Handelshøyskolen BI

GRA 19703 Master Thesis

Thesis Master of Science 100% - W

Predefinert informasjon

Startdato:	16-01-2022 09:00	**Termin:**	202210
Sluttdato:	01-07-2022 12:00	**Vurderingsform:**	Norsk 6-trinns skala (A-F)
Eksamensform:	T		
Flowkode:	202210||10936||IN00||W||T		
Intern sensor:	(Anonymisert)		

Deltaker

Navn:	Eirin Skagseth og Rafaella Sena Rossi

Informasjon fra deltaker

Tittel *:	The Primary Issuance of Norwegian High-Yield Corporate Bonds During Financial Turmoil - Spotlight on the COVID-19 Crisis
Navn på veileder *:	Leon Bogdan Stacescu

Inneholder besvarelsen konfidensielt materiale?:	Nei	**Kan besvarelsen offentliggjøres?:**	Ja

Gruppe

Gruppenavn:	(Anonymisert)
Gruppenummer:	6
Andre medlemmer i gruppen:	

The Primary Issuance of Norwegian High-Yield Corporate Bonds During Financial Turmoil

Spotlight on the COVID-19 Crisis

GRA 19703 Master Thesis

Oslo, June 2022

Supervisor:

Leon Bogdan Stacescu

Study Programme:

Master in Finance

ABSTRACT

In this thesis, we study different factors that might have caused the massive increase in the primary issuance of Norwegian high-yield corporate bonds during the most recent financial turmoil, the COVID-19 crisis during 2020 and 2021. To deepen our understanding of how these factors might influence the issuance volume during crises, we include the two other most recent crises, the oil crisis from 2014 and the global financial crisis from 2008. We found that, historically, economic crises both positively and negatively affected the amount and size of issuance of Norwegian high-yield corporate bonds, especially within sectors such as shipping and supply during the oil crisis, and TMT during COVID-19. For the financial crisis we found zero significant values, and therefore we did not draw any conclusion. None of our included factors was seen to affect the issuance of high-yield bonds significantly and positively. Therefore, we recommend further research on this topic, preferably with a larger data set and other variables, to be performed.

AKNOWLEDGEMENTS

We would like to thank our supervisor Leon Bogdan Stacescu for his valuable input, guidance, and engagement towards our thesis.

We also extend our gratitude to Stamdata for providing us with access to relevant data.

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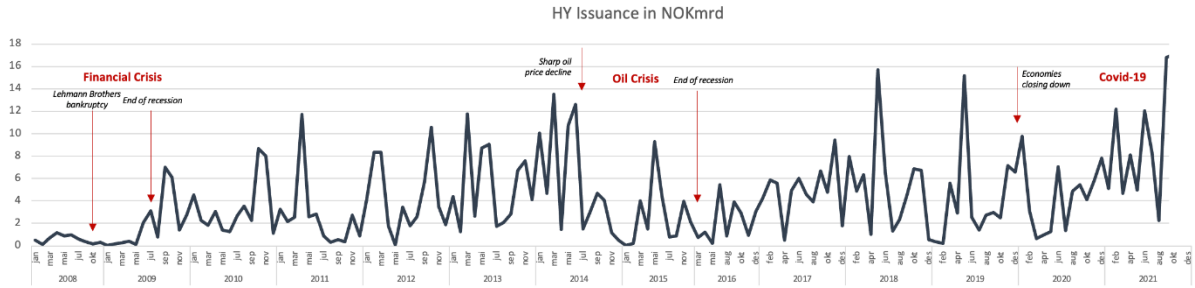
1 Introduction and motivation

The motivation for this thesis is twofold. The Norwegian corporate bond market, meaning all bonds with Norwegian ISINs, dominates the Nordic volume outstanding, with approximately 50% in 2021. A new all-time high was reached in 2021 for Norwegian corporate bonds, with volumes closing at NOK 221bn, 46% higher than the old high watermark from 2020 (Nordic Trustee, 2022). In 2020, during COVID-19, 56% of all issued Norwegian high-yield corporate bonds was issued by first time issuers, highlighting the importance of high-yield corporate bonds as an important source of capital for an increasing number of companies.

We define high-yield as bonds with credit ratings below BBB from S&P or below Baa2 from Moody's, who inherent a coupon around 5% (and 3m NIBOR + 450 bps approximately). The rapid growth in the Norwegian bond market, and especially the high-yield corporate bond market, makes research on this financial instrument highly relevant.



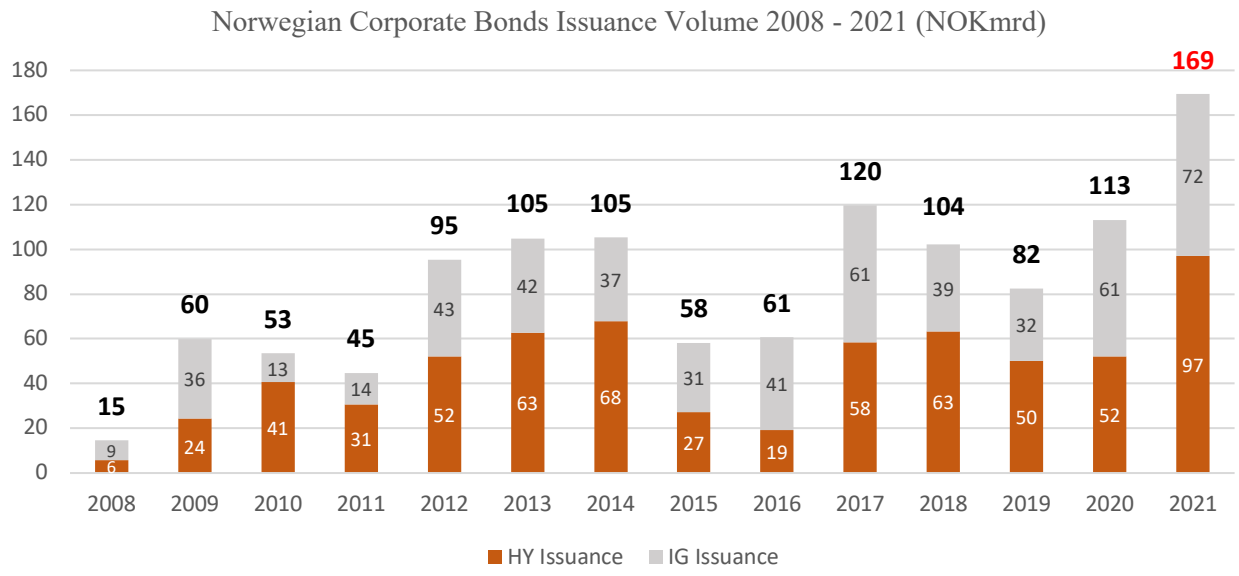
Graph 1.1: *HY Issuance in Nokmrd During the Financial Crisis, Oil Crisis, and COVID-19. Reference: Stamdata & Team Analysis*

Secondary, since Norwegian companies started increasing their issuance of corporate bonds, and in particular high-yield, the Norwegian financial market has experienced three major financial crises. Firstly, the financial crisis in 2008 and 2009, who originated from the US, and shortly spread globally. The trust in the financial market, and especially banks, decreased rapidly and the markets experienced the largest turmoil in many years. After the worst storm, there was an increase in issued bonds, indicating attractive market conditions for companies.

In June 2014, the oil price sharply declined, strongly affecting the Norwegian financial market, which was and remains highly dependent on the oil industry. Most high-yield bonds at the time were issued by Norwegian companies within oil service, drilling and supply.

Regardless, after some time, the number of issuances within both investment-grade and high-yield continued increasing. And yet again, in the spring of 2020, the Norwegian financial market and most companies were severely hit by another crisis. The spread of the virus COVID-19 resulted in a repetitive close-down of the Norwegian and global economies between March 2020 and December 2021, where our sample period ends. During COVID-19, the issuance volume of Norwegian corporate bonds has gone through the roof, and it is the statistics on this, gathered from Stamdata, that inspired us to research why the supply in the primary market, especially for high-yield, increased. What factors may have affected the supply side?

We focus only on corporate bonds, which exclude bonds issued by banks and insurance companies, as well as municipality. Our base is the COVID-19 crisis. By looking at factors, such as the stock market, Norwegian krone (NOK) exchange rate, the interest rate, the credit spread and the oil price, we try answering the following research question: *"What factors can stimulate to an increase of high-yield Norwegian corporate bonds issuance during financial crises?"*



Graph 1.2: *Norwegian Corporate Bonds Issuance Volume 2008 – 2021 in NOKmrd*
Reference: Stamdata & Team Analysis

2 Literature Review

This section summarizes some recent findings from previous research on how COVID-19 affected the corporate bonds market and the effects of policy interventions by central banks.

Khametshin (2021) analyzes the role that the monetary policy measures undertaken by the Federal Reserve and the ECB in response to the COVID-19 crisis may have played in the high-yield corporate bond issuance in the Euro area and the US in 2020. The previously mentioned central banks' immediate response was announcing, among other measures, new programs of asset purchases, including the purchase of corporate debt. This article analyzes the effects of these programs on corporate debt issuance, whether monetary policy affected the pricing of credit risk, market liquidity, or the supply of market finance substitutes, including the possible role of bank credit-supporting measures by national authorities in the euro area. Their findings show that the central bank acting as a buyer-of-last-resort in the market for corporate bonds, mainly for the HY bond exchange traded funds (ETF), can increase market prices and, therefore, reduce the cost of market funding. After the introduction of monetary policy measures, credit risk spreads were reduced and stabilized at their pre-covid levels and primary market liquidity was improved because of restoration of liquidity in the secondary markets. Moreover, central banks also affected the demand for bonds indirectly by stimulating bank credit through fiscal measures, leading to a substitution of bank credit for bond finance. Therefore, monetary policy measures and fiscal support undertaken by the Fed and the ECB affect corporate debt markets, particularly the high-yield segment.

Falato, Goldstein and Hortaçsu (2021) provide an analysis of the fragility experienced by investment funds in corporate bond markets during a time of severe market stress caused by COVID-19, as well as investigate the contributions from Federal Reserve's actions. The Fed's response includes the Primary Market Corporate Credit Facility (PMCCF) and Secondary Market Corporate Credit Facility (SMCCF), a purchase program of corporate bonds. This was the first time in the history of Fed for a program of this type, so the announcement had a major impact in the corporate bond markets, which saw the spreads for corporate bonds reversing to a level which wiped out the increase that occurred after the beginning of the pandemic. This study starts by showing that investment funds in corporate bond markets experienced significant outflows that were never seen since they became prominent market players in this market. The study shows that these large outflows were sustained over weeks and most severe for funds with illiquid assets, vulnerable to fire sales and exposed to sectors hurt by the crisis,

confirming these three characteristics as the main sources of fragility. By providing a liquidity backstop for their bond holdings, they show that the purchase program introduced by Fed served as a financial stability tool also for bond funds because it mitigated liquidity mismatch and fire-sale costs associated with illiquidity of fund holdings. In other words, Fed policy actions helped to reverse outflows, mitigating the fragility of funds after crises, and increasing their resilience. In turn, the program had spillover effects, such as stimulating primary market bond issuance by firms whose outstanding bonds were held by the impacted funds and stabilizing peer funds whose bond holdings overlapped with those of the impacted funds. This analysis shows a bond-fund fragility providing a novel perspective over the transmission of unconventional monetary policy to the real economy via non-bank financial institutions.

Kargar, Lester and Lindsay (2021) study liquidity conditions in the US corporate bond market during COVID-19, as well as the effects of the Federal Reserve's interventions. In response to the large economic shock induced by this pandemic, the Fed introduced facilities, the Primary Market Corporate Credit Facility (PMCCF) and the Secondary Market Corporate Credit Facility (SMCCF), designed to bolster liquidity and reduce the costs and risks of intermediating corporate debt. This is done by allowing the Fed to make outright purchases of corporate bonds issued by US companies along with exchange-traded funds (ETFs) that invested in similar assets. Their findings show that distinguishing between risky-principal and agency trades is relevant with regards to the sources of illiquidity and the efficacy of policy interventions. There was a movement from risky-principal toward agency trades at the peak of the sell-off due to a large increase in cost of trading via risky-principal. The study indicates that liquidity was being provided by both customers' demand for immediacy and dealers' willingness to supply it. While the shift to agency trades brought other customers to provide liquidity, dealers, who initially were reluctant to absorb inventory onto their balance sheets, doubled their inventory holdings relative to pre-pandemic levels after Fed's announcement about the purchase program. Therefore, the facilities established by the Fed contributed positively to market liquidity. However, it lingered months after markets appeared to calm, indicating that elevated trading volume in conjunction with balance sheet constraints remain a risk in times of crisis.

3 Theoretical frameworks

3.1 Introduction to Corporate Bonds

A bond is a security sold by governments and corporations to raise money for investments today in exchange for a promised future payment (Berk & DeMarzo, 2016). When issued by a corporate entity, the bond is categorized as a corporate bond.

3.1.1 Pricing of & Demand for Corporate Bonds

The pricing of a corporate bond is influenced by several factors, such as the maturity, the credit rating of the issuer and the interest rate. An important factor is as well the demand and supply in the corporate bond market. For example, a strict and heavily regulated bank loan market, such as in Norway, can result in a higher supply of corporate bonds.

3.1.1.1 The Norwegian Central Bank Policy Rate

The price of a bond moves in the opposite direction than market interest rates – like opposing ends of a seesaw (SEC Pub. No. 148). That means that when the interest rates increase, the price of the bond decreases. During crises, the interest rate is usually decreased to stimulate to a higher level of activity in the economy, resulting in increasing bond prices.

