FINANCIAL FRONTLINES

ASSESSING THE IMPACT OF THE RUSSIA-UKRAINE CONFLICT ON THE EUROPEAN CORPORATE BOND MARKET

Abstract:

This paper investigates how European firms accessed the corporate bond market during the Russia-Ukraine war. Using a comprehensive dataset of European bond issues from 2017-2023, we find that fewer bonds were issued during the war than in previous periods, particularly Russian bonds and those denominated in Rubles. Bonds issued during the crisis exhibited higher ratings compared to preceding periods, suggesting that ratings played a significant role for firms raising capital during the war. Consistent with existing evidence on bond maturities and coupon rates in times of crisis, we document that, on average, maturities shortened and coupons increased. Regarding bond spreads, we find that the average bond spread in the war period decreased, potentially influenced by changes in market interest rates. However, for firms that have issued bonds in the past, their average spreads increased, suggesting a market reassessment of perceived risk during the war. Finally, we find that firm characteristics, which explain bond spreads comparatively well in normal times, have reduced explanatory power during the war.

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Keywords: Corporate bonds, credit spreads, Russia-Ukraine war

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1. Introduction

On the 24th of February 2022, Russia's president Vladimir Putin announced a "special military operation" in Ukraine[1]. This "special military operation", while previously disguised as military exercises in cooperation with its neighbouring country Belarus, instead consisted of an invasion of Ukrainian territory by the Armed Forces of the Russian Federation (AFRF) and resulted in the onset of one of the most notable wars on European soil in recent history. This conflict has not only disrupted the political and social fabric of Ukraine but also caused widespread effects throughout Europe, profoundly impacting the economic stability and security of the region. In this paper, we aim to study this crucial event and analyse the impact that this war had on firms' access to the corporate bond market.

The ability of businesses to secure the necessary funds to operate, invest, and navigate periods of uncertainty is a key factor when assessing the economic health of a given region. However, disruptions to the global economy and crises in various forms have been recurring features of recent economic history. Whether it be the Great Financial Crisis (GFC) of 2008, the global health crisis triggered by the Covid-19 virus in 2020 or the most recent invasion of Ukraine in 2022, each crisis presented unique challenges for companies worldwide. These crises, which have stemmed from financial, health-related and geopolitical factors, have repeatedly shown their potential to disrupt the equilibrium of the world's capital markets and severely impact the ability of firms to access the resources they need. The war in Ukraine, which we aim to study with this paper, is the most recent of many examples of a global macroeconomic shock to the world economy. However, since the Russia-Ukraine war is still ongoing at the time of this paper, assessing the total impact of this conflict is not possible in this study. We therefore aim to primarily assess the short- and medium-term implications this conflict has had on European firms' ability to raise capital in the corporate bond market.

To answer if and to what extent the war in Ukraine has disrupted the access of European firms to the corporate bond market, we gather comprehensive data on bond

[1] UN Meetings Coverage (23 February 2022)

issues by European companies. The data is gathered from the SDC Platinum database and contains various bond characteristics, such as bond rating, maturity, coupon rate or currency of issue. Our methodology is split into two parts. First, we focus on comparative analysis, comparing the bond issuances in the war period to the Covid-19 period and a predefined control period[2], allowing us to isolate the effects that the war had on the capital markets. Second, we utilise panel regressions with fixed effects to establish conclusions on the determinant factors of bond spreads in times of war.

Examining the dataset in detail, we find that the number of bond issuances decreased significantly in the war period. This effect is particularly strong when investigating the number of bonds issued in the first three months of the invasion, where we observe a significant drop in bond issuances in contrast to previous periods. In line with Benmelech and Bergman (2017), we pose the hypothesis that in times of crisis, liquidity in the primary markets dries up, resulting in less bond issuances overall. We find that this effect is particularly strong for bonds issued by Russian companies and Ruble-denominated bonds, which are suffering immense decreases in new issuances. This is in line with the "flight to safety" hypothesis by Feng et al. (2023), suggesting that investors reduce exposure to investments with higher perceived risk in times of crisis. Our findings reflect that market participants retreat into a more cautious stance amidst geopolitical uncertainty.

In a more granular analysis of firm characteristics, we find a number of interesting patterns. With regard to ratings, our study finds a higher percentage of newly issued investment grade bonds in the war period than in the control or Covid-19 period. This trend indicates the heightened importance of bond ratings for investors during these uncertain times. Moreover, the issuance of high-yield bonds showed a relative decrease between periods, reinforcing the trend of investors moving into safer investments. Interestingly, BBB-rated bonds saw a strong decline in the initial month after the invasion of Ukraine. This hints at the fact that institutional investors, which are bound by investment constraints, were more reluctant to hold low investment grade bonds due to the risk of these bonds losing their investment grade rating and therefore falling out of the investors' investment scope.

[2] Period definitions can be found in Section 4: Data

This study also uncovers notable intricacies with respect to bond coupons and maturities. During the war, we find that corporate bonds have higher coupons and shorter maturities overall. Additionally, coupon rates increased gradually during the war period, mirroring the increase in market interest rates by the central banks across Europe. The decrease in overall maturities can potentially be explained by changing investor preferences and risk perception. In particular, bonds with lower maturities were perceived as safer and less information-sensitive and therefore, investors shifted from bonds with longer maturities to these safer and less information-sensitive securities.

When inspecting bond spreads, we find that the average bond spread decreases slightly during the war period compared to the control and Covid-19 period. This could partially be explained by the impact of increasing market interest rates, which, according Longstaff and Schwartz (1995), tend to lead to lower credit spreads. We also find indications of a notable shift in the risk profile of issuers. The predominant issuers during the war period were firms that issued bonds with lower spreads in the pre-war period, indicating that primarily firms with an overall lower risk profile were able to issue bonds during the war in Ukraine. However, inspecting the issuers that issued in both the war and pre-war period in more depth, we find that the perceived risk of the bond issuances during the crisis increased. The reasoning for this is found in the increase in spreads for bonds by the same issuers between the two periods. This rise in spreads between periods suggests a market reassessment of perceived risk, potentially driven by war-induced increases in volatility.

Our investigation of the determinants of bond spreads during the war period reveals fundamental differences compared to the control period. While the firm characteristics we investigate are all significant during normal times, only tangibility and being a dividend payer have a significant impact on bond spreads in times of war. When considering factors such as the number of historical issues, the historical spread of bonds issued by the same issuer or the bond rating, our analysis indicates that only the historical spread and bond rating are significant predictors of credit spreads in times of crisis. Notably, the impact of bond ratings on spreads intensified during the war period, hinting at the increased market preference for creditworthiness and stability during these times.

While firm characteristics and other observable factors offer a relatively robust explanation for changes in bond spreads in normal times, the explanatory power generally diminishes during times of crisis. This is in line the explanation by Collin-Dufresne et al. (2001) that unobservable time fixed effects, such as local supply and demand shocks, have a greater impact on bond spreads than credit risk factors and standard proxies for liquidity. The amplification of these unobservable effects in times of crisis can be connected to the increasing presence of such shocks and the heightened market uncertainty during the war. This highlights the complex dynamics at play during crisis periods, where traditional metrics may not capture market sentiment fully.

Going forward, we begin by reviewing relevant literature. Next, we derive hypotheses based on the existing literature and explain our dataset. We continue by describing our results and present our empirical findings and finally derive conclusions and discuss the implications of our results.

2. Literature review

This paper aims to contribute to existing literature in two ways: First, by investigating corporate financial behaviour and testing existing hypotheses on bond issuances in times of crisis. Therefore, we aim to find additional intricacies of bond issuances during the Russian-Ukrainian war that set it apart from previous crises. Second, we add to existing literature regarding the determinants of bond spreads, which have been documented to change between times of crisis and non-crisis periods. Overall, while there exists a vast research body regarding stock performance during the war in Ukraine, we have identified the exploration of the corporate bond market during these turbulent times to currently be strongly under-investigated. We therefore aim to address this gap in the literature by empirically analysing the changes in bond issuance behaviour during the Russian-Ukrainian war as well as the changes in the determinants of bond spreads.

2.1. Wars before the Russia-Ukraine war

Historically, war events have shown to have significant implications for financial markets, especially with regard to risk preferences of investors (Frey and Kucher, 2001; Hudson and Urquhart, 2015; Schneider and Troeger, 2006). This makes asset classes that investors consider safer than stocks, such as bonds, particularly interesting. Frey and Kucher (2001) investigate the Second World War and find that crucial war events are reflected in the prices of government bonds. However, not all events that are considered important by historians impact prices on the capital markets. One example is Germany's capitulation in 1945, which was not reflected in bond prices at the time. These findings can be partially explained by the 'negativity effect', which suggests that financial markets react more strongly to negative events than positive events and was first introduced by Akhtar et al. (2011) and further investigated by Hudson and Urquhart (2015). Finally, existing literature on the implication of crises agrees that wars can result in a large-scale destruction of capital, both physical and human, which in turn leads to major reactions in the financial markets (Nordhaus, 2002).

2.2. The Russia-Ukraine war

Since the invasion of Ukraine in February 2022, there have been a number of studies published that have investigated the impact of this war on capital markets. The effect of the Russia-Ukraine war on world stock market returns was initially analysed by Boungou and Yatié (2022), who investigated 94 countries between 22 January and 24 March 2022. They were among the first to provide empirical evidence of the war's impact on the stock market and found a significant negative impact on multiple stock indices across their sample. Moreover, they found that the countries that were most affected were countries sharing a border with the war participants as well as the UN countries that condemned the war. Their findings are also consistent with previous studies on this topic, such as Hudson and Urquhart (2015), Hudson and Urquhart, (2022), Goel et al. (2017) and Richard et al. (2022), who all find a negative effect of geopolitical conflicts on stock returns. Another study that analysed this effect is Assaf et al. (2023), who found that after the announcement of the invasion of Ukraine, stock indices on average exhibited negative abnormal returns. The results differed depending on geographical region with the most affected region being EMEA (Europe, Middle East and Africa), given its close proximity to Russia and Ukraine. These findings can be related to Ramelli and Wagner (2020) who investigated the Covid-19 pandemic and found that the stock price of firms that had a higher exposure to China through trade connections was more negatively affected than the prices of firms without such trade connections. This suggests further that there could be a relation between the exposure of firms to the "outbreak country" and the financial performance of those firms. Investigating how firms with a close connection to Russia, either geographical or in terms of trade intensity, performed after the invasion of Ukraine could therefore be highly relevant to assessing corporate financial behaviour in times of crisis.

In addition to regional differences, there is evidence suggesting that the effect of the war on stock price performance not only varies by region but also by industry, a topic Nerlinger and Utz (2022) were among the first to investigate. They document that energy companies had on average positive cumulative average abnormal returns compared to the overall market post-invasion, suggesting that fundamental differences exist in how different industries reacted to the crisis.

2.3. Recent trends in bond issuance behaviour

When studying bond issuances in Europe over time, it is important to recognise general trends which influence the market regardless of crisis periods. In May 2022, the European Central Bank issued a report about the rise of bond financing in Europe over the past two decades. In this report, Darmouni and Papoutsi (2022) reflect on the different dynamics of Europe compared to the US in terms of raising capital. While the US has historically been more heavily focused on raising capital through market financing such as bonds, Europe has traditionally used bank lending more heavily. This trend however has changed, as market financing has been growing faster than bank lending in Europe over the last 20 years. Moreover, the types of issuers have changed over recent years as many smaller and riskier issuers also entered the market. The authors also highlight that the monetary policy pursued by the European Central Bank (ECB) has stimulated bond issuances by keeping interest rates low. This was discussed by Lo Duca et al. (2016) who find an inverse relation between interest rates and bond issuances, such that low long term interest rates stimulate higher bond issuances. According to the authors, this implies that stricter financial conditions are likely to negatively impact bond issuances. To put this into perspective, the ECB has raised the interest rate on the main refinancing operations from 0.00% in the beginning of 2022 to 4.50% as of September 2023[3]. This could hint at the fact that the drastic changes in the interest rate environment adds another layer of complexity to the analysis of corporate bond issuance behaviour during the Russia-Ukraine war.

2.4. Bonds in times of crisis

In this section, we will delve into some of the previous studies conducted on bond issuances in times of crises. The discussion is generally structured around bond issuance behaviour, ratings, maturities and spreads. The purpose of this section is to uncover insights identified by previous studies and provide a benchmark for the hypothesis development in this thesis.

[3] European Central Bank: Key ECB interest rates (December 2023)

2.4.1. Bond issuance behaviour

This paper is related to previous studies that investigate firms' ability to raise capital in times of crisis. Of particular interest is the Covid-19 crisis since it is the most recent shock to the world's financial system and will function as a proxy for the Russia-Ukraine war going forward. Covid-19 and its impact on the corporate bond market was studied by Halling et al. (2020) who investigated the crisis' impact on maturities and ratings in the US corporate bond market as well as the determinants of credit spreads during Covid-19. They found that in the initial period of the crisis, the number of issues and total amount issued increased more than double, indicating that the bond market played a significant role in raising capital. Their results are in line with the findings from Becker and Benmelech (2021), who also notice an increase in U.S. corporate bond issuances following the outbreak. The increase in bond issuance activity during times of crisis can potentially be explained by both supply- and demand-based theories, as Erel et al. (2012) discuss in their study on how macroeconomic conditions affect firms' ability to raise capital.

On the one hand, the demand for financing increases in times of crisis due to increased uncertainty. Therefore, periods of uncertainty can rationalise higher amounts of bond issuances due to firms' increased demand for liquidity. Acharya and Steffen (2020) document this effect and find an increased drawdown of existing credit lines in the early phases of the pandemic, dubbed "dash for cash" by the authors. Additionally, investors tend to be more risk averse during market downturns and models such as "flight to quality" become applicable (Caballero and Krishnamurthy (2008); Vayanos (2004)). This essentially means that investors shift from riskier assets to safer ones that are less information-sensitive, which could in turn favour bond issuances.

On the other hand, the supply of capital tends to decrease during economic downturns. This was investigated by Holmström and Tirole (1997), who describe a "credit-crunch", associated with economic downturns and environments of higher interest rates. This decrease in overall supply of capital could indicate that firms would have more difficulty raising capital in a crisis, and subsequently less bonds would be issued (Benmelech and Bergman, (2017)). The two counteracting effects of decreasing supply

of capital in periods of high uncertainty and increasing demand for safer securities should have a significant influence on the issuance of corporate bonds during times of crisis.

As established above, there is evidence that investors shift to safer investments in times of uncertainty, which can create an increased demand for fixed income securities (Costantini and Sousa, 2022). This phenomenon could lead to higher bond prices, which in turn leads to lower yields, as Leippold and Matthys (2022) concludes. In the case of the Russia-Ukraine crisis, there is a strong possibility that the geopolitical risk and uncertainty results in this "flight to safety" activity among investors within the fixed income market, which is further highlighted by Feng et al. (2023). A similar effect is also identified with regards to currencies, where in times of crisis capital tends to flow towards "safe haven" currencies, as investigated by (Habib and Stracca, 2012). Moreover, Feng et al. (2023) point out that following Russia's occupation of Crimea in March 2014, the total capital flows to Russia dropped dramatically, providing additional indications that the ongoing war is a compelling subject for further investigation.

