize, reducing the investment advantage associated with firm size.

The results provide support for hypothesis H4. The coefficient on *Cash to assets* is negative, whereas its interaction with *Occupied territory* $\times$ *War years* is positive and significant. This indicates that, following the invasion, the relationship between liquidity and investment changed more positively among geographically exposed firms than among non-exposed firms. Consistent with Dai, Eden, and Beamish's (2017) framework, geographic exposure increases the investment value of financial resilience: liquid resources become more useful for preserving capital commitments when firms face disruption and uncertain access to external finance. This finding suggests that, under war exposure, cash holdings are not merely a precautionary buffer, but a strategic resource that helps firms sustain investment when external financing conditions deteriorate.

The results support hypothesis H5 across both measures of leverage. The coefficients on *Debt to assets* and *Debt to equity* are positive and significant under baseline conditions. This positive relationship may reflect firm access to external finance, a signaling role of debt, or simultaneity between borrowing and investment when firms use debt to finance capital commitments. However, the interactions of both leverage measures with *War years* are negative and significant, indicating that this positive relationship weakens during the war. Their interactions with *Occupied territory* $\times$ *War years* are also negative and significant, showing that the weakening is greater among geographically exposed firms. The consistency across both leverage measures supports the interpretation that war exposure changes the strategic role of leverage from financing capacity toward financial rigidity.⁶

Overall, these findings show that geographic exposure to war changes the strategic value of firm resources: liquidity becomes more valuable and the investment advantages associated with size and leverage weaken. These results further support the broader argument that war changes the strategic value of firm resources and resilience, rather than affecting all firms through a uniform investment shock.

⁶ We re-estimated these models using pre-war firm characteristics, measured either in 2021 or as pre-war averages, to mitigate concerns that contemporaneous size, liquidity, and leverage may themselves be affected by the war. The results remain consistent with our main findings.

4.4. War as a strategic opportunity

We finally examine whether war can also create strategic investment opportunities for firms whose productive capabilities are aligned with wartime demand. Hypothesis H6 predicts that firms in war-related industries increase investment during the war relative to firms in other industries. The argument is not that these firms are unaffected by uncertainty, but that wartime demand may partly offset the negative investment pressures created by the war.

To test H6, we use the dummy variable *War industry* defined above. Figure 5 illustrates the distribution of war-related industry firms across Ukraine. Firms in war industries are located in both occupied and non-occupied territories of Ukraine. This spatial variation allows us to distinguish the effect of the war industry from the effect of the war itself, and to assess whether the impact of the war industry depends on the location of a firm in an occupied territory or not.

Table 5 reports the results of estimations focusing on war-related industries. We use our most comprehensive model specifications including firm fixed effects and all controls, differing on the addition of year fixed effects in column (1) and year $\times$ industry fixed effects in column (2). Given that war industry is constant for a given firm, we additionally consider the same specifications without firm fixed effects in columns (3) and (4) to check the sensitivity of our results.

First, the estimated coefficients for the interaction term *War industry* $\times$ *War years* are positive and significant in three out of four specifications. This indicates that firms in war-related industries increased investment during the war relative to firms in other industries. This result supports H6 and is consistent with sectoral alignment with wartime demand increasing the investment value of firms' productive capabilities.⁷

The interaction term *War industry* $\times$ *Occupied territory* $\times$ *War years* informs about how exposure to war zones influences firms in war-related industries. We find no differential effect between war-related industry firms in occupied and non-occupied

⁷ Because our post-invasion period covers only 2022 and 2023, we cannot determine whether the higher investment of firms in war-related industries reflects a permanent strategic commitment. We thus interpret the result more cautiously as evidence that sectoral alignment with wartime demand during the early phase of the war was associated with higher investment.

territories. This implies that the influence of operating in a war-related sector on investment is uniform across locations, and likely reflects nationwide wartime priorities. Taken together, the results show that war not only generates investment contractions, but it can reallocate investment opportunities toward firms with capabilities valued in the wartime economy.

5. Discussion

This study shows that war not only causes a negative shock to investment, it also creates a strategic context that reshapes the capital commitments of firms. Geographic exposure and local conflict severity make investment more difficult, while firm resources and sectoral capabilities condition how firms respond. Higher liquidity helps firms preserve investment under exposure, whereas the usual investment advantages associated with size and leverage weaken. By contrast, firms in war-related industries increase investment, suggesting that some capabilities become more valuable when aligned with wartime demand.