Due to the high proportion of bonds with floating rate notes (FRN), the Nordic high-yield are less sensitive to increases in interest rates. In Europe and the US, similar bonds are typically issued with a fixed rate. According to Bloomberg, US bonds has a 97% exposure to fixed rate, while EUR bonds has 85%.

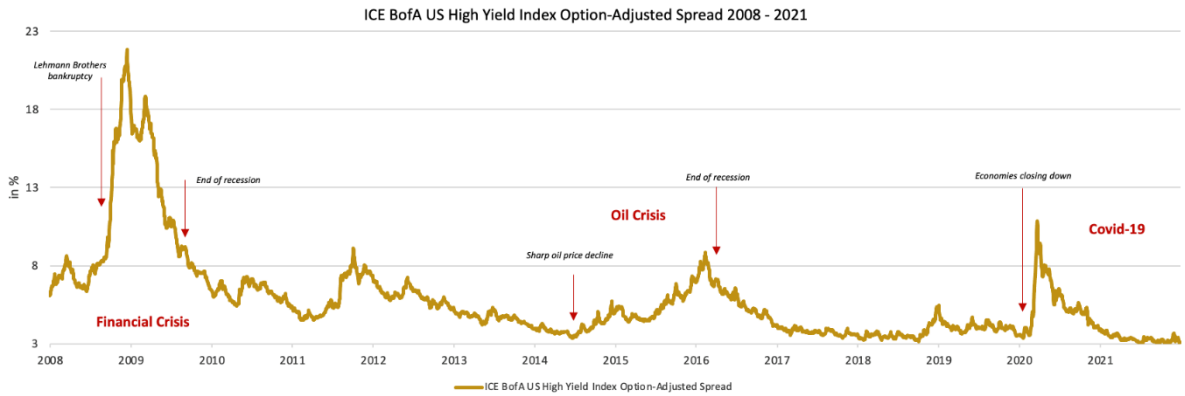
During our sample period 2008 – 2021 we found that, on average, 56% of the bonds issued was with floating rate. For high-yield bonds it was 55%. We especially notice a large portion of issued high-yield bonds with floating rate in 2015, during the oil crisis and 2020, during the COVID-19 crisis, with respectively 72% and 76%.

The rapid decrease in interest rate happened during 2015 and 2020, potentially explaining the reduction in issuance of floating rate, and increased fixed rate, in the following years 2016 and 2021, with respectively 53% and 54%.

Floating rate notes provide protection for rising interest rates. Interest rate sensitivity, which are measured by modified duration, provides an indication on the reaction for the market or fund in case of moving interest rate. Compared to the EUR and US market, the Nordic market stands out with shorter duration. The floating rate feature, together with the shorter bond maturity in the Nordic market, gives shorter duration. Short duration reduces the effects of moving interest rates and can in periods of increasing interest rates help to protect performance (Andersson, 2018).

3.1.1.2 Credit Spread

A credit spread is the difference in yield between a US Treasury bond and another debt security with a different credit quality (default risk), but the same maturity. To compensate investors for taking a risk with corporate bonds, compared to the close-to-zero default risk of treasury bonds, they offer a premium upon the risk-free rate, which is the credit spread. In times of economic uncertainty, investors tend to flee to safe havens, such as US Treasury bonds, at the expense of corporate bonds. This causes the US treasury prices to rise and yields to decline, while for the corporate bonds the prices fall, and yields rise. Credit spread are often a good barometer for the state of the economy. If the credit spread is widening, investors are expecting an economic downhill. When later referring to the credit spread, it should be noted that the extracted date is from the US and exclusively high-yield.



Graph 3.1: *US High-Yield Credit Spread 2008 – 2021. Reference: FRED & Team Analysis*

3.1.1.3 Bank Loan & Credit Supply

Rauh & Sufi (2010) wrote about how firms' credit ratings affect their sources of debt financing. They argued, and later backed with their studies in the same paper, that highly

rated firms rely on equity and unsecured debt. Poorly rated firms, however, rely on secured bank loans and subordinated debt.

3.1.1.4 Norwegian Krone (NOK)

In a relative value trade, if the Norwegian economy is strong relative to comparable developed countries, such as the US and the largest European countries with currency denominated in EUR, and its interest rates are higher, the debt of Norwegian bonds would be more attractive to non-NOK investors.
When foreign capital moves into Norwegian debt, bond prices rise while the yields drop. Norwegian kroner (NOK) in turn gets stronger since investors need to buy NOK to invest in Norwegian debt. In the other case, if foreign capital flows out of Norway due to increased interest rate compared to the mentioned comparable areas above, the currency rate might falls in comparable value, leading the NOK to be further depressed, decreasing bond prices while increasing yields.

3.1.2. Investment-Grade and High-Yield

Corporate bonds are debt instruments issued by an entity, where investors buying that bond are loaning the entity money for a minimum maturity of 12 months. The risk associated with loaning the entity money splits corporate bonds into two categories: Lower-risk (investment-grade) and higher-risk (high-yield) corporate bonds. In this thesis, we will also refer to the respective as HY and IG.

Aussenegg, Goetz & Jelic (2011) found that, in line with previous studies, there are no evidence that lower-rated bonds compensate investors with significantly higher returns compared to debt securities with superior credit quality.

International bond rating firms, such as Moody's, Standard & Poor's and Fitch use different designations to identify the credit quality of the bond. Investment-grade bonds are usually classified from AAA to BBB, while high-yield bonds are from BB and below.

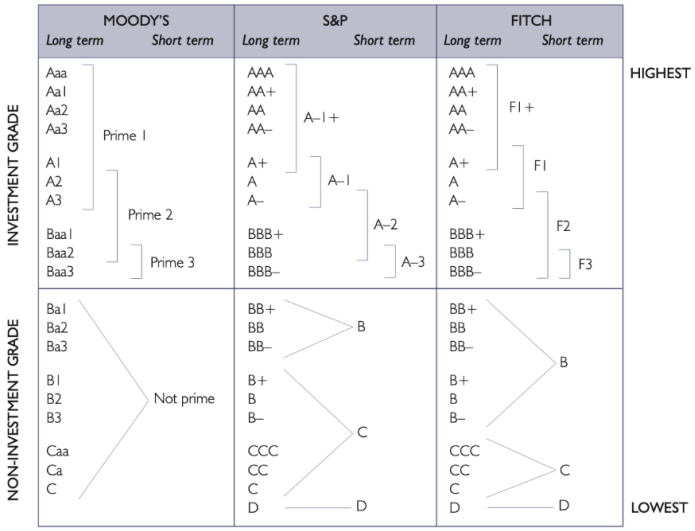


Figure 3.1: *Corporate Credit Rating. Reference: The Association of Corporate Treasurers*

3.1.2.1 Bond Ratings in Norway

To provide a proper rating, a thorough due diligence is performed, which is costly. PwC reported, in 2016, that in the Norwegian bond market the bond issuers rarely do such a public rating, meaning that few bond issuers listed in Oslo have public ratings by S&P, Moody's, or Fitch. Instead of the public rating, the hired investment bank assisted the company in providing a shadow rating, based on public information about the company. The credit analyst from the investment bank follows the same principles as the rating firms, although at a zero additional cost. There had to be at least two separate ratings. Shadow rating was banned in 2016.

51% of the outstanding Norwegian high-yield corporate bonds, by the end of 2021, are unrated. In the Swedish marked only 24% are unrated. Regarding investment-grade stands Norway and Sweden both around 20% (Nordic Trustee, 2022). The reason for lower degree of unrated IG then HY bonds, is that Verdipapirfondenes Forening in June 2020 announced new rules for official rating for investment-grade bonds to be included in a bond fund portfolio. By July 2022, maximum 10% of the portfolio can be without official ratings. This results in an increased amount of investment-grade corporate bonds requiring officially rating by a rating agency with ESMA license (Zakariassen, 2020).

3.1.2.2 Investment-Grade Corporate Bonds

Investment-grade bonds are characterized by high credit quality, meaning a low probability of default. During our sample period we found a large concentration of investment-grade bonds within two sectors - 503 investment-grade bonds was issued by the real estate industry and 488 by utility.

3.1.2.1 High-Yield Corporate Bonds

A high-yield corporate bond is a type of corporate bond that offers a higher rate of interest because of its higher risk of default (SEC Pub. No. 150). Companies in need of capital, which are unable to loan from a bank, seek to the public equity or debt market. Due to already being highly levered, experiencing financial difficulties or being a smaller or emerging company, the issuer might have a lower credit rating (below Baa3 or BBB-), resulting in the need for issuing a high-yield with a higher interest rate to compensate the investors for the higher default risk.

3.1.2.2 Risk Factors Associated with High-Yield Corporate Bonds

Investors with a greater risk tolerance may find high-yield corporate bonds more attractive than investment-grade, especially in a low interest rate environment. (SEC Pub. No. 150). A bonds market price in the secondary market moves in the opposite direction than the market interest rate, exposing bond holders to interest rate risk.

Another risk factor to take into consideration, especially for high-yield corporate bonds, is the economic risk. If the economy is to falter, as it is in three different cases in this paper, investors may decide to get rid of riskier bond – resulting in an exceeding supply compared to demand for especially high-yield corporate bond, and leading prices of bonds to fall.

Additionally, we have the liquidity risk associated with bonds. Liquidity risk is the risk that investors seeking to sell their bonds may not receive the price that reflects the true value of the bonds, based on the bond´s interest rate and creditworthiness of the company (SEC Pub. No. 150).

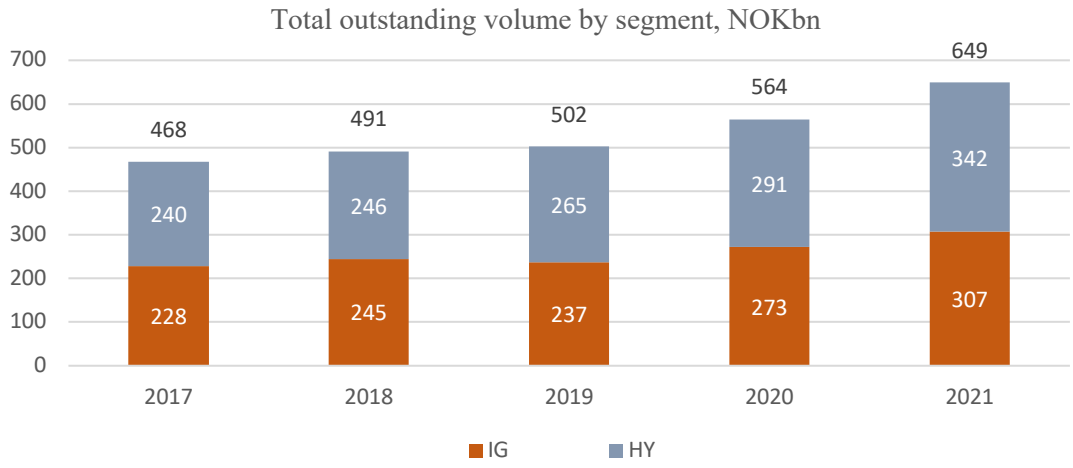
4 The Norwegian Bond Market and Recent Financial Crises

This section will introduce the Norwegian corporate bond market and the three crises relevant for this thesis.

4.1. The Norwegian Bond Market

Norway is the largest of the Nordic corporate bond markets, representing 51% of the total outstanding volume (Nordic Trustee, 2022).

The Norwegian HY market has a substantial share of non-Nordic issuers with a 35%+ of new issue volumes in 2021, reflecting the stronger position the Norwegian bond market has gained internationally (Nordic Trustee, 2022). At the end of 2021, high-yield stood for 53% of the outstanding volume.



Graph 4.1: *Total Outstanding Volume by Segment, NOKbn. Reference: Nordic Trustee*

The Norwegian high-yield market has a diversified industry sector mix, such as real estate, oil service, shipping, O&G E&P, and each industry stands for 10-20% of the issuance volume. On the other hand, the investment-grade market is dominated with 66% of issuance, exclusively from real estate and utilities.

The largest sector, the oil service, has had a negative growth over the past few years, while smaller sectors, such as IT/telecom, real estate, and finance, have had a substantial growth.

The Norwegian investment-grade market is nearly exclusively denominated in NOK with 98% share, while the high-yield market is more diversified. At the end of 2021, 43% of

outstanding Norwegian high-yield corporate bonds had NOK as the key currency, while 36% had USD and 16% EUR. This is unique compared to the rest of the Nordic market.

4.1.1 Corporate Bond Regulations

4.1.1.1 Regulations in the Nordic

The Nordic financial market, hereunder bond market, are considered to offer investors safe and regulated investment opportunities. Companies listed on the Nordic stock exchanges are generally transparent and under strong regulations. Requirements for being listed is to provide timely, reliable, and accurate information, benefitting the investors. The governments in all Nordic countries follow a strict supervision of the financial market.

4.1.1.2 Regulations in Norway

Issuing bonds in the Norwegian market is considered more efficient and cheaper compared to many international markets, especially outside the Nordic. For starter, there are no rating-fees for issuers, and the legal and trustee fees are minor when compared to international bond markets. Secondly, it involves less procedures and documentation – with no need for prospects to be listed. In other bonds markets the overall process can take up to 3 months, as of in Norway only 3 weeks (PwC, 2016). Moreover, Norway also has a low share of rated high-yield corporate bonds compared to others. For example, of the Norwegian corporate bond issuance volume, only 3% are rated high-yield bonds, while in Sweden the volume that are rated is 9% (Nordic Trustee, 2022). This is caused by a lack of requirement for ratings for high-yield. Finally, the aforementioned factors have made listing bonds on the Norwegian high-yield bond market more attractive to both domestic and foreign corporations.