2.4.2. Ratings

With respect to ratings during the Covid-19 period, Halling et al. (2020) find that during the first week of the crisis, 80% of the bonds were rated A or higher. These findings suggest that when uncertainty is high, credit ratings are particularly important for raising capital through debt instruments. This is in line with Erel et al. (2012) who find that capital raising for investment grade borrowers is countercyclical, meaning that in times of crisis, a higher fraction of bond issuers is rated investment grade. Acharya and Steffen (2020) also documented this trend for Covid-19 by establishing that firms with high credit ratings increased their bond issuances during the crisis. However, after the initial weeks of the crisis, Halling et al. (2020) document that the percentage of bonds rated A and above drops to around 30-40%, which is close to the average for the normal period. Additionally, they note that the average amount issued for BBB-rated bonds exceeded normal times, meaning that the market was willing to provide more capital to low investment grade bonds during the crisis. This is interesting given the fact that many institutional investors tend to be restricted in what types of securities they are allowed to hold, as highlighted by Campbell and Taksler (2003) and Ellul et al. (2011). They pose the hypothesis that in periods of crisis, large institutional investors would likely be

reluctant to hold these low investment grade bonds due to their investment constraints. Halling et al. (2020) however find this to not be the case in the Covid-19 crisis. They suggest that in the U.S., the Federal Reserve programs as well as loose regulatory constraints for institutional investors during Covid-19 reduced this reluctancy. This indicates the existence of potential differences between the Covid-19 crisis and previous crises. Overall, these findings suggest that in times of crisis, investors value the safety associated with high credit ratings more than in normal times.

2.4.3. Maturities

Regarding bond maturities, the traditional perspective of Erel et al. (2012) establishes that in poor market conditions, newly issued securities are structured differently, and maturities tend to be shorter overall. According to the authors the reason for this could be found in the supply and demand dynamics of the corporate bond market. From a demand perspective, securities that are less information sensitive are more favourable during poor economic climate and a lower maturity allows less time for changes in security prices, making a lower maturity equal to lower information sensitivity. From a supply perspective, the providers of capital require higher security and certainty when the market conditions are worse, which in turn leads to newly issued bonds having shorter maturities. Contradictory, Kalemli-Özcan et al. (2020) explain that it can be favourable to extend the maturities of debt instruments if investors expect prolonged periods of economic uncertainty even if it increases information sensitiveness. The rationale behind this mechanism is that debt with shorter maturity comes with a rollover risk which can cause underinvestment costs during periods of high volatility. For the Covid-19 pandemic, Halling et al. (2020) found a similar effect, namely that the maturities of bonds issued during the crisis exceeded those of bonds issued in non-crisis times. This contradicts the findings of Erel et al. (2012) on the relation of negative market situations and bond maturities and could potentially be explained by the different nature of the Covid-19 crisis in comparison to previous shocks to the financial system.

2.4.4. Spreads

A major component of Halling et al. (2020) is their research on the determinants of bond spreads. They found that firm characteristics tended to provide a relatively clear

explanation for credit spreads in normal times, while the explanatory power weakened during the Covid-19 pandemic. One particularly interesting finding is that while tangibility lowered credit spreads in normal times, it did not have a lowering effect on spreads during the crisis. This is interpreted by the authors as companies with a large share of tangible assets being perceived as inflexible and more susceptible to the restrictions implemented at that time, resulting in higher tangibility not reducing credit spreads in the Covid-19 period.

In addition to a number of firm characteristics, Halling et al. analyse individual firms' historical bond issuance activity as well as the impact of bond ratings on credit spreads. During normal times the average spread on past issuances seems to be a good indicator of future bond spreads. This correlation was weaker during the crisis, suggesting that in the crisis period, spreads are less influenced by historical patterns than in the control timeframe. Another independent variable investigated is the number of past bond issuances and the effect it has on bond spreads. They find that past issuances can lead to a reduction in spreads during the crisis, while in normal times this effect is not significantly different from zero. These findings suggest that previous experience with the bond market as well as an already established network among investors and underwriters is valuable during times of crisis. Halling et al. additionally find that bond ratings play an important role in the Covid-19 crisis, such that high bond ratings resulted in lower spreads. This effect was still significant in normal times but had a lower economic impact, suggesting that bond ratings had a comparatively higher importance to investors in times of crisis.

Regarding other non-firm-specific determinants of bond spreads, Collin-Dufresne et al. (2001), provide evidence that increases in market interest rates are associated with lower credit spreads. This is in line with previous studies from Longstaff and Schwartz (1995) and Duffee (1998), who also document an inverse relationship between changes in interest rates and credit spreads. Additionally, the findings of Collin-Dufresne et al. (2001) suggest that differences in bond spreads can primarily be explained by changes in the demand and supply dynamics in the bond market, rather than individual firm characteristics. This is an indication that determinants of bond spreads might be decided on an aggregate level instead of a firm-specific one.

3. Hypothesis development

In the following section we define our hypotheses, building on the previous literature with the aim of investigating the impact of the Russia-Ukraine war on the European corporate bond market.

According to Erel et al. (2012) and their hypothesis on macroeconomic conditions and capital raising, both an increase as well as a decrease in bond issuance during the war period could be expected. We however predict the decreasing effect of lower credit supply to outweigh due to the additional effect of high interest rates and stricter monetary policy during the war period.

H1: There is a decrease in the number of bond issuances and bond issuance amount during the war period in contrast to the control period.

Regarding individual bond issuance trends during the war, we predict bonds with a higher rating to be issued more frequently than bonds with lower ratings due to existing theories on anti-cyclical borrowing of investment grade rated issuers.

H2: There is an increase of bonds with investment grade ratings during the war period in contrast to the control period.

As for the impact of the war on credit spreads, we expect two counteracting effects. On the one hand, spreads should increase due to increased macroeconomic uncertainty and risk preferences of investors. On the other hand, the increases in market interest rates during this period should have a negative effect on spreads. Given existing research on previous crises, we predict the uncertainty effect to outweigh and therefore spreads to increase during the war period.

H3: There is an increase in average spread of newly issued bonds during the war period in contrast to the control period.

In line with existing research on the determinants of bond spreads, we expect firm characteristics to explain a considerable part of the variation, albeit decreasing for times of crisis. In the control period, we assume that size, profitability, tangibility, being a dividend payer, having previous experience in the bond market and having a bond rating

above A will have a significant negative impact on spreads while net book leverage and having a historically higher spread will have a positive impact on spreads. In times of crisis, we expect these effects to remain mostly similar, however with a decreasing explanatory power of firm characteristics.

H4: There will be a decrease in the explanatory power with which firm characteristics explain the variability of spreads in the war period in contrast to the control period.

4. Data

The following section describes the sources and data collection for the empirical analysis in our study. First, we define our relevant time frame which spans from the 24th of February 2017 to the 23rd of August 2023. We separate this timeframe into three periods: One "control period", one "Covid-19 period" and one "war period". We define the start of the war period as the 24th of February 2022, which is the date on which Russia officially invaded Ukraine[4]. The end of the war period is the 23rd of August 2023, the latest date with available data at the time of our data collection. Our Covid-19 period begins on March 11th 2020, the date on which the World Health Organization officially declared Covid-19 a pandemic[5], and ends on the 23rd of February 2022, the day before the invasion of Ukraine. The control period spans from the 24th of February 2017 to the 10th of March 2020. We establish a control period to account for the differences in corporate bond issuance behaviour in light of the war in Ukraine, allowing us to differentiate between the Russia-Ukraine war, Covid-19 and non-crisis times. Lastly, we establish a backlog period from the 24th of February 2010 until the beginning of the control period on the 23rd of February 2017 to assess historical issuance metrics for our regression analysis.

4.1. Bond issuance data

For our bond data we collected bond issuances from European companies between February 2010 and August 2023 from the SDC Platinum database. In this sample we excluded bonds issued by financial firms, as their capital structure, regulatory requirements and business model differs significantly from non-financial firms. Furthermore, since we focus on more traditional forms of bonds we exclude covered bonds, convertible bonds, asset-backed bonds, floating-rate bonds and mortgage bonds from our analysis due to their differing premiums and overall structure compared to traditional bonds. This leaves us with an initial data sample of 9,447 observations, spanning from the beginning of the historical period to the end of the war period. The key

[4] Council of European Union (24 February 2022)
[5] World Health Organization (11 March 2020)

data points we collect for each bond issue are name of issuer, coupon rate, maturity date, issue date, currency of origination, issuer nation, amount issued in original currency, industry sector, spread to benchmark (spread to respective treasury rate at issue) and all available ratings for the bond issue from the rating agency Moody's. Next, we gather issuer ratings from S&P Capital IQ and later convert the Moody's ratings to the S&P rating scale. We then exclude all observations that have missing values in one of our key analysis columns, leaving us with 9,004 observations. Additionally, we convert all original currency values to EUR using the currency rate at the time of bond origination, which we retrieve from S&P Capital IQ. We then exclude outliers by winsorizing the top and bottom 1% of our observations based on the amount issued in EUR. This new and finalised dataset leaves us with 4,728 distinct corporate bond issuances for the observation time frame 24th of February 2017 to 23rd of August 2023 as well as another 4,187 observations in the historical period from 24th of February 2010 to 23rd of February 2017. Overall, we collect 2,263 observations for the control period, 1,618 observations for the Covid-19 period and 847 observations for the war period.

4.2. Determinants of bond spreads

To analyse determinants of bond spreads, we investigate the firm-specific characteristics of bond issuers since these factors have been found to impact firms' ability to raise debt. We begin with our initial data sample of 9,447 observations and use the Compustat database to collect balance sheet and income statement items for the individual bond issuers in our dataset. On a quarterly basis we obtain balance sheet data on total assets, current and long-term debt, cash and short-term investments and property plant and equipment (net). From the database we also obtain total sales, EBITDA and EBIT on an annual basis for the issuers. We then match the data in a combined excel file, where each bond issuance is linked to the latest quarterly and annual filing available from the individual issuer, based on the date of the bond issuance.

We begin by excluding all observations that are missing relevant bond data, such as spread to benchmark or amount issued, leaving us with 6,668 observations out of the initial 9,447. Next, we match the firm-specific issuer characteristics data with the existing SDC Platinum output, resulting in 1,426 observations in total. Finally, we winsorize the

top and bottom 1% of our data with regard to the spread to benchmark. This entire process leaves us with a dataset of 602 observations for the control period and 306 observations for the war period. Since we will be running pooled regressions, we combine the control and war period into a merged dataset containing 908 observations.

5. Results and analysis

5.1. Descriptive statistics

5.1.1. Number of issuances and amount issued

We start by investigating the number of bond issuances and the issuance amount over time. As for the number of issues, we observe a total of 4,728 issues in our observation period between February 2017 and August 2023. Of those issues, 847 issues are attributed to the war period, 1,618 to the Covid-19 period and 2,263 to the control period. To investigate any patterns in issuance behaviour, we adjust our analysis for seasonality by taking averages of the war, Covid-19 and control period. Figure 1 illustrates the evolution of the principal amount and the number of bonds issued over time. A notable trend is that the number of newly issued bonds is lower for the war period than for the control or Covid-19 period in almost every month, apart from August and December. Due to the different length of these periods (approximately 18, 24 and 36 months respectively), we focus on the average issues per month to validate if there is indeed a difference in issuance behaviour between the war and other periods, as depicted in Figure 2a. It can be clearly seen that the issues per month in the war period (47.4) are below those in the control (62.3) and in the Covid-19 period (69.0). Furthermore, testing these results for significance, we find that the difference to the war period is significant at the 5% significance level for both the control and Covid-19 period. This shift indicates a decrease in bond issuance frequency during the war in Ukraine, suggesting a cautious market response to the predominant geopolitical instability.

Additionally, we examine the total amount issued in the 18-month period before and after the invasion of Ukraine in Figure 2b, revealing a substantial reduction of total issuance amount during the war period. To complete the picture, we investigate the average and median amount issued in the three periods in Figure 3. Both the average and median amount issued are higher in the Covid-19 and war period compared to the control period. Testing these results for significance indicates that these differences in issuance amount are statistically insignificant at the 5% significance level. These findings suggest that while companies raised comparatively high amounts per bond in the period following

the Russian invasion of Ukraine, the frequency of bond issuances has decreased. This could potentially be an indication that only select firms were able to issue in these turbulent times and that those particular firms had an increased demand for capital, resulting in a lower number of issues but a higher issuance amount per bond. The reduced frequency of issuances in the war period aligns with the "flight to quality" hypothesis by Vayanos (2004), which suggests that investors reduce their exposure to riskier and more volatile assets in times of crisis, resulting in riskier firms having a restricted access to capital and not being able to issue corporate bonds at the same level as previously. In summary, while the observed decrease in frequency of issuances during the war period is in line with our hypothesis H1, the amount issued per bond remains on a higher level than in the control period, albeit statistically insignificant. We therefore cannot confirm our hypothesis H1 of decreasing number of bond issuances and amount issued per bond since we only observe a decrease in frequency and not in amount issued per bond.

In regard to the Covid-19 period, we find that the bond market has been very active during the Covid-19 crisis and even more active than in previous years. Halling et al. (2020) find that in the initial nine weeks of the Covid-19 crisis, the corporate bond market was used to raise more than twice the amount of funds than in a comparable five-month period in previous years. Comparing the issuance in the three months February to April 2022 to the previous years (Figure 4), we find results in line with Halling et al.'s findings. We note that there is a spike in total issuance amount and the number of bonds issued in the three-month period starting February 2020 compared to previous years and that both periods, 2020 and 2021, have higher issuance amount and number of bonds issued than all comparable periods. There is however another interesting finding here regarding the war period. We find that in the period starting February 2022, which encompasses the invasion period and the outbreak of the war in Ukraine, the number of issuances is substantially lower than in all previous comparable periods until 2017. This period thus demonstrates a strong divergence in market behaviour and likely reflects the immediate impact of geopolitical tension on the financial markets. Our findings are also in line with Benmelech and Bergman (2017), who find that the volume of debt issuances in the primary markets declines dramatically in the beginning of a crisis and bond markets become less liquid.

5.1.2. Bonds issued and capital raised by rating

We continue by investigating how the issuance behaviour of firms changed with regards to issuer and bond ratings. We aim to determine whether bond issuers in certain rating categories experienced improved or deteriorated access to the capital markets following the invasion. To assess the relation between rating and bond issuances in the war period, we segment the war timeframe into 18 monthly periods starting February 2022, examining the number of issues and amount issued for each rating class. Our analysis, split between bond rating (Figure 5a) and issuer rating (Figure 5b), reveals strong similarities in their movement between the two rating categories. This correlation simplifies our approach and we therefore focus on bond ratings rather than issuer ratings, due to the more extensive data coverage for bond ratings (4,728 vs 1,254 observations). A key observation is the higher proportion of unrated bonds in terms of number of issues compared to the respective amount issued (50% vs 26%), as can be seen in Figure 5c. This indicates that newly issued bonds during the war period that did not receive a rating had a comparatively lower amount issued than their rated counterparts. With regards to the distribution of ratings, the amount and number of issues show a very similar pattern.

