Cover Letter

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Research interests:
My current and future research interests include banking and corporate finance at a broad level, specifically in climate and sustainable finance, debt markets and (geo)political risks. I also focus on the potential impacts of climate transition and adaption policies on financial markets and real economies.
The NBER Climate Finance Workshop aligns perfectly with my research interests. My current research paper (also serves as my first thesis chapter) focuses on the impact of geopolitical risks on green transition in the green and sustainable (GSLLs) loan market. GSLLs are an important climate finance instrument that supports both transition and adaptation goals. Furthermore, understanding the linkage between geopolitics and the green transition is essential not only for academic research but also for informing the public. All the topics are covered by the NBER climate finance workshop, and I look forward to receiving valuable feedback on my work. In addition, I aim to expand my research to explore the real economic consequences of EU climate policies. I believe the workshop will provide unique insights that will significantly enhance my understanding and guide my future research trajectory.

Expected completion date of PhD program: December 2027

Advisors (References):
Tobias Dieler, E-Mail: tobias.dieler@bristol.ac.uk
Giuseppe Pratobevera, E-Mail: giuseppe.pratobevera@bristol.ac.uk
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Curriculum Vitae

Xueyi Wang

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RESEARCH INTEREST

Banking, corporate finance, ESG, climate and green finance.

EDUCATION

University of Bristol 09/2023 –
PhD Accounting and Finance
Supervised by: Tobias Dieler, Giuseppe Pratobevera, Klaus Schaeck

University of Bristol 09/2021 – 11/2022
MSc Finance and Investment

Shandong University of Finance and Economics 09/2017 – 06/2021
BSc Economics (Credit risk Management)

WORKING PAPER

Geopolitical Risk and Green Transition: Evidence from Green and Sustainability-linked Loans, with Tobias Dieler, Giuseppe Pratobevera, Klaus Schaeck
Presentation: Sustainability and Green Finance Workshop* (Bocconi, May 2025 - poster session), 6th NSFE* (Naples, June 2025 - poster session), ESSEC-Luxembourg-CEPR Conference on Sustainable Financial Intermediation* (Reims, July 2025).

SHORT-TERM TRAINING

2024 BSE Summer School: Difference-in-Difference, directed by Jeffrey Wooldridge

- Covers the most recent development in DiD in theory and practice (cross-sectional and panel data), including common timing, staggered intervention, rolling methods, long Differencing, non-linear DiD etc.
- Participating in practice classes using stata and learned new stata commands.

TEACHING EXPERIENCE

Teaching Assistant for Green and Sustainable Finance (MSc level) 01/2025 –

INSTITUTIONAL EXPERIENCE

Research Assistant, International Institute of Green Finance (IIGF) Central University of Finance and Economics 03/2023 – 08/2023

- Responsible for spearheading the exploration of ecological product value, encompassing data collection, synthesis, and analysis across domestic and international platforms, as well as crafting pertinent reports and materials.
- Contributing to the green finance white paper series: "China Green Finance Research Report (2023)", tasked with composing Chapter 2: Local Green Finance Reform and Innovation Pilot Section. This

involves meticulously gathering and dissecting the developmental landscape of green finance reform pilot areas, scrutinizing typical cases along with their pioneering financial products, and identifying areas for enhancement within the current green finance reform initiatives.

- Engaged in the green finance blue paper series: "China Local Green Finance Development Report (2023)", entrusted with compiling data and insights on the scale of the green credit market. This entails sourcing green credit statistics from the official websites of the People's Bank of China and the Bureau of Statistics, constructing analytical tables, and delving into policy integration while crafting the green credit policy framework.

Analyst Intern (Real Estate), Green Ranking Ltd. 12/2020 – 05/2021

- Analysed ESG reports and financial statements of the real estate industry; completed analyses and commentaries of the performance of real estate companies from factors including profitability, operational efficiency, liquidity, leverage
- Collected real estate industry data through the National Bureau of Statistics, Bloomberg and other databases and assisted in the completion of the 2021 Real Estate Industry Green Credit Report.

SCHOLARSHIP AND AWARDS

- 2023 University of Bristol (UoB) PhD scholarship, 4 years (including full coverage of tuition fee, £19,200 annual living expenditure and £2,000 annual research funding).
- The First Prize Scholarship, Shandong University of Finance and Economics, 2019 – 2020.

SKILLS & LANGUAGES

- ACCA Affiliate
- Data source: Bloomberg, Refinitiv Workspace, LPC Dealscan, S&P Capital IQ Pro.
- Software: Microsoft Office, Python, Stata
- Mandarin Chinese (native), English (fluent)

Geopolitical Risk and Green Transition: Evidence from Green and Sustainability-linked Loans

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Abstract

We show how geopolitical risk influences the green transition. The 2022 Russia–Ukraine war serves as a quasi-natural experiment to examine lending in the green and sustainable loan (GSLL) market. Using bilateral trade exposure as a proxy for geopolitical risk across 54 major economies, we find a significant post-war increase in the number and volume of GSLL originations in highly exposed countries. Firms pursue green and sustainable investments as a hedge against geopolitical risks. Industry-level analysis shows that this increase is driven by low-exposed industries, while high-exposed industries exhibit a negative but statistically insignificant response. Exploring potential mechanisms at firm-level, we find that GSLL borrowers in low-exposed industries experience improved EBIT margins, while those in high-exposed industries face declining operating cash flows. These results highlight two distinct channels: low-exposed firms leverage green loans for growth and opportunity, while high-exposed firms prioritize financial survival by diverting resources away from green investments.
Keywords: Geopolitical risk; Green transition; Green loans; Sustainability-linked loans.

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1. Introduction

The green and sustainable transition has become a key priority for policymakers, but its trajectory remains uncertain amid rising geopolitical tensions. While more and more governments adopt climate policies to promote decarbonization, conflicts like the Russia-Ukraine war may shift attention and resources away from these efforts. Taking Russia-Ukraine war as an example, the war has intensified Europe's energy crisis (IEA, 2022) and disrupt global supply chains, raising the question of whether such geopolitical risks contribute to financial uncertainty and greater reliance on fossil fuels, or lead to increased investment in renewables for energy security as the substitution (Bachmann et al., 2024).

Existing research provides mixed evidence on the relationship between geopolitical risk (GPR) and the green transition. Some studies suggest that green assets, such as green bonds and renewables act as a hedge against geopolitical instability, driving investment and innovation in green assets and creating a window of opportunity for the transition (Sohag et al., 2022; Pham and Do, 2022; Hille, 2023; Husain et al., 2024; Zhang et al. 2025). Others highlight negative effects, such as declining clean equity markets, higher financial risks for transition projects, and reduced renewable energy demand in certain regions (Cheikh and Zaied, 2023; Zhao et al., 2023; Adekoya et al., 2025), reinforcing concerns that geopolitical conflicts divert attention and resources away from the green transition.

Given this ambiguity, we examine the impact of geopolitical risk (GPR) on the green and sustainable transition using the 2022 Russia-Ukraine war as a quasi-natural experiment. The Russia-Ukraine war is one of the most recent and ongoing geopolitical conflicts with significant global influence. It has drawn widespread attention and triggered global discourse since beginning in early 2022, suggesting that its impact is substantial and observable. Importantly, the conflict emerged after the surge in global dialogue surrounding climate change and the green transition, especially climate financial instruments. Therefore, unlike earlier geopolitical events, it offers a "dual context" — marked by both heightened geopolitical risk and a strong momentum toward sustainability, allowing us to more effectively examine the relationship between the two.

We implement a difference-in-differences methodology to assess whether geopolitical shocks serve as catalysts or obstacles in the transition to a low-carbon economy by concentrating on the green and sustainability-linked loan (GSLL) market[1]. GSLLs have emerged as pivotal

[1] According to ICMA, green loans are loan instruments made available exclusively to finance or re-finance, in whole or in part, new and/or existing eligible Green Projects (ICMA, 2018). While sustainability linked loans (also referred to ESG-related

financial instruments since 2017, bridging bank financing to other private sectors committed to transitioning toward a low-carbon economy. These loans are specially designed to fund projects or general sustainable objectives that promote environmental sustainability and reduce carbon emissions, therefore can be viewed as the commitment to green and a broader sustainable objective (Environmental Finance, 2018; S&P Global, 2021; World Bank, 2020; European Commission, 2024). Given the lack of research on the important external factors, we focus on the origination of green and sustainability-linked loans (GSLLs) as our main outcome variable.

We identify countries and industries most economically exposed to the conflict based on their trade ties. Following Glick and Taylor (2010) and Brogaard et al. (2020), we measure GPR exposure using a country's and industry's bilateral trade with Russia and Ukraine relative to its total global trade based on the two recent pre-war years, 2020 and 2021. We end up with 54 major economies worldwide with GSLL origination available. Our sample consists of 12061 country-industry-month observations from June 2020 to September 2023, which is 20 months pre and post the formal announcement of invasion by Russia in February 2022.

Our DiD results reveal a nuanced relationship between GPR and the green/sustainable transition, helping explain the mixed evidence in prior studies. At the country level, we classify countries with above-median trade exposure to Russia and Ukraine as treated. We find a significant and positive effect on green and sustainable loan origination, with the number and volume of GSLLs increasing by 6.6% and 36.8%, respectively, at a 95% confidence level.

The baseline analysis identifies only the country-level treatment geopolitical risks based on the general domestic bilateral trading. However, it is noticeable that trade relationships with Russia and Ukraine can vary across industries. This variation in exposure would also lead to differing reactions in GSLL origination and green investment at the industry level. To further explore this relationship, we refine our treatment variable by matching trade data at the HS6-digit level with industries at the SIC2-digit level based on Pierce and Schott (2012)'s cross mapping method to compute industry-specific exposure. We use the industry exposure median to define the treated industry. Within-country industry-level analysis reveals substantial heterogeneity in responses to geopolitical risk. Industries with low trade exposure to Russia and Ukraine drive the increase in GSLLs in treated countries. The number (volume) of GSLL increase by 8%

loans) are loan instruments and/or contingent facilities which incentivise the borrower's achievement of ambitious, predetermined sustainability performance objectives, whose use of proceeds of sustainability linked loans is not determined in categorisation, but to support borrower's general sustainability purpose by aligning loan terms to the borrower's performance against the relevant predetermined SPTs (ICMA, 2019).

(44%) for low-exposed industries in treated countries post war, significant at 99% confidence level. These results suggest that firms in unaffected sectors take advantage of new opportunities in green finance. In contrast, industries with high exposure experience a slight decline in number (-1.2%) and volume (-11.9%) of GSLLs in treated countries. Though both coefficients are insignificant, their negative signs imply that highly exposed industries may halt or slow their investment in sustainable transition, unlike the increasing trend of less exposed counterparts. This heterogenous pattern suggests that firms in highly affected industries prioritize business survival over sustainability investments, while those in less affected industries see an opportunity to expand green financing, potentially use green investment as a hedge tool against geopolitical risks.

We investigate the mechanism of the business opportunity window from the borrower's perspective, and make the following conjectures for the industry heterogeneity. If firms in low-exposure industries are indeed pursuing new opportunities, we would expect their financial performance to remain stable or even improve following the onset of the war. In contrast, firms in high-exposure industries are more likely to experience a decline in performance due to their greater vulnerability to geopolitical risk. We restrict the firm sample into GSLL borrowers and end up with 761 unique GSLL borrowers from 2020q2 to 2024q2 with financial data available. We use firm-level financial indicators as the dependent variable and re-estimate the DiD regressions for subsamples of high- and low-exposure industries. The firm-level financial indicators include revenue, EBIT margin, operating cash flow and capital expenditure. Firstly, we find that for low-exposed firms in treated countries, EBIT margin increases by 2.3% post-war, whereas there is no significant change for high-exposed firms. Moreover, the increase in revenue contributes to the improvement in EBIT margin among low-exposed firms, rather than being solely driven by a reduction in expenses. The results confirm our first conjecture that firms in low-exposure industries are seeking new opportunities through increasing investment in green transition. Secondly, we find a significant decrease by 0.61% in operating cash flows to total assets for high-exposed firms in treated countries post war, with no significance for low-exposed firms. This result supports our second conjecture that firms with high geopolitical risk exposure face financial strain, particularly in terms of operating cash flow. The negative, though insignificant coefficient for GSLL borrowing further suggests that these firms may be shifting their focus away from green transition investments toward maintaining core business operations and ensuring short-term survival. However, our final tests on capital expenditure reveal no significant effects for either high- or low-exposure industries, suggesting that

geopolitical risk does not significantly influence GSLL borrowers' subsequent capital investment in the post-war period.

An alternative explanation is that banks are also aware of such opportunities and are more willing to lend green and sustainable loans compared to normal loans. Therefore, it is necessary to disentangle the baseline equilibrium results into supply-side and demand-side effects. We provide evidence for loans being initiated by borrowers, by restricting the sample to "multiple lenders" lending to more than one borrower country–industry pairs and adding lender-by-time fixed effect. The significance and magnitude of coefficients are substantially unchanged after adding the lender-by-time fixed effect, which is 8.9% for number and 42.3% for volume respectively. These results confirm that borrowing firms appear to play the key role—potentially motivated by perceived opportunity windows associated with green investments.

We conduct a series of robustness tests to validate our results. Our baseline results are robust with a more granular industry-by-time fixed effect as an alternative specification. We test the key parallel trends assumption using an event study framework. The lack of statistical significance in all pre-treatment periods supports the validity of this assumption. The placebo tests, using normal loans as the dependent variable, yield insignificant results with opposite signs across most specifications. This further indicates that the observed increase in GSLL origination is not driven by general trends in the overall loan market, thereby reinforcing the interpretation of link between geopolitical risk and green financing. And The falsification timing placebo generates no significance. More importantly, we recalculate post-war trading exposure for 2022 and 2023 and confirm that most countries experienced a pronounced decline in trade with Russia and Ukraine, supporting the trading exposure as a valid proxy for geopolitical exposure to the war.

The study contributes to several strands of literature. First, we study the impact of geopolitical risks in the green and sustainable loans (GSLL) market. Current research in green and sustainability loans studies aspects of their design and pricing (Aleszczyk et al., 2024; Pinto et al., 2024), incentives and benefits to borrowers/issuers as well as the subsequent impact on ESG performance (Pop and Atanasov, 2021; Carrizosa and Ghosh, 2022; Du et al, 2022; Kim et al., 2021; González et al., 2024). Kim et al. (2021) document positive stock market reaction to high-transparency SLLs, anchoring the "signalling effect" of positive stock market reaction for green bonds (Flammer, 2021). However, whether and how geopolitical risks affects GSLLs has received little attention. This study is the first to explore how geopolitical risks affect GSLLs, providing a fresh angle for understanding the green and sustainable transition,

specifically through the GSLL market.

In fact, the question of (geo)political uncertainty in traditional debt market and corporate investment has been well-studied in previous literature, which typically conclude with a negative effect. In the debt market, Earlier study uses the political uncertainty index constructed by Baker et al. (2012) and find higher exposure to political uncertainty are associated with higher costs of loans (Francis et al., 2014). More recent studies mainly adopt exogeneous shock to draw causality. They find that increase in political uncertainty leads to more default for outstanding loans and a sharp decline for new loan amount (Tantri, 2018), higher borrowing costs for loans and municipal bond yields (Kim, 2018; Gao, Murphy and Qi, 2019; Gad et al., 2024), and tighter performance-pricing provisions (Nguyen and Kim, 2023). Berg et al. (2021) use Brexit as a quasi-natural shock, which is a similar context as of Russia-Ukraine conflict that causes global political uncertainty and find a significant decreasing in number and volume of syndicated loan issuances in the UK market. Another strand of literature focusing on (geo)political uncertainty in corporate investment draw a similar negative relationship. Julio and Yook (2012) and Jens (2017) document a decrease in firms' investment expenditures in election years. Gozgor et al. (2022) concentrate specifically on tourism industry and indicate that geopolitical risks negatively affect capital investment in tourism. Jia and Li (2020) further extend to corporate sustainable performance and find uncertainty due to economic policy, political instability, and climate change negatively influenced firms' sustainability performance, moderated by option for delay in sustainability investment.

Nonetheless, the negative effect of political uncertainty on conventional debt and investment cannot simply extend to green-sustainable debt and investment, considering its unique "green" and "sustainable" feature. Our result challenges existing literature on political uncertainty in traditional debt markets and corporate investment by providing novel evidence for a significant increase in GSLL borrowing, which is opposite to prior findings.

Third, we contribute to the fast-growing literature in (geo)political risk and green transition. Most studies typically use the geopolitical index (GPR) constructed by Caldara and Iacoviello (2022) to investigate this question but concluded with mixed evidence. Some researchers find that geopolitical risks transmit a positive spillover effect on green equity and the green bond index (Sohag et al., 2022; Pham and Do, 2022). For example, Mohammed et al. (2024) find green bonds offer lower negative cumulative average return responses during the political events like Russia-Ukraine conflict. They further argue that green assets can act as the hedging tool during (geo)political uncertainty. In the field of energy transition, some empirical

evidence shows that Geopolitical risk in supplier countries tended to foster renewable energy diffusion (Hille, 2023; Husain et al., 2024) and boosts renewable energy technology innovation (Zhang et al., 2025). In contrast, few studies draw the opposite conclusion. They argue that global geopolitical risks increase the volatility of most of the green investment assets (Adekoya et al., 2025), negative reaction of clean energy market to high GPR (Cheikh and Zaied, 2023), and reduction in renewable energy and climate change mitigation policies in OECD countries (Zhao et al., 2023). Under the context of Russia-Ukraine war, this study provides comprehensive and novel empirical evidence on the positive effects of geopolitical risk (GPR) on GSLLs across 54 major economies worldwide, reinforcing earlier findings of positive impacts on green assets. Moreover, our country-industry-level analysis further highlights that industry-specific exposure to geopolitical risk plays a significant role in shaping the sustainable transition through GSLL origination within a single country. This finding helps partly explain the mixed evidence in the existing literature regarding the positive versus negative effects of GPR on green and renewable transitions, which are typically examined at the aggregate country or market level.

The remainder of the paper is structured as follows. Section 2 describes the data and sample construction. Section 3 outlines the empirical methodology, the difference-in-differences approach, and develops the regression model. Section 4 discusses the main empirical results, while Section 5 explores potential mechanisms through firm-level analysis. Section 6 presents robustness checks, and Section 7 concludes.