4.2 A Walk-Through of the Three Latest Financial Crises

In this section the three most recent financial crises in Norway are in the spotlight. The crises will be sat in context with endogenous factors, meaning factors that are dependent of each other, and correlates during financial distress. We will see the factors in context with high-yield corporate bonds, which are the topic of this paper.

4.2.1 Corporate Bond Data for Reference

The process of issuing a bond in the Nordic is, as previously mentioned, in the regulatory section fast-tracked compared to other markets. We, therefore, included some lags according to some references, sectionizing pre, during and post crises. The overview of our period's breakdown can be seen in the table below:

Period (Crisis)	Date	Reference
Pre-Financial	January 2008 – August 2008	During financial distress[1], before Lehman
Financial	September 2008 – June 2009	Collapse of Lehman Brothers[2]
Post Financial	July 2009 – End of 2009	Norges Bank[3]
Pre-Oil	January 2014 – June 2014	Oil prices started declining June 2014[4]
Oil	July 2014 – February 2016	Oil prices started increasing February 2016[5]
Post Oil	March 2016 – E d of 2017	Ultimate low point at February 2016[6]
Pre-COVID-19	End of 2019 – February 2020	China started struggling with COVID-19[7]
COVID-19	March 2020 – December 2021	WHO assess COVID-19 as a pandemic[8], still ongoing as of date[9]
Post COVID-19	-	COVID-19 still affected the capital markets on our last data point.

Table 4.1: *Start and End Dates of the Period of Crises*

[1]*(NBER, U.S Business Cycle Expansions and Contractions, n.d.) The beginning is officially December/2007, but the data of this study starts in January/2008.*

[2]*Lehmann Brothers failed 14 September 2008 according to Phillip Swagel (2009)*

[3]*(Norges Bank, 2009)*

[4]*Oil price started declining June 2014 according to brent (USD). Data extracted from Bloomberg.*

[5]*Oil price started increasing February 2016. Data extracted from Bloomberg.*

[6]*Oil price did not start decreasing sharply again before COVID-19 hit in March 2020. Data extracted from Bloomberg.*

[7]*Closed the city of Wuhan on January 23 after confirmation of COVID-19 on January 20, 2020. (Wang, Zhang Z, Zhang Q, et al, 2021)*

[8]*(WHO, 2022). In addition, Norway closed on March 12th, 2020 (Regjeringen, 2020)*

[9]*Our data ends in December 2021 and this thesis is written in 2022, when it is not yet known when this recession will be over.*

4.2.2 Introduction to the Financial Crisis 2007-2009

The financial market was booming going into 2006 in the United States, as well as the housing market – resulting in a credit boom where many Americans bought houses with a high level of leverage. New financial instruments, such as default credit swaps (DCS), arose. They allowed participants to improve their hedging of underlying risk on commodities,

currency, bonds, or equities. With new and complex financial products, the financial market become less transparent and further facilitated for increased leverage.

When the housing market in the US started collapsing in 2008, the performance of securitized housing assets, such as mortgage-backed securities (MBS), started performing poorly by September 2008. This led to a rapid and massive disintegration of major firm's balance sheet, such as AIG and Lehman Brothers - resulting in the bankruptcy of the latter.

4.2.2.1 Corporate Bond Issuance During the Financial Crisis

Due to a lack of information regarding to bond issuance before the financial crisis, the effect of all factors mentioned hereunder is hard to estimate. According to our data, 31 bonds in total were issued before the recession, 90 during and 49 after. 4% of the total number of issuance and 5% of the total volume during our sample period was issued during the financial crisis. In the pre-financial period, twice as many Norwegian high-yield corporate bonds were issued than investment-grade, while during the crisis, the issuances decreased significantly down to 25 out of 65.
During the financial crisis, most corporate bonds issuance came from the following sectors: utility (44), F&S (18), oil service (12), and industrials (9). All, except for utility, were high-yield corporate bonds.

4.2.2.2 Endogenous Factors During the Financial Crisis

The factors that we have taken into consideration for having an impact on the Norwegian high-yield corporate bond market during the financial crisis are the credit spread, Oslo Stock Exchange, NOK, interest rate, and bank regulations & credit supply.

4.2.2.2.1 Credit Spread

From a somehow stable credit spread, the bond market was hit hard in mid-June 2008 with the credit spread in the US spiking from 6.4% to 21.44% in December 2008 – the highest level in recent history. After the worst financial turmoil, the credit spread started to decrease, reaching "normal" level pre-crisis by the end of 2009.

4.2.2.2.2 Oslo Stock Exchange

Following the collapse of Lehman Brothers, the stock market in the US slumped. Risk premiums surged in funding markets and equity prices plunged. On October 15, 2008, the Dow Jones Industrial Average dropped down 7.87% a day (-733.08 points).

The panic in the US spread rapidly to other financial markets across the world. By the end of 2008, Norway found themselves in the largest financial crisis since the Great Depression in the 1930s. The graph below shows the downturn in the Norwegian Stock Market starting in June 2008, whereas the OBX Index hitting its nadir on November 21, 2008, with 163 points.

Graph 4.2: *OBX Index & Volume 2008 - 2010. Reference: Bloomberg*

4.2.2.2.3 Norwegian Krone (NOK)

During the financial crisis in 2008, the NOK weakened sharply, caused by investors flight to large and safe heavens currencies, such as the US dollar and the Swiss franc. The currency regained its previous strength through 2009 and into 2010. Liquidity was also provided through currency swap agreements in both US dollars and euros.

Overall, the effect on the Norwegian Krone was minimal compared to the two later crises (Benedictow & Hammersland, 2022).

4.2.2.2.4 The Norwegian Central Bank Policy Rate

To stimulate the Norwegian economy, by increasing the liquidity and demand for investments and purchases, Norges Bank reduced the interest rate in October 2008. Towards December, the economy was in such bad state that the interest rate was sent further down to 3%, starting at 5.75% beforehand. The interest rate reached 1.25% during the autumn of 2009, before slowly being raised again. In a speech in November 2009, in the aftermath of

slicing the interest rate with 1%, the Governor Svein Gjedrem, from Norges Bank, said that the transmission mechanism is not functioning as previously between Norges Bank's key policy rate and the effects on activity and inflation.

4.2.2.2.5 Bank Regulations & Credit Supply

During the financial crises, 90 Norwegian corporate bonds was issued in total. We were not able to find data on how many of them was bought by Statens obligasjonsfond, a 50bn NOK fund created to add liquidity to the market and capital access for Norwegian companies during the financial crises. The fund, managed by Folketrygdfondet, was only allowed to invest in bonds issued by Norwegian companies. The fund was liquidated in 2014 (Folketrygdfondet, 2014).

Both banks abroad and at home in Norway were reluctant to lend to each other and was tightening their credit standards. Ivashina & Scharfstein (2010) showed that new loans to large borrowers fell by 47% during the peak of the crisis. It can be expected that, even though banks became more restricted on borrowing out money, the fund created by the Norwegian government also replaced the need for bank financing for some companies.

4.2.3 Introduction to the Oil Crisis 2014-2016

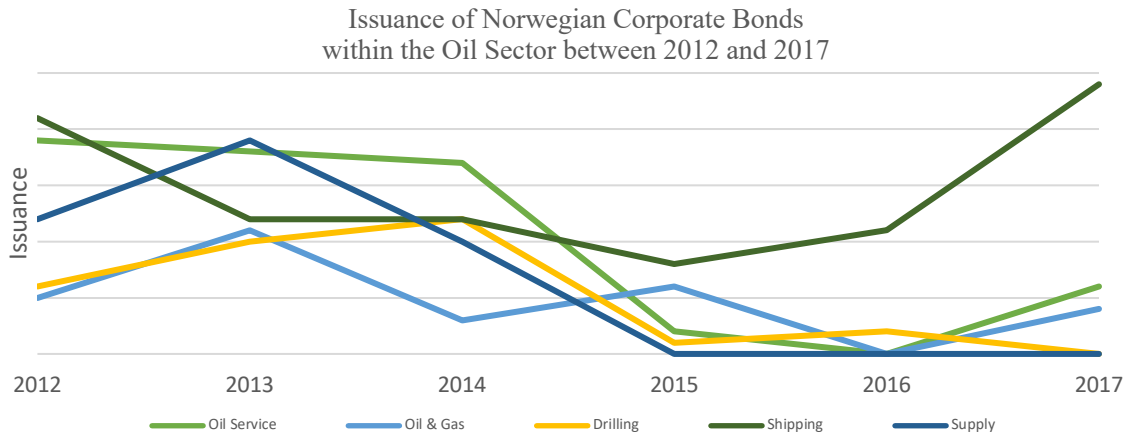
The global economy faced one of the largest oil-price shocks in modern history between mid-2014 and early 2016 with a 70% drop in the oil price, one of the three largest drops since World War II. The decline was triggered by a combination of surging U.S. shale oil production, shift in policies by OPEC (the Organization of Petroleum Exporting Countries), weakening growth prospects globally and reduced geopolitical risk for some key producers (World Bank Group, 2018).

4.2.3.1 Corporate Bond Issuance During the Oil Crisis

Before the fall of the oil price in June 2014, we found 107 issuances in total, whereas 50 of them are categorized as high-yield. Out of these, 26 of them were originated from the following sectors: Oil Service, Shipping, Drilling, and Supply.

As viewed in ***Graph 4.3***, the issuance dropped for all oil-relevant sectors in 2015.

In 2017, compared to 2016, the percentage of issued bonds classified as high-yield increased from 23% to 46%, mostly due to shipping. This is due to two potential reasons: 1) Companies within shipping needed capital instantly, and therefore issued bonds as soon as the market started improving. The banks also became more restricted when borrowing to the oil and shipping industry. 2) Attractive market conditions, such as low interest rate, made it possible for struggling shipping companies to upgrade expensive debt to cheaper debt in the aftermath. Most likely, the increase of issuance after are due to the combination of both.



Graph 4.3: *Issuance of Bonds During the Oil Crisis. Reference: Stamdata & Team Analysis*

4.2.3.2 Endogenous Factors During the Oil Crisis

The factors that we have taken into consideration for having an impact on the Norwegian high-yield corporate bond market during the oil crisis are the oil price, credit spread, interest rate and Norwegian Krone (NOK).

4.2.3.3 Brent Crude Spot Price

As mentioned in the introduction, the reason behind the crisis of 2014 – 2016 was indeed the rapid fall of the oil price, as shown in ***Graph 4.4***. Therefore, we are naturally including the oil price in our research.

Graph 4.4: *Brent Crude Spot Price (USD) & Volume 2012 – 2017. Reference: Bloomberg*

4.2.3.4 Credit Spread

During the oil crisis, the credit spread jumped from 3.35% before the oil price collapse in mid-July 2014 to 8.64% by February 2016.

4.2.3.5 Norwegian Krone (NOK)

Leading up to the summer of 2014, the Norwegian krone weakened to previously unseen level against the euro due to the strengthening of the latter, probably caused by the improved prospects for the European economy. The weaknesses continued from the summer of 2014 on because of the steep fall in oil prices. Since 2016, the development in the NOK has not been in line with fundamentals and the oil price (Benedictow & Hammersland, 2022). Compared to the financial crisis in 2008 and 2009, the Norwegian Krone did not recover just as easily.

4.2.3.6 The Norwegian Central Bank Policy Rate

After the rapid fall in the oil price from 2014, the Norwegian economy haltered going into 2015. All companies in the oil industry were struggling with continued decreasing demand, and, as a result, reduction in investments. To keep up the growth in the Norwegian economy, the interest rate had to decrease, so that companies and private persons can increase their consume and investments.

Another important reason for decreasing the interest rate was to keep the Norwegian krone (NOK) at a low level. A strengthen currency would result in a weakness of position for Norwegian companies compared to foreign competition.

Due to the previously mentioned reasons, Norges Bank decreased the interest rate in November 2014, and continued decreasing until March 2015, reaching a 0.5% interest rate.

4.2.4 Introduction to the COVID-19 Crisis from 2020

COVID-19 originated in Wuhan, China, in December 2019, and spread rapidly - causing a global pandemic within a short period of time. As of March 31, 2020, the global pandemic led to more than 800.000 confirmed cases and 40.000 reported deaths.

The outbreak of the COVID-19 pandemic induced governments to globally shut down major part of their economies to avoid spreading the disease – exposing a major part of companies to a potential liquidity crisis. Exogenously, COVID-19 increased the default risk for many firms by directly affecting their stream of future cash flows. Haddad, Moreira, and Muir (2020) documented that the default risk of riskier firms, but not that of safer firms, increased in early March 2020.

4.2.4.1 Corporate Bonds Issuance During COVID-19

The market for Norwegian Corporate Bond had grown from 31 issuance a year to over 100 per year before COVID-19. In our defined pre-covid sample, we found 101 issuances between October 2019 – February 2020. The market had already started noticing the troubles in China by then, so the fear and beginning panic are most likely affecting this period. Out of the total volume of 47,1 NOKbn issued, almost 30 NOKbn of the volume came from high-yield corporate bonds, indicating a market with corporates with high default risk rising debt and investors with an increased risk-appetite.

As previously defined, we define the beginning of covid-19 as March 2020 due to the assessment of COVID-19 as a pandemic by the WHO and consequently closing of Norway. The financial market had then started thrumbling, and the economy was suddenly completely shut down by the government. Between March 2020 and the end of our sample, i.e., December 2021, 414 Norwegian Corporate Bonds were issued, whereas 172 of them were high-yield corporate bonds. This accounts for 18% of the issuance of bonds during our sample period, although the time only covers below 14% of the total sample period – indicating a high level of issuance during the crisis, regardless of the instant freeze in the market after the close-down. On March 6th, there were two issues, followed by 20-days of zero Norwegian corporate bonds issuance. After Norway “closed down” on March 12, only

investment-grade bonds within real estate sector were issued, except an issuance from Schibsted on April 15th. This marks a long period with very few issuances, and zero high-yield issuances for one and a half month.