The results also help assess the relative economic importance of the mechanisms we examine. The baseline effect of geographic exposure to war is sizeable, but local violent intensity appears more consequential than the simple exposed/non-exposed distinction. A one-standard-deviation increase in the broader measure of war events is associated with an investment decline of about 0.65 percentage points, while comparable increases in fights and strikes are associated with declines of about 0.80 and 0.77 percentage points, respectively. Among firm-level characteristics, size and liquidity have meaningful but more moderate effects: a one-standard-deviation increase in firm size reduces the investment advantage of exposed firms by about 0.21 percentage points, while a one-standard-deviation increase in liquidity offsets the investment decline by a similar amount. By contrast, the financial-rigidity mechanism is larger, with a one-standard-deviation increase in leverage reducing investment by about 0.50 percentage points when leverage is measured by debt to assets and by about 0.48 percentage points when measured by debt to equity. Sectoral alignment with wartime demand is associated with the largest coefficient among the mechanisms we examine: firms in war-related industries increase investment by about 2.0 percentage points in

the preferred specification with year-by-industry fixed effects. These comparisons should be interpreted cautiously because they come from different specifications, but they indicate that wartime investment responses are shaped especially by local violent intensity, financial rigidity, and sectoral alignment with wartime demand.

These findings contribute to strategy research by moving beyond the average effect of conflict. War does not simply reduce firms' willingness or ability to invest. It reconfigures the strategic environment in which investment decisions are made. Geographic exposure changes the risk attached to capital commitments: local conflict severity changes the feasibility of maintaining productive capacity, liquidity becomes more valuable when external finance availability is disrupted, and sectoral capabilities become more valuable when they are aligned with wartime demand. In this sense, war acts as a strategic change that influences the value of firm resources and the conditions under which firms reduce, preserve, or expand investment.

Our findings also have implications for managers facing extreme geopolitical uncertainty. First, investment decisions in wartime should be location-specific rather than country-wide. A national conflict does not expose all firms or all establishments to the same risks. Managers should therefore develop granular assessments of exposure that connect investment projects to local security conditions, infrastructure vulnerability, supply-chain access, and operational disruption. In volatile environments, the relevant unit of strategic analysis is often not the country, but the specific locality in which assets, workers, suppliers, and customers are exposed.

Second, capital allocation should become more contingent and flexible. In highly exposed areas, large irreversible investments are especially risky because future operating conditions are uncertain and assets may become difficult to protect or redeploy. Managers should therefore favor modular, reversible, or scalable investments when possible. Phased investments, smaller capacity additions, temporary production arrangements, and relocation-ready assets can help firms preserve operational continuity while avoiding excessive exposure to assets that may become stranded or destroyed.

Third, firms should preserve financial flexibility before and during geopolitical crises. Our results show that liquidity becomes more valuable for investment among geographically exposed firms. Cash and liquid resources are not merely passive buffers.

In wartime, they become strategic resources that allow firms to continue essential investments when external finance is costly, delayed, or unavailable. By contrast, leverage can become a source of financial rigidity. Debt obligations reduce room for maneuver precisely when firms need flexibility to absorb shocks, repair damaged assets, change suppliers, or relocate operations. Managers should therefore stress-test capital structures against scenarios in which revenues fall, collateral values decline, or refinancing becomes difficult.

Fourth, managers should not assume that scale automatically protects firms under war. The weakening of the investment advantage associated with size suggests that larger firms may have more resources at risk: more fixed assets, more employees, more complex operations, and greater coordination demands. In war, the strategic value of size depends less on the volume of resources controlled than on the ability to reconfigure them quickly.

Fifth, managers need to distinguish between defensive investment and opportunity-driven investment. War imposes severe constraints, but it can also reshape demand. The increase in investment among firms in war-related industries shows that some capabilities become more valuable in a wartime economy. Managers should therefore assess whether their existing capabilities can be redeployed toward urgent wartime needs, reconstruction-related activities, logistics, infrastructure repair, energy resilience, cybersecurity, medical supply, or other activities where demand becomes more resilient.

This study has several limitations. We only examine firm investment during the early phase of Russia's full-scale invasion, using data up to 2023. This allows us to study firm behavior during an active conflict, but it limits our ability to observe longer-term strategic reorientation, post-war recovery, and the persistence of investment changes. Future research could examine whether firms that reduce investment during the war later recover, relocate, exit, or reconfigure their activities more permanently.

Moreover, our analysis focuses on fixed-asset investment. Firms may also adapt through employment, innovation, supply-chain reorganization, export reorientation, digitalization, or relocation. Future research could examine how these different forms of strategic adaptation interact during war. Third, we cannot directly observe managerial decision-making. We interpret the role of liquidity, size, leverage, and war-

related industries as evidence that war changes the strategic value of resources and capabilities, but we do not observe managers' expectations, risk perceptions, or internal capital-allocation routines. Surveys, interviews, or case studies could help clarify these mechanisms.

Finally, the Ukrainian context is distinct, combining an active full-scale invasion, substantial regional variation in violence and occupation, strong national mobilization, and large shifts in wartime demand. These features make it a particularly relevant setting for studying investment under war, but they may limit the generalizability of the findings to other geopolitical shocks, such as sanctions, civil conflict, terrorism, or policy reversal.

These implications suggest that investment in wartime should be understood as a problem of strategic adaptation rather than merely a response to declining demand or damaged assets.