2. Data and Variables

2.1 Loans

Data for syndicated loans is collected from Refinitiv DealScan. Our sample starts from universal loans, with periods spanning from June 2020 to September 2023, which are twenty months pre and post the formal announcement of Russia's attack (February 2022). Then following Pop and Atanasov (2021) Kim et al. (2021) and Carrizosa and Ghosh (2023), we use "Market Segment" variable in DealScan to identify green and sustainable loans. Refinitiv DealScan uses information from loan agreements, public media releases, and discussions with lenders and borrowers to confirm these loan features. (Kim et al., 2021). We classify one facility (deal) as green/sustainability-linked loans if the "Market Segment" description includes one of the following keywords: "Environmental, Social&Governanance" "Green" "Sustainable" "Sustainability". Figure A1 provide some examples of the "Market Segment" description for identified green and sustainable loans, with lenders' and borrowers' name. We exclude public

administration and non-classifiable activities and countries with small number of loan issuance (GSLL <5 and normal loans <15). However, Iceland is retained in the sample despite a relatively small number of observations (10 loans) as a part of European economy and member of NATO[2]. We exclude special taxation jurisdictions such as Bermuda, the Cayman Islands, and the British Virgin Islands, as these locations are often used for financial structuring purposes and may not reflect the economic fundamentals. Additionally, we exclude Russia and Ukraine, the two direct parties involved in the war. At deal-level, we identify 28,285 loans (12.92 trillion in volume) during our sample periods, with 3,408 (1.68 trillion) green/sustainable loans and 24,877 (11.25 trillion) normal loans. This illustrates that the share of green and sustainable loan markets is relatively small compared with the total syndicated loan market, which around 12% (13%) in number (volume), despite their increasing issuance trend.

Table A1 in Appendix A describes the total number and volume for normal and green/sustainable loans by country between June 2020 and September 2023. Most of GSLL origination concentrates on developed countries (European Union, Japan and the U.S.). Among developing countries, China and India are two major issuers. Table A2in Appendix A reports the industry distribution for loans based on SIC 2-didit code. Major issuance industries include Electric, Gas and Sanitary Services (49), financials (60-67), Wholesale (50-51), Construction, transportation (41-47), and some manufacturing industries.

For the baseline country-industry analysis, we aggregate number and volume of deals based on borrower's country of operation and 2-digits SIC industry code at monthly frequency. Our final sample of loans (normal and GSLL consists of 12,061 country-industry-month observations for 73 industries in 54 countries 2,626 out of the 12,061 observations are GSLL loan issuances.

To separate the supply and demand side in loan origination we reproduce the above sample selection and aggregate at lender -borrower's country and SIC2 industry-month level for the number and volume of loans. This allows us to add a lender-by-month fixed effect to absorb the lender's time-varying supply shock for loans.

2.2 International trading data

We study geopolitical risk by employing the 2022 Russia-Ukraine conflict. An intuitive proxy of each country' risk exposure to the war is the geographical distance. However, it may fail to capture the exposure risk in which countries have closer trading or political alignment bur are

[2] If further excluding Iceland, the main results remain robust across all regressions.

far in geographical area. In this paper, we capture geopolitical risk exposure to the war by bilateral international trade with Russia and Ukraine at country and industry level. International trade is considered a crucial role in fostering economic growth. Glick and Taylor (2010) argue that war and conflicts between countries have persistent large effect on international trade and other economic activities. Brogaard et al. (2020) and Hille (2023) study the transmission of political uncertainty and risk through trading relationships. Their finding implies that trade is sensitive to geopolitical conflicts and hence trade exposure serves as an effective measure.

Following Brogaard et al. (2020), we define one country's trading exposure to Russia-Ukraine conflict as:

$$\textit{Country exposure}=\frac{total\ bilateral\ trading\ \ of\ country\ i\ with\ Russia\ and\ Ukraine}{total\ trading\ of\ country\ i\ with\ the\ world}$$

Total trading includes both import and export trading for goods. The exposure is calculated and averaged based on data in 2020 and 2021 (pre-war periods). The trading data is sourced from UN Comtrade database, aggerated into total Harmonized System (HS) commodity and country level[3].

However, trading exposure may also vary among industries. For instance, Russia is a major oil and gas exporter to EU, so European energy industries would exhibit high exposure to the war. Only considering country level exposure may fail to capture the geopolitical risk fluctuations at industry level. To capture industry-level exposure on goods trading, we match HS 6-digit code for each type of goods to each SIC 2-digit code according to the framework developed by Pierce and Schott (2012)[4]. This mapping allows us to treat matched goods as industry trading with Russia-Ukraine. Thus we can compute the trading exposure at industry level:

$$\textit{Industry exposure} = \frac{total\ bilateral\ trading\ \ of\ industry\ j\ in\ country\ i\ with\ R,U}{total\ bilateral\ trading\ of\ industry\ j\ in\ country\ i\ with\ the\ world}$$

This measures country-industry specific exposure. Following Pierce and Schott (2012) we exclude service industries. Service industries normally have no goods trading and are coded zero. As their business nature tend to be locally based, service industries tend not to be so directly affected as of the goods trading. However, we made the underlying assumption is their geopolitical risk exposure can still be captured by the overall country level exposure. We end

[3] 1 We focus on goods trade and exclude services due to inconsistent international reporting. While the IMF and World Bank provide guidelines, service trade data are less standardized, and many countries either do not report it or do so with varying methods and classifications. For countries that report it, trade in services with Russia and Ukraine is minimal compared to goods, so its exclusion is unlikely to significantly affect our results. UN Comtrade and WITS have no data for Taiwan. Its international trading data is manually collected and computed from Observatory of Economic Complexity (OEC). OEC combines UN Comtrade ,BACI (CEPII), and national statistics agencies, and is widely cited for research and industry analysis.

[4] Pierce and Schott (2012) maps US HS 10-digit code to SIC4-digit code. We extract first 6 US HS code that corresponds to the internationally standardized Harmonized System (HS) code, as HS allows countries to extend their 6 digits for better recognition within country. The HS 6-digit code then matched to transferred SIC2-digit.

up with industry exposure for 28 SIC2-digit industries: Agricultural, forestry and fishing (SIC 01, 02, 08, 09), Mining (10-14), Manufacturing (20-39).

2.3 Firm characteristics

The firm-level fundamental data is obtained from S&P Capital IQ fundamentals (Compustat) at quarterly frequency. We first restrict our sample into GSLL borrowers, and further drop the financial firms (SIC 60-67). Next, we manually match firm names from DealScan with S&P Capital IQ Pro. The firm-level financials sample consists of 761 firms with quarterly data available for one of the four firm dependent variables, over the 2020q2 to 2024q2.

The dependent variables used for firm-level analysis are *EBIT margin* and *Revenue*, which proxy for profitability; *Operating cash flow*, which proxies for operating liquidity; *Capex*, which proxies for capital investment. We also control for other fundamentals: firm size (*Total Assets*), leverage (*Total Debt/Total Assets*), Tangibility (*Net Property, Plant and Equipment*), short-term liquidity (*Cash and short term investment*) by one-period lag.

2.4 Other county-level control variables

Country characteristics can potentially affect both loan origination and green transition. Our country-level control variables includes:

Real GDP Growth to measure economic growth from the International Monetary Fund; Change in government party in charge, which are public data manually collected from government website and google news; Rule of Law and Government Effectiveness, which are country-level governance indicators from the World Governance Index (WGI). WGI scores are derived based on surveys and computed into a normal distribution based on the country sample in hand every year. A higher score implies better governance quality for one indicator.

2.5 Descriptive statistics

Table 1 reports the summary statistics. Columns (1) to (3) illustrate number of observations, mean and standard deviation, and columns (4) to (6) illustrate the 5^{th} percentile, median and 95^{th} percentile. Panel A shows the logarithms of number and volume for GSL loans, normal loans and the share of GSLL divided by total loans. Panel B illustrates country and industry exposure with trading and mapping data available. They are the average bilateral trade in 2020 and 2021. We define industries and countries as exposed when a country's or industry's exposure level is above the median. Panel C reports the logarithms of firm-level financial variables between 2020q2 to 2024q2. Panel D shows the country-level controls from 2019 to 2023.. Firm and country level variables are winsorized at 1% and 99%. The detailed definition for each variable is described in Appendix A Table A3.

[Table 1]

3. Methodology

We employ the Russia-Ukraine conflict as a quasi-natural experiment in a Difference-in-Differences (DiD) setup. The Russia-Ukraine conflict is a good setting to study the relationship between geopolitical risk and green- and sustainable transition. The conflict is considered exogenous, as it originates independently of other countries' actions and lies beyond their direct influence. Therefore, employing Russia-Ukraine conflict could mitigate the endogeneity issues contained when simply use GPR index to study its effect on green transition. The GPR index constructed by Caldara and Matteo Iacoviello (2022) is a news-based measure through analysing 10 big US newspapers. Although the GPR index is a comprehensive and widely used measure that captures key historical geopolitical events, its text-based, narrative nature makes it sensible to media sentiment, potentially introducing measurement bias**.** This bias can be mitigated in the quasi-experimental setting of the Russia-Ukraine war by capturing geopolitical exposure through trade relationships. More importantly, emphasis on renewables and the green transition can itself become a source of geopolitical friction, especially for main fossil fuel producers. For instance, OPEC countries publicly criticized the aggressive climate proposal to abandon fossil fuel (Reuters, 2023). The Carbon Border Adjusted Mechanism that was first proposed in 2020 by European Union is also widely criticized by many developing countries as "green protectionism" (Social Europe, 2022; Financial Times, 2024). Reflecting in news, it could increase the GPR index, leading to reverse causality. As the Russia-Ukraine war is exogenous to climate policies with observable and strong consequences, it is unnecessary to have reverse casual. Moreover, the unobserved, omitted variables missed by a simple OLS regressed on GPR index can be differenced out as long as the parallel trend assumption is satisfied. The baseline DiD regression is conducted at country level as of Equation (1):

$$Loan_{ijt} = \alpha + \beta_1 Post_t * High_country50_i + \gamma Controls_{it} + \delta_{ij} + \delta_t + \epsilon_{ijt} \quad (1)$$

The dependent variable, $Loan_{ijt}$, stands for the absolute and share of the number or volume of green and sustainable loans. $High_country50_i$ is the country-level treatment indicator for geopolitical risk to Russia-Ukraine conflict, defined based on the sample median of the country exposure. $High_country50_i$ equals to one if one country's exposure is above the sample median of country exposure, 0.0122. That is, among the 54 countries, the half of the countries have the percentage of trading with Russia and Ukraine above (below) 1.22% relative to the whole world. $Post_t$ equals to one for months after the formal announcement of Russia's invasion in February 2022. The main coefficient interest is the one of the interaction term, β_1. $Controls_{it}$ comprises four country control variables at yearly frequence.

$RealGDPgrowth$ (%) captures the year-by-year economic development for each country, which potentially affects the domestic debt market. $GovChange$ is a dummy variable that equals to one if one country experienced a change in the governing party in a particular year. This measure aims to capture the persistence of governments' attitudes and policy towards green transition during party turnover (Besley and Persson, 2023). Previous research control for governance factors that could correlated to interbank lending (D'Andrea and Limodio, 2023) and green innovation (Kim et al., 2021). We follow D'Andrea and Limodio (2023) and Kim et al. (2021) to select the country-level governance variables from the World Bank Governance Indicator (WGI). Gov_Effect quantifies one government's ability to implement its policies every year. $Rule_Law$ captures the level of agents' confidence in enforcement of rules of society. . δ_{ij} refers to the country-by-industry fixed effects, which aims to absorb the industry invariant factors specific within each country (e.g., industrial fundamentals, share of output and contribution to domestic economy etc.). δ_t refers to the year-month (time) fixed effect.

In some specifications, we use a stricter industry-by-time fixed effect δ_{jt} to replace the time fixed effect. The aim of industry-by-time fixed effect is to further absorb the unobserved industry-time heterogeneity, such as cyclical investment patterns, which may influence loan borrowing through time-varying investment waves.

To test the parallel trend for the baseline DiD regression, we adopt the event-study framework at quarterly level in Equation (2):

$$Loan_{ijt} = \alpha + \sum_{\tau} \beta_{\tau} Post(\tau)_t * High_country50_i + \gamma Controls_{i,t} + \delta_t + \delta_{ij} + \epsilon_{ijt} \quad (2)$$

$Post(\tau)_t$ takes the value of one for τ period(s) before and after period 0. Period 0 is the beginning of the war in 2020q2. The event windows vary from seven quarters before and six quarters after period 0, so τ ranges from -7 to 6. δ_t and δ_{ij} are time and country-by-industry fixed effect respectively.

In the next step, we split the sample into high-exposed industries to the war versus low-exposed industries and conduct subsample tests. Trading at industry level varies within one country depending the domestic industrial structure. For instance, the imports and exports for agriculture industries are unlikely to be equivalent to those of the paper manufacturing. Therefore, only country level exposure itself is insufficient to capture industry exposures. And industry subsample tests also enables to understand the heterogeneous reaction to geopolitical risks among industries with different exposure. We define industries as highly exposed to geopolitical risk if their exposure measure is above sample median 0.0056 across industries. That is, high_ind50 equals to one if the one industry in one country has trading exposure above

the 0.56% with Russia and Ukraine as a percentage of its trading with the world

$$\begin{cases} High_ind50 = 1, & if\ industry\ exposure\ > 0.0056 \\ High_ind50 = 0, & if\ industry\ exposure \leq 0.0056 \end{cases}$$

The baseline DiD Equation (1) is reproduced for high/low exposed industry subsamples. We also further interact $High_ind50$ to perform a triple DiD as an additional test:

$$Loan_{ijt} = \alpha + \beta_1 Post_t * High_country50_i * High_ind50_j + \beta_2 Post_t * High_country50_i \gamma_1 + + \beta_3 Post_t * High_ind50_j + \gamma_1 Controls_{i,t} + \delta ij + \delta_t + \epsilon_{kt} \quad (3)$$

In the third part of our analysis, we first try to disentangle between the supply vs. demand side effect from our baseline equilibrium results. Our baseline regressions do not allow us to disentangle supply-side effects (banks' willingness to lend) from demand-side effects (firms' willingness to borrow). The observed increase or decrease in GSLL could be driven by either side: borrowers adjusting their demand in response to geopolitical risk, or lenders shifting their supply of sustainable finance. To separate these effects, we follow the standard approach in the banking literature (Bruyckere et al., 2013; Cortés et al., 2020; Güler et al, 2021; Martins et al., 2023) by introducing fixed effects that isolate the demand side. Specifically, we re-aggregate loan data at the lender-country-industry level and regress Equation (4). The lender-time fixed effect is then further added in Equation (5).This allows us to control for time-varying lender-specific shocks and better identify changes in borrowing behaviours (i.e., demand for GSLL):

$$Loan_{b,i,j,t} = \alpha + \beta_1 Post_t * High_country50_i + \gamma Controls_{i,t} + \delta_{i,j} + \delta_b + \delta_t + \epsilon_{bijt} \quad (4)$$

$$Loan_{b,i,j,t} = \alpha + \beta_1 Post_t * High_country50_i + \gamma Controls_{i,t} + \delta_{i,j} + \delta_{b,t} + \epsilon_{bijt} \quad (5)$$

The dependent variable is the number and volume of loans aggregated from tranches into bank (lender)- (borrowers') country-industry-month level. The first specification includes country-by-industry fixed effect $\delta_{i,j}$, bank fixed effect δ_b, and year-month fixed effect δ_t. $\delta_{b,t}$ denotes the lender-by-time fixed effect in Equation (5) The idea is that one bank can lend to multiple country-industry pairs at different time points. By adding lender-by-time fixed effect, banks' supply shock is absorbed and it is able to identify the primary side which drives the increase

Comparing the two specifications, we can confirm that results remain substantially unchanged, supporting our approach to make claims from the borrowers' perspective. In the next step, we turn to the firm level to explore the mechanisms behind the baseline results on green and sustainable loan (GSLL) origination. Building on our main findings, we conjecture that changes in GSLL origination may be driven by the effects of geopolitical risk on firms. Furthermore, the industry heterogeneity to the war we documented for low- vs. high-exposed industries, we anticipate that firm operating in the two subsample industries may also exhibit differently in performance, which would in turn affect their capability to borrow and invest in

sustainability.

We perform the triple DiD and run baseline DiD to analyse the financial performance of firms operating in high/low exposed industries using the industry subsample tests (Equations (6)), along with the triple DiD test (Equation (7)):

$$\begin{cases} Firm_{perform_{k,t}} = \alpha + \beta_1 Post_t * High_country50_i + \gamma_1 Controls_{i,t} + \gamma_2 Controls_{k,t} + \delta ij + \delta_k + \delta_t + \epsilon_{kt}, \\ \qquad\qquad if\ high_ind50 = 1 \\ Firm_{perform_{k,t}} = \alpha + \beta_1 Post_t * High_country50_i + \gamma_1 Controls_{i,t} + \gamma_2 Controls_{k,t} + \delta ij + \delta_k + \delta_t + \epsilon_{kt}, \\ \qquad\qquad if\ high_ind50 = 0 \end{cases} \quad (6)$$

$$Firm_perform_{k,t} = \alpha + \beta_1 Post_t * High_country50_i * High_ind50_j + \beta_2 Post_t * High_country50_i \gamma_1 + \\ + \beta_3 Post_t * High_ind50_j + \gamma_1 Controls_{i,t} + \gamma_2 Controls_{k,t} + \delta_k + \delta_t + \epsilon_{kt} \quad (7)$$

The dependent variable, $Firm_perform_{k,t}$ stands for one of the logarithm of the following firm financials, *Ebit_margin, Revenue, Cash_ops* and *Capex*. $Controls_{i,t}$ refers to the matrix of country level control variables which is the same as of baseline, and $Controls_{k,t}$ refers to other firm-level control variables lagged by one quarter, including the logarithm of *Total Assets*, *leverage*, *tangibility* and *cash and short-term investment.* Finally, δij,δ_k δ_t are country-by-industry fixed effect, firm fixed effect and year-quarter fixed effect respectively. Other variables in Equations (6) and (7) remain the same as in Equation (1).

4. Empirical Results

4.1 Baseline

Table 2 and Table 3 present the DiD results for number and volume of GSLL origination. Column (1) and (2) in both Tables illustrate that the coefficients of interaction term $Post_t \times High_country50_i$ are positively and statistically significant for number and volume at 95% confidence level. High-exposed countries on average increased the number and volume of GSLLs by 6.6% (6.7%) and 37% (36%), respectively, following the onset of the geopolitical conflict. This contrasts with previous negative findings in the traditional debt market (Kim, 2018; Gad et al., 2024; Gao, Murphy and Qi, 2019; Berg et al., 2021). The increase in GSLLs indicates that highly exposed countries boost their investment in green and sustainable projects. For the economic meaning, we conduct one back-of-envelope calculation using the sample mean.. The increase in percentage is equivalent to approximately one additional GSLL per year or $2.96 billion increase in loan volume at the aggregate country-industry level.[5] While the change in the number of deals may appear modest, the increase in volume is more economically substantial. This is reasonable given that GSLLs still represent a relatively small share of the

[5] For the number of GSLL, we use the non-zero sample mean of 1.30 (0.066*1.30*12). For the volume of GSLL, use the non-zero sample of 671 million (0.368*671 *12). It should be noted that the calculation is based on our data sample and may not fully reflect broader real-world trends.

overall syndicated loan market, but tend to be larger in size on a per-deal basis compared to conventional loans (PRI, 2022; LMA, 2025).