In 2020, the largest sectors within Norwegian corporate bonds issuance were the real estate, with 86 issuances, and the utility, with 49 issuances. In 2021, when the initial shock of the COVID-19 situation had sat, the market was still thumbling as a response to every bad news, such as a high level of infections, set-backs regarding the vaccine and a new round of closing shops, recommendation of home office and avoidance of social contact. The real estate sector issued a total of 109 bonds during 2021, whereas 33 of them were high-yield. All sectors - except for aquaculture and utility, which saw a reduction of one and four, respectively - increased their issuances during this year, indicating an exploitation of the market conditions provided by the factors mentioned in the next section.

4.2.4.2 Endogenous Factors During COVID-19

The factors that we have taken into consideration for having an impact on the Norwegian high-yield corporate bond market during COVID-19 are the credit spread, interest rate, Oslo Stock Exchange, and Norwegian Krone (NOK).

4.2.4.2.1 Credit Spread

The Credit Spread in the US bond market remained stable and low after the oil crises, until February 2020 – and the news of COVID-19 started influencing the global financial market. From a low level at 3.6% in February 2020, almost 11% was reached within a month. However, in the aftermath of the initial shock, the credit spread decreased and remained at the lowest levels in recent history by the end of summer 2021 until the end-of-year. This observation is in accordance with our literature review, which says that the liquidity provided by FED to the bonds market during this period resulted in a reduction of the credit spread.

4.2.4.2.2 The Norwegian Central Bank Policy Rate

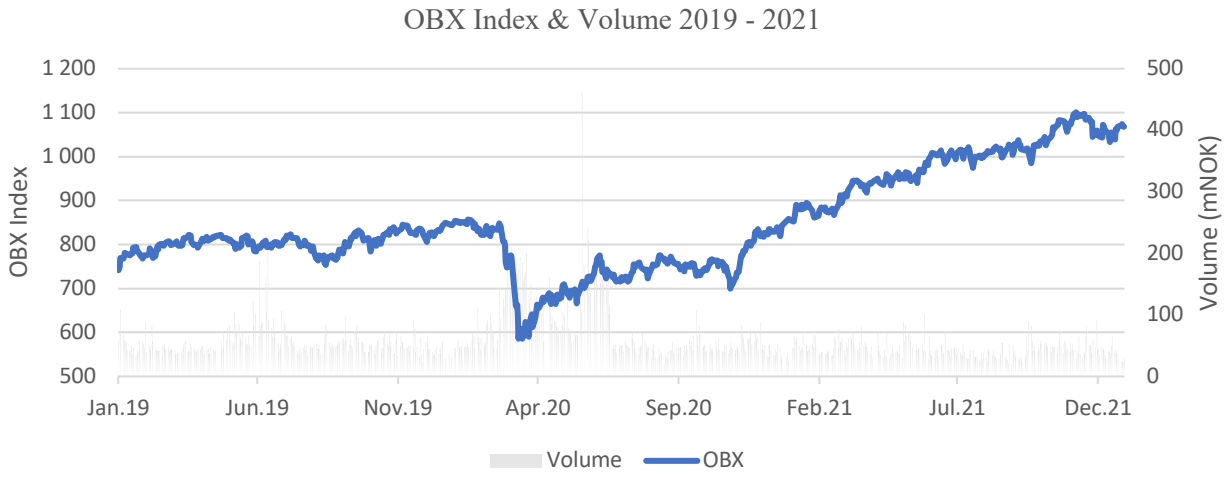
The shutting down of the society in March 2020 resulted in a high level of unemployment and high financial distress for both private persons and companies. To stimulate the economy and use of money, Norges Bank decreased the rate several times until reaching 0% in May 2020. Due to the returning feature of the COVID-19 disease, the interest rate was kept at 0%

until September 2021. At the end of 2021, the interest rate was still at a low level, ending the year at 0.5%.

Decreasing interest rate increased the bond price. Given the low interest rate in 2020 and 2021, corporations seem to have been on a borrowing-binge looking to change their high-cost debt in favor of issuing new bonds at a lower rate. Some investors consider bonds to have an attractive feature of hedging during a stock bear market as well.

4.2.4.2.3 Oslo Stock Exchange

With lower future expected cash flow, as mentioned in section 4.2.4, the market value of a firm's equity decreases, and the company is devaluated at a lower value in the stock market. This resulted in a high level of volatility in March 2020 and a long downturn on Oslo Stock Exchange, with the first large one-day fall at 12% at the day of the initial lockdown, on March 12, 2020.



Graph 4.5: *OBX Index 2019 – 2021. Reference: Bloomberg*

The liquidity crisis resulted in companies in desperate need for cash, and, in combination with attractive market conditions, such as a low interest rate, both the supply and demand side for Norwegian corporate bond increased – potentially resulting in a record high issuance of bonds during the pandemic.

For reference on how the global stock market was affected, it is worth mentioning that the largest point drops in history on the industry index Dow Jones Industrial Average happened

on March 16, 2020, due to concerns over the ongoing pandemic, resulting in the index hitting 2997 points, a daily downfall of 12,96% (Domm, 2020).

4.2.4.2.4 Norwegian Krone (NOK)

Over the last years the weakness in NOK against EUR and USD has been substantial. Economists have been surprised, especially in 2019, by the weakness of NOK, considering the traditional drivers such as positive carry versus the EUR, low unemployment, good GDP development and increased oil price.

FX denominated bonds became more normal after the oil crisis and was well received by investors due to its hedging effect, which was considered “easy” and “cheap”. Hedging is positive if the price volatility of the underlying asset is smaller than the FX volatility (Kjennerud, 2022).

The substantial weakness in NOK against EUR and USD over the last years before COVID-19 created an opportunity to take on unhedged Nordic high-yield exposure, investment-grade exposure (or a combination) with a significant positive carry as compensation against the risk of a weaker NOK. (FIRST, 2020). For instance, the spread between 3-month EURIBOR and 3-month NIBOR was at 2.20% at the end of 2019, according to date collected from Macrobond.

It is important to note that hedging reduces FX risks but increases liquidity risk, and NOK has proven to be more sensitive to the global risk sentiment during crises.

5 Methodology

In this research, there will be performed a regression model that aimed to address the flow of High-yields bonds issues during periods of global crises, which we analyzed and compared to the outputs from the summary statistics obtained from the Norwegian corporate bonds market, such as the annual split of issued bonds between high-yield, investment-grade, and sector-issuance for the HY segment.

5.1 Data

This section presents the data used in this study.

5.1.1 Data Description

A fully description of our data is found as follows:

5.1.1.1 Corporate Bonds Issued in the Norwegian Bonds Market

List of all deals carried out in the Norwegian corporate bonds market in the period from 1st January 2008 to 31st December 2021. Such dataset contains the following information:

- Name of the issuer
- Industry of the issuer
- Deal pricing date
- Type of credit
- Issue type
- Rating
- Currency
- Interest
- Maturity
- Coupon
- Size

The data was extracted from Stamdata (Nordic Trustee) between January 2021-2022.

5.1.1.2 The Norwegian Central Bank Policy Rate

Daily observation of policy rate during the period from 1st January 2008 to 31st December 2021. The data was extracted from Norges Bank (Norges Bank, Policy rate).

5.1.1.3 FX Market for the Norwegian Krone (NOK)

Norges Bank's exchange rates of NOK/USD and NOK/EUR during the period from 1st January 2008 to 31st December 2021. These are middle rates, i.e., the mid-point between buying and selling rates in the interbank market at a given time, and they are only intended to serve as an indication. The data was extracted from Norges Bank (Norges Bank, Exchange rates).

5.1.1.4 OBX Total Return Index

Daily total return on the Oslo Stock Exchange Index (OBX), in NOK, during the period from 1st January 2008 to 31st December 2021. Data got extracted from Bloomberg.

5.1.1.5 Firms' Total Assets

Total assets of the firms at the time of each issuance of corporate bonds to categorize them according to their size, such as large or small.

The thresholds follow the European Commission guidelines (European Union, 2015), as seen in ***Table 9*** in the Appendix, with the exception that, for the purpose of this thesis, medium-sized, small, and micro will fall in the same category, defined as small size.

5.1.1.6 Stock Prices

Daily return, in NOK, during the period from 1st January 2008 to 31st December 2021, on the following stocks: AKER.OL; HAVI.OL; SNI.OL; BONHR.OL; ODF.OL; and NAS.OL. Data extracted from Refinitiv Eikon.

5.1.1.7 Brent Crude (ICE)

Daily price of the Brent crude oil future contract in USD/bbl. during the period from 1st January 2008 to 31st December 2021, which serves as a benchmark price for purchases of oils worldwide. Brent Crude are used to price two thirds of the international traded crude oil supplies. This data was extracted from Bloomberg.

5.1.1.8 ICE BofA US High-yield Index Option-Adjusted Spread

Daily spread, in percentage, in the period from 1st January 2008 to 31st December 2021, between the US dollar denominated below investment-grade rated corporate debt publicly issued in the US domestic market and a spot Treasury curve. The reason was this data is from the US is that there is not enough data in Norway to create a benchmark. This data was extracted from FRED, Federal Reserve Bank of St. Louis. (Ice Data Indices, LLC)

All data is collected and analyzed in a matter that complies with legal and ethical regulations – NSD.

5.1.2 Sample Selection

Our main data source is Stamdata (Nordic Trustees). The sample period is from 2008 to 2021, making it possible to cover the three recent major financial crises mentioned previously. For summary statistics purpose, all bonds issued during this period are observed. For regression purpose, to be included in our sample, a firm must have had issued corporate bonds at least 3

times during this period and be considered of a large size, which give us a total of 1,442 observations across 148 companies. Then, we summed up the quantity and size of the issuances at a monthly frequency during the data period, which generated 168 observations for our regression.

5.2 Methodology

This section presents and discusses our methodology.

5.2.1 Definition of Variables

The variable of study here will be the proportion (%) of high-yield to the total amount of issued bonds. Time-series regression will be used to run monthly observations with time fixed effects.

The explanatory variables will be the 2008 and 2009 financial crisis, oil crash crisis and COVID-19 pandemic. There will be a dummy variable for each event in each month. The accurate inflection points between a period of crisis and non-crisis are expected to be in line with the following date range:

Period #		From	To	No. Months
1	Financial Crisis	January/2008	June/2009	18
2	-	July/2009	June/2014	60
3	Oil Crash Crisis	July/2014	February/2016	20
4	-	March/2016	February/2020	48
5	COVID-19 pandemic	March/2020	December/2021	22
Total No. Months				**168**

Table 5.1: *Overview of the data period*

To control for any variation that is not of primary interest of this research, it is necessary to include a set of time-fixed effects in the specifications, such as the interest rate, stock market return and credit spread for HY bonds. These control variables will be defined as monthly averages to align with the monthly observations. Other relevant factors, such as size of firms (***Table 9*** in the appendix) type of industry, term-to-maturity, and currency also need to be adjusted for in the data regression. The industries of this study are the following: Utility, TMT, Supply, Shipping, Real Estate, Oil Service, Oil & Gas, Industrials, F&S, Drilling and Aquaculture.

The interest rate control variable is included in the regression due to its inverse relationship to bonds issues. When interest rate rises, bond prices usually fall, and so does bonds issuance, and vice-versa.

There is also a relationship with the stock market. During recessions, bond and stock markets tend to have a positive relationship due to the low interest rate. During this period there is an increase in bonds issuance caused by the higher prices while stocks perform better since investors would be looking for higher returns. On the other hand, in periods of economic expansion, they tend to have a negative relationship because they are competing for capital.

The credit spread measures the difference between the required returns on corporate bonds and the risk-free rate of similar maturity (typically government bonds). The spreads quantify the risk premium required by investors to compensate for default risk.

The size of firm is due to the economies of scales, resulting in a lower fixed cost of issuance for larger firms.

By splitting the data into industries, it was possible to observe how the impacts of economic crises at the primary issuance of HY bonds differs across industries. The data is also split by maturity, due to usually the higher the maturity, the higher the spread, meaning also higher rates of return. The bonds term-to-maturity are split as following: 1 to 3 years; 3+ to 5 years; 5+ to 10 years; and over 10 years. All figures will be standardized in NOK.

We also performed an analysis of the oil price and the Norwegian krone (NOK) movement on the primary issuance of HY bonds. For this, we used the oil crash crisis period, and lagged the issuance in two months to observe the effect. That is due to our estimates that the phenomenon of perceiving well market conditions and taking advantage of that by issuing this type of credit takes approximately two months. Nevertheless, we also examined the effects with 1-month lag and without any lag.

A monthly proportion of high-yield bonds issued are regressed on those factors through a time series regression, both in size and number of issuances, to investigate whether it has changed from prior to during the crises.

5.2.2 The Regression

$$HY_t = \alpha_t + \beta.FINCRISIS_t + \delta.OILCRISIS_t + \gamma.COVID19_t + Controls + \varepsilon_t$$

The dependent variable (HY) is a measure of the high-yield bonds issued in the month. For each month, it was obtained the proportion of this type of credit in relation to the total credit from the primary market, that means, High-yield plus Investment-grade bonds.