An intriguing pattern occurs at the onset of the war in February 2022, where an exceptionally low value of BBB-rated bonds can be observed, despite these being the most issued bonds over the entire war period. This contradicts previous findings regarding the Covid-19 pandemic, where a very high issuance activity for BBB-rated bonds in the initial months of the crisis was found. We instead find a large part of the issued bonds in the early months of the war to be either above or below BBB, with very few issuances being rated exactly BBB. This is in line with Campbell and Taksler (2003) and Ellul et al. (2011) who suggest that low investment grade issues should decline in times of uncertainty, since institutional investors that are bound by investment constraints are more reluctant to hold those bonds due to the risks of these bonds dropping below investment grade rating.

Further categorising bond ratings into investment grade (IG), high-yield and not rated (NR) (Figure 5c), we uncover distinct trends between periods. The war period saw a substantial reduction in high-yield issues compared to the Covid-19 and control period (7% vs. 21% vs. 18%). This indicates that bond issuances potentially were more difficult

for issuers that issued high-yield bonds, which resulted in a lower percentage of high-yield issues in the war period. Conversely, 67% of bonds issued during the war were rated investment grade, in contrast to 45% in the Covid-19 period and 56% in the control period, which supports our hypothesis H2. This shift highlights the heightened importance of bond ratings in the capital markets during the war, resulting from companies leaning more towards safer, investment grade rated issuances. This is in line with Erel et al. (2012), who find that capital raising for investment grade borrowers is countercyclical, meaning that in times of crisis, a higher fraction of bond issuers is rated investment grade.

In summary, we find that the rating distribution was considerably different in the war period compared to previous periods, with a higher focus on safer, investment grade rated bonds. We also find that in the initial months of the invasion, fewer bonds with BBB rating were issued, which might be due to financial constraints for institutional investors (Campbell and Taksler (2003); Ellul et al. (2011)). This highlights potential fundamental differences of the war in Ukraine in contrast to previous crises, such as Covid-19. The importance of bond ratings during the war will be further investigated in our spread regression in section 5.2, where we establish if high bond ratings had a positive impact on the spread on said bonds.

5.1.3. Bonds issued and capital raised by region

Next, we investigate bond issuance behaviour from a geographical perspective, particularly focusing on how the proximity to Russia influenced issuance patterns during the war. Boungou and Yatié (2022), Assaf et al. (2023), and Karamti and Jeribi (2022), have researched how the geographical proximity to Russia affected the gravity of the consequences of the war. They found that regions closer to Russia tended to be more affected by the war than countries further away. We aim to test this hypothesis by inspecting how the issuance behaviour of companies with a high proximity to Russia has changed.

Since Europe is a fragmented continent, we group the different countries into the four regions, Western, Southern, Eastern and Northern Europe according to the UN definitions for these regions. This categorisation allows us to distil complex regional

dynamics into a clearer picture. We begin by investigating the distribution of observations on a regional basis for each period in Figure 6a and 6b. We can see that with regards to the number of bonds issued, 49% of all bonds in the entire period were issued by companies from Western Europe, 36% by Nordic companies, 8% in Southern Europe and 7% in Eastern Europe. Regarding amount issued, Western Europe has an even stronger market position, with 66% of all the bond issuance amount being issued in Western Europe. An interesting finding is that the bond issuance of companies from Eastern Europe has decreased dramatically in the war period compared to previous periods. In comparison to the control period, the amount issued decreased drastically from 3% to 1% and the number of issues from 8% to 1%.

To inspect if this shift was directly attributable to the invasion of Ukraine, we delve into a monthly breakdown of the 6 months prior and post February 2022, the month of the invasion (Figure 6c and 6d). During this period, we can again see that Western Europe issued the most bonds, both in terms of number and amount issued. A notable outlier is the surge in Nordic bond issuances in July 2022, where 100% of all bonds issued were Nordic bond issues. Upon closer examination, we find that this outlier is attributable to the small sample size in this period (9.0 observations vs 48.2 observations on average) and can thus be considered an anomaly.

When inspecting the bond issuances from the Eastern European region in particular, we can make another notable observation. Eastern European bond issuances have declined dramatically after the invasion from 3% in the months before to 0% in terms of issuance amount and from 6% to 1% in terms of number of bonds issued. This downturn in bond issuances from Eastern Europe not only confirms our observations from Figure 6a and 6b but also suggests that after the invasion of Ukraine, bond issuances from Eastern Europe have come to an almost complete halt.

In conclusion, our analysis confirms the hypothesis of geographical proximity and its influence on the severity of market disruptions during the war. The dramatic downturn in Eastern European bond issuances post-invasion highlights the significant repercussions for firms in close proximity to geopolitical conflicts. These insights underscore the important role of geography as a potential factor that is shaping market responses during times of crisis.

5.1.4. Bonds issued and capital raised by industry

Next, we turn our attention to the relation between the industry affiliation and bond issuances in the context of the Russia-Ukraine war. It has been established that, similar to previous crises, the war had varying effects on different industries. Nerlinger and Utz (2022) were among the first to investigate the impact of industry on financial performance in light of the Russia-Ukraine war and find that the effect of the war on stock price performance not only varies by region but also by industry. They document that energy companies outperformed the overall market post-invasion, suggesting that fundamental differences exist in how different industries reacted to the crisis. To investigate if these effects persist in bond issuance behaviour and capital market access, we investigate our sample with regard to industry classification.

Our analysis begins with an industry breakdown of our sample, aiming to assess the importance of the corporate bond market for the 11 individual industries in our sample. Table 1 and Figure 7a show the distribution of industries in the control period, revealing that the largest sector in our sample is real estate (23%), followed by energy and power (17%) and industrials (17%). These three sectors make up more than half of all observations in the full sample. However, when inspecting the war period exclusively, the distribution of industries in our sample changes. As can be seen in Table 2 and Figure 7b, the energy and power sector is now the most prevalent sector with (27%), surpassing real estate (17%) and industrials (17%).

Given Russia's key role as a major global exporter of fossil fuels and the European dependency on Russian exports of oil and gas[6], we investigate next if this relative increase in bond issuances in the European energy and power sector is driven by Russian firms. A comparison of the number of issuances from Russian companies between the control and war period (Table 3a and 3b), shows a drastic decrease of bond issuances from firms in the energy and power sector, with 27 issuances in the control period and only 1 issuance in the entire war period. However, this decrease in bond issuances in the energy and power sector (96%) is in line with the overall decrease of bond issuances from Russian companies post-invasion (97%). We can therefore conclude two things: First, the relative increase in European bond issuances in the energy and power sector is not driven by an

[6] European Commission: 15.9% of EU oil imports were supplied by Russia (25 September 2023)

increase in bonds by Russian companies and second, that the decrease in the bond issuances by Russian energy and power companies is in line with the overall decrease of bond issuances by Russian companies.

Due to the strong Russian presence in the European energy and power sector as well as Russia's involvement in the war in Ukraine, investigating the access of the energy and power sector to the corporate bond market is of particular interest for this study. For this, we will further analyse the relation between affiliation with the energy and power sector and bond spreads in our spread analysis. This involves using a dummy variable to determine if companies in the energy and power had significantly different bond spreads than firms in other industries and how these dynamics evolved between the control and war period.

5.1.5. Bonds issued and capital raised by currency

In this section, we dissect our sample with regards to the currency of issue, examining both the number of issues and amount issued. This allows us to investigate if certain currencies were impacted more by the Russia-Ukraine war than others, similar to the geographical proximity approach (section 5.1.3). We begin by analysing the currency distribution over the war period as depicted in Figure 9. Our findings show a strong preference for the Euro, with 75% of issuance amount and 52% of bonds being issued in Euro during the war period. With regards to issuance amount, the Euro is followed by the US Dollar, the British Pound and the Swiss Franc while in terms of number of bonds, the Euro is followed by the British Pound, Swedish Krona and Swiss Franc. When comparing the amount issued to the number of issuances per currency, we find that there is a substantially lower percentage of Euro denominated bonds when it comes to the number of issues. This suggests that the Euro denominated bonds had, on average, a higher issuance amount than bonds in other currencies, such as SEK denominated bonds.

To further inspect how the issuer preferences changed with regard to currencies post-invasion, we inspect the 6 months before and after February 2022 (Figure 10). We observe that the amount issued in Russian Rubles and the number of Ruble-denominated issues decreased drastically right before the invasion in February 2022. With regard to the amount issued, we can see that Ruble-denominated bonds decreased from between

1% and 4% of bond amounts to 0% for the first 6 months after the Russian invasion. This effect is even more pronounced with regard to the number of issues, where the number of Ruble-denominated bonds made up between 3% and 17% of all bonds issued in the months before the invasion and then dropped to zero for the first 6 months after the invasion. Costantini and Sousa (2022) offer a possible explanation, suggesting that in times of uncertainty, investors gravitate towards safer assets. In accordance with their findings, it is logical that investors would reduce their exposure to Russian Rubles while investing in other, more stable currencies. Therefore, Russian companies, traditionally issuing their bonds in Rubles, might have had a difficult time accessing the corporate bond market post-invasion. This is in line with our country analysis in 5.1.3, where we find that Eastern European companies have decreased their bond issuances drastically following the invasion of Ukraine.

In summary, our analysis reveals a notable shift away from Ruble-denominated bonds following the Russian invasion. This trend highlights the influence of geopolitical instability on currency preferences in the corporate bond market as investors seek exposure to more stable and safer currencies.

5.1.6. Bonds issued and capital raised by maturity and coupon

In the final section of the descriptive analysis, we dissect our sample with regards to maturity and coupon rate, aiming to explain any potential changes of coupon rates and maturity during the war period in comparison to the Covid-19 and control period. Our ambition is also to provide possible reasons for these potential changes and their implications for the corporate bond market.

We begin by examining the different average coupon rates (Figure 11a). Notably, the average coupon in the war period is the highest of the three periods at 3.87%, while both the Covid-19 and control period have considerably lower coupons at 2.46% and 2.75%. When we run a t-test on these differences, we find that they are statistically significant at the 1% significance level. To further analyse this, we limit our sample only to the companies that have issued bonds during the war period. Only inspecting this limited sample portrays the differences even stronger, with the coupon rate for the control and Covid-19 period now being 1.44% and 1.63% in contrast to 3.87% in the war period.

This suggests firms issuing bonds in the war period had to issue bonds at much higher coupons than previously. The fact that this difference becomes more pronounced when limiting the sample to companies that issued during the war could potentially be explained by firms with higher average coupon rates before the invasion refraining from issuing bonds during the war. A plausible explanation for this shift might be found in the deteriorated funding conditions on the corporate bond market.

To investigate this further, we look at the changes of coupon rates over time. For this, we split the period into quarterly intervals and calculate the average coupon for each of these periods as well as each corresponding period in the control timeframe. The results can be seen in Figure 12. We find that for most of the war period, the coupon rate during the war period is higher than the coupon rate in the same months in the control period. Additionally, we find that the coupon rate is increasing from period to period in the war timeframe. This gradual increase in coupon rates can be linked to changes in the interest rates starting in July 2022, where central banks across Europe started increasing their lending and deposit rates. Most notably, the ECB increased its deposit and marginal lending facility in July 2022 for the first time in 11 years[7]. As the central banks rates rose across Europe, corporate bond yields had to increase as well. Naturally, this required firms seeking to issue bonds to do so at a higher coupon rate, providing investors with a higher yield than before.

Turning to bond maturities, Figure 11b displays the average maturities for the control, Covid-19 and war period. The war period shows a decrease in maturity (7.4 years) compared to the control (8.4 years) or Covid-19 period (8.3 years), with statistical significance at the 1% level. If we limit our analysis in a similar way to the coupon analysis and only investigate the companies that have issued bonds in the war period, the picture becomes more pronounced. We now find that the maturity for the control period is 8.8 years and the maturity for the Covid-19 period is 9.0 years. Putting this into context with the maturity in the war period which again was 7.4 years, we find that the average maturity in the war period was substantially lower.

[7] European Central Bank: Key ECB interest rates (December 2023)

To further analyse the changes in maturity over time, we investigate the quarterly intervals in the war period. Figure 13 shows that the maturity in every interval in the war period is lower than the respective interval in the control period as well as the benchmarks. This trend towards shorter maturities is in line with Erel et al. (2012) who find that during times of crisis, newly issued bonds shift towards shorter maturity and higher seniority. This is attributed to investor preference for relatively safe securities with lower information-sensitivity and therefore, firms tend to primarily issue securities with shorter maturities in times of crises.

In summary, our findings suggest that bonds issued in the war period had a significantly higher average coupon than the bonds issued in the control or Covid-19 period. We suspect that this increase in coupon rates is at least partially driven by the stricter monetary policy and the subsequent increase in market interest rates. For bond maturities, we find that the average maturity in the war period is shorter than all comparable benchmarks, which is mainly driven by the investor demand for less information-sensitive securities in times of heightened uncertainty.

5.1.7. Intermediate summary of descriptive results

Our initial analysis of the European corporate bond market during the Russia-Ukraine war uncovers a variety of interesting insights. As for the total amount issued through corporate bonds, we find a distinct decrease in the overall issuance amount during the war. Additionally, the frequency of bond issuances decreased substantially while the capital raised per bond remained on a relatively similar level to previous periods. This could imply that only select firms could issue bonds in these uncertain times, and potentially riskier firms had restricted access to the capital markets.

When inspecting issuer and bond ratings, we note a strong increase in newly issued investment grade bonds during the war in Ukraine. This observation indicates a shift in investor preference towards safer and higher-rated bonds. It shows a fundamental change with regard to the Covid-19 or control period, which had significantly less newly issued investment grade bonds and substantially more high-yield issuances. This trend underscores the uniqueness of different crises, especially with regard to investor preferences and market dynamics.

On a geographical level, the proximity to the outbreak countries Russia and Ukraine emerged as a significant factor for the corporate bond market. Eastern European companies in particular experienced a drastic reduction in bond issuances, both in terms of number of bonds and issuance amount. This confirmed the hypothesis that geographical proximity to zones of conflict severely impacts capital market activity. This is in line with our findings regarding issue currency, where we establish that Ruble-denominated bonds decline drastically following the invasion. This shift is in line with established theories of "safe haven" currencies and illustrates how geopolitical conflicts influence currency preferences in bond issuances.

With regard to the industries of firms issuing bonds during the war, we observe a relative increase in firms in the energy and power industry in response to the war. Since Russia is one of the world's largest exporters of oil and gas and the European energy sector is closely tied to Russia's exports, we investigate if this shift in industries is related to Russian issuances during the war. We however find that this trend is not driven by a change in the industry composition of bonds issued by Russian companies.

Lastly, we inspect coupon rates and maturities, finding higher average coupons and shorter maturities during the war. We attribute these changes to the tightening of monetary policy by the central banks in Europe and a shift in investor demand towards less information-sensitive securities. These findings reflect a broader market adjustment to the increased risk and uncertainty caused by the war in Ukraine and highlights the complex interaction of monetary policy, investor behaviour and geopolitical events.