6. Conclusion

This study examines how Russia's full-scale invasion of Ukraine reshaped firms' strategic investment decisions. Using firm-level financial data matched with granular conflict information, we show that war does not affect firm investment uniformly. Firms exposed to occupation or contestation reduce investment more strongly than non-exposed ones, and investment declines further when local conflict is more prolonged or intense.

Our findings also show that war changes the strategic value of firm resources. Liquidity helps firms preserve investment under exposure, whereas the investment advantages associated with size and leverage weaken. At the same time, firms in war-related industries increase investment, suggesting that some capabilities become more valuable when they are aligned with wartime demand.

Overall, the paper shows that war is not only a destructive shock, but also creates a strategic context that reshapes capital allocation. Firms' investment responses depend on where they are exposed, which resources are vulnerable, which financial buffers preserve flexibility, and whether their capabilities fit the demands of the wartime economy. This perspective contributes to strategy research by showing how extreme

geopolitical uncertainty transforms the value of firm resources and produces heterogeneous patterns of investment adaptation.

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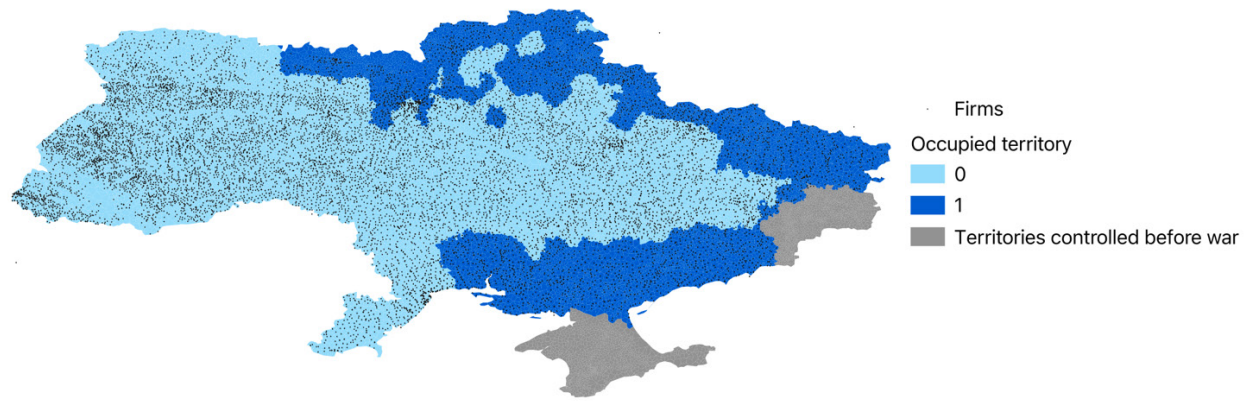
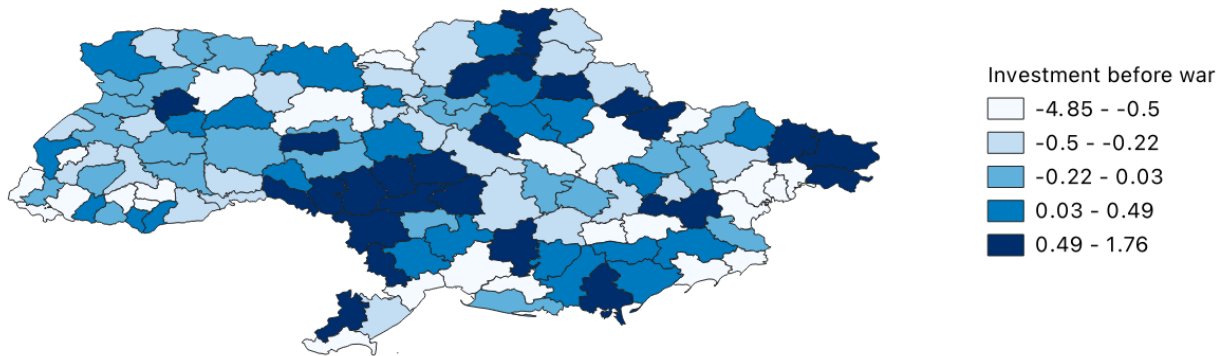


Figure 1. Occupied territories during the war.

This map presents the distribution of the variable *Occupied territory* across Ukraine, along with firms' location (the black dots). *Occupied territory* is a dummy variable equal to 1 if a firm is located in a territorial unit ever occupied or contested by Russian forces during the war.