The independent variables are dummy variables for the 3 observed periods: 2008 financial crisis (FINCRISIS); oil crash crisis (OILCRISIS) and COVID-19 pandemic (COVID19), which equals one if the month is within the time range of the crisis in question and equals zero otherwise. The time fixed effects will be captured by the coefficient alpha, α_t.

The main objects of interest are the three coefficients of the independent variables, i.e., β, δ and γ, that will explain the relationship between the amount of High-yield bonds and those specific periods of time.

5.2.3 Event Study

In addition, this thesis also includes the analysis of the trends in the stock prices of companies publicly listed following the issuance of high-yield bonds.

The event studies approach is based on an Event Window of 6 months, according to the following timeline:

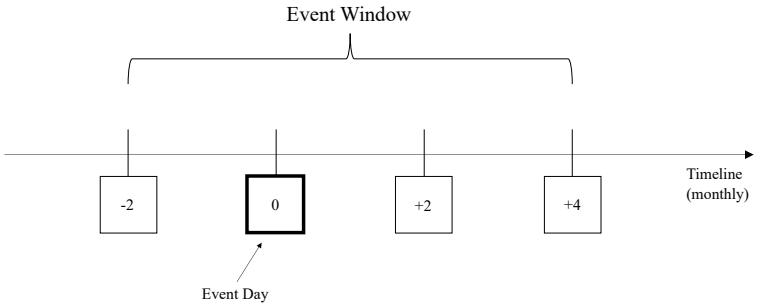


Figure 5.1: *Event Window of the Event Study*

For this research, we assumed that the month has 30 days.

Our Estimation Window is the period of our main data, i.e., from Jan/2008 to Dec/2021. Since there are several bond issues during the whole period, a long-term estimation seems more accurate.

For this study, it was collected data from 6 of the companies that most issued High-yield bonds in the primary market during the data period. All emissions that would interfere in the observed period of each other were excluded.

The Event Day is the day in which the specific event has occurred. In this study, it is the launch date of High-yield bond issue in the primary market. This is when the deal is announced, and the book is opened. Since our data was based on the deal pricing date, and according to the PWC, 2016, we estimate 3 weeks before for the launch date.

The abnormal returns were calculated for each interval over the observation period, as per ***Figure 5.1*** above. These are estimated by the difference between the daily returns on the selected firms' stocks and their expected returns, which are calculated by the single factor market model using the daily return on the Oslo stock market index (OBX) as their reference market index. The coefficients α and β of the market model are estimated by ordinary least squares (OLS) from the Estimation Window. So, our expected return is calculated as follows:

$$E[R_{i,t}] = \alpha_i + \beta_i \, x \, R_{m,t}$$

where $E[R_{i,t}]$ is the expected return on the stock of company i at day t and $R_{m,t}$ is the return on the market index at day t.

Following, the abnormal daily returns (AR) of company i at day t is given as follows:

$$AR_{i,t} = R_{i,t} - E[R_{i,t}]$$

where R_{it} is the real return on the stock of company i at day t.

To examine abnormal returns in each interval of time for multiple events of the same event type, we calculate the average abnormal return (AAR):

$$AAR_t = \frac{1}{N} \sum_{i=1}^{N} AR_{i,t}$$

Finally, the average cumulative abnormal returns (CARs) are calculated by summing up the average abnormal returns for each time window.

$$CAR(t_1, t_2) = \sum_{t=t_1}^{t_2} AAR_t$$

If abnormal return occurs in the following 2 months from the Event Day, so the market is responding to the quality of that information/event. However, if we continue to observe significant abnormal returns up to 4 months after Event Day, we should question the validity of efficient market hypothesis with respect to this event. Moreover, if we start observing abnormal returns prior to the Event Day, i.e., 2 months before, we verify that there might have been insider information.

5.3 The Hypotheses

We wanted to investigate the issuance volume of Norwegian corporate high-yield bonds during the three recent crises, so our main hypothesis was as following:

Hypothesis 1: Do economic crises positively affect the amount of issuance of HY corporate bonds in the primary market when controlling for relevant factors?

In the case of hypothesis 1 is satisfied, we would investigate further questions, such as:

Hypothesis 2: Do economic crises positively affect the size of the issuance of HY corporate bonds in the primary market when controlling for relevant factors?

Hypothesis 3: Are companies from different type of sectors expected to face different changes on their issuance of HY bonds during crises?

Hypothesis 4: Does the issuance of bonds with distinct term-to-maturity differ during crises?

Hypothesis 5: Market security prices are related to the primary issuance of bonds during period of crises.

Hypothesis 6: The high oil price and the appreciation of the Norwegian Krone (NOK) contribute positively to the primary issuance of HY bonds in approximately two months.

6 Results

In this section we will present our results and discuss them.

6.1 Main results

Table 10.1 in the Appendix contains our main results. It shows the average effect of each crisis across all industries.

The constant terms (interceptions) of our regression have no value for our analysis, so they were disregarded. Moreover, there was not enough data for HY bonds with term-to-maturity over 10 years, so we will also disregard this analysis and focus on the bonds with term-to-maturity between 1 and 10 years.

The significant results for the percentage of HY bonds monthly issued in the primary market was very similar in terms of quantity and size, so we will consider the proportion of this type of credit in general terms. This is in accordance with our expectations of finding a direct relationship between these variables.

The coefficients estimate of 2008 financial crisis for all the industries are not statistically significant at 10% at least, therefore the outcome is not significantly predicted by this variable. It is not possible to make any conclusion on how the financial crisis affected the bonds market through our model.

On another hand, the oil crash crisis and COVID-19 pandemic seem to have had significant impacts to certain industries.

The oil crisis negatively affected the issuance of High-yield bonds with term-to-maturity of 1 to 3 years for the Shipping and Supply industries, with 10% confidence level, and the High-yield bonds with term-to-maturity of 3 to 5 years for the Shipping industry, also with 10% confidence level. The coefficients for the bonds with term-to-maturity between 1 and 3 years of the Shipping and Supply segments on the OILCRISIS dummy are -0.158 and -0.106, respectively, both in quantity and size, implying that the percentage of these type of bonds issued by these industries drop by around 15.8 and 10.6 percentage points during this period, respectively. The 3-5-years-term-to-maturity bonds of the Shipping industry drop by around 18.8 percentage points during the period. This is in line with our expectations, since there was a sudden drop in the oil price, whereas oil is the foundation of their services. The market

conditions for issuing bonds for oil supply and shipping companies was, because of the decreasing oil price, poor – and the companies was not able to raise capital through the debt market as a result.

The COVID-19 pandemic negatively affected four sectors: F&S, Industrials, Oil & Gas and TMT. At 10% significance level, Industrials and Oil & Gas had their coefficients for the HY bonds with term-to-maturity of 3-5 years on the COVID19 dummy of -0.176 and -0.143, respectively, both in number of issues, implying that the percentage of HY bonds issuance by these industries drop by around 17.6 and 14.3 percentage points during the pandemic, respectively. The same term-to-maturity bonds issue fell, in quantity, by 20.0 percentage points in the F&S industry, with 1% significance level. The TMT sector, however, had an impact in the 1-3 years term-to-maturity bonds issue of 15.6 percentage points, with 5% significance level. As a result of global financial distress, the central banks decreased the interest rate – making F&S and TMT a less attractive stock for investors, resulting in a decreasing market value of equity for the companies. Therefore, it is natural that the same companies also face tougher market conditions while issuing bonds, because of decreased future earning potential. Oil & Gas was expected to decrease their issuance, due to the oil crisis, making investors search for safe heavens in a turbulent stock and capital market. We believe that the methodology of excluding small companies resulted in a decrease of issuance for industrial companies, whereas the large one remaining in our data set can finance through banks or have access to reserve cash if needed during time of crises.

The Key Interest Rate by Norges Bank and Credit Spread controls were only statistically significant, in both number and size of issuance, for the 3-5-years-term-to-maturity bonds from the F&S and Oil Service industries, respectively, suggesting that it might not be relevant to control for these factors. On the other hand, the Stock Market Return control was statistically significant, in both number and size of issuance, for 3 industries when considering 1-3-years-term-to-maturity bonds, being Drilling, Supply and TMT; for 4 industries when considering 3-4-years-term-to-maturity bonds, being Oil & Gas, Oil Service, Supply and TMT; and for 1 industry, Shipping, when considering 5-10-years-term-to-maturity bonds. However, coefficients on the Stock Market return variable are very close to zero, which suggest no significant effects to be controlled for.

One point that we would like to highlight is that the credit spread may not have been relevant due to potential mismatch between the US and Norwegian bond market. As mentioned in our

theoretical framework, during COVID-19, for example, the US credit spread decreased significantly due to the FED intervention, and it is not possible for us to infer whether and how it impacted the Norwegian market. A separate study for that is deemed necessary to obtain further conclusions.

The insignificance of many of the variables in this model might be because the sample size is too small, which could have been enhanced by the split of the data by type of industry and term-to-maturity. This might account for the financial crisis result.

The adjusted R-squared for all the regressions had very low values, which may suggest the model is not a good fit, and we might be missing out some relevant independent variables. This conclusion is made combined with the overall high p-values of the independent variables.

Further researchers should try to use larger sample size and look at different set of variables than the ones in this study.

6.2 Complementary Analysis

Table 10.2 in the Appendix contains our complementary analysis. It shows the average effect of the oil price and the Norwegian krone movement to the HY bonds issues.

We found no significant results for the analysis of whether the oil price and the Norwegian krone movement affect the primary issue of High-yield bonds when considering 2-months lag observation. So, it is not possible for us to predict any linear dependence for a time of reaction of the market of 2-months, as suggested previously in this study. Then, we decided to verify the scenarios for 1-month lag and no lag to see whether we could observe any effect. Also, no significance when looking at the 1-month lag. On the other hand, in the analysis of the proportion of HY bond issue without a lag after observing oil price and Norwegian krone movement it was possible to find a significant positive relationship with the oil price. The estimates coefficients for both size and number of issuances on the BRENT variable are, respectively, 0.004, implying an increase of 0.4 percentage points, with 10% confidence level, and 0.005, implying an increase of 0.5 percentage points, with 5% confidence level. This result may suggest a tiny immediate reaction from the bond market to the fluctuation of the oil price. Here we expected to see a significant reaction with a lag of two months. The

Interest Rate control was statistically significant, in both number and size of issuance, suggesting that it might be relevant to control for this factor.

6.3 Event-study Results

In this study we investigated how the stock market respond to the issuance of high-yield corporate bonds. The main difficulty of this study is the choice of event date since the announcement date is not known precisely. Because of that, we were conservative by pushing this date back 3 weeks from the deal pricing date and accounted for a 2-month interval to observe a cumulative abnormal return.

The event study results are reported in ***Table 9.3.1*** in the Appendix. The sample includes 31 issues across 6 companies with high level of issuance during the data period. All events are independent and isolated.

As shown in ***Table 9.4*** in the Appendix, the average CAR in the event window that follows the event day [0,1] and [0,2] are 3.01% and 3.69%, respectively, and statistically insignificant. Moreover, the other intervals immediately before and after those event windows are insignificant, except from the [-2,0] that had a significant average CAR of 6.45% at 10% confidence level. This, however, should not be interpreted as an insider information since there is no significance for any event windows following the event day, suggesting no evidence that the stock market does react to that kind of events. One could also think our estimated event day was a little advanced in time, which we also disregard due to the insignificant of the event window [0,1]. The issuance process can take 4-5 weeks, or even less if the issuer has listed bonds in the past (PwC, 2016). In that regard, we consider a period of 1 month prior to our already conservative back-in-time-event-day not relevant for this analysis. We may attribute that significant abnormal return to other kind of public information that affected the stock market.

Our analysis conclude that the stock market does not show any significant reaction to HY bond issue, which agrees with the literature, such as Ederington, Guan & Yang (2015), that the stock market is typically unresponsive to conventional bond issues.

7 Conclusion

Economic crises positively and negatively affected the amount and size of issuance of high-yield corporate bonds in the primary market. Companies from different type of sectors was seen to change their issuance of HY bonds at different levels during crises. Due to zero significant values found for the financial crisis, no further conclusions will be drawn. During the oil crisis, shipping and supply decreased their issuance of high-yield bonds, and this can be attributed to the downturn in oil prices. As for the COVID-19 crisis, we found a declining amount of high-yield corporate bonds issuance for the TMT sector.

Since our significant results fell mostly in the 1-to-3-years and 3-to-5 years maturity groups, which are timeframes still considered to be short-term, we find it not possible to draw conclusions about correlations between HY bonds issue and term-to-maturity during crises.

Neither did we found evidence that the high oil price and the appreciation of the Norwegian Krone (NOK) contributed positively to the primary issuance of high-yield corporate bonds in approximately two months. Further investigation should be made into the timing of reaction for the Norwegian bond market on shocks.

According to our event study, there is no relationship between market security prices and primary issuance of high-yield bonds during period of crises.

Finally, our research does not enable us to identify correlation from our proposed factors with high-yield bonds issuance during the three latest crises, apart from the null correlation with the stock market. On further studies on this topic, we recommend researchers to include larger sample size and look at different set of variables or other factors.