[Table 2]

[Table 3]

We also use share of GSLLs to total loans as an alternative measure. Column (3) and (4) in Tables 2 and 3 present the results for the GSLL share. The coefficients of the interaction term $Post_t * High_country50_i$ are also positive, but only weakly significant at 90% confidence level. After adding more granular industry-time fixed effect, the coefficients become insignificant. Nevertheless, although we find only weak evidence for share of GSLL originations relative to total loans, this measure helps to validate and support the results for the number and volume of GSLL originations as an alternative dependent variable.

Nevertheless, the weaker statistical significance in the share-based results, may be partly explained by underlying industry-level heterogeneity in the impact of the war on GSLL origination. We explore the role of this heterogeneity in the next subsection.

For the control variables, the coefficients of GDP growth is close to zero and insignificant, suggesting that the previous year's GDP growth doesn't have a meaningful impact on the GSLL origination. The dummy variable for a change in the ruling party, GovChange, is positively significant. This may indicate that, during our sample period, new governments tended to place greater emphasis on environmental issues and support the transition to a sustainable, green economy. The coefficients for the country governance indicators (Rule_of_Laws and Government_Effectiveness) are positive. Although not significant across all specifications, this aligns with the expectation that stronger country governance can support sustainability efforts.

In the last two columns, the number and volume of normal loans are used as the dependent variables to ensure that the increase in GSLLs in high-exposed countries is not driven by a general rise in normal borrowing. Column (5) and (6) in Table 2 show the results for the number of normal loans; the interaction coefficients are insignificant and close to zero. In Table 3, the results for volume of normal loans, shown in Column (5) and (6), are even negatively significant at 90% confidence level, consistent with prior findings on traditional loans by Schäfer et al. (2021) in the context of Brexit. Compared to Column (1) through (4), the contrasting results for normal loans help rule out concerns that the increase in GSLL originations is merely part of a general trend in the loan market, thereby reinforcing our main argument.

One critical assumption for Difference-in-Differences is the parallel trend assumption. It

requires that, in the absence of treatment, the trends in green and sustainable loan origination between high-exposed and low-exposed countries would have followed similar trajectories. While the assumption itself cannot be directly tested, we examine pre-treatment trends using an event study framework as specified in Equation (2). Event periods are defined at quarterly frequency, ranging from -7 to 6. We plot the estimated coefficients of the interaction term in Figure 1a and 1b for the number and volume of GSLLs, respectively, reporting 90% confidence intervals. All pre-periods coefficients in Figure 1a and 1b are not statistically different from zero, suggesting that the trends were parallel prior to the onset of the war. Moreover, we observe positive coefficients and an upward trend in the post-periods, although some are not statistically significant.

[Figure 1]

4.2 Industry Heterogeneity

In the next step, we conduct the subsample tests for high-exposed industries (above sample median) and low-exposed industries (below the median) separately. Industry-level trade exposure can vary within countries and may therefore reflect differing levels of geopolitical exposure to the Russia-Ukraine conflict. These subsample tests allow us to explore GSLL origination at a more granular level.

Table (4) and (5) report the results of industry subsample tests for the number and volume of GSLL origination. Columns (1), (4), and (7) present the results for high-exposed industries, while Columns (2), (5), and (8) present those for low-exposed industries. Columns (1) through (4) show the results for the number and volume of GSLLs, as well as their share. The coefficients of $Post_t \times High_country50_i$ for high-exposed industries are negative and statistically insignificant. However, the coefficients of $Post_t \times High_country50$ for low-exposed industries are significantly positive at the 95% confidence level or higher, with magnitudes larger than those in the baseline country-level results. These findings suggest that the increase in GSLLs in high-exposed countries is driven by domestically low-exposed industries. Conversely, the negative (though insignificant) coefficients for high-exposed industries imply that GSLL borrowing in these sectors does not increase, and may even decline. Finally, Columns (5) and (6) show the placebo results using the number and volume of normal loans as dependent variable. The coefficients of $Post_t \times High_country50_i$ are negative and mostly insignificant for both high and low-exposed industries, recalling the baseline placebo results in Table 2 and 3 of normal loans. We also conduct a triple difference-in-differences (triple DiD) analysis as of Equation (3), by introducing an interaction with the High_ind50

dummy to further test the heterogeneity of the treatment effect. Columns (3), (6), and (9) report the results of this specification. The coefficients on the double interaction term, $Post_t \times High_country50$ remain positively significant. remain positive and statistically significant. Importantly, the coefficients on the triple interaction term, $Post_t \times High_country50 \times High_ind50$ are negative and statistically significant for the number, volume, and share of GSLLs. Again, this test suggest a differential response across industries with varying exposure to the Russia–Ukraine war.

[Table 4]

[Table 5]

The industry subsample tests, together with the triple DiD, reveals substantial heterogeneity in responses to geopolitical risk. While low-exposed industries sustained or accelerated their uptake of GSLLs, high-exposed industries appear to have diverged from this trend. The differing patterns between high- and low-exposed industries suggest that firms in highly affected sectors prioritize business survival over sustainability investments, potentially eflecting greater uncertainty, risk aversion, or capital constraints. While those in less affected industries may view the situation as an opportunity to expand green financing, potentially as a hedge against geopolitical risks. In the next section, we further explore and justify this argument by analysing firm-level financial performance

5. Mechanism

This section aims to further explore the rationale behind the observed industry-level heterogeneity in GSLL origination by borrowers. We conjecture that firms' financial performance could be affected by geopolitical risk, which in turn could affect their investment in green and sustainable projects. However, based on the baseline equilibrium results, it is difficult to determine whether the observed increase in GSLLs is driven by lenders' willingness to provide support —possibly due to green financing policies—or by borrowers' increased demand and willingness to take on GSLLs. To make a meaningful argument from the borrower's perspective, we must first disentangle our baseline loan origination results from supply-side and demand-side to identify which primarily drives the positive effect.

5.1 Supply vs. Demand

We re-aggregate the loan data at the bank-borrower country -industry level, i.e., the total number and volume of loans one bank lend to a particular country-industry pair at month t The sample includes 4,928 unique bank lenders, of which 2,045 lend only to one country-industry pair. The data shows that the majority of lenders in our sample provide loans to multiple

country-industry pairs, which allows us to separate demand- and supply-side effects using these multiple lending pairs. We restrict the bank-country-industry sample to banks that lend to more than one borrowing country-industry pair (i.e., multiple lenders), resulting in a subsample of 2,883 unique bank lenders. We then estimate Equation (4), then add lender-by-time fixed effect to absorb time-varying supply-side effects from the lenders in Equation (5). This method is commonly adopted in the banking literature to absorb bank supplying shock (Bruyckere et al., 2013; Cortés et al., 2020; Güler et al, 2021; Martins et al., 2023).

[Table 6]

[Table 7]

Table 6 and 7 report the bank-country-industry level results for the number and volume of loans. Columns (1) – (3) present the results with country-by-industry fixed effect, lender fixed effect, and time (month) fixed effects, while Column (4)-(6) additionally include lender-by-time fixed effects. The coefficients of the interaction term $Post_t * High_country50_i$ remain positively and statistically significant for both the number and volume of GSLLs at the 99% confidence level. The number (volume) of GSSLs increases on average by 9.2% (48.7%) per bank per month for each country-industry pair post-war.

More importantly, Columns (4)-(6) show that after adding lender-by-time fixed effects, the coefficients of the interaction term become only slightly smaller in magnitude and remain statistically significant at the 99% confidence level. The number (volume) of loans on average increases by 8.9% (42.3%) per bank per month for each country-industry pair post-war, even after absorbing time-varying supply shock. This comparison provide evidence for the demand effect: the increase in GSLL origination is primarily driven by borrower-side factors, rather than an expansion in GSLL supply by banks.

5.2 Firm-level Financial Performance

In this section, we turn our focus to GSLL borrowing firms to explore the potential rationale behind the increase in GSLLs. Prior studies have shown that political uncertainty can negatively impact firms' performance, affecting investment, capital allocation, and debt default (Julio and Yook, 2012; Jens, 2017; Col et al, 2017; Islam et al, 2022; Hassen et al., 2024). We propose two conjectures to explain the observed industry heterogeneity in GSLL origination. Firms in high-exposed industries may experience financial strain due to geopolitical risks, leading them to scale back investment in green and sustainable initiatives. In contrast, firms operating in low-exposed industries are less severely affected by the negative war shock, and are thus able tocontinue borrowing and investing in sustainability, possibly use it as a hedge tool against the perceived geopolitical risk.. The increase in GSLL borrowing by low-exposed

industries even suggests that firms seek for new business opportunities through such investment.

To verify our conjectures, we restrict the sample to GSLL borrowers and analyse firms' financial performance. We propose three strands of firm-level financial tests and estimate the industry subsample DiD tests (Equation (6)), along with a triple DiD regression (Equation (7)). The first strand of firm-level test focuses on EBIT margin and revenue. EBIT margin is the proxy for profitability, reflecting a company's ability to generate earnings from its operations. Strong profitability can also signal potential business growth. Table 8 reports the results for EBIT margin and revenue. The dependent variable in columns (1)-(3) is the logarithm of EBIT margin. The interaction terms in Columns (1) and (3) are significantly positive, indicating that firms operating in low-exposed industries experience an increase in EBIT margin. Following the onset of the war, low-exposed firms in high-exposed countries show a 2.3 percentage-points increase in EBIT margin, corresponding to 25.8% rise relative to the sample mean (0.089), which is large in economic magnitude. In contrast, the triple interaction in column (1) and DiD interaction in column (2) are negative. Although statistically insignificant, the negative sign offers some indication that firms in high-exposed industries may have experienced profitability pressures due to the geopolitical risk.

[Table 8]

While the rise in EBIT margin could reflect either an increase in revenue or a reduction in expenses, the results for revenue reported in Table 8, columns (4)–(6), suggest that it is largely the result of revenue growth rather than simply cost-cutting. Overall, the rise in EBIT margin and revenue for SLL borrowing firms in low-exposed industries provides evidence that their financial performance was not severely hurt by the geopolitical shock. The increase in EBIT margin anchors the increase in GSLL borrowing. As green/sustainable can act as hedging tools (Sohag et al., 2022; Pham and Do, 2022; Mohammed et al., 2024), low-exposed firms may increase borrowing to hedge the geopolitical risks and seek business opportunities through the aligned green projects and sustainable goals.

The second strand of analysis focuses on operating cash flow, which serves as a proxy for operating liquidity. Table 9 presents the results using operating cash flow as the dependent variable. In contrast to the findings for EBIT margin, we do not observe significant effects for firms in low-exposed industries. The DiD interaction *Post* × *High_country50* in columns (1) and (3) yields a positive but statistically insignificant coefficient, indicating that low-exposed firms did not experience a liquidity shock. Conversely, the triple interaction term *Post* × *High_country50* × *High_ind50* in column (1) and the DiD interaction term *Post* ×

High_country50 in column (2) for the low-exposed subsample are both significantly negative. The results suggest that the operating cash flow of high-exposed firms declined by 0.61% in treated countries following the Russia-Ukraine war, corresponding to a 32.1% decrease relative to the sample mean. This result contradicts previous findings of increasing cash holdings resulting from domestic uncertainty in an election or political alignment setting (Julio and Yook, 2012; Magerakis et al., 2023).

The large decrease in magnitude suggests that highly exposed firms in treated countries experienced significantly tighter cash flows, supporting our second conjecture: that highly exposed firms are more adversely affected by the geopolitical shock compared to their less-exposed counterparts when one country as a whole is highly exposed to geopolitical risks. Consequently, these firms prioritize business survival over investment in green and sustainable transitions. Their cessation of GSLL borrowing can be explained by the fact that GSLLs typically impose ESG-related clauses or require proceeds to be invested in eligible green projects, which may further constrain the cash flows of highly exposed firms.

[Table 9]

Our final strand of analysis focuses on capital expenditure. Prior research has shown that firms tend to reduce capital investment in the face of political uncertainty (Julio and Yook, 2012; Jens, 2017). However, we find no significant effects for capital expenditure, as presented in Table 10. The coefficients for the triple interaction term in column (1) and the DiD interaction terms in columns (2) and (3) are both insignificant and very close to zero. These results suggest no significant difference in capital investment between firms operating in low- and highly-exposed industries after the onset of the war. Specifically, as we restrict our firm sample to GSLL borrowers only, the insignificance of capital expenditure also implies that the increase in GSLL borrowing by low-exposed firms does not lead to increased capital investment, at least in the short term.

[Table 10]

5.3 Textual Examples of Borrowing Firms' document

Companies typically communicate fundamental information to stakeholders in greater detail through various disclosure channels. These include written documents—such as financial reports, investor presentations, and sustainability reports—as well as verbal communication during earnings calls or public events. Through these channels, firms explain key developments, highlight risks and new opportunities, and outline future business strategies. For example, recent research has employed textual analysis of corporate communications—such as earnings calls and annual reports—to identify firm-level exposure to risks like Brexit and climate change

(Hassen et al., 2024; Sautner et al., 2023). These methods have proven to be effective and precise tools for capturing firms' perceptions and strategic responses to external shocks. Therefore, besides our analysis on financial performance, we aim to provide some examples extracted from the corporate documents (eg., Annual reports, earnings calls) for firms operating in high-exposed countries. This can be an additional support for understanding more straightforward our argument about the two conjectures, i.e., de-prioritizing sustainability for high-exposed firms vs. window of opportunity for low-exposed firms. Figure 2 illustrates text examples for one high-exposed firms in high-exposed countries, AGRANA Beteiligungs-Aktiengesellschaft. AGRANA is an Austria company specializing in sugar and fruit production (SIC 20). As Ukraine plays an key role in European agriculture supply chain, AGRANA communicate that it suffered from disruption in operation activity and supply chain in its 22/23 annual report. The fruit production in Ukraine only maintained at 50% of pre-war level, and it is difficult to supply Russian customers due to the sanction, leading to sales loss (p110). This caused significant increase in costs, for example, the impairment in goodwill (p19) and the rise in raw material and energy prices (p121). AGRANA highlight that the uncertainty caused by Ukraine war regarding the unpredictable consequences. More importantly, in its conference call for the first three quarter of 2022/23, it emphasized that the priority this year was ensuring continuity of supply to customers and the energy and processing security. The company employing extra light heating oil to secure production continuity in the short term. Although the manger highlighted this did not detract from long-term sustainability measures, the extra oil use did imply that AGRANA diverted from sustainable activities in order to prioritize operation in the short-term. This further confirms our conjecture of de-prioritizing that high-exposed firms suffered from business disruption and had to prioritize current business survival over sustainability goals.

Figure 3 illustrates text examples for low-exposed firms in high-exposed countries. Figure 3a give examples extracted from the Annual Report of Big Yellow Group Plc, a UK warehousing and storage business for individual and business customers (SIC42). While it acknowledged the significant rise in in inflation, interest rate and living cost, which led to higher market volatility for the company, the business didn't suffer strongly from the negative shock. Their customer base remained stable (p16), no stress in demand after the war (p28), and its pricing model successfully mitigated the inflation drove the revenue growth. Simultaneously, Big Yellow Group expanded investment in ESG, especially its solar energy scheme. During this year it expanded the solar installation to 53 buildings which increased the renewable energy generation by 94% (p11). The solar PVs also helped the company saved electricity costs (p63).

Moreover, Big Yellow Group also use ESG strategies to strengthen its customers and improve customer engagement (p68). Business opportunities under the war also mentioned by AF Gruppen ASA (Figure 3b), a Norwegian contracting and industrial business (SIC 15). Again, the company acknowledged the significant uncertainty, including inflation, commodity price rise, energy crisis, reduced public investment etc., it also argued that such uncertainty had limited influence on its projects (p118, p132). Specifically, under the environment of high energy price together with the government's pro-environmental policies, it recognized significant market potential and business opportunities for the offshore wind segment (p127, p133). The communication from the two companies' annual report anchor the "window of opportunity", where low-exposed firms pursue business opportunities through the sustainable investment under the perceived war risk which didn't adversely affect much their performance.

6. Robustness Checks

This section provides additional checks for the robustness of our results.

A series of policies targeted at climate change and green transition were crowdedly issued during 2020 and early 2022 before the war, for example, the European Climate Law in June 2021. It is possible that these events could act as the confounding events that promote the GSLL borrowing. We generate the false treatment timing by shifting back 6 months, 8 months, 10 months, and 12 months, and regressing on the treatment and control units before the true treatment time. Appendix C, figure C1 and C2 show the coefficients of the interaction term *Post* × *High_country50* with four "false treated time" for the number and volume of GSLLs, plotted at 90% confidence interval. Both figures show that all coefficients of the four "false treated time" are statistically insignificant and much smaller than our true treatment effect, which are 0.066 and 0.368 in magnitude. In the baseline regression (Equation (1)), we use the sample median (50^{th} percentile) of country trading exposure to define the treated country. In this section, we lift this treated threshold to 75^{th} percentile as an alternative robustness test. A country is classified as treated if its trading exposure exceeds the 75th percentile (0.023). We then reproduce the baseline regression of Equation (1) by comparing GSLL origination between countries above this threshold and those below the 50th percentile (median). Table C1 Panel A and B in Appendix C report the results for the number and volume of GSLL based on country-level trading exposure at 75th percentile. The dependent variables in Columns (1)-(2) and Columns (3)-(4) are GSLL origination measured by the number (volume) of loans and their share relative to total loans respectively. The coefficients of the interaction Post×high_country75 for the number, volume and share of GSLLs are highly significant at the 99% or 95% confidence level and larger in magnitude compared to the baseline results. These

findings further confirm that GSLL origination post-war increases with country-level exposure, reinforcing our baseline conclusions. Financial borrowers account for a substantial share of GSLL origination in our sample, with 2,273 out of 12,061 total observations coming from the financial sector. Most are assets or property management groups, real estate and REITs. We retain financial industry in our baseline regressions, as their large share highlights their importance in GSLL origination and their representativeness for studying the impact of geopolitical uncertainty on green transition financing. However, we acknowledge that it is common practice in the accounting and finance literature to exclude financial firms due to their distinct operating fundamentals. Therefore, we drop the financial industry (SIC 60-67) and reproduce the baseline regression Equation (1) as the robustness check. Appendix C Table C2 reports the regression results after excluding the financial sector for the number (Panel A) and volume (Panel B) of GSLLs. The coefficients of the interaction term *Post* × *High_Country50* in columns (1)–(4) remain substantively unchanged for both the number and volume of GSLLs, as well as their share relative to total loans. Specifically, after excluding financial firms, the number (volume) of GSLLs increases by 6.5% (37%) at the 95% confidence level, with the magnitude and significance levels remaining stable compared to the results reported in Table 2. This study adopts the 2022 Russia–Ukraine war as a quasi-exogenous shock. While we acknowledge that tensions between Russia and Ukraine have existed since the 2014 annexation of Crimea, we argue that the geographical scope, severity, international response, and negative economic consequences were significantly greater during the full-scale invasion in 2022 (Atlantic Council, 2024). In contrast, the 2014 Crimea annexation was a more localized geopolitical tension with relatively limited global repercussions.