(A) Distribution of mean firm investment before war (2017–2021)



(B) Distribution of mean firm investment during war (2022–2023)

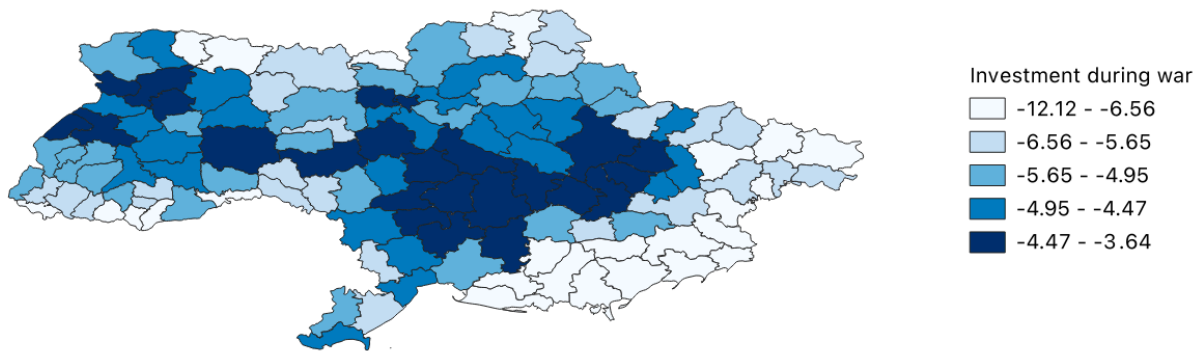


Figure 2. Mean firm investment before (A) and during (B) the war across Ukrainian raions.

These maps present the distribution of the variable firm investment across Ukrainian raions, respectively before and during war. *Investment* variable is defined as firm net fixed assets minus firm lagged net fixed assets scaled by total assets (%). The average of the variable *Investment* has been calculated over each period and by raion. Definitions and sources of variables are provided in the Appendix.

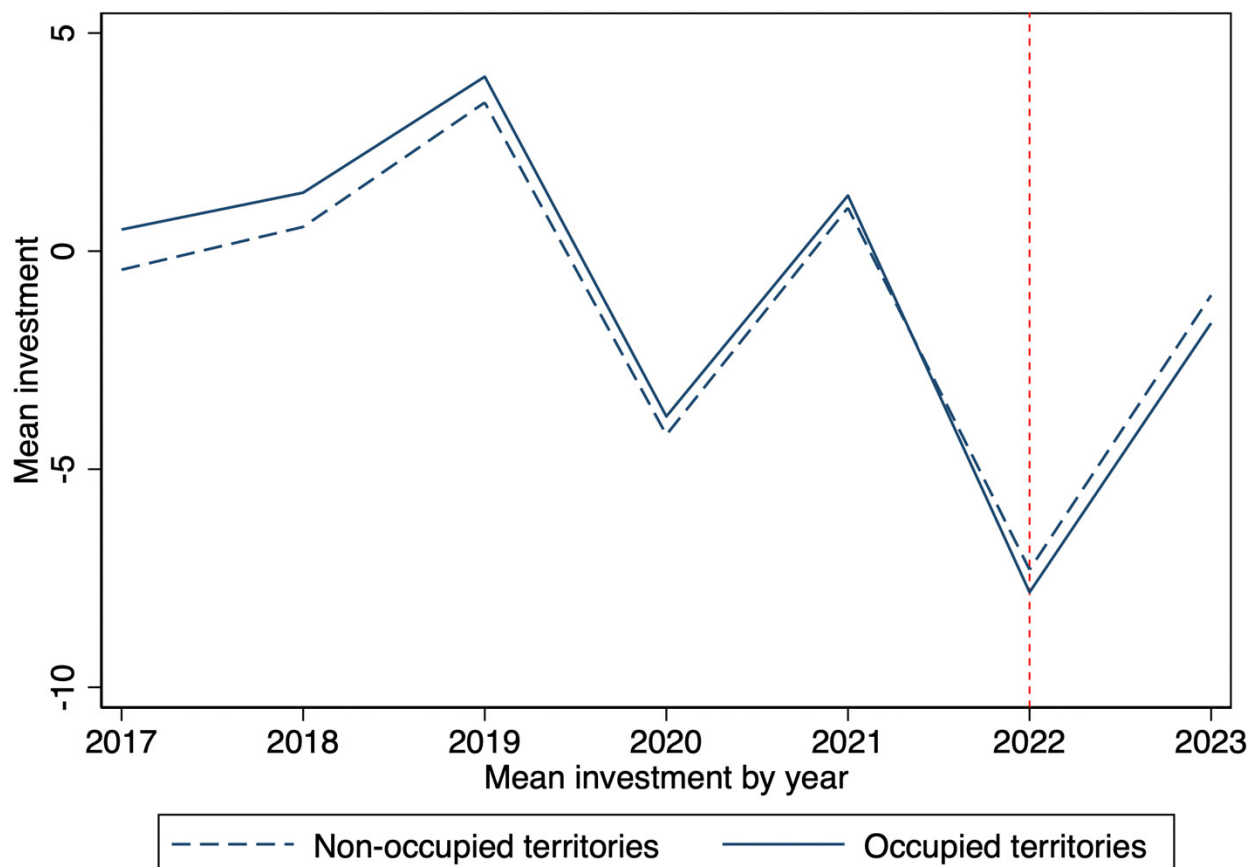


Figure 3. Firm investments in occupied and non-occupied territories.

This figure presents the evolution of firm investment in Ukrainian territories that remained non-occupied and those occupied during the war. It is based on yearly data from 2017 to 2023, and the *Investment* variable is defined as firm net fixed assets minus firm lagged net fixed assets scaled by total assets (%).