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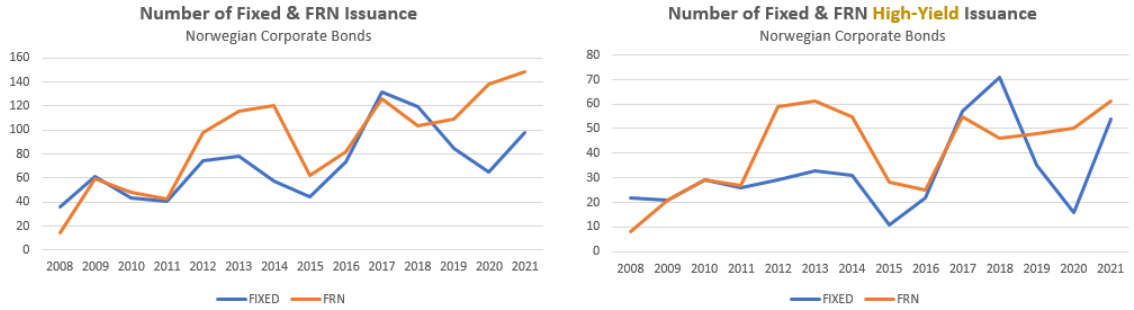
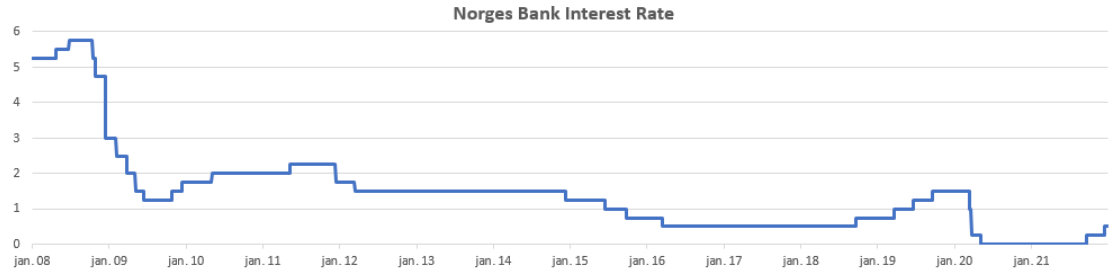
9 Appendix

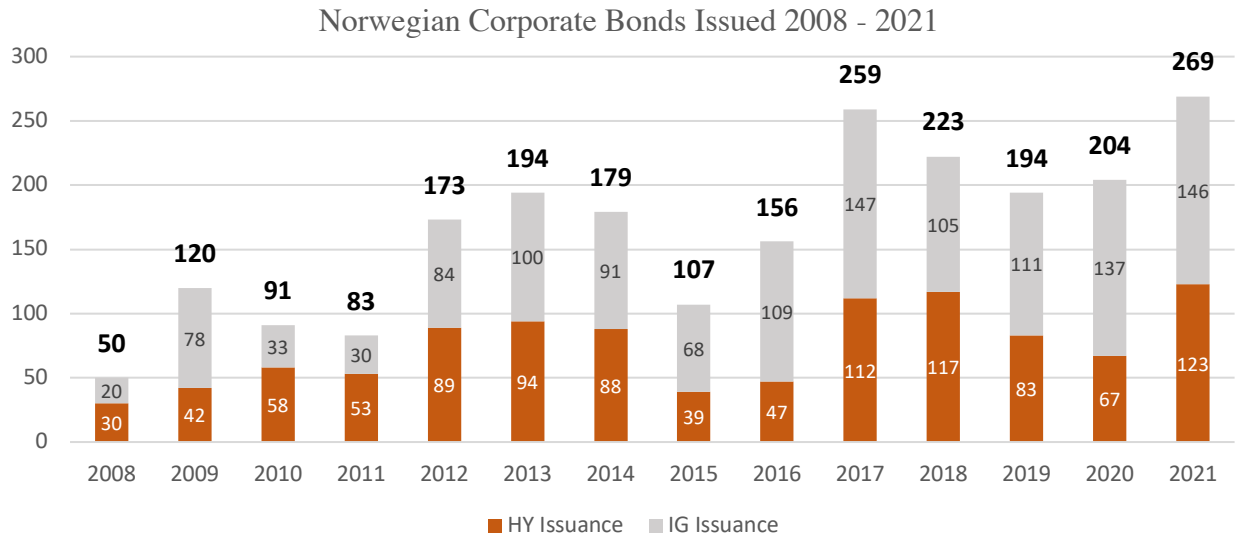


Graph 9.1: *Number of fixed and floating rate issuance, both IG and HY, and HY exclusively.*

Reference: Stamdata & Team Analysis

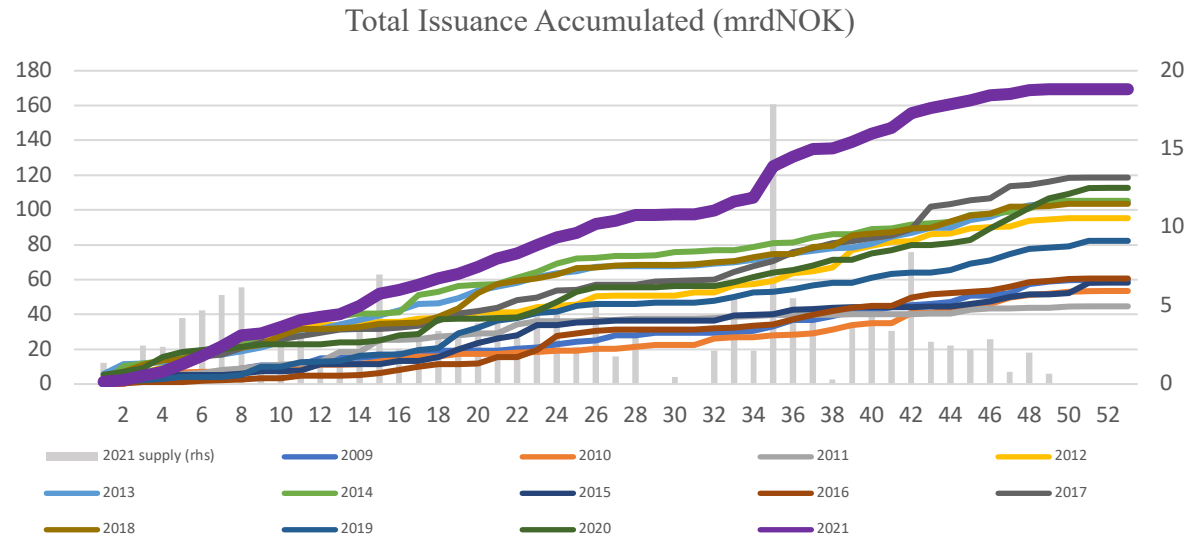


Graph 9.2: *Norges Bank Interest Rate 2008 – 2021. Reference: Norges Bank*

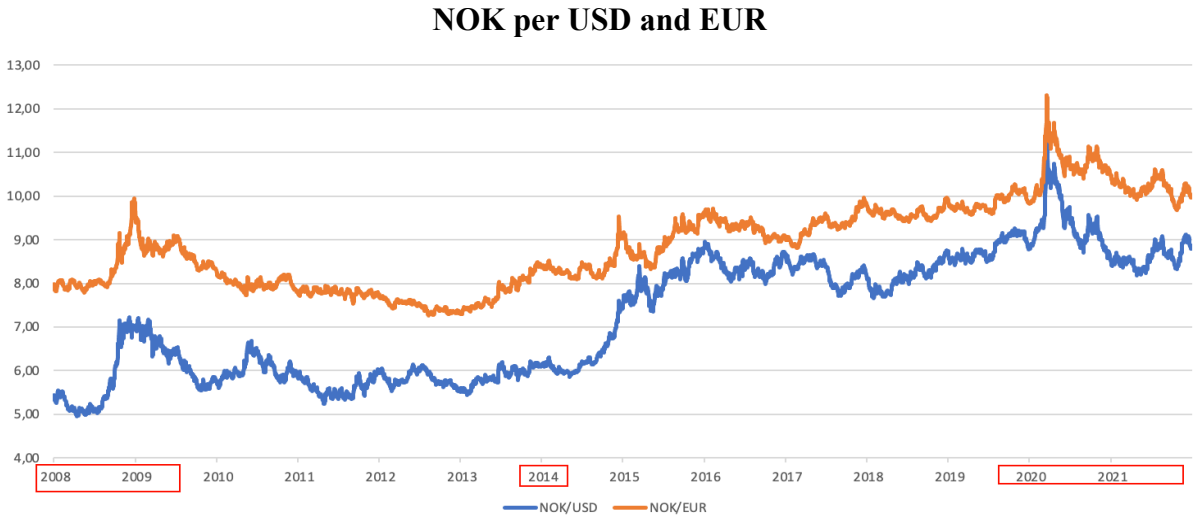


Graph 9.3 *Norwegian Corporate Bonds Issuance 2008 – 2021*

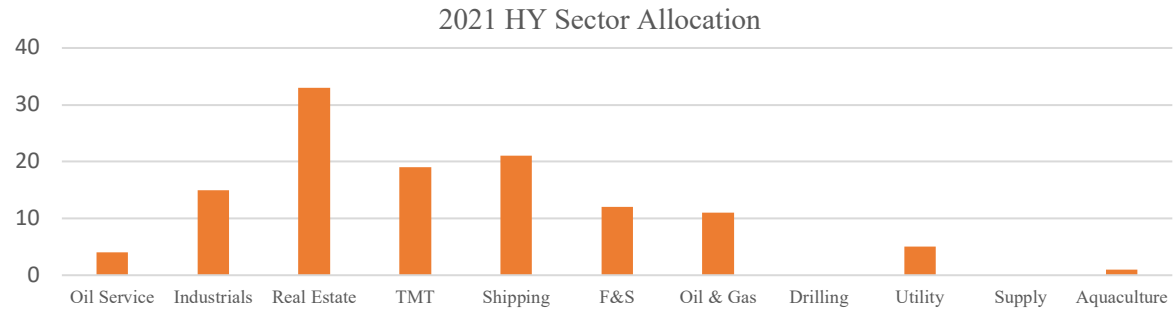
Reference: Stamdata & Team Analysis



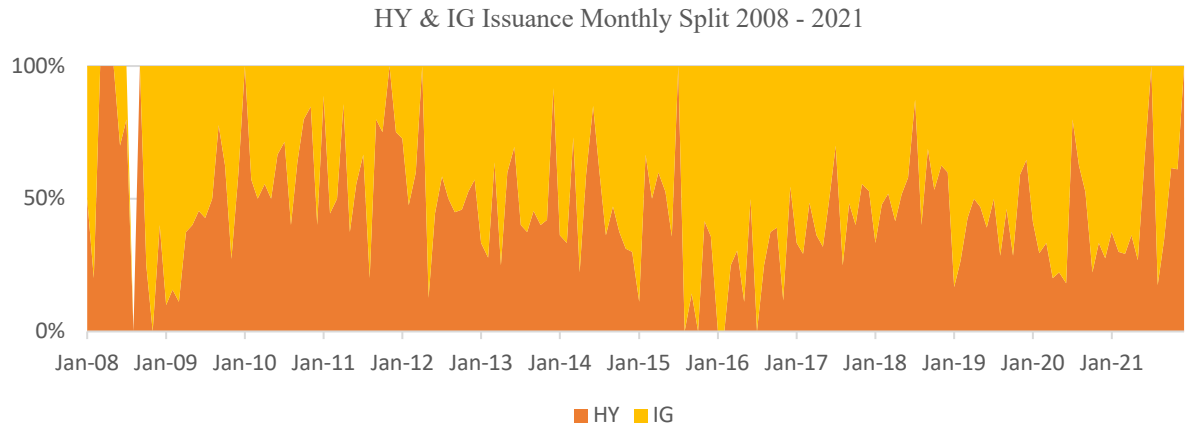
Graph 9.4: *Total Issuance Accumulated of Norwegian Corporate Bonds split in weeks (mrdNOK) 2009 – 2021. Reference: Stamdata & Team Analysis*



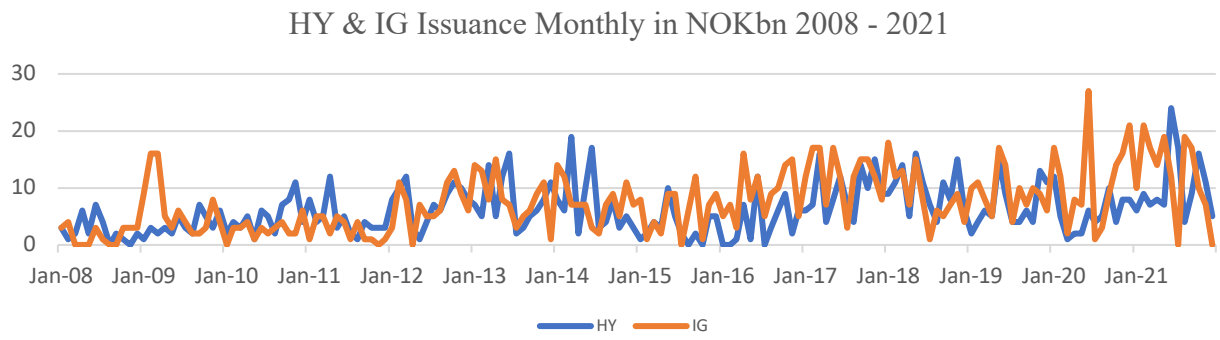
Graph 9.5: *NOK per EUR and NOK per USD 2008 – 2021. Reference: Norges Bank*