Since we use pre-war trading exposure as a proxy to capture one country's exposure to the geopolitical conflict, the underlying assumption is that trading activities were significantly affected following the onset of the war. To validate this assumption, we calculate the changes in trading exposure in 2022 and 2023 across 54 countries, as reported in Appendix C Table C3. Column (1) reports the average trading exposure between 2020 and 2021 prior to the war, which is used to define treated countries. Column (2) presents the trading exposure in percentage points for 2022, while Columns (3) and (4) report the change in trading exposure (in percentage points) and its proportion relative to the pre-war level, respectively. By the end of 2022, many countries had already experienced a decline in trade with Russia and Ukraine. Columns (5)–(7) present the trading exposure, the change in percentage points, and its proportion relative to the pre-war level for 2023. Trade with Russia and Ukraine experienced a more substantial decline across most countries by the end of 2023, with European nations

particularly affected. In many cases, the reduction in trade was around or exceeded 50%, with the most pronounced declines approaching 100%, such as the United Kingdom (-92%) and New Zealand (-93%). Some treated countries, such as China, India, Turkey, and Brazil, experienced an increase in trade, likely due to their political alignment with Russia. However, they remain vulnerable to the broader geopolitical and economic risks stemming from the Russia-Ukraine war. The conflict has disrupted global supply chains and inflated energy prices, which affect these nations as key trading partners of Russia.

As pointed out by IEA Report 2022, Russia-Ukraine war dampened the global energy crisis. It is also noted that SIC 49 Electric, Gas and Sanitary Services constitutes a large observations (1002) in our sample, which are highly sensitive to energy prices and fossil fuel supplies. Thus, it may be argued that borrower GSLL simply to hedge the energy risk could be the main reason rather than the general geopolitical risk, and the electricity industries dominate the positive effects. We exclude SIC 49 (Electric, Gas, and Sanitary Services) and re-estimate the baseline DiD regressions on both the full sample and each industry subsample for the number, volume, and share of GSLLs. This allows us to assess whether the positive effect persists outside the energy utilities sector. Table C4 in Appendix C reports the DiD results for the number or volume of GSLLs and their share to total loans. With respect to the number and volume of GSLLs, the results remain positive and statistically significant for both the full sample (Column 1) and the low-exposed industry subsample (Column 4), thereby reinforcing the findings reported in Tables 2 to 5, with a slightly reduced magnitude. The coefficients for the share of GSLLs in the full sample (Column 4) remain positive but become statistically insignificant, possibly due to the exclusion of large observations. However, for the low-exposed industry subsample (Column 6), the coefficients turn significant, indicating that the effect persists outside within the low exposed industries. The reduction in coefficient magnitude and significance level indicates that the energy factor plays a role, which is reasonable and expected given that energy-related risks are a component of the broader geopolitical risks triggered by the war. Nonetheless, Table C4 indicate that the positive effect remains even after excluding the energy utility sector, implying that the underlying mechanism extends beyond simple energy risk and reflects the impact of generalized geopolitical risk.

7. Conclusion

How geopolitical risks affect the ongoing green and sustainable transition remains an open questions under the current geopolitical conflicts. It could be in two opposite directions: deprioritizing vs window of opportunities. This study examines the impact of geopolitical risks on green and sustainable loans (GSLL) by adopting the 2022 Russia-Ukraine war as a quasi-

exogenous shock. Employing a Difference-in-Difference (DiD) methodology, we find that countries with high exposure to geopolitical risks experienced a significant increase in the number and volume of GSLL origination after the beginning of the war. This suggests a growing trend of investment in the green and sustainable transition to geopolitical instability. Furthermore, we conduct the industry subsample analysis. The results show heterogeneous trends between high-exposed and low-exposed industries. The increase in GSLL origination is primarily driven by low-exposed industries, as evidenced by the positive and significant coefficient of the interaction term $Post_t * High_country50_i$. In contrast, the coefficient for high-exposed industries is negative but statistically insignificant, suggesting a more cautious response in sectors more directly affected by geopolitical risks. The results are robust to placebo tests using normal loans as the dependent variable, which shows statistically insignificant and opposite signs for both baseline DiD regression and industry heterogeneous analysis. Next, we investigate the mechanisms behind the increase in GSLL origination from the borrowers' perspective, by analysing the financial performance for GSLL borrowers. We find a significant increase post-war in EBIT margin and revenue among low-exposed firms in high-exposed countries. In contrast, we find a significant decrease in operating cash flows among high-exposed firms post-war. These findings suggest that the financial performance of low-exposed firms has not been strongly affected by the war. This allows them to continue borrowing GSLLs and investing in sustainable transition, possibly use such investment to hedge against geopolitical risks pursue new growth opportunities. However, highly exposed firms are suffering from tightening operating liquidity and thus prioritize business survival over borrowing GSLLs, as GSLLs typically impose ESG performance clauses. Finally, we confirm that the increase in GSLLs is primarily driven by borrowers by disentangle supply vs. demand effects.

We provide a fresh insight to help the public and policy makers understand the link between geopolitical risks and green and sustainable transition. Capturing the timely risk under the Russia-Ukraine war, our results inform the policy makers, for example, to better motivate the borrowers towards green transition. While low-exposed firms are able to seek new business opportunities through green and sustainable investment, high-exposed firms may need additional policy support to stand with the geopolitical risks and continue investing in sustainability goals.

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Figure 1 Coefficients plotting for event studies

Figure 1 illustrates the coefficients plots for the interaction term in Equation (2). Figure 1a and 1b refer to number and volume of GSLL origination respectively. The coefficients are plotted at 90% confidence level. The control variables included are the same as of baseline model. The event study framework include Country×Industry FE, time (month) FE. The standard errors are doubly clustered at country-industry level.

Figure 1a Event study for number of GSLL origination

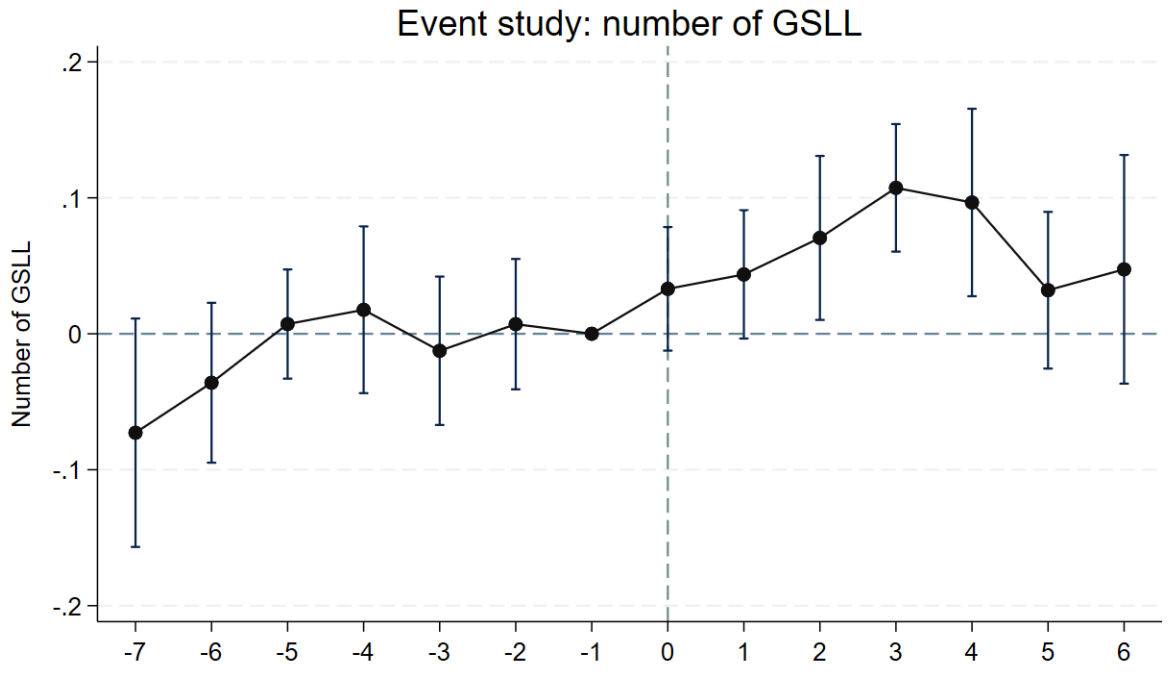


Figure 1b Event study for volume of GSLL origination

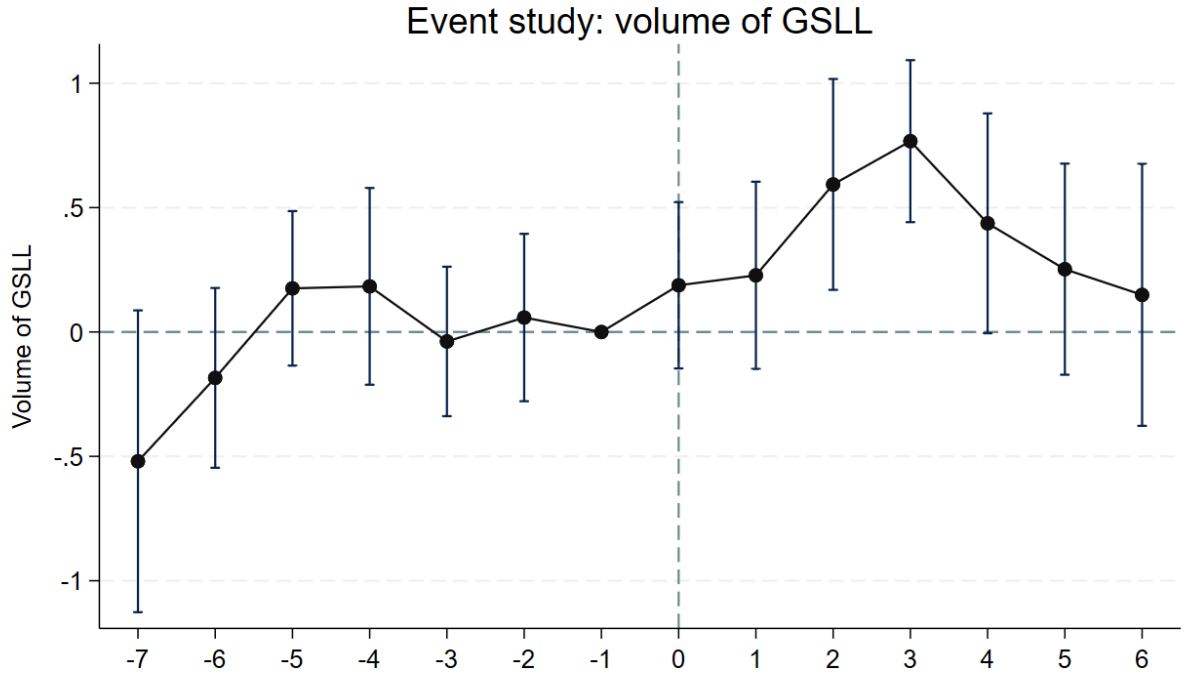


Figure 2 Text examples for firm in high-exposed countries operating in high-exposed industries: AGRANA Beteiligungs-Aktiengesellschaft

AGRANA Beteiligungs-Aktiengesellschaft is a Austria suger, fruit producer (SIC 20). It is classified as firms operating in high-exposed industries in in high-exposed countries. Figure 2 provides some extracts from its 22/23

Annual report and conference call for the first 3 quarters of 2022/23, to show the company experienced negative impact due to the war, including high cost, production disruption etc, and prioritized the supply rather than sustainable goals.

22/23 Annual report. Source: https://uob-my.sharepoint.com/personal/yo21886_bristol_ac_uk/Documents/Desktop/political%20uncertainty%20and%20green%20transition/draft/AGRANA%20Beteiligungs-Aktiengesellschaft_Other%20Financials_2023-02-28_English.pdf

p19

An impairment test required at 31 August 2022, however, resulted in the recognition of impairment on assets and goodwill in our Fruit cash generating unit. This write-down of € 91.1 million – an exceptional item attributable indirectly to the Ukraine war and directly to steeply rising capital costs – was not a cash expense, but was responsible for the posting of an operating loss (negative EBIT) for the Fruit segment.

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Key sources of uncertainty for the following forecast remain the war in Ukraine and its consequences. Due to the unpredictability of the further course of the war, effects such as exceptional cost increases and demand declines cannot be ruled out. Since the outbreak of the war, the volatility in the Group's product markets and procurement markets further intensified. AGRANA's projections are based on the assumptions that the physical supplies of energy and raw materials remain assured and that purchasing price increases, especially for raw materials and energy, can be passed on in adjusted customer contracts.

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The production of fruit preparations in Ukraine has stabilised in the region of 50% of the pre-war level. The decline is due mainly to the loss of export markets and lower domestic consumption as a result of the war. Despite the difficult situation, with power outages

In Russia, the Ukraine war is causing significant shifts in the market environment. While global brands are experiencing a decline in sales and Western companies are leaving the country, local companies are benefit-ing from this development because they are taking over this business, sometimes as new owners. AGRANA's largest customers also saw major changes in this respect in the financial year.

Due to the sanctions in place, supplying the Russian plant with imported goods is becoming increasingly challenging. On the purchasing side, the flow of goods has shifted away from Europe and towards Asia. In addition to fruit, this also affected stabilisers, packaging materials and machine parts.

It is currently difficult to assess whether further valuation adjustments will have to be made on assets in Ukraine and Russia in the future (also see the Notes, from page 152).

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– As a result of the war in Ukraine that began on February 24, 2022, uncertainty continues regarding the unpredictable further course of the war and its consequences; thus, effects such as exceptional cost increases, demand declines as well as a rising cost of capital due to macroeconomic developments cannot be ruled out. Since the outbreak of the war, the volatility in the Group's product markets and procurement markets further intensified. AGRANA's projections are based on the assumptions that the physical supplies of energy and raw materials remain assured and that purchasing price increases, especially for raw materials and energy, can be passed on in adjusted customer contracts.

conference call for the first 3 quarters of 2022/23. Source: https://uob-my.sharepoint.com/personal/yo21886_bristol_ac_uk/Documents/Desktop/political%20uncertainty%20and%20green%20transition/draft/AGRANA%20Beteiligungs-Aktiengesellschaft_Earnings%20Call_2023-01-

12_English%20(1).pdf

Ladies and gentlemen, as an industrial food processor, the group has no higher priority this year than ensuring continuity of supply to our customers and the energy and processing security that this requires. The use of extra light heating oil alongside natural gas and the requisite conversation -- conversion of systems in the relevant sugar and starch factories have been effective to date. But employing extra light heating oil to secure production continuity in the short term does not detract from our long-term sustainability measures.

Figure 3 Text examples for firm in high-exposed countries operating in low-exposed industries: Big Yellow Group and AF Gruppen ASA

Figure 3a 22/23 Annual Report extracted from Big Yellow Group Plc, a UK warehousing and storage business for individual and business customers (SIC42). Figure 2a provides the textual communication from its 22/23 Annual Report. The company claimed that such war risk didn't impact the core operation, and it continued to invest in sustainability, especially renewable energy. Source: https://uob-my.sharepoint.com/personal/yo21886_bristol_ac_uk/Documents/Desktop/political%20uncertainty%20and%20green%20transition/draft/Big%20Yellow%20Group%20Plc_AR_2023-03-31_English.pdf

p16

Trading

We are pleased to have delivered a set of results that are testament to the underlying resilience of our business. The significant increase in interest rates to tackle higher inflation and tighter mortgage borrowing conditions following the Russian invasion of Ukraine, added to by the negative headlines and volatility around the UK economy last Autumn, does, as we've said in the past, have an impact on our demand at the margin, particularly for those making bigger ticket decisions.

Over the year there has been a significant increase in the cost of living, driven by energy, fuel and food inflation, which is having a disproportionate impact on those with lower incomes. However, we have not seen that distress come through to our customer base, where bad debts have not increased from last year, and our aged debtors remain below their pre-Covid levels. Unemployment remains at very low levels and our customers on the whole are storing goods or individual possessions that are of value to them, and our customer base is largely comprised of those from higher income groups.

Self storage is not immune to these external shocks and resultant uncertainty, but this performance alongside our track record since the Global Financial Crisis, demonstrates our ability to navigate these headwinds. Finally, as with last year, we are seeing a return to occupancy growth in May, with an improving demand picture.

p28

The Group grew occupancy over the first six months of the financial year, with the gains principally coming from our domestic and student customers. In our seasonally weakest third quarter, we lost 3.8 ppts of occupancy, similar to the prior year. Our fourth quarter started well with a strong January, but has been relatively muted since. We believe this to be partially as a result of the uncertainty caused by the US regional bank crisis and customers continuing to acclimatise to a higher cost of debt environment. We can say that move-out levels are also subdued at the moment, and as mentioned previously, we are not seeing stress amongst our customers. We saw a similar hesitancy in demand in the prior year following the Russian invasion of Ukraine, with activity levels returning to more normal levels by the end of May 2022.

p14

We are pleased to have delivered these results despite an increasingly familiar year of macroeconomic, political and geopolitical volatility. Our pricing models to new and existing customers have successfully mitigated the impacts of higher inflation, delivering improved average achieved rents, which have been the main driver of revenue growth. Underpinning our resilience is our core strategy to invest significantly in the London market, which has seen the strongest performance, driven by both domestic and business customers, over the last year. We have also been successful in controlling overall increases in store operating expenses to 4% on a like-for-like basis, resulting in improved operating margins.

p11

Generating Solar Energy

We use the extensive roof space on our stores to generate on-site renewable energy through solar PVs. During the year, we installed solar panels on 25 of the Group's stores. We have invested £4.7 million on our retrofit programme this year and now have 53 of our buildings with solar PVs installed. We have committed a further £3 million investment over the next 12 months to retrofit solar PVs across a further 12 stores.