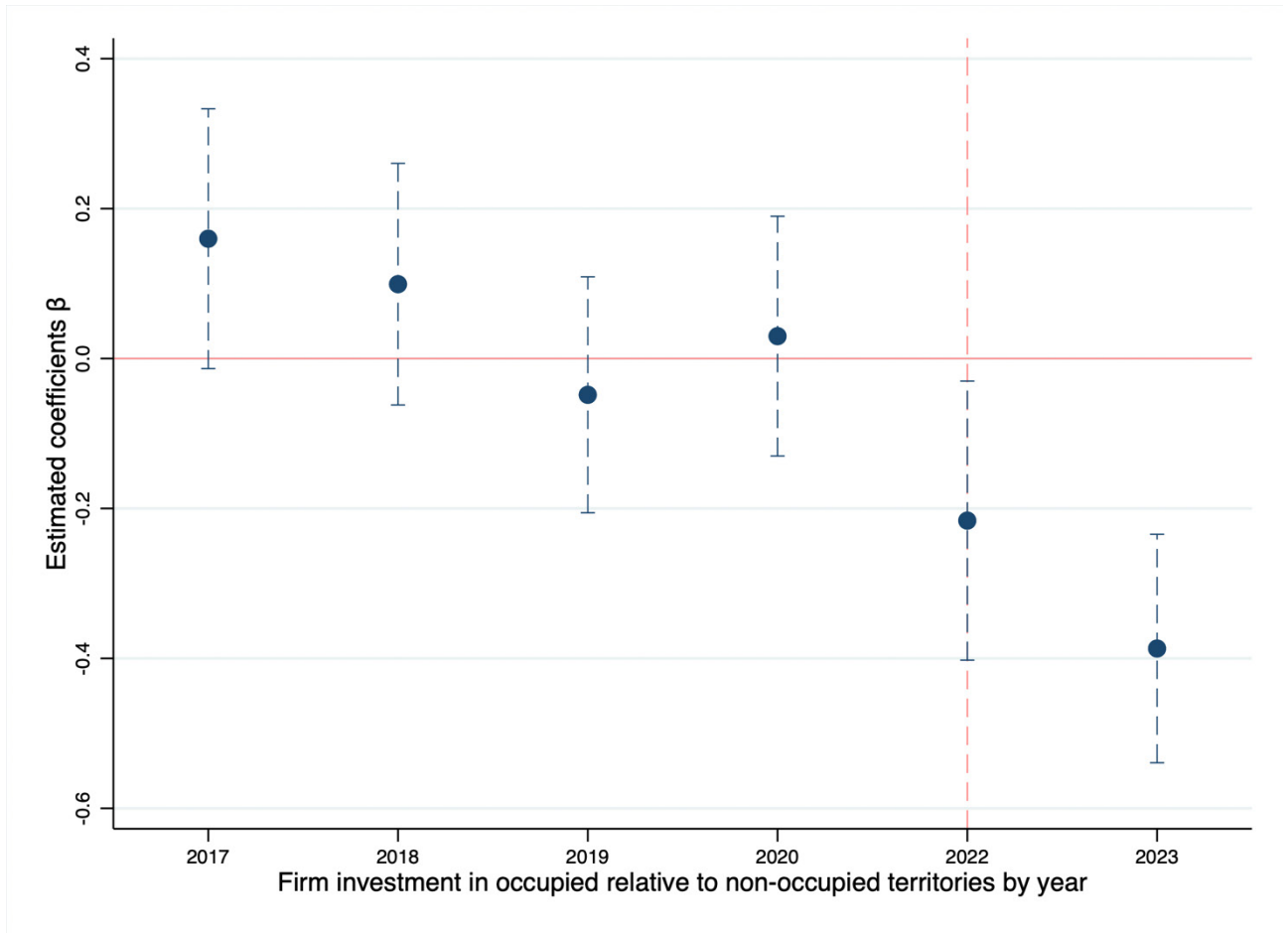


Figure 4. Firm investment by year in occupied territories relative to non-occupied territories.

This graph shows the β coefficients and associated 95 % confidence intervals from the following regression with yearly data: $Investment_{f,t,j} = \alpha + \sum \beta_t (Occupied\ territory_j \times 1_{Year=t}) + \theta X_{f,t} + \mu_f + \lambda_{f,t} + \varepsilon_{f,t,j}$. β_t measures the impact of *Occupied territory*, from 2017 to 2023 (relative to 2021). Standard errors are clustered at the firm level.