5.2. Determinants of bond spreads

In this section, we aim to investigate the determinants of bond spreads in the control and war period and investigate if these changed between periods. We initiate our analysis by establishing independent variables, as presented in Table 4, following the methodology of Halling et al. (2020). When inspecting all observations with available spread data, we find that the average spread in the control period is 175 basis points while the average spread in the war period is 157; the spread difference between the control and war period is significant at the 2% level. This finding suggests that our H3 hypothesis of increasing spreads during the war period should be rejected. However, if we investigate a sample

where we filter out all observations without issuer data, such as balance sheet or income statement data, the spread in the filtered control period is 142 basis points and the spread in the filtered war period is 136 basis points. The difference in spreads shrinks from 18 basis points to 6 basis points and is also not significant anymore at the 5% significance level. Lastly, filtering the control dataset to only contain companies that have issued in the war period presents us with an interesting result. In this case, the spread for the filtered control period is 108 basis points in contrast to the 136 basis points in the war period. This difference in bond spreads is significant again at the 1% level. This suggests that for the companies that issued during both the control and war period, the spread to benchmark increased between the two periods. Additionally, since the average spread of all observations decreased between periods, we find that companies that have not issued in the war period had higher spreads previously. Therefore, it could potentially be the case that companies that previously had higher spreads and therefore higher risk premia, issued less bonds in the crisis period following the invasion of Ukraine. This is in line with our findings from section 5.2, where we determined that the percentage of newly issued high-yield bonds has been significantly lower in the war period than in the control period. We therefore suspect that during the war period, the newly issued bonds had on average a lower risk profile than during the control period. This pre-selection of issuers would indicate that primarily issuers with comparatively lower spreads and higher bond ratings issued bonds on the capital markets during this period.

Our graphical presentation in Figure 14 illustrates these findings further. We find that the spreads in the war period are generally lower than in the control or Covid-19 period, with the exception of the November period. We also find that the average spread in the entire war period is lower than in the control period, which in turn is lower than in the Covid-19 period. Interestingly, we also find that the spread in the initial period of the war starting February 2022 has the largest difference to the control period and is substantially lower than the spread in the respective control period. This aligns with our hypothesis that at the onset of the war, predominantly lower-risk issuers issued bonds, resulting in a lower average risk profile and lower average spread during this period. This phenomenon of pre-selection among issuers seems to have led to the decrease in average spreads in the initial months of the war.

5.2.1. Separate war and control model

In our initial analysis of the determinants of bond spreads, we investigate the spreads that firms had to pay during the Russia-Ukraine war using a panel data regression model with year and region fixed effects. We show the explanatory variables used for this with their respective statistics over the entire observation period in Table 5. To run our regressions, we split our dataset into control, Covid-19 and war periods and run our regression models on the control and war dataset separately. We exclude Covid-19 since it is not the focus of this study and including it in the control period would compromise the control window's purpose as a non-crisis period. We account for any changes between years by including time dummies and control for any geographical changes using region dummies. Our regression models, inspired by Halling et al. (2020), look as follows:

$$
\begin{aligned}
Model\ 1\colon\ & Spread\ to\ Benchmark_{i,t} \\
&= \beta_0 + \beta_1 size_{i,t} + \beta_2 tangibility_{i,t} + \beta_3 profitability_{i,t} \\
&+ \beta_4 netbookleverage_{i,t} + \beta_5 Div\_Dummy_{i,t} \\
&+ \beta_6 Energy\_Dummy_{i,t} + \epsilon_{i,t}
\end{aligned}
$$

$$
\begin{aligned}
Model\ 2\colon\ & Spread\ to\ Benchmark_{i,t} \\
&= \beta_0 + \beta_1 size_{i,t} + \beta_2 tangibility_{i,t} + \beta_3 profitability_{i,t} \\
&+ \beta_4 netbookleverage_{i,t} + \beta_5 Div\_Dummy_{i,t} \\
&+ \beta_6 Energy\_Dummy_{i,t} + \beta_7 hist\_issues_{i,t} \\
&+ \beta_8 hist\_spread\_avg_{i,t} + \epsilon_{i,t}
\end{aligned}
$$

$$
\begin{aligned}
Model\ 3\colon\ & Spread\ to\ Benchmark_{i,t} \\
&= \beta_0 + \beta_1 size_{i,t} + \beta_2 tangibility_{i,t} + \beta_3 profitability_{i,t} \\
&+ \beta_4 netbookleverage_{i,t} + \beta_5 Div\_Dummy_{i,t} \\
&+ \beta_6 Energy\_Dummy_{i,t} + \beta_7 hist\_issues_{i,t} \\
&+ \beta_8 hist\_spread\_avg_{i,t} + \beta_9 Rating\_Dummy_{i,t} + \epsilon_{i,t}
\end{aligned}
$$

The first regression inspects firm characteristics as explanatory variables for bond spreads, such as size, tangibility, probability, net book leverage, dividend status and an energy sector dummy that is 1 if the firm is in the energy and power sector and 0 otherwise. The second adds information about historical issues as independent variables, in particular the number of historical issues of that specific bond issuer and the average

spread of said issues. The historical period hereby references the period 2010-2017. In the third and final regression, we add a rating dummy that is 1 if the bond rating is above an A rating and 0 otherwise to identify if high bond ratings had a significant impact on spreads.

Table 6 presents our regression results. First investigating the adjusted R2 in our first model, we find that firm characteristics explain bond spreads at issuance better in the control period than in the war period since the adjusted R2 in the war period (0.134) is less than half of that in the control period (0.305). This pattern, which is consistent across all models, is in line with the findings of Halling et al. (2020) and suggests that bond spreads in war times are better explained by other factors than firm characteristics. It also aligns with our hypothesis H4, namely that the explanatory power of firm characteristics is lower in the war period than in the control period. Collin-Dufresne et al. (2001) investigate this as well and find that there is a single unobservable common factor that determines bond spreads to a large extent. However, they are not able to determine the set of variables that characterises this factor and conclude that bond spreads are mainly driven by the supply and demand shocks in the corporate bond market in contrast to firm characteristics. This is one possible explanation for the relatively low explanatory power we find with regards to firm characteristics.

With respect to the regression coefficients, the war and control periods exhibit similar signs. In the control period, size, profitability, the dividend dummy and the energy sector dummy all negatively influence bond spreads, whereas tangibility and net book leverage all exhibit positive effects. Additionally, all variables are significant in explaining credit spreads in normal times. With regards to economic intuition, the fact that size, profitability and the dividend dummy decrease bond spreads makes sense since a higher revenue, higher EBITDA to assets ratio and the ability to pay a consistent dividend are signs of superior financial health. Especially interesting is that the profitability variable has the highest impact on bond spreads in both the control and war period. With a coefficient of -646.0 in the control period, a one-unit higher profitability of a given company resulted in a 6.46% lower spread for the bonds issued by said company, implying that high profitability results in investors accepting lower yields for corporate bonds. The negative sign of the energy sector dummy on the other hand implies

that firms in the energy and power industry have a lower spread than other industries, which is reasonable since the energy industry does traditionally have stable cash flows and is generally perceived as a comparatively safe and secure industry. The positive sign on net book leverage implies that higher leverage and lower cash reserves increase bond spreads, which is reasonable since higher leverage can be a sign of increased credit risk and investors need to be compensated for taking on such risk. Lastly, the observed positive sign on tangibility is an intriguing anomaly since a higher degree of tangible assets should in theory be a sign of an overall secure balance sheet and large amounts of collateral in case of debt overhang. Our findings therefore contradict previous research on this topic. We believe one potential explanation for the divergence from existing research can be attributed to the unique composition and certain industry-specific characteristics of our data sample. Notably, our dataset includes a number of industries where high tangibility is associated with higher credit spreads, such as the materials and retail sector. Other industries, such as high technology, exhibit a low percentage of tangible assets in combination with low spreads. Such industry-specific dynamics in our sample could offer a potential explanation for the atypical positive association between tangibility and bond spreads.

When comparing this to the war period, the significance with which firm characteristics explain credit spreads shifts. Only tangibility and the dividend dummy remain significant[8], whereas net book leverage is not significant anymore and switches from a positive sign to a negative one, implying that higher leverage decreases bond spreads in the crisis. A potential explanation could be that higher leverage can result from taking on debt before the war in Ukraine broke out. This could be a good sign, if these companies used their access to the comparatively cheap financing before the interest rate hikes by the central banks and improved their financial situation prior to the Ukraine crisis. However, since the coefficient on net book leverage is not significant, we cannot reach a certain conclusion from this. With regard to the significant variables, the economic intuition for the negative impact of profitability and paying dividends on credit spreads remains the same. The relative importance of profitability however changes

[8] While profitability remains significant at the 10% significance level, we do not consider this sufficient to be statistically significant

drastically since the coefficient on profitability in the war model is now -127.0 instead of the -646.0 in the control period. This indicates that profitability had a more distinct impact on credit spreads in normal times than during the war, such that a one unit increase in profitability decreases spreads by 1.27% in the war period on average. The positive sign of tangibility in the war period can now be interpreted as companies with a lot of fixed assets such as property, real estate and physical equipment having higher risk in times of war. This intuitively makes sense, since firms that have a lot of fixed assets are more susceptible to the destruction of physical capital and are generally perceived as less flexible in times of crisis (Nordhaus, 2002).

Next, we include the information on past issuance activity in the second set of regressions. We find that adding the number of past issuances by that same issuer in the timeframe 2010-2017 and the average historical spread of past issues to our existing model increases the adjusted R2 in normal times from 0.305 to 0.395, thereby improving the explanatory power of the model. Both variables are significant, with historical issues having a negative sign while average historical spread has a positive sign. This is reasonable, since the number of historical issues signals experience and reputation in the bond market and could be an indication of an existing network of investors and relationships which could help firms issue bonds with lower spreads. A high historical spread however could be a sign of more risky debt issuances in the past and therefore increase the current credit spread. While the signs remain the same for the war period, the adjusted R2 only increases slightly, from 0.134 to 0.149. Additionally, in the war period, the number of past issues is not significant, implying that previous experience in issuing bonds did not impact bond spreads during the Russia-Ukraine crisis. This is relatively surprising, since especially in times of crisis, past experience in the bond market should intuitively be valued more than in normal, more predictable times. This finding is in direct contradiction to Halling et al.'s (2020) findings, who determine that the number of historical issues influenced bond spreads during the Covid-19 crisis but not during normal times.

Finally, the rating dummy which indicates if a bond had a rating above A, is significant in both the control and war model, albeit with varying importance. Adding the rating dummy increases the R2 of the war model from 0.149 to 0.179 while it does not

increase the explanatory power in the control model. In the control period, the coefficient on the rating dummy is -19.2, implying that bonds with a better credit rating had on average a 19.2 bps lower spread than their worse rated counterparts. In the war period however, the coefficient on the rating dummy is more than twice as high at -43.4, implying that the effect of high credit ratings on bond spreads was more pronounced during the war.

In summary, our analysis reveals that firm-specific characteristics have a diminishing importance in explaining bond spreads during periods of geopolitical unrest such as the Russia-Ukraine war, aligning with our expectations outlined in the H4 hypothesis.

5.2.2. Pooled model with dummies

In our subsequent analysis, we employ a pooled dataset for a panel regression with region fixed effects by pooling the control and war period into one dataset. This approach, incorporating a war dummy (WD) and making it interact with our dependent variables, aims to investigate the impact of the war on bond spreads in-depth. The purpose of this section is to employ a more robust modelling approach to provide additional comprehensive analysis of the factors influencing bond spreads during the specified periods. Furthermore, pooling the data allows us to get more precise estimators and test statistics with more power, thereby better determining the direct effect that the war had on bond spreads. The summary of our variables across the pooled dataset can be found in Table 5b, the regressions are designed as follows:

$$
\begin{aligned}
Pooled\ Model\ 1{:}\ Spread\ to\ Benchmark_{i,t} \\
&= \beta_0 + \beta_1\, size_{i,t} + \beta_2\, size_{i,t} * WD_{i,t} + \beta_3 tangibility_{i,t} \\
&+ \beta_4 tangibility_{i,t} * WD_{i,t} + \beta_5 profitability_{i,t} + \beta_6 profitability_{i,t} \\
&* WD_{i,t} + \beta_7 netbookleverage_{i,t} + \beta_8 netbookleverage_{i,t} * WD_{i,t} \\
&+ \beta_9 Div\_Dummy_{i,t} + \beta_{10} Div\_Dummy_{i,t} * WD_{i,t} \\
&+ \beta_{11} Energy\_Dummy_{i,t} + \beta_{12} Energy\_Dummy_{i,t} * WD_{i,t} + \epsilon_{i,t}
\end{aligned}
$$

$$Pooled\ Model\ 2\colon\ Spread\ to\ Benchmark_{i,t}$$
$$= \beta_0 + \beta_1\, size_{i,t} + \beta_2\, size_{i,t} * WD_{i,t} + \beta_3 tangibility_{i,t}$$
$$+ \beta_4 tangibility_{i,t} * WD_{i,t} + \beta_5 profitability_{i,t} + \beta_6 profitability_{i,t}$$
$$* WD_{i,t} + \beta_7 netbookleverage_{i,t} + \beta_8 netbookleverage_{i,t} * WD_{i,t}$$
$$+ \beta_9 Div\_Dummy_{i,t} + \beta_{10} Div\_Dummy_{i,t} * WD_{i,t}$$
$$+ \beta_{11} Energy\_Dummy_{i,t} + \beta_{12} Energy\_Dummy_{i,t} * WD_{i,t}$$
$$+ \beta_{13} hist\_issues_{i,t} + \beta_{14} hist\_issues_{i,t} * WD_{i,t}$$
$$+ \beta_{15} hist\_spread\_avg_{i,t} + \beta_{16} hist\_spread\_avg_{i,t} * WD_{i,t} + \epsilon_{i,t}$$

$$Pooled\ Model\ 3\colon\ Spread\ to\ Benchmark_{i,t}$$
$$= \beta_0 + \beta_1\, size_{i,t} + \beta_2\, size_{i,t} * WD_{i,t} + \beta_3 tangibility_{i,t}$$
$$+ \beta_4 tangibility_{i,t} * WD_{i,t} + \beta_5 profitability_{i,t} + \beta_6 profitability_{i,t}$$
$$* WD_{i,t} + \beta_7 netbookleverage_{i,t} + \beta_8 netbookleverage_{i,t} * WD_{i,t}$$
$$+ \beta_9 Div\_Dummy_{i,t} + \beta_{10} Div\_Dummy_{i,t} * WD_{i,t}$$
$$+ \beta_{11} Energy\_Dummy_{i,t} + \beta_{12} Energy\_Dummy_{i,t} * WD_{i,t}$$
$$+ \beta_{13} hist\_issues_{i,t} + \beta_{14} hist\_issues_{i,t} * WD_{i,t}$$
$$+ \beta_{15} hist\_spread\_avg_{i,t} + \beta_{16} hist\_spread\_avg_{i,t} * WD_{i,t}$$
$$+ \beta_{17} Rating\_Dummy_{i,t} + \beta_{18} Rating\_Dummy_{i,t} * WD_{i,t} + \epsilon_{i,t}$$

The results, detailed in Table 7 show that the war dummy variable has a negative sign across all three models and is highly significant. In the first regression, the regression coefficient is -168.0, implying that if a company issued a bond in the war period, the spread of said bond was on average 1.68% lower than in the normal period. At first glance this is a surprising finding, since bond spreads are closely related to the overall riskiness of the bond. In times of crisis, one would intuitively expect the bond spreads to rise and not decrease, symbolising the increased default risk and higher uncertainty in the bond market. This interpretation, however, is based on the assumption that the market interest rates were essentially fixed at 0%. As of 2023, the continuous increase in market interest rates by central banks across Europe violates this assumption and therefore fundamentally changes the interpretation of credit spreads in the war period. Previously, credit spreads were effectively only dependent on the yield, which is in turn defined by the price of the

bond and the continuous cash flow paid by the bond. Ever since the market interest rates have started to change, the now varying benchmark rate has to be factored into the equation and creates another layer of analysis. Since we are only controlling time fixed effects based on the year and not on a continuous scale, these unobservable time effects on bond spreads are only filtered out partially by the yearly fixed effect model, which could in turn lead to the significant negative coefficient on the war dummy.