We are currently trialling battery technology to help further maximise the use of solar energy to power our buildings.

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Having generated over 1.5million kWh of power on our stores this year means that we have saved over £200,000 in grid electricity bills. Once an export connection is established, which takes some time after the panel installation is complete we are also able to sell any unused power back to the grid. Below is a summary of this year's financial benefits from our solar generation.

Financial benefits of solar generation*

Year ended 31 March	2021	2022	2023
Solar Generation (MWh)	681	865	**1,681***
Store solar use (MWh)	391	557	**1,521**
Displaced grid energy savings (£)	£93,116	£121,065	**£235,385**
FiT & PPA payments (£)	£108,951	£115,735	**£134,841**
Total savings (£)	£202,068	£236,800	**£370,226**

* Indicates data reviewed by SGS. See page 73 for their independent assurance report.

Notes:

- Total Grid Savings: Solar Payments from Energy Companies = Feed in Tariff + PPA payments. March 23 FiT payments have been estimated using March 22 data as current year not available until 02.
- Supplied UK Network displaced electricity savings = solar generated kWh x 14p Grid kWh charges.

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6. Our customers

Our most material commitment to all of our customers is a safe, secure, welcoming and friendly environment.

We provide self storage facilities at all our stores, and office space at 29 stores. The vast majority of our lettable area (98.6%) are self storage units, with 1.4% of our current lettable area used as office space. In terms of numbers, out of our 73,000 customers, less than 0.5% rent offices.

Our reporting therefore focusses on our self storage customers and any reference to 'customer' should be taken to mean 'self storage customer'.

Furthermore, we provide our customers with easy access to relevant environmental and broader ESG information and actively engage with them through our Big Yellow Foundation. We have increased our solar installations significantly this year. Each store with a Solar PV (Photo Voltaic) energy supply has a display in either the reception or loading bay areas indicating how much energy has been generated; all our stores have EPCs (Energy Performance Certificates) with most of the estate achieving a C rating or above.

6.1 Highlights

- Our NPS (Net Promoter Score) for combined move-in and move-out responses was 78.9 over the last 12 months.
- During the year we have strengthened our Customer Engagement activities with:
  - strong social media content 'Big Yellow and Green' www.bigyellow.co.uk/green/.
  - engaging customer web journey ESG related content and the continued use of our customer facing animation telling our environmental story.
  - visibility of our commitment to using renewable energy through in-store displays, as well as a centralised solar generation display on our corporate site.
- Delivered continued engagement with our Big Yellow Foundation: 36.9% of customers donated at move-in stage, 38.4% at move-out stage.

Figure 3b 2022 Annual Report for AF Gruppen ASA, a Norwegian contracting and industrial business specialising in civil engineering, construction, property and offshore etc (SIC 15). The 2022 Annual Report communicate how this company affected by Russia-Ukraine war and the opportunity identified under the energy price surge. Source: https://uob-my.sharepoint.com/personal/yo21886_bristol_ac_uk/Documents/Desktop/political%20uncertainty%20and%20green%20transition/draft/AF%20Gruppen%20ASA_Other%20Financials_2023-06-30_English.pdf
P118

The world economy has changed significantly the last couple of years, and there has been a significant uncertainty in the macro environment. War in Europe and the aftermath of the pandemic have led to inflation, energy crisis and delivery challenges. However, most projects have managed to maintain good performance. During the year, there have been significant price increases for several commodities, but this has stabilised slightly towards the end of the year. Higher market prices affect all our projects and construction projects have been particularly affected.

Civil engineering experienced high levels of activity in 2022, with revenues at the same level as in 2021. The year was characterised by high levels of production in several major projects, amongst which the E39 Kristiansand vest – Mandal øst was handed over in November. Several projects in their final phase in 2022 helped contribute to very good results for Civil Engineering in 2022. In Construction, there

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MARKET OUTLOOK AND STRATEGY

High inflation, the energy crisis and disruptions to supply chains led to a shift in the Norwegian and international economies in 2022. Throughout the year, significant interest increases were introduced over short periods of time in an attempt to slow down inflation. Forecasts from the Central Bank of Norway, the Swedish National Bank and several other central banks indicate that interest rates will continue to rise in 2023. In addition to tightened monetary policies from the Central Bank, the Norwegian government also presented a tighter fiscal policy together with the 2023 national budget. The national budget contained several aspects that could affect AF Gruppen's operations, both with regards to activity levels and the company's direct costs. Lower predictability in public sector investments and indications of reduced public sector development and budget allocations for road and railway development are all creating added uncertainty during a time of challenging framework conditions.

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Nevertheless, we believe that the long-term prospects for the markets in which AF Gruppen operates are good overall. The civil engineering market is strong and has historically been less sensitive to cyclical fluctuations, as public demand remains the strongest driver for investment in civil engineering projects. For construction and property, interest rate increases and high construction costs may curb growth in the short term, but activity levels nevertheless look set to be good in the longer term, especially in central regions. We are seeing significantly increased demand in the Energy and Environment business area. Norwegian authorities have set ambitious targets for reducing energy use up to 2030, and high electricity prices make investments in energy-efficient measures very attractive. We also see significant market potential for the Offshore business area, in which several major portfolios of oil platforms are set to be demolished over the coming decade.

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The green transition and shift towards a low-emission society is providing market opportunities for AF's operations within climate control (HVAC) in the offshore and marine markets and the ever-increasing carbon allowance price could help accelerate the pace of electrification. Increased investments in offshore wind are also providing new market possibilities for Aeron. The offshore wind farms Sunrise Wind in New York and East Anglia Windfarm in the UK, for which Aeron will supply ventilation and cooling equipment, are good examples.

Table 1 Descriptive statistics

This table reports the summary statistics for variables used in this study. Panel A reports the logarithm of number and volume for green/sustainable loans, normal loans and the share of GSLL divided by total loans from 2020.6 to 2023.9. Panel B reports the country exposure and industry exposure with trading and mapping data available, averaged between 2020-2021. Panel C reports the logarithm of firm-level financial variables between 2020q2 to 2024q2. Panel D reports the country-level control variables from 2019 to 2023.

	(1)	(2)	(3)	(4)	(5)	(6)
Variables	Obs	Mean	Std	5%	median	95%
Panel A Loans (logarithm)						
Ln_no_SLL (non-zero)	2,626	0.795	0.240	0.693	0.693	1.386
Ln_share_SLL	12,061	0.113	0.235	0.000	0.000	0.693
Ln_no_normal	12,061	0.882	0.585	0.000	0.693	2.079
Ln_no_total	12,061	1.004	0.518	0.693	0.693	2.079
Ln_vol_SLL	2,494	5.675	1.281	3.615	5.671	7.849
Ln_vol_share	11,914	0.111	0.239	0.000	0.000	0.693
Ln_vol_normal	12,061	4.985	2.418	0.000	5.364	8.331
Ln_vol_total	12,061	5.681	1.722	2.863	5.711	8.419
Panel B trading exposure						
Country exposure	54	0.0205	0.0260	1.99E-03	0.0122	0.0829
Industry exposure	1512	0.0287	0.0881	5.78E-05	0.0056	0.119
Panel C firm-level financial fundamentals (logarithm)						
Ebit_margin	12,324	0.089	0.166	-0.080	0.079	0.343
Revenue	12,044	0.166	0.103	0.029	0.152	0.368
Cash_ops	10,480	0.019	0.026	-0.024	0.018	0.062
Capex	10,123	0.013	0.013	0.001	0.009	0.038
Assets	12,315	15.379	1.603	12.782	15.330	18.155
Lev	12,295	0.277	0.122	0.081	0.279	0.482
NPPE	12,236	13.994	1.921	10.757	14.070	17.114
Cash_short_invest	12,268	0.102	0.076	0.013	0.084	0.259
Panel D Country-level control variables						
RealGDPgrowth (%)	12,061	1.474	5.144	-9	2.5	8.4
GovChange	12,061	0.205	0.404	0	0	1
Gov_Effect	12,061	1.198	0.553	0.028	1.298	1.916
Rule_Law	12,061	1.138	0.645	-0.258	1.389	1.819

Table 2 DiD regression for number of GSLL

	(1)	(2)	(3)	(4)	(5)	(6)
	ln_no_SLL	ln_no_SLL	ln_share_SLL	ln_share_SLL	ln_no_normal	ln_no_normal
Post×High_country50	0.066**	0.067**	0.032*	0.029	-0.010	-0.001
	(0.026)	(0.027)	(0.018)	(0.018)	(0.031)	(0.037)
GovChange	0.045***	0.039***	0.034***	0.029***	0.029	0.042
	(0.013)	(0.014)	(0.010)	(0.010)	(0.029)	(0.029)
RealGDPgrowth	0.000	-0.000	-0.000	-0.000	0.001	0.001
	(0.001)	(0.001)	(0.001)	(0.001)	(0.001)	(0.002)
Gov_Effect_lag	0.033	0.021	0.054	0.061	0.018	0.002
	(0.062)	(0.061)	(0.047)	(0.046)	(0.049)	(0.064)
Rule_Law_lag	0.342**	0.336**	0.148	0.128*	-0.001	0.022
	(0.150)	(0.134)	(0.102)	(0.090)	(0.138)	(0.160)
Constant	-0.280	-0.253	-0.136	-0.117	0.868***	0.862***
	(0.172)	(0.154)	(0.116)	(0.102)	(0.140)	(0.164)
Year-month (time) FE	YES	NO	YES	NO	YES	NO
Country×Industry FE	YES	YES	YES	YES	YES	YES
Industry×time FE	NO	YES	NO	YES	NO	YES
Country-Industry Cluster SE	YES	YES	YES	YES	YES	YES
Observations	11618	11055	11618	11055	11618	11055
Adjusted R^2	0.263	0.206	0.236	0.189	0.567	0.548

This table reports the regression results of Equation (1). The dependent variable is the number of GSLLs (logarithm) in columns (1)-(2), share their number to total loans in columns (3)-(4), and number of normal loans in columns (5)-(6). High_country50 equals to one if one's country exposure exceeds the sample median 0.0122. The control variables include RealGDPgrowth (%), GovChange, Gov_Effect and Rule_Law. The continuous control variables are winsorized at 1% and 99% and lagged by one year. The fixed effects included are Country×industry FE, Year-month (time) FE for columns (1), (3) and (5). And we further add a stricter Industry×time FE in columns (2), (4) and (6). The standard errors in parentheses are doubly clustered at country-industry level in all specifications. * $p < 0.10$, ** $p < 0.05$, *** $p < 0.01$

Table 3 DiD regression for volume of GSLL

	(1)	(2)	(3)	(4)	(5)	(6)
	ln_vol_SLL	ln_vol_SLL	ln_share_vol	ln_share_vol	ln_vol_normal	ln_vol_normal
Post×High_country50	0.368**	0.353**	0.034*	0.030	-0.243*	-0.203*
	(0.167)	(0.172)	(0.019)	(0.019)	(0.126)	(0.120)
GovChange	0.333***	0.314***	0.032***	0.029***	-0.075	-0.046
	(0.094)	(0.095)	(0.010)	(0.009)	(0.093)	(0.092)
RealGDPgrowth	-0.005	-0.005	-0.001	-0.001	0.004	0.005
	(0.008)	(0.009)	(0.001)	(0.001)	(0.007)	(0.008)
Gov_Effect_lag	0.284	0.204	0.063	0.061	-0.358	-0.467
	(0.440)	(0.416)	(0.042)	(0.043)	(0.445)	(0.433)
Rule_Law_lag	2.180**	2.221**	0.130	0.124	-0.153	0.018
	(1.091)	(0.965)	(0.115)	(0.100)	(0.925)	(0.809)
Constant	-1.817	-1.698*	-0.129	-0.112	5.697***	5.629***
	(1.166)	(1.012)	(0.130)	(0.115)	(1.146)	(1.008)
Year-month (time) FE	YES	NO	YES	NO	YES	NO
Country×Industry FE	YES	YES	YES	YES	YES	YES
Industry×time FE	NO	YES	NO	YES	NO	YES
Country, Industry Cluster SE	YES	YES	YES	YES	YES	YES
Observations	11618	11055	11468	10891	11618	11055
Adjusted R^2	0.219	0.165	0.224	0.171	0.316	0.289

This table reports the regression results of Equation (1). The dependent variable is the volume of GSLLs (logarithm) in columns (1)-(2), share of their volume to total loans in columns (3)-(4), volume of normal loans in columns (5)-(6). High_country50 equals to one if one's country exposure exceeds the sample median 0.0122. The control variables include RealGDPgrowth (%), GovChange, Gov_Effect and Rule_Law. The continuous control variables are winsorized at 1% and 99% and lagged by one year. The fixed effects included are Country×industry FE, Year-month (time) FE for columns (1), (3) and (5). And we further add a stricter Industry×time FE in columns (2), (4) and (6). The standard errors in parentheses are doubly clustered at country-industry level in all specifications. * p < 0.10, ** p < 0.05, *** p < 0.01.

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Table 4 Subsample tests for high- vs. low-exposed industries: No. of GSLL

	(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)	(9)
	ln_no_SLL			ln_share_SLL			ln_no_normal		
	high_ind50	low_ind50	Triple DiD	high_ind50	low_ind50	Triple DiD	high_ind50	low_ind50	Triple DiD
Post×High_country50	-0.022	0.080***	0.081***	-0.016	0.039***	0.040**	-0.001	-0.018	-0.019
	(0.043)	(0.026)	(0.025)	(0.037)	(0.018)	(0.017)	(0.044)	(0.035)	(0.036)
Post×High_ind50			0.056**			0.037			0.011
			(0.022)			(0.024)			(0.044)
Post×High_country50×High_ind50			-0.105***			-0.059**			0.036
			(0.026)			(0.028)			(0.066)
GovChange	0.065***	0.042***	0.046***	0.066**	0.029***	0.034***	-0.046	0.041	0.029
	(0.027)	(0.012)	(0.013)	(0.026)	(0.009)	(0.010)	(0.040)	(0.029)	(0.029)
RealGDPgrowth	0.001	0.000	0.000	0.001	-0.001	-0.000	0.002	0.001	0.001
	(0.003)	(0.001)	(0.001)	(0.002)	(0.001)	(0.001)	(0.002)	(0.002)	(0.001)
Gov_Effect_lag	0.049	0.026	0.030	0.037	0.054	0.052	0.051	0.018	0.018
	(0.117)	(0.061)	(0.063)	(0.094)	(0.046)	(0.048)	(0.091)	(0.047)	(0.049)
Rule_Law_lag	0.408**	0.320**	0.338**	0.340***	0.106	0.145	-0.639***	0.104	-0.000
	(0.176)	(0.141)	(0.147)	(0.093)	(0.101)	(0.101)	(0.223)	(0.150)	(0.138)
Constant	-0.326*	-0.256	-0.278	-0.281*	-0.096	-0.133	1.417***	0.768***	0.867***
	(0.182)	(0.173)	(0.169)	(0.138)	(0.116)	(0.115)	(0.250)	(0.141)	(0.141)
Year-month (time) FE	YES	YES	YES	YES	YES	YES	YES	YES	YES
Country×Industry FE	YES	YES	YES	YES	YES	YES	YES	YES	YES
Country, industry cluster SE	YES	YES	YES	YES	YES	YES	YES	YES	YES
Observations	1849	9769	11618	1849	9769	11618	1849	9769	11618
Adjusted R^2	0.171	0.278	0.264	0.213	0.239	0.237	0.468	0.578	0.567

This table presents the subsample results for highly- vs. low-exposed industries separately, and the triple DiD regression. Highly-exposed industries are industries whose exposure exceed the sample median 0.0056. The dependent variables are number of GSLLs, share of GSLLs to total loans and number of normal loans, converted into logarithm. Columns (1), (4), (7) show the results for high-exposed industries, and Columns (2), (5), (8) show the results for low-exposed industries. Columns (3), (6), (9) show the additional triple DiD test of Equation (3). High_country50 equals to one if one's country exposure exceeds the sample median 0.0122. The control variables are the same as in baseline model, and we include Year-month (time) FE and Country×Industry FE. The standard error in parentheses are doubly clustered at country-industry level in all specifications. * $p < 0.10$, ** $p < 0.05$, *** $p < 0.01$

Table 5 Subsample tests for high- vs. low-exposed industries: volume of GSLL

	(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)	(9)
	ln_vol_SLL			ln_share_vol			ln_vol_normal		
	high_ind50	low_ind50	Triple DiD	high_ind50	low_ind50	Triple DiD	high_ind50	low_ind50	Triple DiD
Post×High_country50	-0.119	0.444***	0.450***	-0.017	0.041**	0.042**	-0.013	-0.262**	-0.270**
	(0.406)	(0.164)	(0.161)	(0.037)	(0.019)	(0.018)	(0.388)	(0.130)	(0.120)
Post×High_ind50			0.281			0.037			-0.263
			(0.295)			(0.029)			(0.389)
Post×High_country50×High_ind50			-0.558*			-0.061*			0.302
			(0.318)			(0.033)			(0.413)
GovChange	0.510**	0.308***	0.336***	0.068***	0.026***	0.032***	-0.453***	-0.011	-0.076
	(0.214)	(0.086)	(0.094)	(0.021)	(0.010)	(0.010)	(0.134)	(0.091)	(0.093)
RealGDPgrowth	0.003	-0.007	-0.005	-0.000	-0.001	-0.001	0.006	0.004	0.004
	(0.018)	(0.009)	(0.009)	(0.002)	(0.001)	(0.001)	(0.014)	(0.007)	(0.006)
Gov_Effect_lag	0.204	0.287	0.268	0.048	0.066	0.061	-0.367	-0.314	-0.344
	(0.772)	(0.444)	(0.446)	(0.106)	(0.041)	(0.043)	(1.011)	(0.420)	(0,456)
Rule_Law_lag	3.058*	1.969*	2.160**	0.301**	0.097	0.128	-1.077	0.003	-0.141
	(1.601)	(1.020)	(1.073)	(0.138)	(0.113)	(0.113)	(1.515)	(0.917)	(0.918)
Constant	-2.460	-1.630	-1.785	-0.258	-0.100	-0.125	6.401***	5.511***	5.676***
	(1.549)	(1.160)	(1.145)	(0.174)	(0.129)	(0.128)	(2.182)	(1.034)	(1.142)
Year-month (time) FE	YES	YES	YES	YES	YES	YES	YES	YES	YES
Country×Industry FE	YES	YES	YES	YES	YES	YES	YES	YES	YES
Country, industry cluster SE	YES	YES	YES	YES	YES	YES	YES	YES	YES
Observations	1849	9769	11618	1816	9652	11468	1849	9769	11618
Adjusted R^2	0.164	0.230	0.219	0.204	0.226	0.224	0.247	0.329	0.315

This table presents the subsample results for highly- vs. low-exposed industries separately, and the triple DiD regression. Highly-exposed industries are industries whose exposure exceed the sample median 0.0056. The dependent variables are volume of GSLLs, volume share of GSLLs to total loans and volume of normal loans, converted into logarithm. Columns (1), (4), (7) show the results for high-exposed industries, and Columns (2), (5), (8) show the results for low-exposed industries. Columns (3), (6), (9) show the additional triple DiD test of Equation (3).High_country50 equals to one if one's country exposure exceeds the sample median 0.0122. The control variables are the same as in baseline model, and we include Year-month (time) FE and Country×Industry FE. The standard errors in parentheses are doubly clustered at country-industry level in all specifications. * $p < 0.10$, ** $p < 0.05$, *** $p < 0.01$.