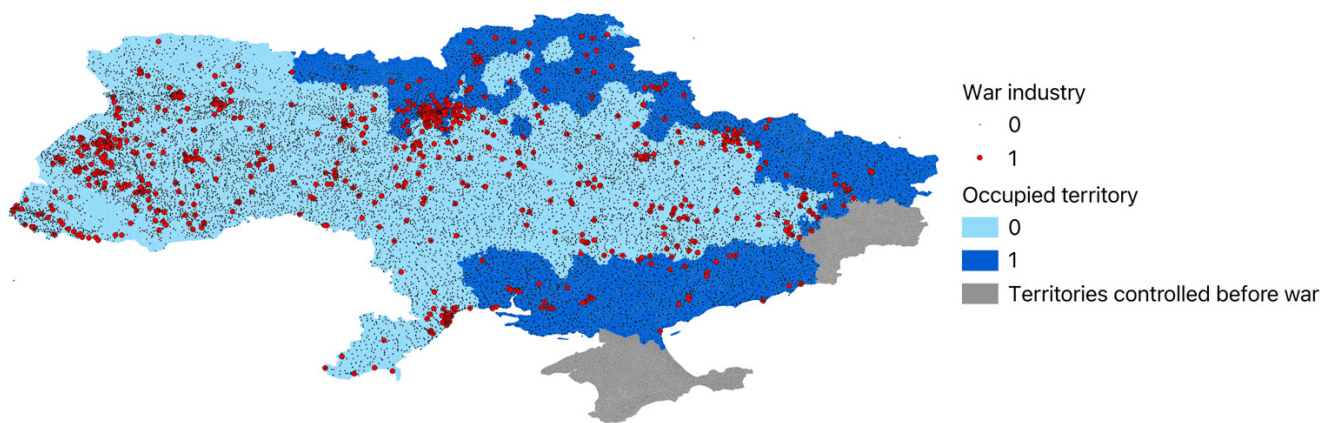


Figure 5. Location of war industry firms in Ukraine.

This map presents the distribution of the variable *Occupied territory* across Ukraine, along with the location of firms operating in the war industry. *Occupied territory* is a dummy variable equal to 1 if a firm is located in a territorial unit ever occupied or contested by Russian forces during the war. *War industry* is a dummy variable equal to 1 if a firm operates in a war-related industry, classified under the following two-digit NACE codes C.25, C.26 and C.30. Detailed definitions and sources of variables are provided in the Appendix.

Table 1
Descriptive statistics

This table reports the descriptive statistics for the variables employed in this study. Definitions of all variables are provided in the Appendix.

Variable	Observations	Mean	Standard deviation	Minimum	Maximum
<i>Dependent variables</i>					
Investment	2,057,910	-1.073	10.002	-25.705	22.233
<i>War variables</i>					
War years	2,057,910	0.245	0.430	0	1
Occupied territory	1,998,910	0.112	0.315	0	1
Occupied territory × War years	1,998,910	0.037	0.188	0	1
Occupied territory in days	488,749	0.853	7.188	0	100
War events	488,749	7.697	1.301	1.946	10.015
Fights	488,749	7.307	1.350	1.946	9.763
Strikes	488,749	6.978	1.368	1.609	9.462
<i>Other explanatory variables</i>					
Size	2,057,892	3.513	2.585	-1.550	7.965
Cash to assets	1,764,241	16.605	26.240	0.017	92.539
Operating revenue growth	1,579,851	12.380	72.829	-93.682	208.216
Debt to assets	2,055,159	3.729	10.438	0	41.834
Debt to equity	2,014,157	3.792	11.684	0	47.962
War industry	2,057,910	0.015	0.123	0	1

Table 2
Geographic exposure to war

This table presents the results of difference-in-differences OLS regressions. The dependent variable is *Investment*. Standard errors are reported in parentheses and are clustered by firm. *, **, and *** indicate statistical significance at the 10 %, 5 %, and 1 % level, respectively. Definitions of all variables used in this table are provided in the Appendix.

	(1)	(2)	(3)	(4)
Occupied territory × War years	-0.476*** (0.057)	-0.668*** (0.061)	-0.407*** (0.067)	-0.372*** (0.065)
Occupied territory		0.404*** (0.037)		
War years	-2.646*** (0.028)	-1.214*** (0.030)	-2.680*** (0.034)	-0.838*** (0.044)
Size		0.570*** (0.004)	1.856*** (0.017)	1.873*** (0.017)
Cash to assets		0.015*** (3.174e-04)	-0.016*** (6.684e-04)	-0.015*** (6.679e-04)
Operating revenue growth		0.014*** (1.241e-04)	0.009*** (1.426e-04)	0.009*** (1.414e-04)
Debt to assets		0.004*** (0.001)	0.046*** (0.002)	0.050*** (0.002)
Firm FE	Yes	No	Yes	Yes
Year FE	Yes	Yes	Yes	No
Region FE	No	Yes	No	No
Year × Industry FE	No	No	No	Yes
Observations	1,998,910	1,371,066	1,371,066	1,371,064
Number of firms	487,212	333,659	333,659	333,657
Within R-squared	0.155		0.184	0.213

Table 3
Local conflict severity

This table presents the results of OLS regressions. The dependent variable is *Investment*. Standard errors are reported in parentheses and are clustered by firm. *, **, and *** indicate statistical significance at the 10 %, 5 %, and 1 % level, respectively. Definitions of all variables used in this table are provided in the Appendix.