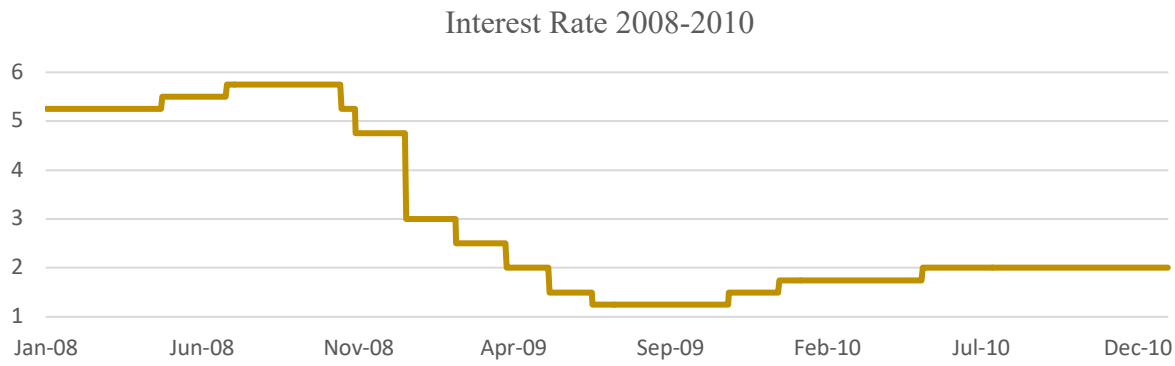
Graph 9.6: *High-yield Sector Allocation in 2021. Reference: Stamdata & Team Analysis*



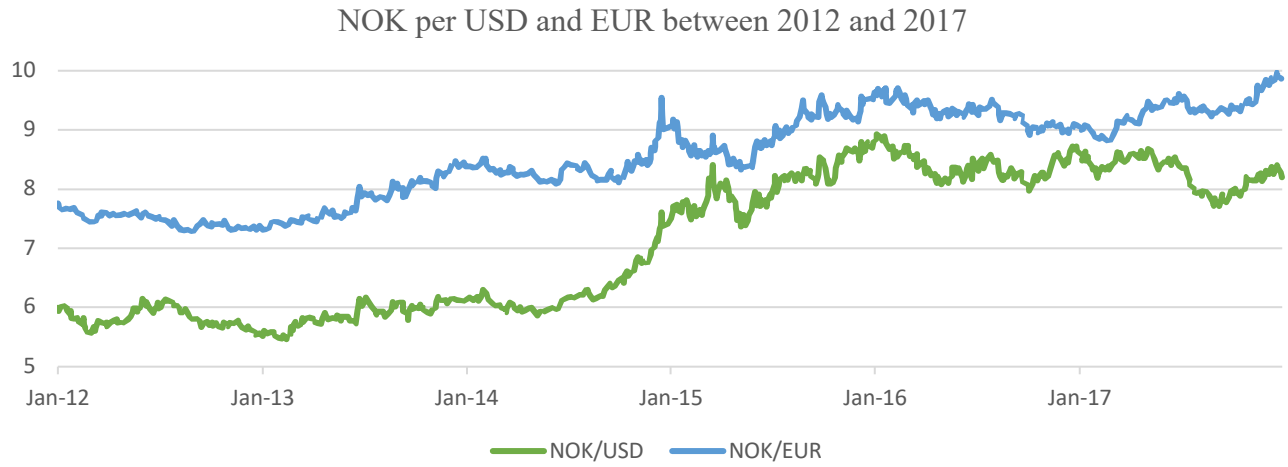
Graph 9.7: *HY & IG Issuance Monthly Split 2008-2021. Source: Stamdata & Team Analysis*



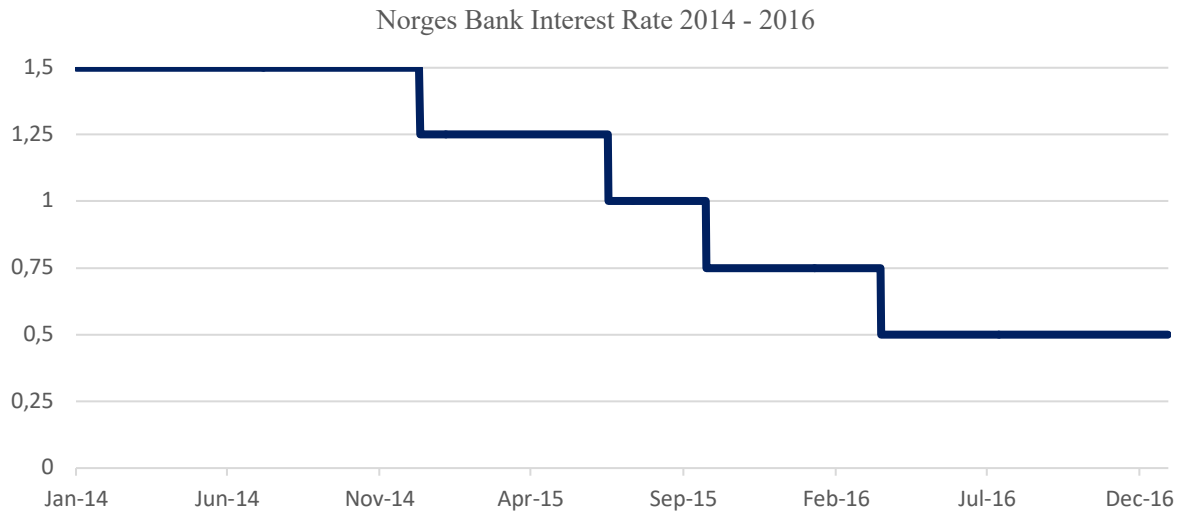
Graph 9.8: *HY & IG Issuance Monthly 2008-2021. Source: Stamdata & Team Analysis*



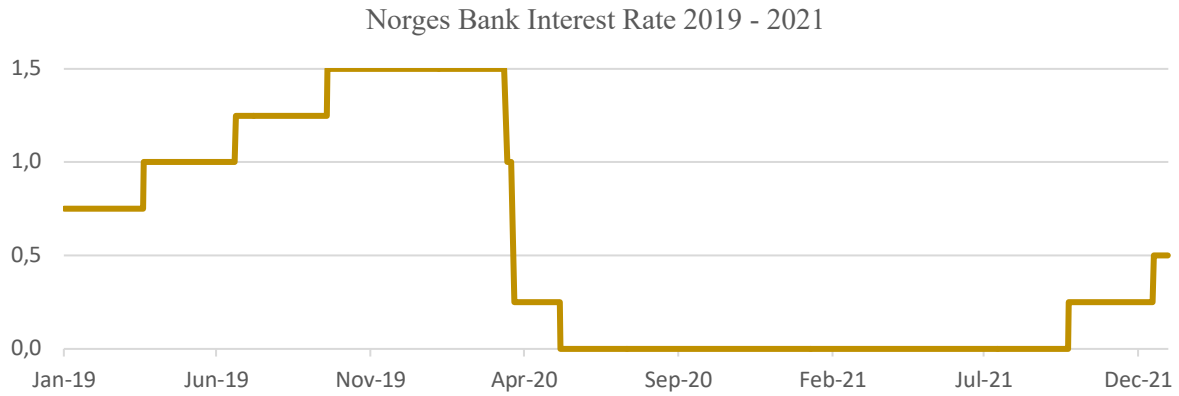
Graph 9.9: *Interest Rate 2008-2010. Reference: Norges Bank*



Graph 9.10: *NOK per USD and EUR 2012 – 2017. Reference: Norges Bank*



Graph 9.11: *Norges Bank Interest Rate 2014 – 2016. Source: Norges Bank*



Graph 9.12: *Norges Bank Interest Rate 2019 – 2021. Source: Norges Bank*

Thresholds *(Article 2)*

Enterprise category	Headcount: Annual work unit (AWU)	Annual turnover	*or*	Annual balance sheet total
Medium-sized	< 250	≤ EUR 50 million	*or*	≤ EUR 43 million
Small	< 50	≤ EUR 10 million	*or*	≤ EUR 10 million
Micro	< 10	≤ EUR 2 million	*or*	≤ EUR 2 million

Table 9.1: *The European Commission guidelines for company size.*

Reference: European Union, 2015

10 Appendix – Results

FINCRISIS, OILCRISIS and COVID19 are dummy variables that equal one if the amount of high-yield bonds issued in that month is within the time range of the 2008 financial crisis, the oil crash crisis, and the COVID-19 pandemic, respectively. Interest Rate is the interest rate set by the Norwegian Central Bank. Stock Market is the return of the Oslo Stock Exchange Index (OBX). Credit Spread is the adjusted credit spread for the US High-yield bonds index. The coefficients are estimated using ordinary least squares (OLS). The sample consists of 168 monthly observations for large-sized firms with number of total issuance equal or higher than 3 times during the observed period. The sample period is from 2008 to 2021. t-Statistics are in parentheses. *, **, and *** denote significance at the 10%, 5%, and 1% levels, respectively.

Table 10.1 – Main Results

Viewed in Table 10.1.1 – 10.1.6

Dependent variable:	% HY bonds issues, with term-to-maturity 1-3 years, in quantity										
Industry:	Aquaculture	Drilling	F&S	Industrials	Oil&Gas	Oil Service	Real Estate	Shipping	Supply	TMT	Utility
FINCRISIS	0.068	-0.081	0.092	-0.091	0.037	-0.006	0.031	-0.103	-0.008	-0.037	-0.006
	(1.06)	(-0.69)	(0.62)	(-0.47)	(0.37)	(-0.04)	(0.23)	(-0.52)	(-0.05)	(-0.29)	(-0.26)
OILCRISIS	-0.012	-0.060	0.034	-0.053	-0.045	-0.102	0.004	-0.158*	-0.106*	-0.019	-0.005
	(-0.45)	(-1.25)	(0.56)	(-0.67)	(-1.09)	(-1.43)	(0.08)	(-1.93)	(-1.69)	(-0.35)	(-0.55)
COVID19	-0.013	0.036	-0.102	0.008	-0.030	0.082	-0.002	-0.009	0.057	-0.156**	-0.018
	(-0.39)	(0.59)	(-1.32)	(0.08)	(-0.56)	(0.92)	(-0.03)	(-0.09)	(0.72)	(-2.31)	(-1.52)
Interest Rate	-0.020	0.000	-0.049	-0.020	-0.017	-0.015	-0.035	-0.032	-0.031	0.013	0.001
	(-1.39)	(-0.01)	(-1.48)	(-0.48)	(-0.76)	(-0.38)	(-1.18)	(-0.71)	(-0.91)	(0.43)	(0.17)
Stock Market Return	0.000	0.000**	0.000	0.000	0.000	0.000	0.000	0.000	-0.001***	0.000***	0.000
	(-0.63)	(-2.11)	(-0.77)	(-1.58)	(-0.97)	(-1.44)	(-1.17)	(0.25)	(-3.26)	(2.77)	(1.55)
Credit Spread	0.004	-0.009	-0.010	-0.015	-0.009	0.006	-0.007	0.026	-0.017	0.007	0.001
	(0.64)	(-0.81)	(-0.74)	(-0.83)	(-0.99)	(0.35)	(-0.52)	(1.42)	(-1.15)	(0.58)	(0.69)
Adj. R-squared	0.02	0.03	0.00	0.01	-0.01	0.02	-0.01	0.02	0.08	0.05	-0.01
No. observations	168	168	168	168	168	168	168	168	168	168	168

Table 10.1.1 *Proportion of High-yield bonds with term-to-maturity between 1 and 3 years in respect of the number of issuances*

Dependent variable:	% HY bonds issues, with term-to-maturity 1-3 years, in size										
Industry:	Aquaculture	Drilling	F&S	Industrials	Oil&Gas	Oil Service	Real Estate	Shipping	Supply	TMT	Utility
FINCRISIS	0.068	-0.081	0.092	-0.099	0.037	-0.006	0.009	-0.103	-0.008	-0.037	-0.001
	(1.06)	(-0.69)	(0.62)	(-0.51)	(0.37)	(-0.04)	(0.07)	(-0.52)	(-0.05)	(-0.29)	(-0.26)
OILCRISIS	-0.012	-0.060	0.040	-0.054	-0.045	-0.102	0.026	-0.158*	-0.106*	-0.019	0.000
	(-0.45)	(-1.25)	(0.64)	(-0.68)	(-1.09)	(-1.43)	(0.47)	(-1.93)	(-1.69)	(-0.35)	(-0.55)
COVID19	-0.013	0.036	-0.102	-0.006	-0.030	0.082	0.022	-0.009	0.057	-0.156**	-0.002
	(-0.39)	(0.59)	(-1.32)	(-0.06)	(-0.56)	(0.92)	(0.32)	(-0.09)	(0.72)	(-2.31)	(-1.52)
Interest Rate	-0.020	0.000	-0.049	-0.019	-0.017	-0.015	-0.028	-0.032	-0.031	0.013	0.000
	(-1.39)	(-0.01)	(-1.48)	(-0.45)	(-0.76)	(-0.38)	(-0.94)	(-0.71)	(-0.91)	(0.43)	(0.17)
Stock Market Return	0.000	0.000**	0.000	0.000	0.000	0.000	0.000	0.000	-0.001***	0.000***	0.000
	(-0.63)	(-2.11)	(-0.77)	(-1.55)	(-0.97)	(-1.44)	(-1.31)	(0.25)	(-3.26)	(2.77)	(1.55)
Credit Spread	0.004	-0.009	-0.010	-0.014	-0.009	0.006	-0.006	0.026	-0.017	0.007	0.000
	(0.64)	(-0.81)	(-0.73)	(-0.78)	(-0.99)	(0.35)	(-0.50)	(1.42)	(-1.15)	(0.58)	(0.69)
Adj. R-squared	0.02	0.03	0.01	0.01	-0.01	0.02	-0.01	0.02	0.08	0.05	-0.01
No. observations	168	168	168	168	168	168	168	168	168	168	168

Table 10.1.2 *Proportion of High-yield bonds with term-to-maturity between 1 and 3 years in respect of the size of issuances*