Table 6 Bank-country-industry: Number of loans

	(1) ln_SLL_lend	(2) ln_share_lend	(3) ln_normal_lend	(4) ln_SLL_lend	(5) ln_share_lend	(6) ln_normal_lend
Post×High_country50	0.092***	0.054***	-0.026	0.089***	0.046***	-0.025
	(0.033)	(0.017)	(0.029)	(0.017)	(0.009)	(0.025)
GovChange	0.085***	0.047***	-0.035	0.065***	0.037***	-0.013
	(0.031)	(0.016)	(0.027)	(0.020)	(0.012)	(0.016)
RealGDPgrowth	-0.001	-0.000	-0.001	-0.001	0.000	-0.001
	(0.001)	(0.001)	(0.002)	(0.002)	(0.001)	(0.002)
Gov_Effect_lag	0.139	0.095	0.004	0.161	0.103*	0.072
	(0.107)	(0.065)	(0.107)	(0.114)	(0.059)	(0.096)
Rule_Law_lag	0.532	0.296*	-0.256	0.415***	0.233**	-0.155
	(0.349)	(0.167)	(0.311)	(0.152)	(0.102)	(0.233)
Constant	-0.682*	-0.394**	1.223***	-0.576***	-0.333***	1.026***
	(0.399)	(0.192)	(0.359)	(0.225)	(0.125)	(0.268)
Year-month (time) FE	YES	YES	YES	NO	NO	NO
Country×Industry FE	YES	YES	YES	YES	YES	YES
Lender FE	YES	YES	YES	NO	NO	NO
Lender×time FE	NO	NO	NO	YES	YES	YES
Country, Industry Cluster SE	YES	YES	YES	YES	YES	YES
Observations	108361	108361	108361	92541	92541	92541
Adjusted R^2	0.302	0.331	0.264	0.304	0.340	0.261

This table reports the DiD regression of Equations (4) and (5) for number of loans. The dependent variable is the number of GSLLs, share of GSLLs to total loans, number of normal loans, aggregate at bank-borrowers' country-borrowers' industry. Columns (1) – (3) reports the results with Year-month (time) FE, Country×Industry FE, Lender FE. Columns (4) – (6) reports the results by further adding Lender×time FE, which aims to absorb the time-varying supplying shock by lending bank. The control variables include RealGDPgrowth (%), GovChange, Gov_Effect and Rule_Law. The continuous control variables are winsorized at 1% and 99% and lagged by one year. The standard error in parentheses are doubly clustered at country-industry level in all specifications. * $p < 0.10$, ** $p < 0.05$, *** $p < 0.01$.

Table 7 Bank-country-industry: volume of loans

	(1) ln_SLLvol_lend	(2) ln_sharevol_lend	(3) ln_normalvol_lend	(4) ln_SLLvol_lend	(5) ln_sharevol_lend	(6) ln_normalvol_lend
Post×High_country50	0.487***	0.053***	-0.502***	0.423***	0.044***	-0.498***
	(0.144)	(0.018)	(0.168)	(0.108)	(0.009)	(0.134)
GovChange	0.488***	0.047***	-0.296**	0.417***	0.037***	-0.239**
	(0.143)	(0.017)	(0.141)	(0.120)	(0.012)	(0.107)
RealGDPgrowth	-0.004	-0.000	0.004	-0.002	0.000	0.001
	(0.009)	(0.001)	(0.007)	(0.015)	(0.001)	(0.010)
Gov_Effect_lag	0.799	0.099	-0.988	0.864	0.105*	-1.010*
	(0.571)	(0.064)	(0.596)	(0.624)	(0.057)	(0.552)
Rule_Law_lag	2.865*	0.303*	-2.353	2.318**	0.231**	-1.443
	(1.470)	(0.175)	(1.693)	(0.957)	(0.105)	(1.215)
Constant	-3.636**	-0.407**	9.378***	-3.091**	-0.332**	8.433***
	(1.689)	(0.203)	(2.004)	(1.230)	(0.130)	(1.296)
Year-month (time) FE	YES	YES	YES	NO	NO	NO
Country×Industry FE	YES	YES	YES	YES	YES	YES
Lender FE	YES	YES	YES	NO	NO	NO
Lender×time FE	NO	NO	NO	YES	YES	YES
Country, Industry Cluster SE	YES	YES	YES	YES	YES	YES
Observations	108361	107906	108361	92541	92196	92541
Adjusted R^2	0.317	0.328	0.381	0.314	0.336	0.382

This table reports the DiD regression of Equations (4) and (5) for volume of loans. The dependent variable is the volume of GSLLs, share of GSLLs to total loans, volume of normal loans, aggregate at bank-borrowers' country-borrowers' industry. Columns (1) – (3) reports the results with Year-month (time) FE, Country×Industry FE, Lender FE. Columns (4) – (6) reports the results by further adding Lender×time FE, which aims to absorb the time-varying supplying shock by lending bank. . The control variables include RealGDPgrowth (%), GovChange, Gov_Effect and Rule_Law. The continuous control variables are winsorized at 1% and 99% and lagged by one year. The standard error in parentheses are doubly clustered at country-industry level in all specifications. * $p < 0.10$, ** $p < 0.05$, *** $p < 0.01$.

Table 8 Firm-level analysis: EBIT Margin and Revenue

	(1) Ebit_margin Full-sample: triple DiD	(2) Ebit_margin Subsample DiD: high_industry	(3) Ebit_margin Subsample DiD: low_industry	(4) Revenue Full-sample: triple DiD	(5) Revenue Subsample DiD: high_ind	(6) Revenue Subsample DiD: low_ind
Post×High_country50	0.022**	-0.01	0.023**	0.0056**	0.0057	0.0053**
	(0.010)	(0.023)	(0.010)	(0.003)	(0.005)	(0.003)
Post× High_ind50	0.001			-0.0028		
	(0.022)			(0.006)		
Post× High_country50 × High_ind50	-0.029			0.0078		
	(0.024)			(0.006)		
L.ln_lev	-0.125***	-0.051	-0.200***	-0.081***	-0.096**	-0.076***
	(0.044)	(0.106)	(0.063)	(0.013)	(0.024)	(0.015)
L.ln_asset	-0.014	0.006	-0.021	-0.032***	-0.028**	-0.032***
	(0.015)	(0.024)	(0.018)	(0.009)	(0.014)	(0.009)
L.ln_tangible	0.001	-0.032	0.011	0.007	0.019	0.000
	(0.015)	(0.025)	(0.016)	(0.008)	(0.016)	(0.006)
L.ln_cash	0.221***	0.100	0.272***	-0.018	-0.045	-0.007
	(0.062)	(0.089)	(0.080)	(0.020)	(0.036)	(0.021)
RealGDPgrowth	0.002***	0.001	0.002***	0.001***	0,000	0.001***
	(0.001)	(0.001)	(0.001)	(0.000)	(0.000)	(0.000)
GovChange	0.002	-0.013	0.007	0.001	-0.005	0.002
	(0.006)	(0.011)	(0.006)	(0.002)	(0.003)	(0.002)
Gov_Effect_lag	-0.007	-0.045	0.001	0.002	0.007	-0.003
	(0.023)	(0.040)	(0.027)	(0.006)	(0.012)	(0.007)
Rule_Law_lag	-0.032	-0.025	-0.03	-0.041***	-0.046*	-0.039***
	(0.038)	(0.057)	(0.047)	(0.010)	(0.024)	(0.011)

Constant	0.384	0.521	0.318	0.636***	0.423***	0.725***
	(0.243)	(0.336)	(0.283)	(0.101)	(0.151)	(0.104)
Country×Industry FE	YES	YES	YES	YES	YES	YES
Year-quarter FE	YES	YES	YES	YES	YES	YES
Firm FE	YES	YES	YES	YES	YES	YES
Firm cluster SE	YES	YES	YES	YES	YES	YES
Observations	11162	3274	7888	10964	3177	7787
Adjusted R^2	0.551	0.517	0.560	0.931	0.896	0.940

This Table reports the (triple) Difference-in-Difference results of Equations (6) and (7).Column (1) reports the results for triple DiD. Columns (2) and (3) reports the subsample tests for high/low exposed industries. The dependent variable is the logarithm of EBIT margin (EBIT/Revenue) and Revenue, winsorized at 1% and 99%. High_country50 equals to one if country exposure exceed the median of 0.0122, high_ind50 equals to one if industry exposure exceed the median of 0.0056. Firm-level control variables are one quarter lagged, including Lev, Assets, Cash, NPPE, one period. The firm-level control variables are converted into logarithm and winsorized at 1% and 99%. We also keep country-level control variables in the model, including RealGDPgrowth (%), GovChange, Gov_Effect and Rule_Law, lagged by one year and winsorized at 1% and 99%. We include CountryxIndustry FE, Firm FE and Year-quarter FE. The standard errors in parentheses are clustered at firm level. * $p < 0.10$, ** $p < 0.05$, *** $p < 0.01$.

Table 9 Firm-level analysis: Operating cash flows

	(1) Cash_ops Full-sample: triple DiD	(2) Cash_ops Subsample DiD: high_industry	(3) Cash_ops Subsample DiD: low_industry
Post×High_country50	0.001	-0.0061**	0.001
	(0.002)	(0.003)	(0.002)
Post× High_ind50	0.0016		
	(0.003)		
Post× High_country50 × High_ind50	-0.0069**		
	(0.003)		
L.ln_lev	0.019**	0.004	0.025**
	(0.008)	(0.014)	(0.010)
L.ln_asset	-0.005	-0.003	-0.005
	(0.004)	(0.005)	(0.004)
L.ln_tangible	0.001	0.002	-0.000
	(0.002)	(0.003)	(0.002)
L.ln_cash	-0.013	-0.041**	0.000
	(0.012)	(0.017)	(0.015)
RealGDPgrowth	0.000*	0.000	0.000
	(0.000)	(0.000)	(0.000)
GovChange	0.002**	0.002	0.002*
	(0.001)	(0.002)	(0.001)
Gov_Effect_lag	-0.006	-0.009	-0.005
	(0.005)	(0.008)	(0.006)
Rule_Law_lag	0.005	0.012	0.003
	(0.006)	(0.011)	(0.007)
Constant	0.079*	0.043	0.089*
	(0.040)	(0.058)	(0.049)
Country×Industry FE	YES	YES	YES
Year-quarter FE	YES	YES	YES
Firm FE	YES	YES	YES
Firm cluster SE	YES	YES	YES
Observations	9673	3004	6669
Adjusted R^2	0.272	0.228	0.297

This Table reports the (triple) Difference-in-Difference results of Equations (6) and (7). Column (1) reports the results for triple DiD. Columns (2) and (3) reports the subsample tests for high/low exposed industries. The dependent variable is the logarithm of operating cash flow (Cash_ops/Total Assets), winsorized at 1% and 99%. High_country50 equals to one if country exposure exceed the median of 0.0122, high_ind50 equals to one if industry exposure exceed the median of 0.0056. Firm-level control variables are one quarter lagged, including Lev, Assets, Cash, NPPE, one period. The firm-level control variables are converted into logarithm and winsorized at 1% and 99%. We also keep country-level control variables in the model, including RealGDPgrowth (%), GovChange, Gov_Effect and Rule_Law, lagged by one year and winsorized at 1% and 99%. We include CountryxIndustry FE, Firm FE and Year-quarter FE. The standard errors in parentheses are clustered at firm level. * p < 0.10, ** p < 0.05, *** p < 0.01.

Table 10 Firm-level analysis: Capex

	(1) Capex Full-sample: triple DiD	(2) Capex Subsample DiD: high_industry	(3) Capex Subsample DiD: low_industry
Post× High_country50	0.0004	0.001	0.0003
	(0.001)	(0.002)	(0.001)
Post× High_ind50	-0.0019		
	(0.001)		
Post× High_country50 × High_ind50	0.001		
	(0.002)		
L.ln_lev	-0.021***	-0.033***	-0.013**
	(0.005)	(0.009)	(0.005)
L.ln_asset	-0.004***	-0.006*	-0.003**
	(0.001)	(0.003)	(0.001)
L.ln_tangible	0.003***	0.001	0.005***
	(0.001)	(0.001)	(0.001)
L.ln_cash	0.006	0.013	0.003
	(0.005)	(0.009)	(0.005)
RealGDPgrowth	0.000	0.000	0.000
	(0.000)	(0.000)	(0.000)
GovChange	0.000	0.000	0.000
	(0.000)	(0.001)	(0.000)
Gov_Effect_lag	-0.001	0.001	-0.002
	(0.002)	(0.004)	(0.002)
Rule_Law_lag	0.003	0.006	0.001
	(0.003)	(0.006)	(0.004)
Constant	0.027	0.079**	-0.008
	(0.020)	(0.038)	(0.022)
Country×Industry FE	YES	YES	YES
Year-quarter FE	YES	YES	YES
Firm FE	YES	YES	YES
Firm cluster SE	YES	YES	YES
Observations	9379	2941	6438
Adjusted R^2	0.662	0.638	0.678

This Table reports the (triple) Difference-in-Difference results of Equations (6) and (7). Column (1) reports the results for triple DiD. Columns (2) and (3) reports the subsample tests for high/low exposed industries. The dependent variable is the logarithm of Capital expenditure (Capex/Total Assets), winsorized at 1% and 99%. High_country50 equals to one if country exposure exceed the median of 0.0122, high_ind50 equals to one if industry exposure exceed the median of 0.0056. Firm-level control variables are one quarter lagged, including Lev, Assets, Cash, NPPE, one period. The firm-level control variables are converted into logarithm and winsorized at 1% and 99%. We also keep country-level control variables in the model, including RealGDPgrowth (%), GovChange, Gov_Effect and Rule_Law, lagged by one year and winsorized at 1% and 99%. We include CountryxIndustry FE, Firm FE and Year-quarter FE. The standard errors in parentheses are clustered at firm level. * p < 0.10, ** p < 0.05, *** p < 0.01.

Appendix A

Figure A1 Examples of "Market Segment" description for identified green and sustainable loans

Lender_Name	Borrower_Name	Market_Segment
114 Bank	SBS Holdings Inc	Sustainability Linked Loans, Sustainable Finance Loans
114 Bank	SBS Holdings Inc	Sustainability Linked Loans, Sustainable Finance Loans
114 Bank	Mitsubishi Electric Corp	Sustainability Linked Loans, Sustainable Finance Loans
77 Bank Ltd	Tokyo Century Corp	Environmental, Social & Governance/Sustainable Linked
77 Bank Ltd	Tokyo Century Corp	Sustainability Linked Loans, Sustainable Finance Loans
77 Bank Ltd	Healthcare & Medical Investment Corp	Environmental, Social & Governance/Sustainable Linked
77 Bank Ltd	Healthcare & Medical Investment Corp	Social Loan, Sustainable Finance Loans
77 Bank Ltd	AEON REIT Investment Corp	Environmental, Social & Governance/Sustainable Linked
77 Bank Ltd	Daito Trust Construction Co Ltd	Green Loan, Sustainable Finance Loans
77 Bank Ltd	Abashiri Biomass Second Power LLC	Green Loan, Project Finance
77 Bank Ltd	Taiyo Reserve 3 Godo Kaisya	Green Loan, Project Finance
77 Bank Ltd	Sapporo Holdings Ltd	Sustainability Linked Loans, Sustainable Finance Loans
77 Bank Ltd	Sekisui House REIT Inc	Green Loan, Sustainable Finance Loans
77 Bank Ltd	Thai Union Group Public Co Ltd	Environmental, Social & Governance/Sustainable Linked
77 Bank Ltd	Thai Union Group Public Co Ltd	Environmental, Social & Governance/Sustainable Linked
77 Bank Ltd	Healthcare & Medical Investment Corp	Environmental, Social & Governance/Sustainable Linked
77 Bank Ltd	Obayashi Corp	Environmental, Social & Governance/Sustainable Linked
77 Bank Ltd	Healthcare & Medical Investment Corp	Environmental, Social & Governance/Sustainable Linked
77 Bank Ltd	SBS Holdings Inc	Sustainability Linked Loans, Sustainable Finance Loans
77 Bank Ltd	AEON REIT Investment Corp	Environmental, Social & Governance/Sustainable Linked
77 Bank Ltd	Hazama Ando Corp	Sustainability Linked Loans, Sustainable Finance Loans
77 Bank Ltd	AEON REIT Investment Corp	Environmental, Social & Governance/Sustainable Linked
77 Bank Ltd	Healthcare & Medical Investment Corp	Environmental, Social & Governance/Sustainable Linked
77 Bank Ltd	Healthcare & Medical Investment Corp	Environmental, Social & Governance/Sustainable Linked
77 Bank Ltd	Rengo Co Ltd	Green Loan, Sustainable Finance Loans
77 Bank Ltd	AEON REIT Investment Corp	Environmental, Social & Governance/Sustainable Linked
77 Bank Ltd	Sapporo Holdings Ltd	Sustainability Linked Loans, Sustainable Finance Loans
77 Bank Ltd	KI Star Real Estate Co Ltd	Sustainability Linked Loans, Sustainable Finance Loans
77 Bank Ltd	Canadian Solar Infrastructure Fund Inc	Green Loan, Project Finance
77 Bank Ltd	Toda Corp	Sustainability Linked Loans, Sustainable Finance Loans
77 Bank Ltd	Canadian Solar Infrastructure Fund Inc	Green Loan, Project Finance