As for the other coefficients in our model, they portray a very similar picture to the original model. Starting with the isolated firm characteristics, we find that all variables on their own are significant, with the same signs as in our previous regressions: size, profitability, the dividend dummy and the energy sector dummy all had negative signs whereas tangibility and net book leverage had positive signs. Notable however are the interaction terms, where only size (+), profitability (+), net book leverage (-) and the energy sector dummy (+) are significant. This suggests that for size, profitability and the energy sector dummy, the relative importance of those factors has decreased in the war period. Taking the example of the size factor, we can see that the negative effect on the isolated size variable (-16.7) is higher than the positive coefficient on the interaction term of size and the war dummy (+12.6). This means that the overall effect of size on spreads in the war period is still negative, albeit to a lower degree than in the control period. This holds for size, profitability and the energy sector dummy. Net book leverage however is particularly interesting, since the positive coefficient on the isolated variable (+84.2) is lower than the negative coefficient on the interaction term of net book leverage with the war dummy (-97.6). This results in a switch in the sign of the net book leverage coefficient from the control to the war period and suggests that in the war period, net book leverage actually decreases spreads instead of increasing them. This can be interpreted as a one unit increase in net book leverage resulting in a 13.4 bps decrease in credit spreads in the war period. This is in line with our analysis from the previous model.

Adding data on historical issues to the regression model, we find that the effects of number of historical issues and historical average spread stay consistent with the previous model. However, the interaction term of historical average spread is not significant, indicating that the effect of the historical average spread is similar between periods. We find the same patterns as above, such that the signs of the total effects stay the same

between control and war period, but the relative impact of the variables on bond spreads decrease. Lastly, adding the rating dummy to our model, we can see that the negative impact of a high rating on spreads persists in the normal model (-18.3). In the war period, this effect even increases in relative importance, however the interaction term of the rating dummy and the war dummy is not statistically significant anymore. This model therefore predicts that, independent of the period, a bond with a rating of A and above should have an 18.3 bps lower spread.

In one final step, we aim to investigate the time fixed effects in our model more extensively. Previously, we have established that one potential shortfall of our existing model might be that we only control for time fixed effects on a yearly basis and not on a more frequent basis. In light of the continuous treasury rate changes throughout the year by the central banks in Europe, this could imply that our year fixed effects do not capture the full extent of these interest rate changes and that there could be an unobserved factor that affects our dependent variable in the form of treasury rate changes throughout the year. We therefore replace the time fixed effects on a yearly basis with more granular fixed effects on a daily basis. Running this model for the control (Table 8) and war period (Table 9), we find that the sign on the coefficients between the daily fixed effect model and the yearly fixed effect model remain almost exclusively the same, while the absolute size and significance of the coefficients change. The most interesting component however is the adjusted R2 of the regressions. When using fixed effects on a daily basis, the adjusted R2 in the control period increases from between 0.305 and 0.395 to 0.523 and 0.581, indicating that the model with daily fixed effects explains the variance in the spreads significantly better than the yearly fixed effect model. This effect is amplified for the war period where the adjusted R2 increases from between 0.134 and 0.179 in the initial model to 0.515 and 0.541 in the daily fixed effect model. These findings indicate that a significant part of the variability in spreads could be caused by unobserved time fixed effects. This is in line with Collin-Dufresne et al. (2001) who established that spreads are mostly dependent on unobservable changes in the market supply and demand of bonds. A potential reason as to why this effect is stronger for the war period than for the control period could be that the changes in treasury rates in Europe have added additional variability and amplified the already dominant effect of supply and demand shocks in the corporate bond market.

In summary, our pooled regression analysis reveals nuanced insights into the factors influencing bond spreads. The unique market conditions in the war period, in particular the changes in market interest rates, appear to significantly impact bond spreads and underscore the dynamic nature of the corporate bond market during periods of crisis.

6. Conclusion

This paper investigates firms' access to the corporate bond market during the Russia-Ukraine war. We find that the overall number of issuances and total issuance amount in the war period declined substantially in comparison to the previous periods, highlighting a potential liquidity shortage in the corporate bond market at this time. Additionally, Russian and Ruble-denominated bonds showed a strong decline following the invasion, which intuitively makes sense with regard to the international sanctions against Russia and the overall impact of the war on the Russian economy.

With regard to bond characteristics, our findings suggest that predominantly bonds with high ratings, i.e. lower credit risk, were issued in the war period and conversely, riskier high-yield bonds were issued less. This trend indicates an investor preference for more secure and stable investments amid heightened insecurity in the capital markets. In line with these findings, our results suggest that the issuers that issued during the war period had better risk profiles, which is demonstrated by the, on average, lower spread that these companies had before the outbreak of the war. For the companies that issued during both the war period and the control period, we also find that the perceived risk potentially increased, demonstrated by the increase in spreads between periods for these companies. This is noteworthy, since the increase in market interest rates across Europe potentially had a negative influence on spreads during the war period. This counteracting effect of increasing market interest rates diminishes the increase in credit spreads and suggests that the true effect of investor's risk perception on credit spreads could be underestimated in our analysis. Additionally, we suggest that the increase in market interest rates also led to new issues having even higher coupons on average, and the heightened uncertainty in the capital markets post-invasion resulted in these issues exhibiting shorter maturities.

Our analysis also delves into the determinants of bond spreads. We find that while firm characteristics explore bond spreads comparatively well during normal times, this effect is reduced in crisis times. Among the few characteristics that remain significant during the war period, profitability emerges as particularly influential across models,

highlighting the market's increased sensitivity to a company's financial health during these periods of increased instability.

Finally, we also identify significant variability in bond spreads attributable to unobservable time fixed effects. We find that the explanatory power of these effects is stronger in the war period than in the control period, hinting at the fact that changes in bond spreads are more accurately determined by factors other than firm characteristics during times of crisis.

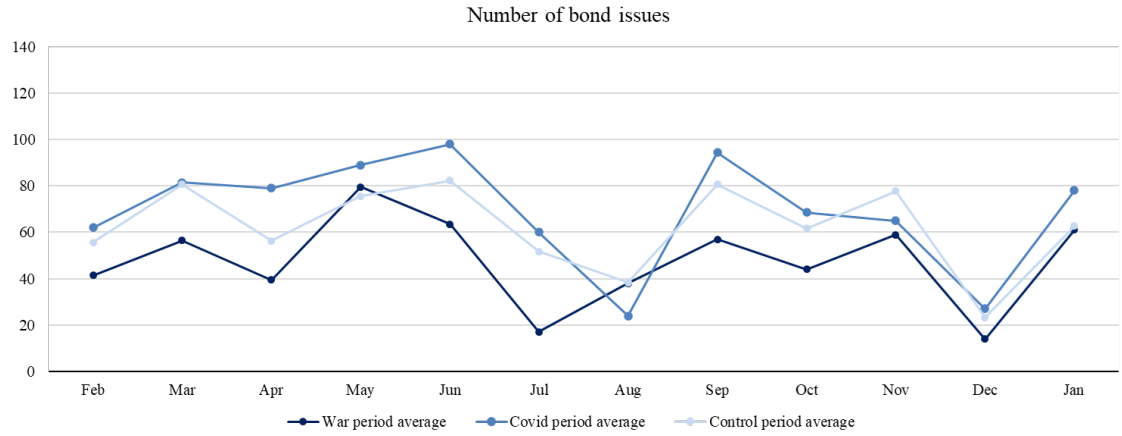
As a last remark, we suggest that future research could focus on investigating the dynamic nature of the conflict, in particular the long-term implications of the war and how its impact evolves over time. Another interesting topic to investigate further is the role of the monetary policy in these uncertain times and what specific implications the interest rate environment has on the determinants of bond spreads. In summary, our paper provides valuable insights into the behaviour of the corporate bond market during the ongoing war in Ukraine and highlights certain shifts and trends during these turbulent times. Our findings therefore contribute to existing literature in exploring the bond market dynamics during periods of geopolitical unrest.

7. Figures and tables

7.1. Figures

Figure 1: Bond issuance

The figures below show average bond issuances per month across the three periods, where control period refers to the timeframe 24.02.17-10.03.20, Covid-19 period refers to 11.03.20-23.02.22 and war period refers to 24.02.22-23.08.23 (for period descriptions see section 4). The analysis is based on the number of bonds (top figure) and the total amount issued (bottom figure).



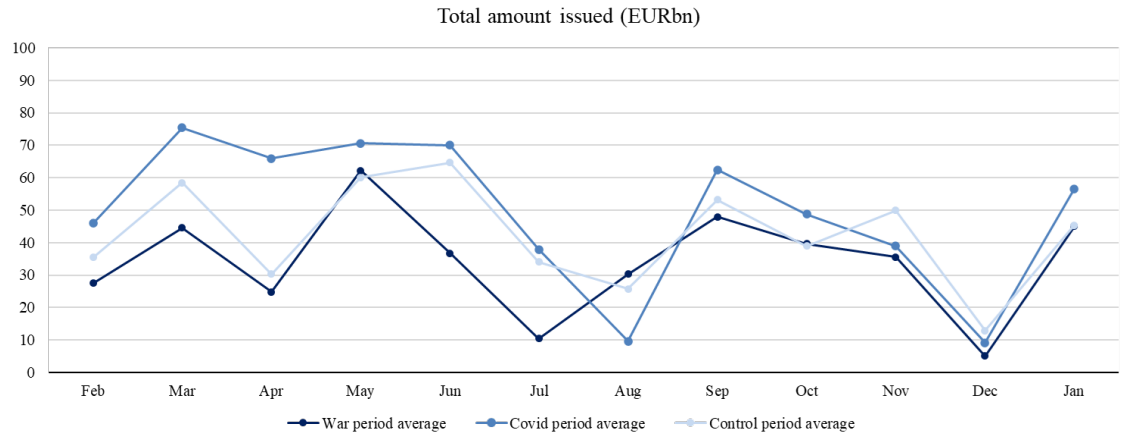


Figure 2a: Average number of issues per month

The figure below displays the average number of bond issuances for the three observation periods (for period descriptions see section 4). We also include standard deviation in bars.

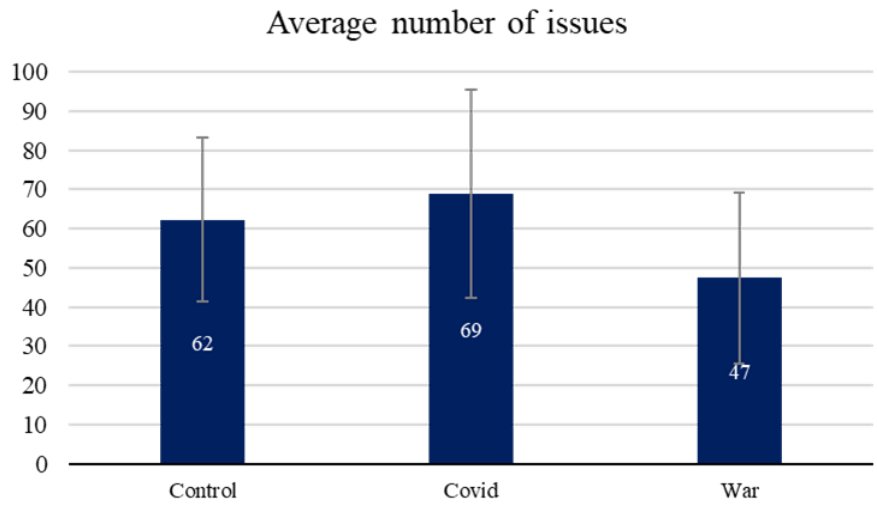


Figure 2b: Total amount issued

This figure shows the total amount issued during the war period (for period descriptions see section 4), spanning 18 months, and compares this to the previous 18 month period.

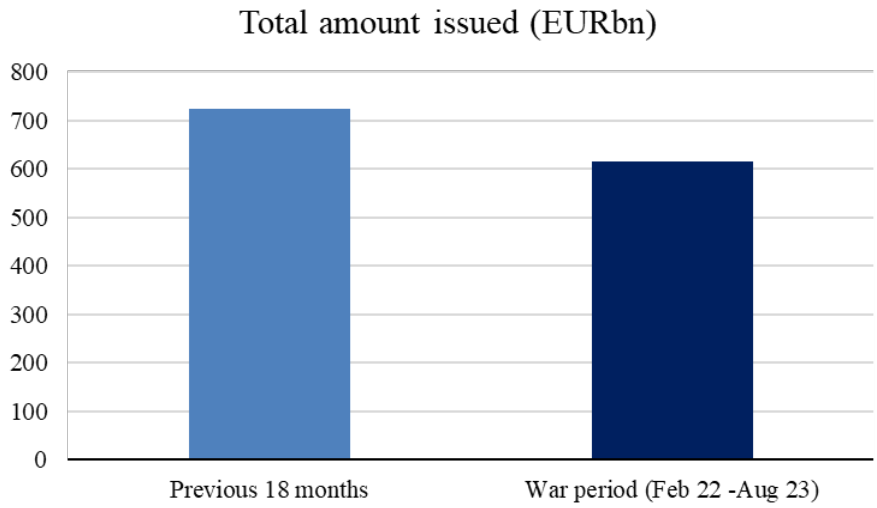


Figure 3: Amount issued per bond

This figure illustrates the average and median amount issued per bond for the three observation periods (for period descriptions see section 4).