	(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)
Occupied territory in days	-0.041*** (0.006)	-0.034*** (0.006)						
War events			-0.532*** (0.098)	-0.502*** (0.096)				
Fights					-0.680*** (0.075)	-0.596*** (0.073)		
Strikes							-0.651*** (0.071)	-0.566*** (0.069)
Firm controls	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes
Firm FE	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes
Year FE	Yes	No	Yes	No	Yes	No	Yes	No
Year × Industry FE	No	Yes	No	Yes	No	Yes	No	Yes
Observations	356,438	356,438	356,438	356,438	356,438	356,438	356,438	356,438
Number of firms	203,098	203,098	203,098	203,098	203,098	203,098	203,098	203,098
Within R-squared	0.246	0.289	0.246	0.289	0.246	0.289	0.246	0.289

Table 4
Firm resources, resilience and financial rigidity

This table presents the results of triple difference-in-differences OLS regressions. The dependent variable is *Investment*. Standard errors are reported in parentheses and are clustered by firm. *, **, and *** indicate statistical significance at the 10%, 5%, and 1% level, respectively. Definitions of all variables used in this table are provided in the Appendix.

	(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)
Size × Occupied territory × War years	-0.083*** (0.027)	-0.082*** (0.027)						
Size × Occupied territory	-0.043 (0.051)	-0.053 (0.051)						
Size × War years	-0.839*** (0.011)	-0.852*** (0.011)						
Cash to assets × Occupied territory × War years			0.008*** (0.002)	0.008*** (0.002)				
Cash to assets × Occupied territory			-0.009*** (0.002)	-0.009*** (0.002)				
Cash to assets × War years			0.076*** (0.001)	0.074*** (0.001)				
Debt to assets × Occupied territory × War years					-0.048*** (0.008)	-0.048*** (0.008)		
Debt to assets × Occupied territory					0.002*** (0.006)	0.021*** (0.006)		
Debt to assets × War years					-0.099*** (0.003)	-0.088*** (0.003)		
Debt to equity × Occupied territory × War years							-0.041*** (0.006)	-0.041*** (0.006)
Debt to equity × Occupied territory							0.017*** (0.004)	0.017*** (0.004)
Debt to equity × War years							-0.077*** (0.002)	-0.076*** (0.002)
Occupied territory × War years	-0.052 (0.128)	-0.034 (0.128)	-0.503*** (0.080)	-0.494*** (0.078)	-0.360*** (0.065)	-0.334*** (0.064)	-0.269*** (0.069)	-0.233*** (0.067)
War years	0.954*** (0.055)	3.065*** (0.066)	-3.829*** (0.037)	-1.777*** (0.046)	-2.522*** (0.034)	-0.704*** (0.044)	-2.296*** (0.035)	-0.539*** (0.044)
Size	2.217*** (0.018)	2.222*** (0.019)	1.876*** (0.017)	1.881*** (0.017)	1.884*** (0.017)	1.895*** (0.017)	1.870*** (0.017)	1.881*** (0.017)
Cash to assets	-0.014***	-0.014***	-0.036***	-0.036***	-0.015***	-0.015***	-0.015***	-0.015***

	(6.588e-04)	(6.589e-04)	(7.285e-04)	(7.340e-04)	(6.685e-04)	(6.680e-04)	(6.671e-04)	(6.669e-04)
Operating revenue growth	0.008***	0.008***	0.009***	0.009***	0.010***	0.010***	0.009***	0.009***
	(1.421e-04)	(1.409e-04)	(1.423e-04)	(1.411e-04)	(1.735e-04)	(1.719e-04)	(1.424e-04)	(1.412e-04)
Debt to assets	0.046***	0.049***	0.046***	0.049***	0.046***	0.050***	0.069***	0.070***
	(0.002)	(0.002)	(0.002)	(0.002)	(0.002)	(0.002)	(0.002)	(0.002)
Firm FE	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes
Year FE	Yes	No	Yes	No	Yes	No	Yes	No
Year × Industry FE	No	Yes	No	Yes	No	Yes	No	Yes
Observations	1,371,066	1,371,064	1,371,066	1,371,064	1,371,066	1,371,064	1,371,066	1,371,064
Number of firms	333,659	333,657	333,659	333,657	333,659	333,657	333,659	333,657
Within R-squared	0.191	0.221	0.190	0.219	0.184	0.214	0.186	0.215

Table 5
War-related industry

This table presents the results of difference-in-differences OLS regressions. The dependent variable is *Investment*. Standard errors are reported in parentheses and are clustered by firm. *, **, and *** indicate statistical significance at the 10 %, 5 %, and 1 % level, respectively. Definitions of all variables used in this table are provided in the Appendix.