Table A1 Number and volume of loan origination by country

	No. of Loans			Volume of Loans (billion USD)		
Country/Region	Total Loans	Green/Sustainable Loans	Normal loans (exc. G/S loans)	Total Loans	Green/Sustainable Loans	Normal loans (exc. G/S loans)
Argentina	16	3	13	5.11	0.72	4.39
Australia	969	144	825	392.85	68.56	324.29
Austria	93	30	63	29.33	6.89	22.44
Bahrain	20	7	13	13.66	9.27	4.39
Belgium	84	20	64	58.81	19.66	39.15
Brazil	255	17	238	54.00	5.66	48.35
Canada	842	25	817	391.70	6.29	385.41
Chile	93	18	75	37.35	2.77	34.58
China (inc. Hong Kong)	2302	255	2047	812.42	90.97	721.45
Colombia	70	6	64	21.93	0.78	21.15
Cyprus	22	7	15	18.04	5.62	12.43
Czech Republic	34	6	28	24.63	1.45	23.18
Denmark	101	31	70	47.46	20.45	27.02
Egypt	53	5	48	23.03	1.11	21.91
Estonia	11	6	5	3.00	1.78	1.22
Finland	161	55	106	50.79	13.31	37.48
France	917	230	687	436.13	135.61	300.51
Germany	785	166	619	515.29	124.44	390.86
Greece	41	8	33	13.74	1.72	12.02
Hungary	18	4	14	7.85	2.58	5.27
Iceland	10	3	7	1.52	0.47	1.05
India	527	79	448	216.23	54.69	161.54
Indonesia	220	21	199	105.31	8.30	97.01

Ireland	119	8	111	145.28	2.20	143.07
Israel	26	6	20	12.97	3.20	9.76
Italy	517	163	354	230.28	78.27	152.01
Japan	5731	334	5397	899.27	57.63	841.64
Kenya	17	6	11	2.18	0.10	2.08
Lithuania	26	5	21	2.82	0.58	2.24
Luxembourg	145	26	119	113.43	12.27	101.16
Malaysia	100	18	82	46.09	1.94	44.15
Mauritius	25	6	19	11.11	3.14	7.98
Mexico	161	18	143	54.80	15.75	39.05
Netherlands	335	85	250	285.27	90.08	195.18
New Zealand	94	26	68	25.42	5.76	19.66
Norway	139	43	96	65.85	19.41	46.43
Peru	42	6	36	10.52	0.46	10.06
Philippines	101	11	90	32.02	0.82	31.20
Poland	109	33	76	36.64	14.84	21.80
Portugal	50	20	30	13.86	7.76	6.10
Saudi Arabia	116	13	103	166.76	29.49	137.26
Singapore	491	156	335	224.15	77.64	146.52
South Africa	115	25	90	39.85	8.49	31.36
South Korea	71	13	58	28.16	3.24	24.92
Spain	818	318	500	223.28	91.23	132.05
Sweden	233	65	168	144.76	35.55	109.21
Switzerland	167	31	136	159.73	21.02	138.71
Taiwan	713	238	475	179.46	82.42	97.04
Thailand	88	30	58	48.46	5.59	42.88
Turkey	145	56	89	63.31	29.27	34.04
United Arab Emirates	122	13	109	144.86	9.26	135.60
United Kingdom	909	187	722	627.58	121.55	506.04
United States	8714	282	8432	5566.37	260.54	5305.83
Vietnam	202	21	181	39.41	2.97	36.44

Total	28285	3408	24877	12924	1676	11249

This table reports the total number and volume of loans (including Green/sustainable loans and normal loans) by country/region between June 2020 and September 2023. The sample consists of 28,285 loans in total, with 3408 green/sustainable loans and 24877 normal loans separately.

Table A2 Number and volume of loan origination by SIC2-digit industry

	No. of Loans			Volume of Loans (billion USD)		
SIC2digit	Total Loans	Green/Sustianable Loans	Normal loans (exc. G/S loans)	Total Loans	Green/Sustianable Loans	Normal loans (exc. G/S loans)
49	3180	827	2353	1249.12	392.64	856.48
67	2038	263	1775	778.88	122.08	656.80
65	2695	257	2438	636.07	78.26	557.81
28	996	123	873	609.73	65.56	544.17
73	2339	121	2218	1317.51	62.34	1255.17
36	690	115	575	409.59	58.68	350.91
62	1030	111	919	606.83	66.06	540.77
20	753	111	642	314.20	50.06	264.15
60	361	102	259	158.58	45.90	112.69
61	783	88	695	299.17	41.01	258.17
35	766	85	681	353.56	55.27	298.29
87	739	77	662	315.93	26.07	289.85
15	616	64	552	180.55	29.34	151.21
37	476	62	414	403.65	78.65	325.00
48	550	58	492	565.23	47.84	517.39
44	257	56	201	95.04	15.57	79.46
50	780	53	727	257.93	20.49	237.44
16	456	52	404	146.67	10.82	135.86
51	568	50	518	261.06	42.56	218.50
33	366	46	320	108.51	16.37	92.14
13	610	42	568	590.25	57.42	532.83
26	238	41	197	71.19	14.73	56.46
63	363	36	327	240.37	19.72	220.65

38	339	36	303	281.10	12.39	268.71
32	207	34	173	75.26	25.42	49.83
80	530	27	503	209.62	17.60	192.02
42	222	25	197	77.91	11.54	66.37
59	337	24	313	153.33	10.37	142.96
45	240	23	217	178.77	22.71	156.06
70	248	22	226	96.83	5.02	91.81
41	143	22	121	60.02	8.03	51.99
34	292	21	271	66.46	4.22	62.24
47	263	21	242	78.58	8.52	70.06
54	157	21	136	113.12	14.99	98.13
10	234	17	217	111.78	8.40	103.38
30	170	16	154	63.47	8.34	55.13
75	145	15	130	43.51	4.37	39.14
01	76	15	61	14.94	5.29	9.65
17	146	14	132	32.53	2.97	29.56
29	118	14	104	144.56	8.51	136.04
89	146	13	133	116.80	3.08	113.72
53	83	13	70	38.76	5.49	33.27
83	74	13	61	27.56	3.66	23.91
82	131	12	119	35.77	1.24	34.53
56	92	12	80	26.35	6.16	20.19
14	53	12	41	20.69	2.52	18.16
40	94	10	84	100.10	3.83	96.27
02	59	10	49	11.81	1.63	10.18
58	223	9	214	66.10	3.69	62.41
39	188	9	179	39.22	5.19	34.03
27	125	9	116	56.50	16.80	39.70
22	69	9	60	9.79	0.67	9.12
23	128	8	120	24.09	1.93	22.16
24	77	8	69	19.20	3.62	15.58

09	17	7	10	2.53	0.67	1.86
64	101	6	95	71.21	6.63	64.58
52	52	6	46	20.54	3.24	17.29
79	286	4	282	139.30	1.06	138.24
55	154	4	150	57.04	0.56	56.48
72	97	4	93	21.77	0.82	20.95
76	47	4	43	13.34	2.39	10.95
31	25	4	21	18.51	1.02	17.49
57	101	3	98	30.19	0.72	29.47
07	66	3	63	34.63	1.06	33.57
12	54	2	52	19.50	0.76	18.75
46	48	2	46	42.35	0.29	42.06
25	56	1	55	19.52	0.11	19.41
78	55	1	54	10.20	0.10	10.09
08	20	1	19	4.44	0.18	4.26
86	17	1	16	4.67	0.29	4.38
21	9	1	8	41.99	0.00	41.99
81	17	0	17	8.22	0.00	8.22
84	4	0	4	0.05	0.00	0.05
Total	28285	3408	24877	12924.13	1675.55	11248.58

This table reports the total number and volume of loans (including Green/sustainable loans and normal loans) by SIC2-digit code for 73 industries in the sample between June 2020 and September 2023. Industries are downside ranked based on number of G/S loans. The sample consists of 28,285 loans in total, with 3408 green/sustainable loans and 24877 normal loans separately.

Appendix B

Table B1 Variable Description

	Description	Source
Dependent variables: loans		
Ln_no_SLL	Logarithm of the number of green and sustainability linked loans, aggregated at country-industry-month level.	DealScan
Ln_share_SLL	Logarithm of the share, defined as the number of green and sustainability linked loans divided by total loans, aggregated at country-industry-month level.	DealScan
Ln_no_normal	Logarithm of the number of normal loans, which are total number of loans minus the number of green and sustainable loans, aggregated at country-industry-month level.	DealScan
Ln_vol_SLL	Logarithm of the USD volume of green and sustainability linked loans, aggregated at country-industry-month level.	DealScan
Ln_vol_share	Logarithm of the volume share, defined as the volume of green and sustainability linked loans divided by volume of total loans, aggregated at country-industry-month level.	DealScan
Ln_vol_normal	Logarithm of the volume of normal loans, which is the total volume of loans minus the volume of green and sustainable loans, aggregated at country-industry-month level.	DealScan
Dependent variables: firm financials		
Ebit_margin	Logarithm of the EBIT margin, defined as EBIT divided by the current year's total revenue.	S&P Capital IQ Pro fundamentals (Compustat)
Revenue	Logarithm of Revenue divided by the current year's total Assets.	S&P Capital IQ Pro fundamentals (Compustat)
Cash_ops	Logarithm of the operating cash flow, defined as the cash of operations divided by the current year's total assets.	S&P Capital IQ Pro fundamentals (Compustat)
Capex	Logarithm of the capital expenditure, defined as capital expenditure divided by the current year's total assets.	S&P Capital IQ Pro fundamentals (Compustat)
Independent variables		
High_country50	Treatment indicator=1 for countries highly exposed to geopolitical risk invoked by Russia-Ukraine War, if their country-level trading exposure exceed the median (50th percentile) of country exposure.	UN Comtrade
high_ind50	Treatment indicator=1 for SIC2-digit industries highly exposed to geopolitical risk invoked by Russia-Ukraine War, if their country-industry level trading exposure exceed the median (50th percentile) of industry exposure.	UN Comtrade
Post	Dummy variable equal to 1 for periods after the formal announcement of Russia's invasion in February 2022.	
Firm-level control variables		
Assets	Logarithm of one firm's total assets.	S&P Capital IQ fundamentals (Compustat)

Lev	Logarithm of one firm's leverage, defined as total debt divided by total assets.	S&P Capital IQ fundamentals (Compustat)
NPPE	Logarithm of one firm's net property, plant and equipment .	S&P Capital IQ fundamentals (Compustat)
Cash	Logarithm of one firm's cash and short-term investment, divided by total assets.	S&P Capital IQ fundamentals (Compustat)
Country-level control variables		
RealGDPgrowth (%)	One country's real GDP growth expressed as a percentage.	IMF
GovChange	A dummy variable that equals to one if one country had government change for its party in charge in that year, and zero otherwise.	government website, google news search
Gov_Effect	Government effectiveness captures perceptions of the quality of public services, the quality of the civil service and the degree of its independence from political pressures, the quality of policy formulation and implementation, and the credibility of the government's commitment to such policies.	World Bank WGI
Rule_Law	Rule of law captures perceptions of the extent to which agents have confidence in and abide by the rules of society, and in particular the quality of contract enforcement, property rights, the police, and the courts, as well as the likelihood of crime and violence.	World Bank WGI
Variables for Additional tests		
Ln_no_SLL_lend	Logarithm of the number of green and sustainability linked loans one bank lent to multiple country-industry pairs, aggregate at lending bank-borrower country-industry-month level.	
Ln_share_SLL_lend	Logarithm of the share of the number of green and sustainability linked loans divided by total loans, aggregate at lending bank-borrower country-industry-month level.	
Ln_vol_SLL_lend	Logarithm of the volume of green and sustainability linked loans one bank lent to multiple country-industry pairs, aggregate at lending bank-borrower country-industry-month level.	
ln_sharevol_lend	Logarithm of the share of the volume of green and sustainability linked loans divided by total loans, aggregate at lending bank-borrower country-industry-month level.	
Ln_no_normal_lend	Logarithm of the number (volume) normal loans one bank lent to multiple country-industry pairs, aggregate at lending bank-(borrowers') country-industry-month level.	
High_country75	Treatment indicator=1 for countries highly exposed to geopolitical risk invoked by Russia-Ukraine War, if their country-level trading exposure exceed the 75th percentile of country exposure.	

Appendix C

Figure C1 Placebo Test for Treatment Timing, Number of GSLLs

This figure plots the coefficients of the baseline DiD interaction term for the number of GSLLs, by shifting back 6-months, 8-months, 10-months and 12-months of treatment timing. The confidence interval is calculated at 90% level. All coefficients for false time are statistically insignificant.

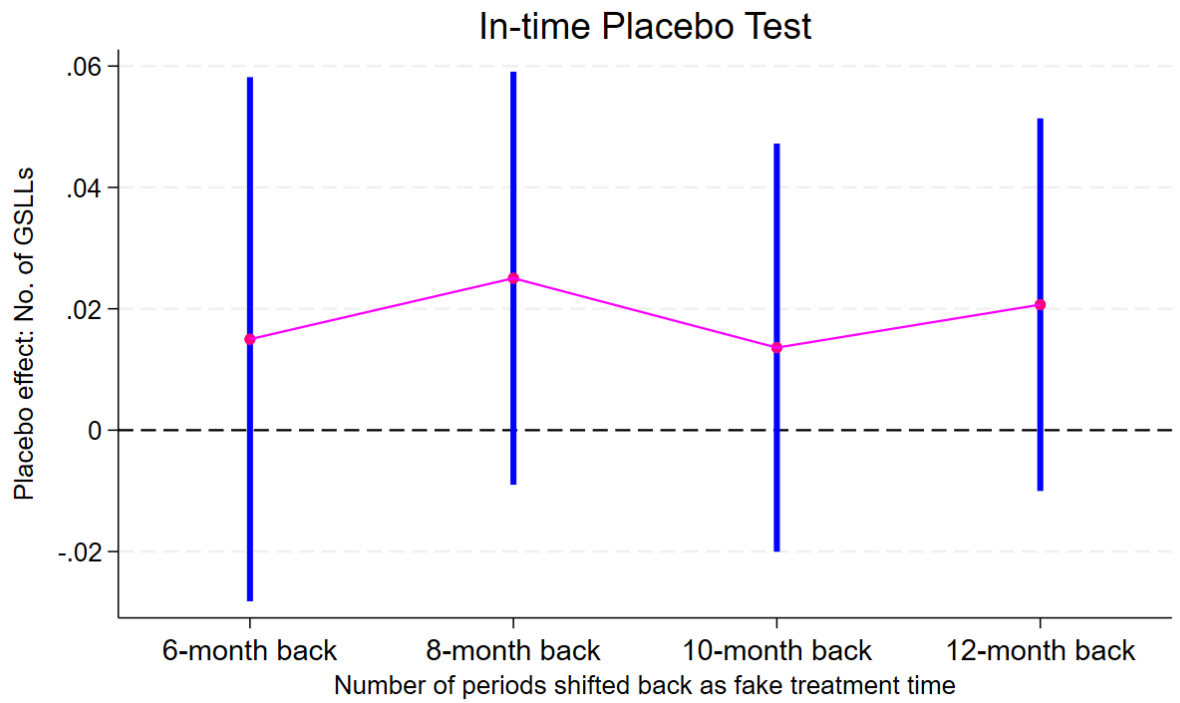


Figure C2 Placebo Test for Treatment Timing, Volume of GSLLs

This figure plots the coefficients of the baseline DiD interaction term for the volume of GSLLs, by shifting back 6-months, 8-months, 10 months and 12 months of treatment timing.

The confidence interval is calculated at 90% level. All coefficients for false time are statistically insignificant.

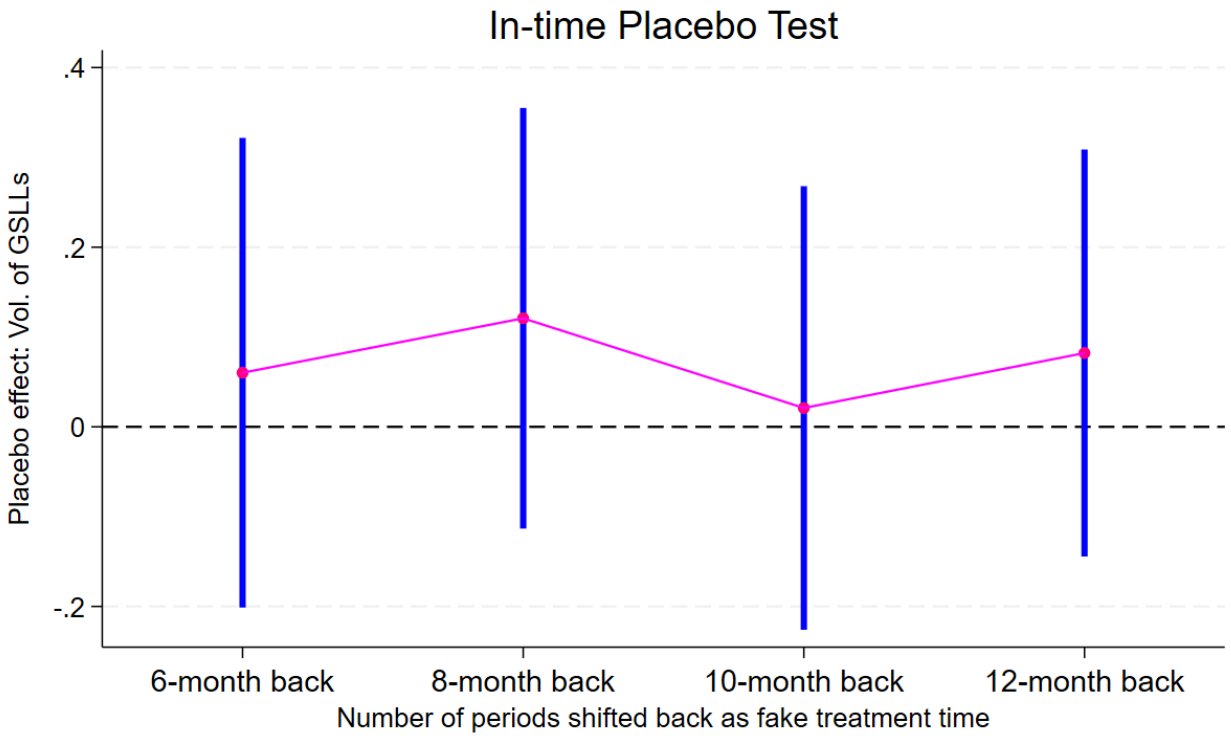


Table C1 Baseline Regression Based on 75th Percentile

Panel A Number of GSLL

	(1) ln_no_SLL	(2) ln_no_SLL	(3) ln_share_SLL	(4) ln_share_SLL	(5) ln_no_normal	(6) ln_no_normal
Post×High_country75	0.092***	0.083***	0.065***	0.055**	-0.069**	-0.056
	(0.027)	(0.031)	(0.022)	(0.023)	(0.026)	(0.035)
GovChange	0.046***	0.048**	0.027**	0.027*	0.049	0.059*
	(0.017)	(0.021)	(0.010)	(0.013)	(0.030)	(0.033)
RealGDPgrowth	-0.001	0.000	-0.002	-0.001	0.002	0.000
	(0.002)	(0.001)	(0.001)	(0.001)	(0.002)	(0.002)
Gov_Effect_lag	0.11	0.068	0.104	0.092	0.012	-0.029
	(0.111)	(0.115)	(0.088)	(0.079)	(0.077)	(0.111)
Rule_Law_lag	0.460**	0.461**	0.269**	0.257***	-0.235*	-0.252*
	(0.213)	(0.184)	(0.128)	(0.091)	(0.127)	(0.131)
Constant	-0.483**	-0.415**	-0.318**	-0.279**	1.129***	1.201***
	(0.197)	(0.176)	(0.128)	(0.111)	(0.134)	(0.181)
Year-month (time) FE	YES	NO	YES	NO	YES	NO
Country×Industry FE	YES	YES	YES	YES	YES	YES
Industry×time FE	NO	YES	NO	YES	NO	YES
Country-Industry Cluster SE	YES	YES	YES	YES	YES	YES
Observations	7572	6784	7572	6784	7572	6784
Adjusted R2	0.263	0.192	0.238	0.185	0.62	0.614