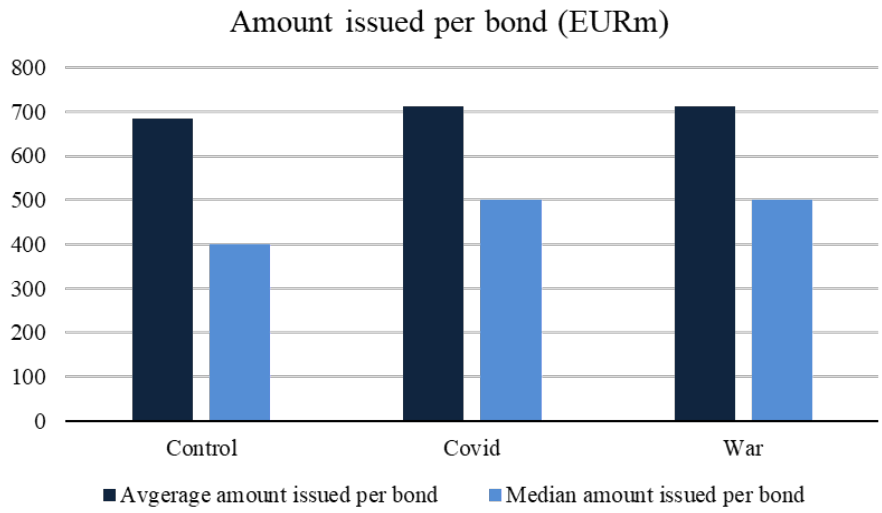


Figure 4: Bond issuance per three month period

This figure shows the total amount issued (top figure) and the total number of issuances (bottom figure) for predefined three month periods starting in February of each year.

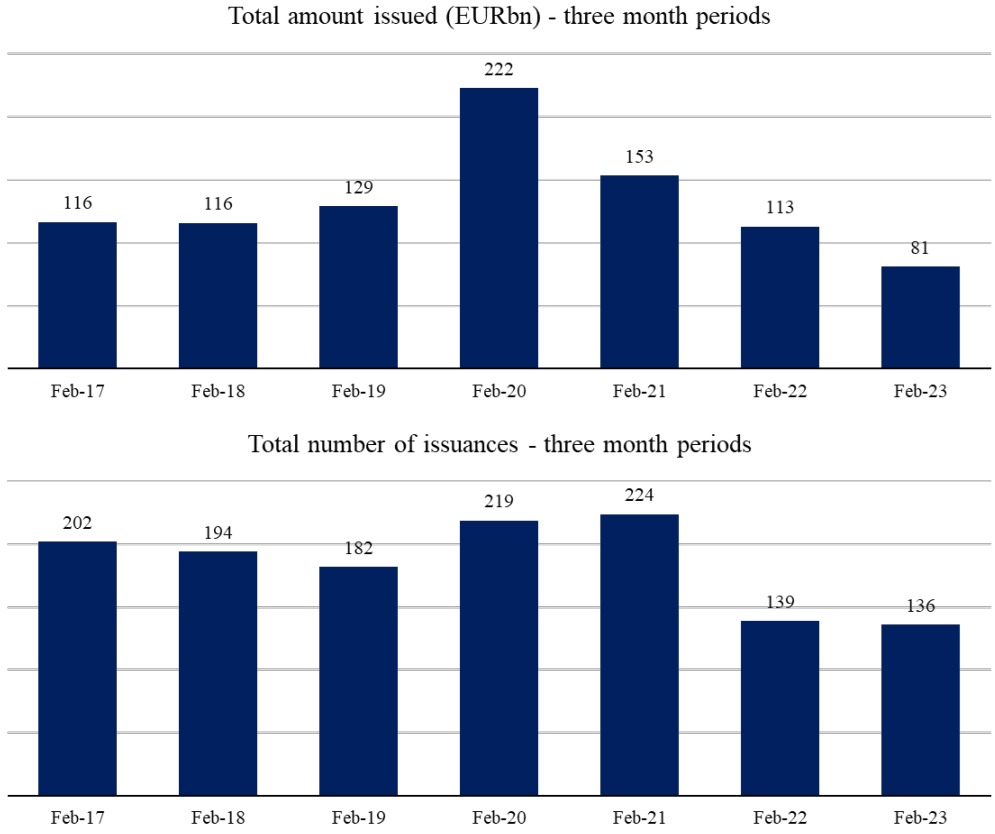
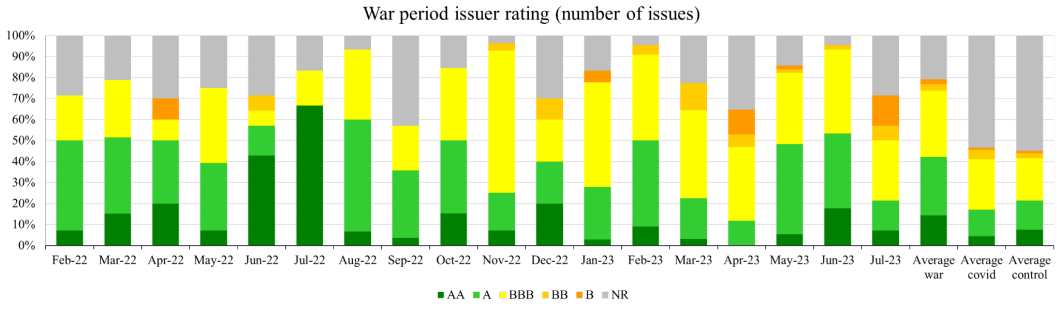


Figure 5a: Bond / issue rating

This figure shows the split among bond ratings across the war period, both based on the number of issues (top figure) and the issue amount (bottom figure). The three columns to the right of the figures also include the average for the entire control, Covid-19 and war period (for period descriptions see section 4).

Figure 5b: Issuer rating

This figure shows the split among issuer ratings across the war period, both based on the number of issues (top figure) and the issue amount (bottom figure). The three columns to the right of the figures also include the average for the entire control, Covid-19 and war period (for period descriptions see section 4).



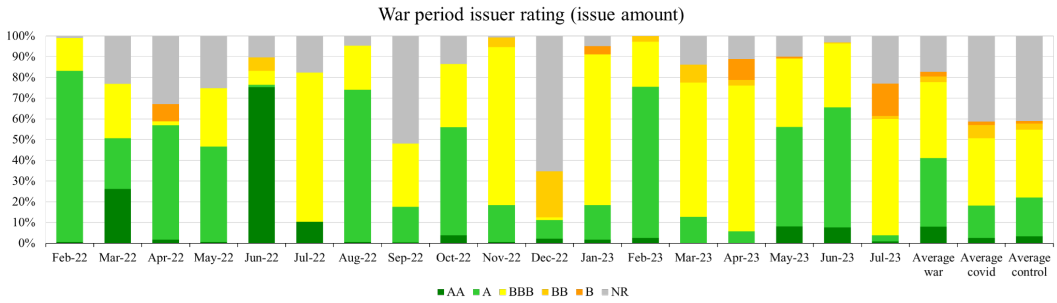


Figure 5c: Rating split

This figure shows a detailed overview of the average bond rating across the three periods (for period descriptions see section 4). The categories are investment grade (from AAA to BBB- rating), high-yield (below BBB) and NR (not rated). We distinguish based on the total amount issued (left figure) and the number of bonds issued (right figure).

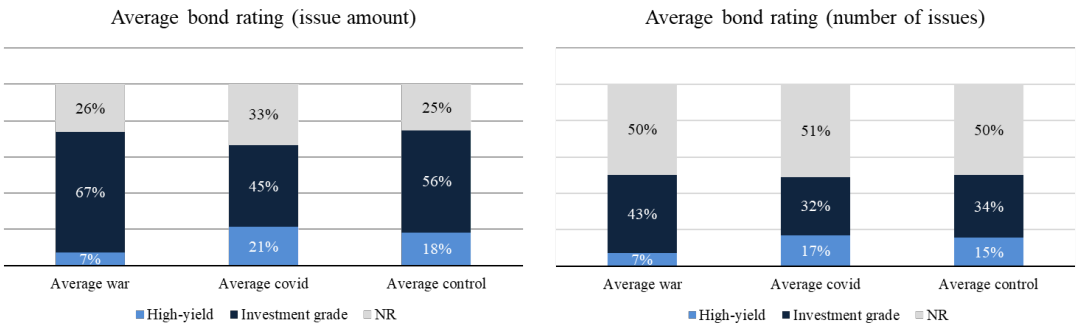


Figure 6a and 6b: Regional split

This figure shows a detailed overview of the bond issuance split across regions in the three periods (for period descriptions see section 4). The countries in the dataset are split according to the UN definitions into Western, Northern, Southern and Eastern Europe. We distinguish based on the total amount issued (left figure) and the number of bonds issued (right figure).

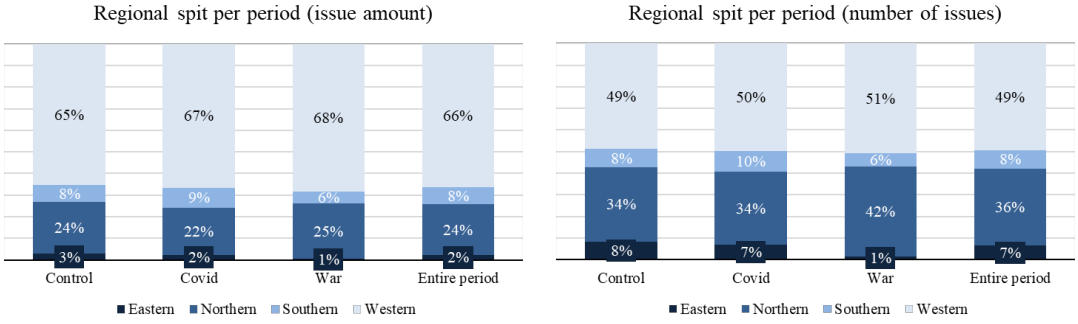


Figure 6c and 6d: Regional split (monthly)

This figure shows a detailed overview of the monthly bond issues during the six months before and after the invasion of Ukraine. We distinguish based on the total amount issued (top figure) and the number of bonds issued (bottom figure).

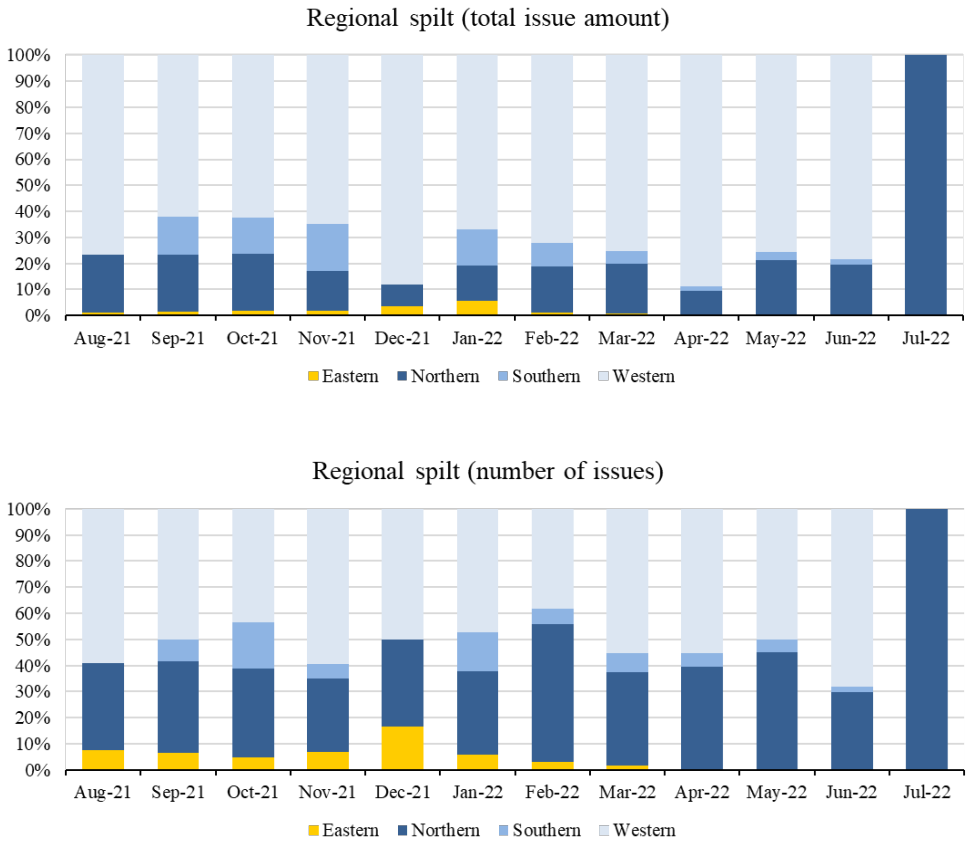


Figure 7a: Industry split (control period)

This figure shows a detailed overview of the bond issuance split across industries over the control period (for period descriptions see section 4). The split is calculated based on the total number of issues.

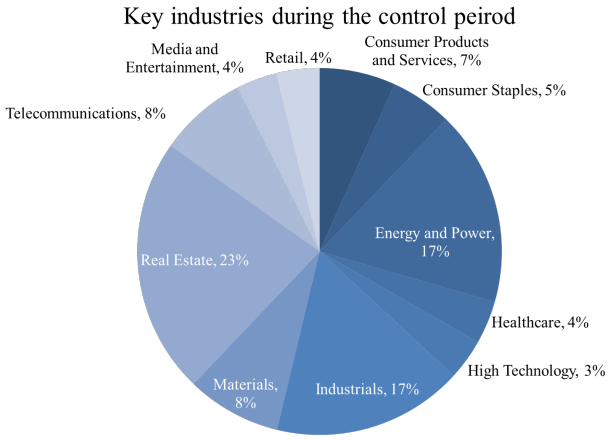


Figure 7b: Industry split (war period)

This figure shows a detailed overview of the bond issuance split across industries over the war period (for period descriptions see section 4). The split is calculated based on the total number of issues.

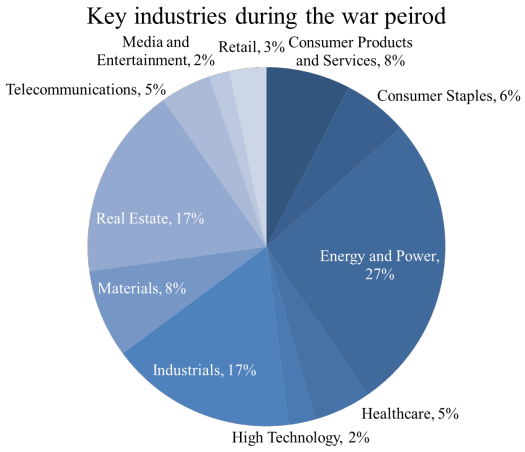


Figure 8: Issues per industry (war period)

This figure shows the change in accumulated bond issuances split by industry during the war period.