	(1)	(2)	(3)	(4)
War industry × Occupied territory × War years	0.446 (0.415)	0.412 (0.415)	0.291 (0.390)	0.236 (0.390)
War industry × War years	0.195 (0.187)	2.018*** (0.193)	0.364** (0.172)	1.810*** (0.178)
Occupied territory × War years	-0.417*** (0.068)	-0.387*** (0.066)	-0.685*** (0.062)	-0.651*** (0.061)
War years	-2.684*** (0.034)	-0.835*** (0.044)	-1.321*** (0.030)	0.037 (0.139)
War industry × Occupied territory			-0.072 (0.185)	-0.018 (0.185)
Occupied territory			0.307*** (0.031)	0.280*** (0.031)
War industry			-0.138* (0.076)	-1.167*** (0.079)
Firm controls	Yes	Yes	Yes	Yes
Firm FE	Yes	Yes	No	No
Year FE	Yes	No	Yes	No
Year × Industry FE	No	Yes	No	Yes
Observations	1,371,066	1,371,064	1,371,066	1,371,064
Number of firms	333,659	333,657	333,659	333,657
Adjusted R-squared	0.184	0.213	0.172	0.201
Within R-squared	0.184	0.214		

Appendix

Definitions and sources of variables

Variable	Definition	Source
<i>Dependent variables</i>		
Investment	Firm net fixed assets minus firm lagged net fixed assets scaled by total assets (%).	Orbis
<i>War variables</i>		
War years	Dummy equal to 1 during war years (2022 and 2023), and 0 otherwise.	Own calculations
Occupied territory	Dummy equal to 1 if the firm is located in a territorial unit ever occupied or contested by Russian forces during the war, and 0 otherwise. Ukraine comprises 33,141 populated places, each considered as a territorial unit.	VIINA 2.0 database (Zhukov and Ayers, 2023)
Occupied territory in days	Yearly proportion of days on which the firm's territory was contested or occupied by Russian forces (2022–2023, %).	VIINA 2.0 database (Zhukov and Ayers, 2023)
War events	Natural logarithm of 1 plus the number of events related to war that happened within 100 kilometers of the firm's location during 2022-2023. War-related events include: - Anti-air defense, Buk, shoulder-fired missiles (Igla, Strela, Stinger) - Air strike, strategic bombing, helicopter strike - Unmanned or remotely-piloted aerial vehicle - Tank battle or assault - Arrest by security services or detention of prisoners of war - Shelling by field artillery, howitzer, mortar, or rockets like Grad/BM-21, Uragan/BM-27, other Multiple Launch Rocket System (MRLS) - Any exchange of gunfire with handguns, semi-automatic rifles, automatic rifles, machine guns, rocket-propelled grenades (RPGs) - Improvised explosive device, roadside bomb, landmine, car bomb, explosion - Assault/attack by paratroopers or special forces, usually followed by a retreat - Occupation of territory or building - Destruction of property or infrastructure - Cyber operations, including DDOS attacks, website defacement - Attacks on hospitals and humanitarian convoys - Event report mentions military casualties - Event report mentions civilian casualties	VIINA 2.0 database (Zhukov and Ayers, 2023)

Fights	Natural logarithm of 1 plus the number of fight events that happened within 100 kilometers of the firm's location during 2022-2023. Fight-related events include: - Anti-air defense, Buk, shoulder-fired missiles (Igla, Strela, Stinger) - Air strike, strategic bombing, helicopter strike - Tank battle or assault - Shelling by field artillery, howitzer, mortar, or rockets like Grad/BM-21, Uragan/BM-27, other Multiple Launch Rocket System (MRLS) - Any exchange of gunfire with handguns, semi-automatic rifles, automatic rifles, machine guns, rocket-propelled grenades (RPGs) - Improvised explosive device, roadside bomb, landmine, car bomb, explosion - Assault/attack by paratroopers or special forces, usually followed by a retreat	VIINA 2.0 database (Zhukov and Ayers, 2023)
Strikes	Natural logarithm of 1 plus the number of strike events that happened within 100 kilometers of the firm's location during 2022-2023. Strike-related events include: - Air strike, strategic bombing, helicopter strike - Shelling by field artillery, howitzer, mortar, or rockets like Grad/BM-21, Uragan/BM-27, other Multiple Launch Rocket System (MRLS) This event classification has already been used in the paper of Zhukov (2023).	VIINA 2.0 database (Zhukov and Ayers, 2023)
<i>Other explanatory variables</i>		
Size	Natural logarithm of firm total assets.	Orbis
Cash to assets	Firm cash to total assets (%).	Orbis
Operating revenue growth	Firm operating revenue minus lagged operating revenue to lagged operating revenue (%).	Orbis
Debt to assets	Firm short- and long-term debt to total assets (%).	Orbis
Debt to equity	Firm short- and long-term debt to total equity (%).	Orbis
War industry	Dummy equal to 1 if the firm operates in a war-related industry, classified under the following two-digit NACE codes: - C.25 Manufacture of fabricated metal products, except machinery and equipment - C.26 Manufacture of computer, electronic and optical products - C.30 Manufacture of other transport equipment	Orbis