Dependent variable:	% HY bonds issues, with term-to-maturity 3-5 years, in quantity										
Industry:	Aquaculture	Drilling	F&S	Industrials	Oil&Gas	Oil Service	Real Estate	Shipping	Supply	TMT	Utility
FINCRISIS	-0.036	-0.116	0.163	-0.185	-0.113	0.358	0.022	0.023	-0.119	-0.034	-0.007
	(-0.30)	(-0.99)	(1.33)	(-0.93)	(-0.76)	(1.44)	(0.55)	(0.09)	(-0.80)	(-0.26)	(-0.34)
OILCRISIS	-0.043	-0.058	-0.043	-0.029	-0.037	-0.070	-0.016	-0.187*	-0.042	-0.051	-0.005
	(-0.88)	(-1.21)	(-0.86)	(-0.35)	(-0.60)	(-0.69)	(-0.98)	(-1.74)	(-0.68)	(-0.96)	(-0.62)
COVID19	0.086	0.031	-0.200	-0.176*	-0.143*	-0.076	-0.030	-0.030	0.048	0.017	0.005
	(1.40)	(0.51)	(-3.14)	(-1.69)	(-1.86)	(-0.59)	(-1.42)	(-0.22)	(0.62)	(0.25)	(0.41)
Interest Rate	0.002	0.019	-0.051*	0.017	0.033	-0.089	-0.007	-0.029	0.016	0.020	0.001
	(0.08)	(0.74)	(-1.86)	(0.37)	(0.99)	(-1.61)	(-0.78)	(-0.50)	(0.49)	(0.69)	(0.21)
Stock Market Return	0.000	0.000	0.000	0.000	0.001	-0.001**	0.000	0.000	0.000**	0.001	0.000
	(-0.85)	(-1.56)	(1.08)	(1.31)	(3.06)	(-2.23)	(0.26)	(0.91)	(-2.22)	(3.47)	(-1.12)
Credit Spread	-0.007	-0.010	-0.007	0.006	0.011	-0.045*	-0.002	-0.021	-0.020	0.010	-0.001
	(-0.64)	(-0.87)	(-0.64)	(0.33)	(0.79)	(-1.91)	(-0.54)	(-0.86)	(-1.44)	(0.84)	(-0.69)
Adj. R-squared	-0.01	0.02	0.06	0.01	0.06	0.02	-0.01	0.07	0.05	0.15	-0.02
No. observations	168	168	168	168	168	168	168	168	168	168	168

Table 10.1.3 *Proportion of High-yield bonds with term-to-maturity between 3 and 5 years in respect of the number of issuances*

Dependent variable:	% HY bonds issues, with term-to-maturity 3-5 years, in size										
Industry:	Aquaculture	Drilling	F&S	Industrials	Oil&Gas	Oil Service	Real Estate	Shipping	Supply	TMT	Utility
FINCRISIS	-0.036	-0.116	0.183	-0.184	-0.113	0.296	0.008	0.018	-0.119	-0.034	-0.004
	(-0.30)	(-0.99)	(1.34)	(-0.91)	(-0.76)	(1.19)	(0.38)	(0.07)	(-0.80)	(-0.26)	(-0.33)
OILCRISIS	-0.043	-0.058	-0.008	-0.031	-0.037	-0.066	-0.007	-0.188*	-0.042	-0.051	-0.003
	(-0.88)	(-1.21)	(-0.15)	(-0.37)	(-0.60)	(-0.64)	(-0.88)	(-1.75)	(-0.68)	(-0.96)	(-0.62)
COVID19	0.086	0.031	-0.215	-0.180*	-0.143*	-0.077	-0.007	-0.035	0.048	0.017	0.002
	(1.40)	(0.51)	(-3.03)	(-1.72)	(-1.86)	(-0.60)	(-0.63)	(-0.26)	(0.62)	(0.25)	(0.38)
Interest Rate	0.002	0.019	-0.060*	0.016	0.033	-0.075	-0.003	-0.028	0.016	0.020	0.000
	(0.08)	(0.74)	(-1.95)	(0.36)	(0.99)	(-1.35)	(-0.59)	(-0.49)	(0.49)	(0.69)	(0.16)
Stock Market Return	0.000	0.000	0.000	0.000	0.001	-0.001**	0.000	0.000	0.000**	0.001	0.000
	(-0.85)	(-1.56)	(0.94)	(1.33)	(3.06)	(-2.01)	(-0.57)	(0.96)	(-2.22)	(3.47)	(-1.10)
Credit Spread	-0.007	-0.010	-0.008	0.006	0.011	-0.041*	-0.002	-0.021	-0.020	0.010	-0.001
	(-0.64)	(-0.87)	(-0.60)	(0.33)	(0.79)	(-1.74)	(-0.85)	(-0.84)	(-1.44)	(0.84)	(-0.64)
Adj. R-squared	-0.01	0.02	0.06	0.01	0.06	0.01	-0.02	0.07	0.05	0.15	-0.02
No. observations	168	168	168	168	168	168	168	168	168	168	168

Table 10.1.4. *Proportion of High-yield bonds with term-to-maturity between 3 and 5 years in respect of the size of issuances*

Dependent variable:	% HY bonds issues, with term-to-maturity 5-10 years, in quantity										
Industry:	Aquaculture	Drilling	F&S	Industrials	Oil&Gas	Oil Service	Real Estate	Shipping	Supply	TMT	Utility
FINCRISIS	0.049	-0.039	0.041	0.031	-0.054	-0.024	-	-0.053	-0.063	-	-
	(1.06)	(-0.43)	(0.74)	(0.30)	(-0.69)	(-0.20)		(-0.48)	(-0.69)		
OILCRISIS	-0.010	-0.038	-0.017	0.008	0.032	-0.062	-	-0.053	0.026	-	-
	(-0.51)	(-1.01)	(-0.75)	(0.18)	(0.98)	(-1.26)		(-1.17)	(0.69)		
COVID19	-0.017	-0.027	-0.026	-0.032	-0.032	-0.026	-	0.019	0.028	-	-
	(-0.70)	(-0.57)	(-0.90)	(-0.59)	(-0.79)	(-0.42)		(0.34)	(0.58)		
Interest Rate	-0.013	-0.008	-0.019	-0.021	0.015	-0.001	-	-0.007	0.013	-	-
	(-1.27)	(-0.41)	(-1.52)	(-0.90)	(0.84)	(-0.04)		(-0.27)	(0.64)		
Stock Market Return	0.000	0.000	0.000	0.000	0.000	0.000	-	0.000	0.000	-	-
	(-0.51)	(-0.47)	(-0.53)	(-0.84)	(0.96)	(-0.91)		(-1.84)	(-1.11)		
Credit Spread	-0.004	0.002	-0.001	-0.006	0.002	-0.011	-	-0.007	-0.005	-	-
	(-0.93)	(0.24)	(-0.28)	(-0.57)	(0.30)	(-0.96)		(-0.67)	(-0.61)		
Adj. R-squared	-0.02	-0.02	-0.01	-0.02	-0.02	0.00	-	0.01	-0.01	-	-
No. observations	168	168	168	168	168	168	-	168	168	-	-

Table 10.1.5 *Proportion of High-yield bonds with term-to-maturity between 5 and 10 years in respect of the number of issuances*

Dependent variable:	% HY bonds issues, with term-to-maturity 5-10 years, in size										
Industry:	Aquaculture	Drilling	F&S	Industrials	Oil&Gas	Oil Service	Real Estate	Shipping	Supply	TMT	Utility
FINCRISIS	0.049	-0.039	0.043	0.028	-0.054	-0.024	-	-0.053	-0.063	-	-
	(1.06)	(-0.43)	(0.73)	(0.27)	(-0.69)	(-0.20)		(-0.48)	(-0.69)		
OILCRISIS	-0.010	-0.038	-0.019	0.011	0.032	-0.062	-	-0.053	0.026	-	-
	(-0.51)	(-1.01)	(-0.76)	(0.27)	(0.98)	(-1.26)		(-1.17)	(0.69)		
COVID19	-0.017	-0.027	-0.028	-0.026	-0.032	-0.026	-	0.019	0.028	-	-
	(-0.70)	(-0.57)	(-0.92)	(-0.49)	(-0.79)	(-0.42)		(0.34)	(0.58)		
Interest Rate	-0.013	-0.008	-0.020	-0.018	0.015	-0.001	-	-0.007	0.013	-	-
	(-1.27)	(-0.41)	(-1.53)	(-0.78)	(0.84)	(-0.04)		(-0.27)	(0.64)		
Stock Market Return	0.000	0.000	0.000	0.000	0.000	0.000	-	0.000*	0.000	-	-
	(-0.51)	(-0.47)	(-0.51)	(-0.85)	(0.96)	(-0.91)		(-1.84)	(-1.11)		
Credit Spread	-0.004	0.002	-0.001	-0.006	0.002	-0.011	-	-0.007	-0.005	-	-
	(-0.93)	(0.24)	(-0.24)	(-0.62)	(0.30)	(-0.96)		(-0.67)	(-0.61)		
Adj. R-squared	-0.02	-0.02	-0.01	-0.02	-0.02	0.00	-	0.01	-0.01	-	-
No. observations	168	168	168	168	168	168	-	168	168	-	-

Table 10.1.6 *Proportion of High-yield bonds with term-to-maturity between 5 and 10 years in respect of the size of issuances*

Table 10.2 – Complementary Results

Viewed in Table 10.2.1 – 10.2.3

FXNOKUSD and BRENT are explanatory variables representing the rate of exchange for NOK/USD and the oil price, respectively. Interest Rate is the interest rate set by the Norwegian Central Bank. Stock Market is the return of the Oslo Stock Exchange Index (OBX). Credit Spread is the adjusted credit spread for the US High-yield bonds index. The coefficients are estimated using ordinary least squares (OLS). The sample consists of 166 monthly observations in case of 2-months lag observation, 167 in case of 1-month lag observation and 168 in case of no lag. The data comprises large-sized firms with number of total issuance equal or higher than 3 times during the observed period. The sample period is from 2008 to 2021. t-Statistics are in parentheses. *, **, and *** denote significance at the 10%, 5%, and 1% levels, respectively.

Dependent variable:	% HY bonds issues (in size)	% HY bonds issues (in quantity)
FXNOKUSD	-0.033	-0.046
	(-0.51)	(-0.82)
BRENT	0.000	0.001
	(0.18)	(0.45)
Interest Rate	-0.028	-0.042
	(-0.84)	(-1.43)
Stock Market Return	0.000	0.000
	(-0.54)	(-0.19)
Credit Spread	-0.029**	-0.008
	(-2.02)	(-0.61)
Adj. R-squared	0.05	0.04
No. observations	166	166

Table 10.2.1. *Proportion of High-yield bonds observed with 2-months lag in respect of the number and size of issuance*

Dependent variable:	% HY bonds issues (in size)	% HY bonds issues (in quantity)
FXNOKUSD	0.009	-0.011
	(0.13)	(-0.19)
BRENT	0.003	0.003
	(1.32)	(1.58)
Interest Rate	-0.052	-0.063**
	(-1.65)	(-2.29)
Stock Market Return	0.000	0.000
	(-0.75)	(-0.36)
Credit Spread	-0.019	0.002
	(-1.29)	(0.18)
Adj. R-squared	0.07	0.07
No. observations	167	167

Table 10.2.2 *Proportion of High-yield bonds observed with 1-month lag in respect of the number and size of issuance*

Dependent variable:	% HY bonds issues (in size)	% HY bonds issues (in quantity)
FXNOKUSD	0.010	0.016
	(0.14)	(0.27)
BRENT	0.004*	0.005**
	(1.68)	(2.40)
Interest Rate	-0.068**	-0.077***
	(-2.33)	(-3.05)
Stock Market Return	0.000	0.000
	(-0.51)	(-0.41)
Credit Spread	-0.009	0.012
	(-0.62)	(0.94)
Adj. R-squared	0.09	0.11
No. observations	168	168

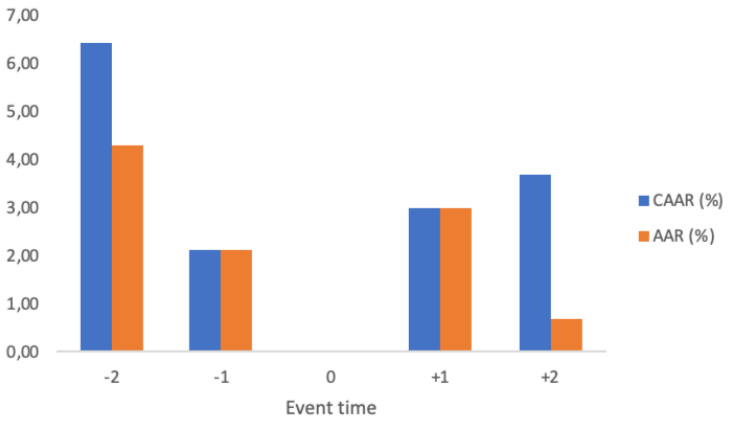
Table 10.2.3 *Proportion of High-yield bonds observed with no lag in respect of the number and size of issuance*

Table 10.3 Event-study results

The methodology used to compute average cumulative abnormal returns (CARs) is described in **Section 6.3**. The event windows are shown in the first column with their average CAR shown as a percentage in the second column. The sample consists of 31 high-yield bond issue events. t-Statistics are in parentheses. *, **, and *** denote significance at the 10%, 5%, and 1% levels, respectively.

Event time	CAR
[-2,0]	6.45***
	(1.78)
[-1,0]	2.14
	(0.83)
[0,1]	3.01
	(1.17)
[0,2]	3.69
	(1.02)
[0,4]	5.65
	(0.90)

Table 10.3.1: *Event-study results*



Graph 9.4: *Average Cumulative Abnormal Return (CAAR) and Average Abnormal Return (AAR)*