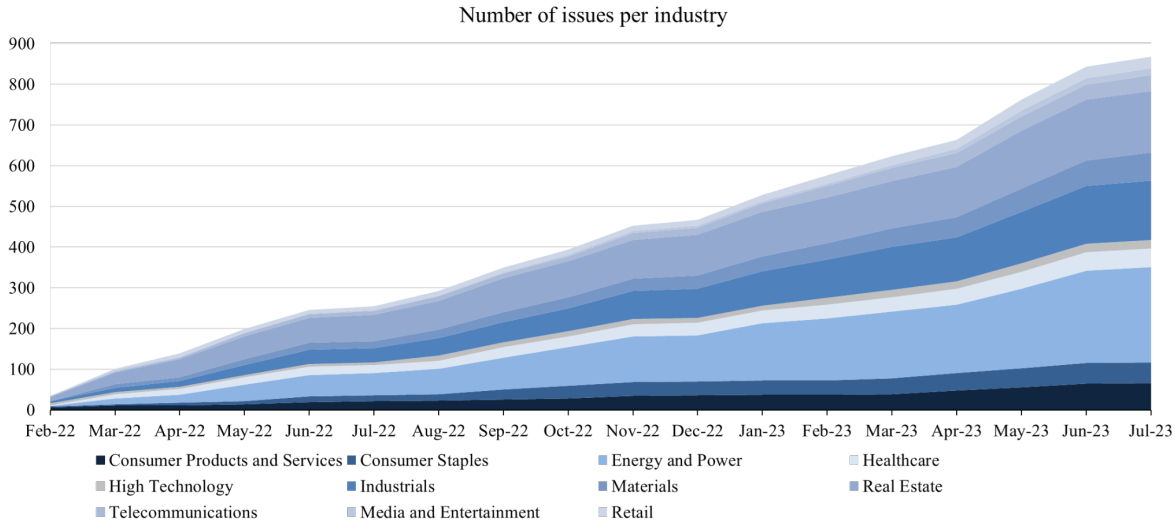


Figure 9: Issues per currency (war period)

This figure shows the bond issuances split by currency across the war period, both based on the issue amount (top figure) and the number of issues (bottom figure).

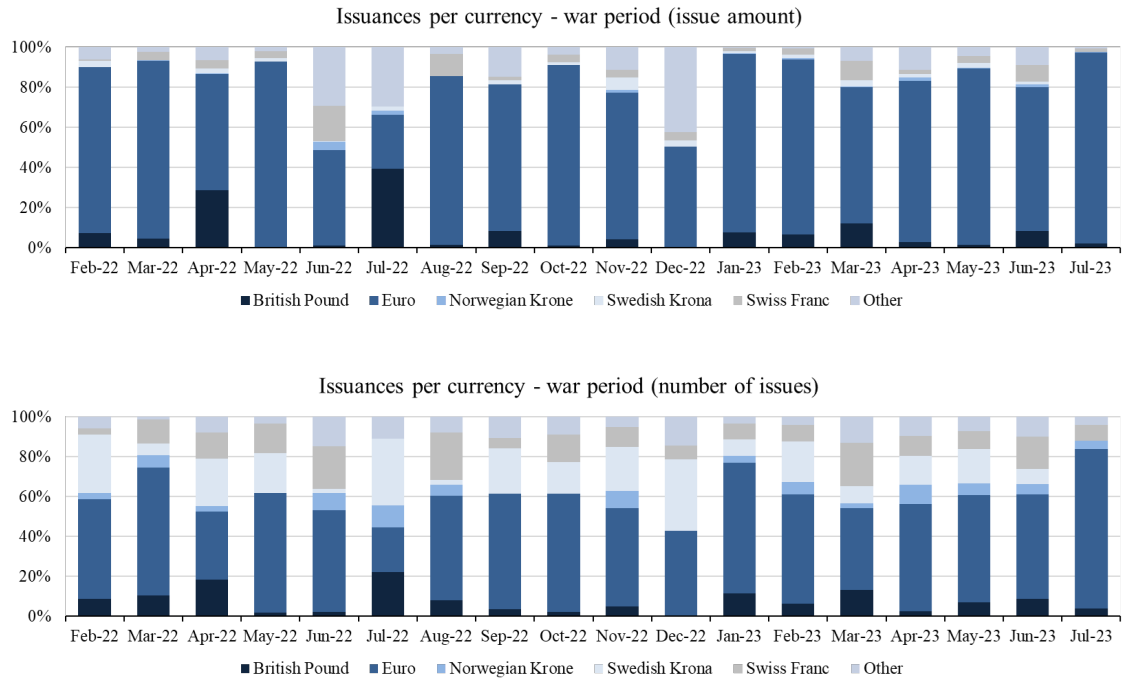


Figure 10: Issues per currency (invasion period)

This figure shows the monthly bond issues split by currency of issue during the six months before and after the invasion of Ukraine. We distinguish based on the total amount issued (top figure) and the number of bonds issued (bottom figure).

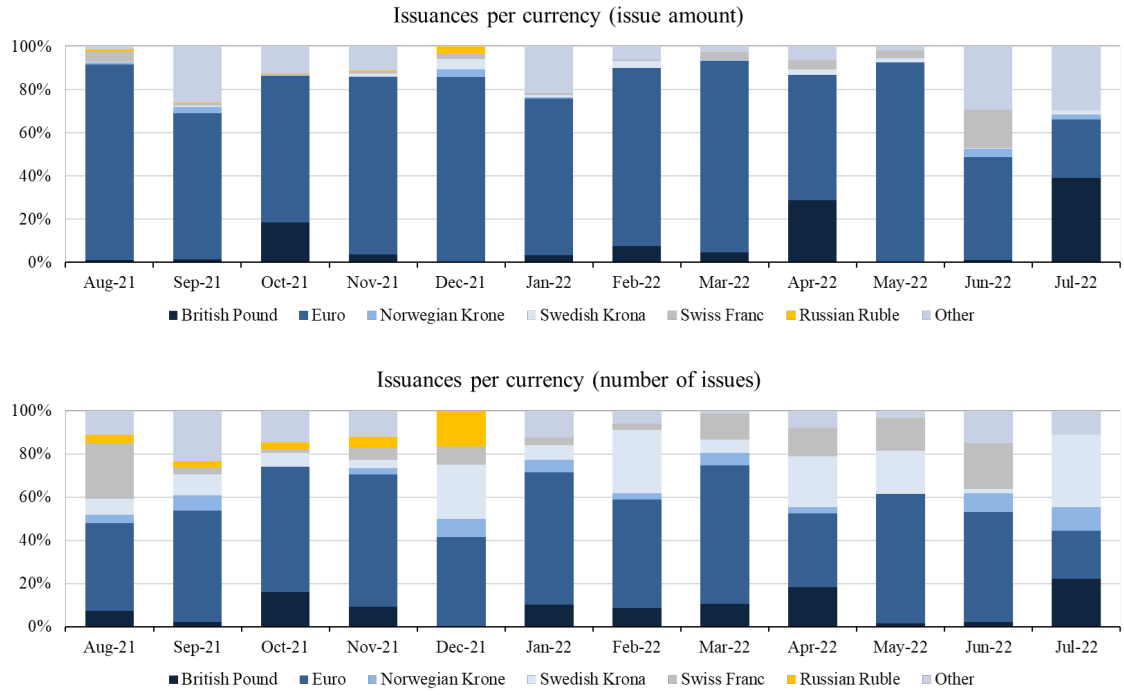


Figure 11a: Average coupon

This figure shows the average coupon in percent for each observation period (for period descriptions see section 4).

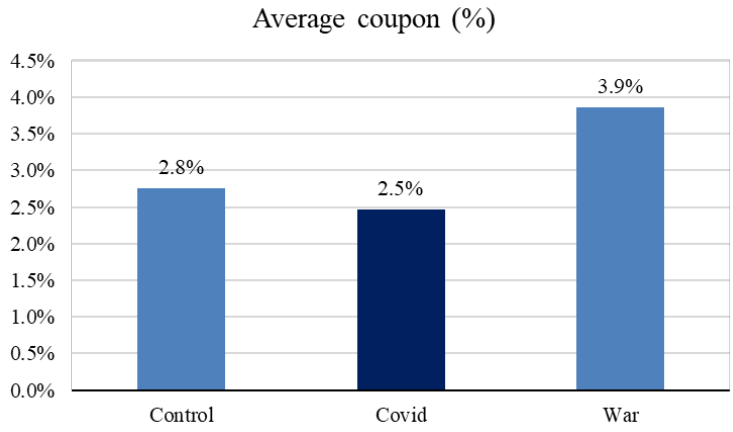


Figure 11b: Average maturity

This figure shows the average maturity in years for each observation period (for period descriptions see section 4).

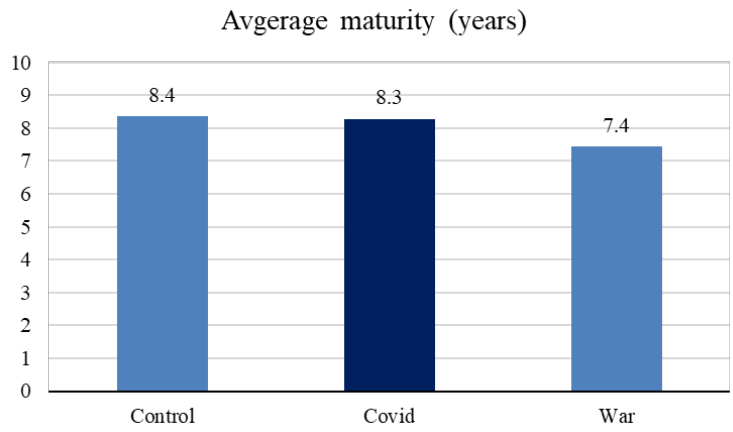


Figure 12: Average coupon per three month period

This figure shows the average coupon in percent for predefined three month periods during the war period and the control period. The dotted lines represent the average coupon for the entire war, Covid-19 and control period.

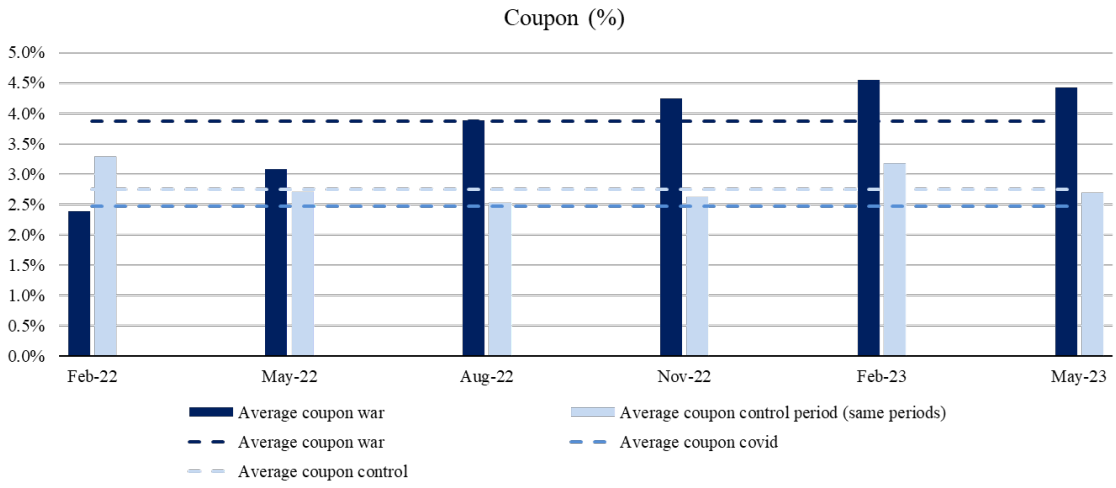


Figure 13: Average maturity per three month period

This figure shows the average maturity in years for predefined three month periods during the war period and the control period. The dotted lines represent the average maturity for the entire war, Covid-19 and control period.

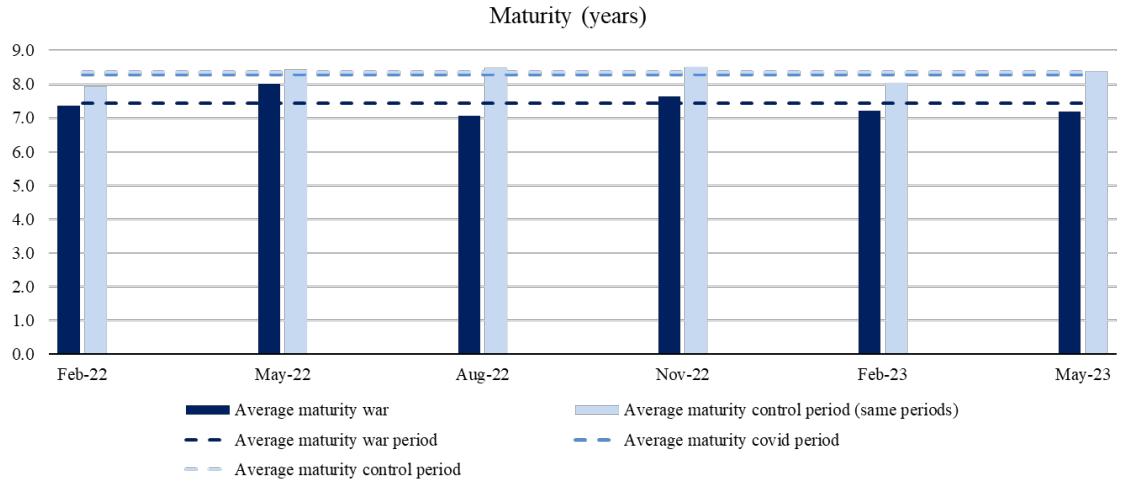
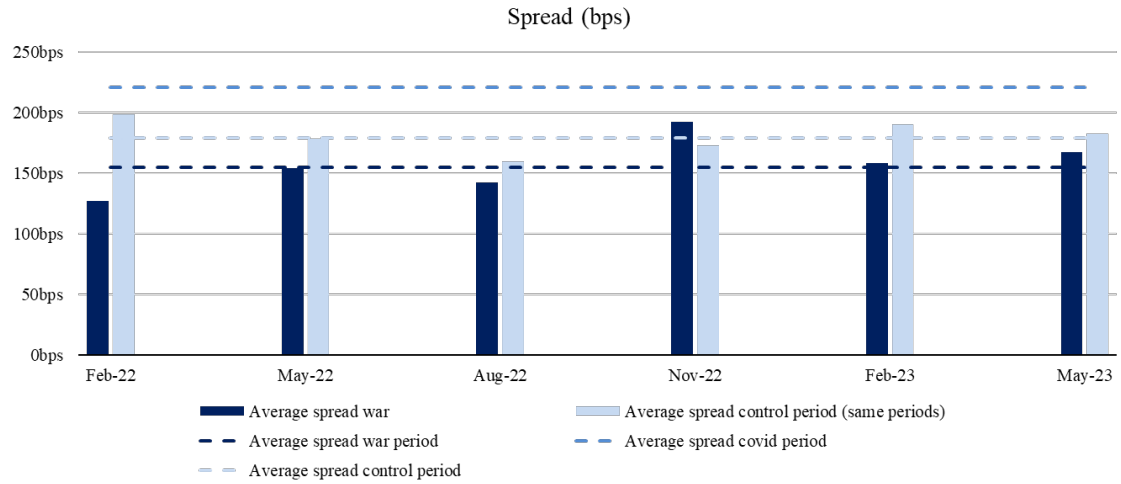


Figure 14: Average spread per three month period

This figure shows the average spread in basis points for predefined three month periods during the war period and the control period. The dotted lines represent the average spread for the entire war, Covid-19 and control period.