Panel B Volume of GSLL

	(1) ln_vol_SLL	(2) ln_vol_SLL	(3) ln_vol_share	(4) ln_vol_share	(3) ln_vol_normal	(4) ln_vol_normal
Post×High_country75	0.625***	0.556***	0.067***	0.058**	-0.546***	-0.529***
	(0.173)	(0.194)	(0.021)	(0.024)	(0.149)	(0.167)

GovChange	0.318***	0.350***	0.027**	0.027**	-0.069	-0.034
	(0.106)	(0.125)	(0.011)	(0.013)	(0.077)	(0.107)
RealGDPgrowth	-0.014	-0.01	-0.002*	-0.002*	0.006	0.005
	(0.011)	(0.009)	(0.001)	(0.001)	(0.008)	(0.008)
Gov_Effect_lag	0.886	0.508	0.115	0.081	-1.089	-0.932
	(0.771)	(0.773)	(0.085)	(0.083)	(0.663)	(0.699)
Rule_Law_lag	3.093**	3.068**	0.275*	0.283**	-1.466	-1.625*
	(1.455)	(1.228)	(0.143)	(0.106)	(1.037)	(0.813)
Constant	-3.362**	-2.753**	-0.338**	-0.293**	8.251***	8.189***
	(1.282)	(1.186)	(0.136)	(0.125)	(1.171)	(1.156)
Year-month (time) FE	YES	NO	YES	NO	YES	NO
Country×Industry FE	YES	YES	YES	YES	YES	YES
Industry×time FE	NO	YES	NO	YES	NO	YES
Country-Industry Cluster SE	YES	YES	YES	YES	YES	YES
Observations	7572	6784	6687	7572	7572	6784
Adjusted R2	0.223	0.158	0.171	0.34	0.34	0.32

This table reports the results of using 75th percentile of country-level trading exposure to define the treated country. Panel A reports the results for number of GSLL origination. The dependent variable is the number of GSLL in Columns (1) and (2), and number of normal loans in Columns (3) and (4). Panel B reports the results for volume of GSLL. The dependent variable is the volume of GSLL in Columns (1) and (2), share of GSLL in Columns (3) and (4), volume of normal loans in Column (5) and (6). High_country75 equals to one if their country-level trading exposure exceed the 75th percentile. The control variables include RealGDPgrowth (%), GovChange, Gov_Effect and Rule_Law. The continuous control variables are winsorized at 1% and 99% and lagged by one year. The fixed effects included are Country×Industry FE Year-month (time) FE, Industry×time FE. The standard errors in parentheses are doubly clustered at country-industry level in all specifications. * p < 0.10, ** p < 0.05, *** p < 0.01.

Table C2 Baseline Regression Dropping Financials

Panel A Number of GSLL

	(1) ln_no_SLL	(2) ln_no_SLL	(3) ln_share_SLL	(4) ln_share_SLL	(5) ln_no_normal	(6) ln_no_normal
Post×High_country50	0.065**	0.063**	0.035**	0.030*	0.002	0.017
	(0.025)	(0.027)	(0.017)	(0.017)	(0.036)	(0.044)
GovChange	0.054***	0.047***	0.040***	0.035***	0.026	0.044
	(0.014)	(0.013)	(0.012)	(0.011)	(0.031)	(0.032)
RealGDPgrowth	0.000	-0.001	-0.001	0.000	0.002	0.002
	(0.001)	(0.001)	(0.001)	(0.001)	(0.001)	(0.001)
Gov_Effect_lag	0.031	0.027	0.059	0.070*	-0.037	-0.039
	(0.041)	(0.038)	(0.039)	(0.039)	(0.040)	(0.060)
Rule_Law_lag	0.333**	0.311**	0.161	0.131	-0.024	0.02
	(0.163)	(0.152)	(0.103)	(0.089)	(0.136)	(0.164)
Constant	-0.289	-0.248	-0.167	-0.138	0.929***	0.880***
	(0.182)	(0.162)	(0.115)	(0.104)	(0.137)	(0.174)
Year-month (time) FE	YES	NO	YES	NO	YES	NO
Country×Industry FE	YES	YES	YES	YES	YES	YES
Industry×time FE	NO	YES	NO	YES	NO	YES
Country-Industry Cluster SE	YES	YES	YES	YES	YES	YES
Observations	9401	8858	9401	8858	9401	8858
Adjusted R2	0.285	0.225	0.247	0.192	0.52	0.495

Panel B Volume of GSLL

	(1)	(2)	(3)	(4)	(3)	(4)

	ln_vol_SLL	ln_vol_SLL	ln_vol_share	ln_vol_share	ln_vol_normal	ln_vol_normal
Post×High_country50	0.370**	0.339**	0.037**	0.031	-0.227**	-0.168*
	(0.159)	(0.167)	(0.018)	(0.019)	(0.106)	(0.088)
GovChange	0.378***	0.363***	0.036***	0.033***	-0.101	-0.062
	(0.101)	(0.094)	(0.012)	(0.011)	(0.095)	(0.094)
RealGDPgrowth	-0.009	-0.01	-0.001	-0.001	0.003	0.004
	(0.008)	(0.009)	(0.001)	(0.001)	(0.007)	(0.009)
Gov_Effect_lag	0.187	0.156	0.064*	0.069*	-0.485	-0.678
	(0.337)	(0.299)	(0.036)	(0.041)	(0.480)	(0.428)
Rule_Law_lag	2.166*	2.145**	0.144	0.13	-0.416	-0.159
	(1.194)	(1.046)	(0.118)	(0.099)	(0.790)	(0.629)
Constant	-1.799	-1.659	-0.153	-0.135	6.104***	6.030***
	(1.250)	(1.082)	(0.131)	(0.118)	(1.160)	(0.989)
Year-month (time) FE	YES	NO	YES	NO	YES	NO
Country×Industry FE	YES	YES	YES	YES	YES	YES
Industry×time FE	NO	YES	NO	YES	NO	YES
Country-Industry Cluster SE	YES	YES	YES	YES	YES	YES
Observations	9401	8858	9275	8718	9401	8858
Adjusted R2	0.228	0.164	0.231	0.171	0.309	0.278

This table reports the results of Equation (1) after dropping financial industries. Panel A reports the results for number of GSLL origination. The dependent variable is the number of GSLL in Columns (1) and (2), and number of normal loans in Columns (3) and (4). Panel B reports the results for volume of GSLL. The dependent variable is the volume of GSLL in Column (1) and (2), share of GSLL in Columns (3) and (4), volume of normal loans in Columns (5) and (6). High_country50 equals to one if their country-level trading exposure exceed the median (50^{th}) percentile. The control variables include RealGDPgrowth (%), GovChange, Gov_Effect and Rule_Law. The continuous control variables are winsorized at 1% and 99% and lagged by one year. The fixed effects included are Country×Industry FE, Year-month (time) FE, Industry×time FE. The standard errors in parentheses are doubly clustered at country-industry level in all specifications. * $p < 0.10$, ** $p < 0.05$, *** $p < 0.01$.

Table C3 Changes in Country-level Trading Exposure Post-war

Country	(1) expave_goods(%	(2) exp_goods_2022%	(3) post_diff22%	(4) post_percent22	(5) exp_goods_2023%	(6) post_diff23%	(7) post_percent23
Argentina	0.918	0.478	-0.440	-47.93%	0.314	-0.604	-65.78%
Australia	0.120	0.110	-0.010	-8.03%	0.015	-0.105	-87.16%
Austria	1.429	1.073	-0.356	-24.92%	0.795	-0.634	-44.39%
Bahrain	0.199	0.085	-0.114	-57.30%	0.053	-0.146	-73.33%
Belgium	1.571	1.572	0.001	0.04%	0.841	-0.730	-46.45%
Brazil	1.429	1.715	0.285	19.97%	2.116	0.687	48.09%
Canada	0.231	0.092	-0.139	-60.12%	0.054	-0.177	-76.74%
Chile	0.526	0.272	-0.254	-48.35%	0.295	-0.231	-43.92%
China	2.279	2.667	0.388	17.01%	3.598	1.319	57.86%
Colombia	0.728	0.528	-0.200	-27.49%	0.384	-0.344	-47.30%
Cyprus	1.381	2.143	0.762	55.14%	0.810	-0.571	-41.34%
Czech Republic	3.025	3.356	0.330	10.92%	1.582	-1.443	-47.71%
Denmark	1.344	0.657	-0.687	-51.13%	0.387	-0.957	-71.19%
Egypt	5.091	4.152	-0.939	-18.44%	6.233	1.143	22.45%
Estonia	9.706	8.077	-1.629	-16.78%	3.984	-5.722	-58.95%
Finland	8.295	4.837	-3.458	-41.69%	1.400	-6.894	-83.12%
France	1.467	1.439	-0.028	-1.92%	0.527	-0.940	-64.07%
Germany	2.174	1.691	-0.483	-22.23%	0.791	-1.383	-63.61%
Greece	4.574	6.845	2.271	49.66%	2.767	-1.806	-39.50%
Hungary	3.868	5.193	1.325	34.27%	3.777	-0.091	-2.36%
Iceland	0.891	0.325	-0.566	-63.56%	0.338	-0.553	-62.07%
India	1.643	3.796	2.153	131.04%	6.579	4.936	300.41%
Indonesia	1.003	0.702	-0.301	-30.01%	0.743	-0.261	-25.97%

Ireland	0.439	0.295	-0.143	-32.70%	0.181	-0.257	-58.69%
Israel	1.195	0.695	-0.500	-41.84%	2.191	0.996	83.37%
Italy	2.800	2.817	0.017	0.59%	1.000	-1.800	-64.28%
Japan	1.453	1.223	-0.229	-15.79%	0.729	-0.724	-49.82%
Kenya	2.379	1.502	-0.877	-36.88%	2.723	0.344	14.47%
Lithuania	13.525	7.302	-6.223	-46.01%	4.983	-8.541	-63.15%
Luxembourg	0.671	0.363	-0.308	-45.85%	0.203	-0.468	-69.79%
Malaysia	0.448	0.457	0.008	1.84%	0.557	0.108	24.16%
Mauritius	0.165	0.133	-0.032	-19.23%	0.111	-0.054	-32.99%
Mexico	0.233	0.203	-0.031	-13.11%	0.171	-0.063	-26.90%
Netherlands	2.280	1.974	-0.306	-13.42%	0.793	-1.487	-65.23%
New Zealand	0.472	0.077	-0.396	-83.78%	0.032	-0.440	-93.27%
Norway	1.242	0.628	-0.614	-49.41%	0.364	-0.878	-70.70%
Peru	0.799	0.442	-0.357	-44.67%	0.364	-0.435	-54.46%
Philippines	0.617	0.322	-0.295	-47.79%	0.110	-0.507	-82.22%
Poland	5.862	5.091	-0.772	-13.16%	3.142	-2.720	-46.40%
Portugal	0.918	0.541	-0.376	-41.01%	0.458	-0.460	-50.09%
Saudi Arabia	0.507	0.473	-0.035	-6.85%	0.787	0.280	55.17%
Singapore	0.369	0.257	-0.112	-30.42%	0.418	0.049	13.15%
South Africa	0.572	0.384	-0.188	-32.81%	0.389	-0.183	-32.00%
South Korea	2.067	1.560	-0.507	-24.54%	1.260	-0.807	-39.03%
Spain	1.311	1.324	0.013	0.99%	0.924	-0.387	-29.49%
Sweden	1.392	0.549	-0.843	-60.56%	0.417	-0.975	-70.03%
Switzerland	0.853	1.016	0.163	19.14%	0.952	0.099	11.63%
Taiwan	0.741	0.644	-0.096	-12.99%	0.655	-0.085	-11.53%
Thailand	0.609	0.332	-0.277	-45.49%	0.287	-0.321	-52.78%
Turkey	7.715	12.253	4.537	58.81%	10.305	2.589	33.56%
United Arab	0.673	1.199	0.527	78.28%	1.089	0.416	61.85%

Emirates							
United Kingdom	2.704	0.700	-2.004	-74.11%	0.198	-2.505	-92.66%
United States	0.781	0.364	-0.417	-53.44%	0.152	-0.629	-80.53%
Vietnam	0.965	0.520	-0.445	-46.16%	/	/	/

This table illustrates the changes in country-level bilateral trading exposure with Russia and Ukraine after the beginning of the war in 2022. Column (1) is the average trading exposure in 2020 and 2021; Columns (2)-(4) illustrate the trading exposure, change in trading exposure in percentage points and its proportion relative to pre-war average for 2022; Columns (5)-(7) illustrate the trading exposure, change in trading exposure in percentage points and its proportion relative to pre-war average for 2023. Vietnam didn't have trading data available in 2023. From this table, it is expected that the trade with Russia and Ukraine dropped dramatically acorss most countries by the end of 2023, despite some countries experienced a trading increase.

Table C4 Baseline and subsample regression after dropping SIC 49

Panel A Number of GSLL

	(1)	(2)	(3)	(4)	(5)	(6)
		ln_SLL			ln_share_SLL	
	Baseline full sample	High-exposed industry	Low-exposed industry	Baseline full sample	High-exposed industry	Low-exposed industry
Post×High_country50	0.055**	-0.022	0.067**	0.027	-0.016	0.032*
	(0.026)	(0.043)	(0.025)	(0.018)	(0.037)	(0.018)
GovChange	0.042**	0.065**	0.038**	0.033**	0.066**	0.027**
	(0.017)	(0.027)	(0.016)	(0.013)	(0.026)	(0.011)
RealGDPgrowth	-0.000	0.001	-0.000	-0.000	0.001	-0.001
	(0.001)	(0.003)	(0.001)	(0.001)	(0.002)	(0.001)
Gov_Effect_lag	0.027	0.049	0.020	0.044	0.037	0.044
	(0.073)	(0.117)	(0.078)	(0.054)	(0.094)	(0.056)
Rule_Law_lag	0.309*	0.408**	0.275	0.150	0.340***	0.100
	(0.178)	(0.176)	(0.172)	(0.126)	(0.093)	(0.130)
Constant	-0.270	-0.326*	-0.233	-0.142	-0.281*	-0.092
	(0.203)	(0.182)	(0.211)	(0.140)	(0.138)	(0.145)
Year-month (time) FE	YES	YES	YES	YES	YES	YES
Country×Industry FE	YES	YES	YES	YES	YES	YES
Country-Industry Cluster SE	YES	YES	YES	YES	YES	YES
Observations	10618	1849	8769	10618	1849	8769
Adjusted R^2	0.206	0.171	0.212	0.237	0.213	0.238

Panel B Volume of GSLL

	(1)	(2)	(3)	(4)	(5)	(6)
		ln_vol_SLL			ln_share_vol	
	Baseline full sample	High-exposed industry	Low-exposed industry	Baseline full sample	High-exposed industry	Low-exposed industry
Post×High_country50	0.333*	-0.119	0.405**	0.028	-0.017	0.033*
	(0.180)	(0.406)	(0.175)	(0.018)	(0.037)	(0.018)
GovChange	0.327***	0.510**	0.299***	0.032**	0.068***	0.026**
	(0.116)	(0.214)	(0.107)	(0.012)	(0.021)	(0.011)

RealGDPgrowth	-0.003	0.003	-0.004	-0.001	-0.000	-0.001
(mean) Gov_Effect_lag	0.362	0.204	0.394	0.063	0.048	0.067
	(0.514)	(0.772)	(0.542)	(0.050)	(0.106)	(0.052)
Rule_Law_lag	1.924	3.058*	1.629	0.117	0.301**	0.074
	(1.273)	(1.549)	(1.197)	(0.134)	(0.138)	(0.134)
Constant	-1.814	-2.327	-1.599	-0.127	-0.258	-0.091
	(1.391)	(1.483)	(1.419)	(0.153)	(0.174)	(0.157)
Year-month (time) FE	YES	YES	YES	YES	YES	YES
Country×Industry FE	YES	YES	YES	YES	YES	YES
Country-Industry Cluster SE	YES	YES	YES	YES	YES	YES
Observations	10618	1849	8769	10477	1816	8661
Adjusted R2	0.189	0.164	0.192	0.223	0.204	0.224

This table reports the results after dropping SIC 49, Electric, Gas and Sanitary Services. Panel A reports the regression results for the number of GSLLs and Panel B reports the regression results for the volume of GSLLs. The dependent variable in Columns (1) – (3) is the number (volume) of GSLL, and the dependent variable in Columns (4) – (6) is the share of GSLL to total loans. In each Panel, Columns (1) and (4) report the DiD regression for the full sample, Columns (2) and (5) report the DiD regression for high-exposed industries, and Columns (3) and (6) report the DiD regression for low-exposed industries . High_country50 equals to one if their country-level trading exposure exceed the median (50th) percentile. The control variables include RealGDPgrowth (%), GovChange, Gov_Effect and Rule_Law. The continuous control variables are winsorized at 1% and 99% and lagged by one year. The fixed effects included are Country×Industry FE and Year-month (time) FE. The standard errors in parentheses are doubly clustered at country-industry level in all specifications. * $p < 0.10$, ** $p < 0.05$, *** $p < 0.01$.