7.2. Tables

Table 1: Sector split (control period)

This table shows the number of bonds issued, the amount issued as well as a percentage distribution for the different sectors in the control dataset, spanning from 2017 to 2020.

	Industry Sector	Count	Amount Issued (EUR)	Percentages
1	Real Estate	511	136279.80	22.58
2	Energy and Power	391	254707.08	17.28
3	Industrials	380	253019.89	16.79
4	Materials	188	137541.13	8.31
5	Telecommunications	175	192879.55	7.73
6	Consumer Products and Services	153	127994.62	6.76
7	Consumer Staples	125	120994.73	5.52
8	Retail	88	67269.07	3.89
9	Healthcare	87	142678.45	3.84
10	Media and Entertainment	83	69811.92	3.67
11	High Technology	81	130570.34	3.58
12	Government and Agencies	1	1671.54	0.04

Table 2: Sector split (war period)

This table shows the number of bonds issued, the amount issued as well as a percentage distribution for the different sectors in the war period, spanning from 2022 to 2023.

	Industry Sector	Count	Amount Issued (EUR)	Percentages
1	Energy and Power	237	201241.19	27.98
2	Industrials	146	93143.67	17.24
3	Real Estate	140	26520.07	16.53
4	Materials	69	67700.59	8.15
5	Consumer Products and Services	61	39278.05	7.20
6	Consumer Staples	49	49228.03	5.79
7	Healthcare	46	51333.13	5.43
8	Telecommunications	39	23002.26	4.60
9	Retail	29	26386.16	3.42
10	High Technology	16	22520.85	1.89
11	Media and Entertainment	15	10983.06	1.77

Table 3a: Sector split (control period; Russia)

This table investigates bond issuances by Russian companies and shows the number of bonds issued as well as the amount issued for the different sectors in the control period, spanning from 2017 to 2020.

	Industry.Sector	Count	Volume
1	Industrials	32	4776.39
2	Energy and Power	27	6568.94
3	Materials	26	7498.08
4	Telecommunications	14	2704.53
5	Consumer Products and Services	8	409.96
6	Retail	8	691.49
7	Real Estate	7	523.68
8	High Technology	5	922.65
9	Consumer Staples	2	107.17

Table 3b: Sector split (war period; Russia)

This table investigates bond issuances by Russian companies and shows the number of bonds issued as well as the amount issued for the different sectors in the war period, spanning from 2022 to 2023.

	Industry.Sector	Count	Volume
1	Materials	2	755.60
2	Energy and Power	1	88.03
3	Industrials	1	351.88

Table 4: Variable descriptions

This table contains variable descriptions for the independent variables in the spread regression.

	Variable	Description
1	Basis Point Spread to Benchmark	Difference between bond yield and respective treasury rate at issuance (in basis points)
2	Size	Natural logarithm of net sales
3	Profitability	Operating income before depreciation to total assets (book value) ratio
4	Tangibility	Net PPE to total assets (book value) ratio
5	Net book leverage	Total debt less cash and cash equivalent to total assets (book value) ratio
6	Dividend Dummy	Dummy variable that is 1 if the issuer issued a dividend in the timeframe 2010-2017 and 0 otherwise
7	Energy Sector Dummy	Dummy variable that is 1 if the issuer is in the energy and power sector and 0 otherwise
8	Hist. Issues	Total number of past bond issues in the timeframe 2010-2017
9	Hist. Avg. spread	Average offering spread of past bond issues in the timeframe 2010-2017
10	Rating Dummy	Dummy variable that is 1 if the bond is rated A and above and 0 otherwise

Table 5a: Summary statistics (entire observation period)

This table contains the summary statistics for each variable during the entire observation timeframe.

	Basis Point Spread to Benchmark	Size	Tangibility	Profitability	Net Book Leverage	Dividend Dummy	Energy Sector Dummy	Hist. Issues	Hist. Avg. Spread	Rating Dummy
Mean	152.32	9.28	0.27	0.10	0.23	0.55	0.23	4.60	98.46	0.19
SD	132.49	1.52	0.19	0.06	0.18	0.50	0.42	7.45	119.09	0.40
1st Quartile	62.00	8.16	0.10	0.07	0.12	0.00	0.00	0.00	0.00	0.00
Median	110.00	9.33	0.24	0.10	0.22	1.00	0.00	2.00	71.57	0.00
3rd Quartile	197.50	10.55	0.38	0.13	0.33	1.00	0.00	5.00	144.17	0.00
N Observations	1426.00	1426.00	1426.00	1426.00	1426.00	1426.00	1426.00	1426.00	1426.00	1426.00

Table 5b: Summary statistics (pooled dataset)

This table contains the summary statistics for each variable during the pooled dataset spanning the control and war timeframe.

	Basis Point Spread to Benchmark	Size	Tangibility	Profitability	Net Book Leverage	Dividend Dummy	Energy Sector Dummy	Hist. Issues	Hist. Avg. Spread	Rating Dummy
Mean	140.28	9.42	0.27	0.11	0.23	0.62	0.24	4.82	103.36	0.21
SD	125.11	1.44	0.19	0.06	0.17	0.49	0.43	7.44	118.76	0.41
1st Quartile	60.00	8.28	0.11	0.07	0.12	0.00	0.00	0.00	0.00	0.00
Median	100.00	9.42	0.24	0.10	0.21	1.00	0.00	2.00	72.40	0.00
3rd Quartile	175.25	10.63	0.39	0.13	0.32	1.00	0.00	5.00	157.50	0.00
N Observations	908.00	908.00	908.00	908.00	908.00	908.00	908.00	908.00	908.00	908.00

Table 6: Regression results (war and control period)

This table contains the regression results from the split war and control regressions. Stars denote significance levels, such that ***p<0.01 ; **p<0.05 ; *p<0.1

Regression Results War Control Separate

	Dependent variable:					
	`Basis Point Spread to Benchmark`					
	War Model 1	War Model 2	War Model 3	Control Model 1	Control Model 2	Control Model 3
	(1)	(2)	(3)	(4)	(5)	(6)
Size	-3.180	-1.780	3.590	-17.100***	-10.100***	-8.270***
	(3.700)	(3.910)	(4.070)	(2.490)	(2.700)	(2.790)
Tangibility	77.800***	86.800***	65.000**	77.000***	64.500***	59.300***
	(28.600)	(29.300)	(29.000)	(19.400)	(18.500)	(18.600)
Profitability	-127.000*	-87.400	-25.800	-646.000***	-658.000***	-636.000***
	(71.400)	(73.900)	(73.300)	(72.000)	(71.600)	(71.300)
Net Book Leverage	-16.700	-7.020	-7.380	79.200***	85.600***	83.100***
	(29.600)	(29.700)	(28.800)	(20.900)	(20.700)	(20.700)
Dividend Dummy	-28.600***	-26.400***	-26.700***	-35.500***	-27.200***	-25.400***
	(9.400)	(9.860)	(9.580)	(7.170)	(6.860)	(6.860)
Energy Sector Dummy	-5.410	-4.500	-9.920	-61.600***	-51.100***	-48.400***
	(11.000)	(11.100)	(10.900)	(9.430)	(9.230)	(9.270)
Hist. Issues		-0.580	-0.272		-2.060***	-1.740***
		(0.744)	(0.726)		(0.488)	(0.509)
Hist. Avg. Spread		0.136***	0.116**		0.255***	0.241***
		(0.048)	(0.047)		(0.029)	(0.029)
Rating Dummy			-43.400***			-19.200**
			(12.200)			(9.040)
Constant	190.000***	157.000**	135.000**	443.000***	300.000***	287.000***
	(63.200)	(64.900)	(63.300)	(35.900)	(36.600)	(36.900)
Observations	306	306	306	602	602	602
Adjusted R^2	0.134	0.149	0.179	0.305	0.395	0.392
Note:						*p**p***p<0.01

Table 7: Regression results (pooled)

This table contains the regression results from the pooled set of regressions. Stars denote significance levels, such that ***p<0.01 ; **p<0.05 ; *p<0.1

Pooled Regression Results Interaction Terms

	Dependent variable:		
	`Basis Point Spread to Benchmark`		
	Pooled Model 1	Pooled Model 2	Pooled Model 3
	(1)	(2)	(3)
War Dummy	-168.000***	-112.000**	-137.000***
	(45.400)	(47.600)	(48.600)
Size	-16.700***	-9.610***	-7.820***
	(2.350)	(2.610)	(2.670)
Tangibility	79.500***	66.900***	61.000***
	(18.600)	(18.200)	(18.100)
Profitability	-669.000***	-685.000***	-660.000***
	(69.300)	(70.200)	(69.300)
Net Book Leverage	84.200***	93.400***	90.000***
	(19.700)	(20.000)	(19.800)
Dividend Dummy	-36.400***	-28.800***	-26.800***
	(6.800)	(6.660)	(6.600)
Energy Sector Dummy	-62.200***	-53.200***	-51.000***
	(8.970)	(8.970)	(8.910)
Hist. Issues		-2.120***	-1.810***
		(0.478)	(0.494)
Hist. Avg. Spread		0.245***	0.230***
		(0.028)	(0.028)
Rating Dummy			-18.300**
			(8.660)
War Dummy * Size	12.600***	6.620	9.760**
	(4.170)	(4.500)	(4.740)
War Dummy * Tangibility	1.060	26.600	13.400
	(33.800)	(33.300)	(33.500)
War Dummy * Profitability	534.000***	587.000***	622.000***
	(102.000)	(103.000)	(103.000)
War Dummy * Net Book Leverage	-97.600***	-103.000***	-99.100***
	(35.700)	(35.200)	(34.700)
War Dummy * Dividend Dummy	6.770	2.160	-0.497
	(11.600)	(11.800)	(11.600)
War Dummy * Energy Sector Dummy	53.600***	45.800***	38.500***
	(14.300)	(14.000)	(13.900)
War Dummy * Hist. Issues		1.420	1.380
		(0.887)	(0.889)
War Dummy * Hist. Avg. Spread		-0.115**	-0.119**
		(0.056)	(0.056)
War Dummy * Rating Dummy			-24.500
			(15.200)
Constant	415.000***	295.000***	287.000***
	(33.000)	(34.500)	(34.500)
Observations	908	908	908
Adjusted R^2	0.258	0.329	0.332
Note:			*p<0.1; **p<0.05; ***p<0.01

Table 8: Regression results (control period; daily fixed effects)

This table contains the regression results investigating the different time fixed effects on a daily and yearly basis for the control period. Stars denote significance levels, such that ***p<0.01 ; **p<0.05 ; *p<0.1

Control Regression Results (Daily Fixed Effects)

	Dependent variable:					
	`Basis Point Spread to Benchmark`					
	felm			*MM-type linear*		
	Control 1 (Year)	Control 2 (Year)	Control 3 (Year)	Control 1 (Day)	Control 2 (Day)	Control 3 (Day)
	(1)	(2)	(3)	(4)	(5)	(6)
Size	-14.400***	-10.100*	-9.960*	-17.100***	-10.100***	-8.270***
	(4.940)	(5.260)	(5.410)	(2.490)	(2.700)	(2.790)
Tangibility	118.000***	103.000***	102.000***	77.000***	64.500***	59.300***
	(35.600)	(33.500)	(33.700)	(19.400)	(18.500)	(18.600)
Profitability	-1,148.000***	-1,120.000***	-1,116.000***	-646.000***	-658.000***	-636.000***
	(158.000)	(152.000)	(155.000)	(72.000)	(71.600)	(71.300)
Net Book Leverage	71.300	67.200	67.200	79.200***	85.600***	83.100***
	(45.300)	(43.800)	(43.900)	(20.900)	(20.700)	(20.700)
Dividend Dummy	-30.300**	-29.500**	-29.400**	-35.500***	-27.200***	-25.400***
	(14.400)	(13.500)	(13.500)	(7.170)	(6.860)	(6.860)
Energy Sector Dummy	-92.100***	-70.000***	-69.700***	-61.600***	-51.100***	-48.400***
	(18.800)	(18.100)	(18.200)	(9.430)	(9.230)	(9.270)
Hist. Issues		-2.370**	-2.320**		-2.060***	-1.740***
		(1.120)	(1.160)		(0.488)	(0.509)
Hist. Avg. Spread		0.327***	0.326***		0.255***	0.241***
		(0.052)	(0.053)		(0.029)	(0.029)
Rating Dummy			-2.570			-19.200**
			(18.200)			(9.040)
Constant				443.000***	300.000***	287.000***
				(35.900)	(36.600)	(36.900)
Observations	602	602	602	602	602	602
Adjusted R^2	0.523	0.581	0.579	0.305	0.395	0.392
Note:						*p**p***p<0.01

Table 9: Regression results (war period; daily fixed effects)

This table contains the regression results investigating the different time fixed effects on a daily and yearly basis for the war period. Stars denote significance levels, such that ***p<0.01 ; **p<0.05 ; *p<0.1

War Regression Results (Daily Fixed Effects)

	Dependent variable:					
	`Basis Point Spread to Benchmark`					
	felm			*MM-type linear*		
	War 1 (Year)	War 2 (Year)	War 3 (Year)	War 1 (Day)	War 2 (Day)	War 3 (Day)
	(1)	(2)	(3)	(4)	(5)	(6)
Size	-21.400***	-19.000**	-7.510	-3.180	-1.780	3.590
	(8.150)	(8.450)	(8.960)	(3.700)	(3.910)	(4.070)
Tangibility	317.000***	328.000***	286.000***	77.800***	86.800***	65.000**
	(63.100)	(64.200)	(63.800)	(28.600)	(29.300)	(29.000)
Profitability	-342.000**	-332.000**	-263.000*	-127.000*	-87.400	-25.800
	(139.000)	(141.000)	(138.000)	(71.400)	(73.900)	(73.300)
Net Book Leverage	-11.500	-2.290	-32.500	-16.700	-7.020	-7.380
	(53.300)	(54.300)	(53.600)	(29.600)	(29.700)	(28.800)
Dividend Dummy	-2.150	-1.700	-1.880	-28.600***	-26.400***	-26.700***
	(18.200)	(18.600)	(18.000)	(9.400)	(9.860)	(9.580)
Energy Sector Dummy	-20.600	-23.600	-33.900	-5.410	-4.500	-9.920
	(20.700)	(21.000)	(20.600)	(11.000)	(11.100)	(10.900)
Hist. Issues		-1.870	-0.929		-0.580	-0.272
		(2.010)	(1.970)		(0.744)	(0.726)
Hist. Avg. Spread		0.091	0.060		0.136***	0.116**
		(0.095)	(0.093)		(0.048)	(0.047)
Rating Dummy			-87.300***			-43.400***
			(27.300)			(12.200)
Constant				190.000***	157.000**	135.000**
				(63.200)	(64.900)	(63.300)
Observations	306	306	306	306	306	306
Adjusted R^2	0.515	0.513	0.541	0.134	0.149	0.179
Note:						*p**p***p<0.01

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