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THE ATTRACTION OF BOND FINANCING BY FOOD PRODUCING COMPANIES IN ARCTIC COUNTRIES

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A B S T R A C T

The article contains an analysis of the established practices of attracting financing through the issuance of bonds on the example of companies in the agricultural and food sectors of the countries included in the Arctic zone: Denmark, Iceland, Canada, Norway, Russia, Finland, Sweden. The goal is to compile profiles of the bond market of individual countries and identify existing patterns. The research sample included 60 companies producing food products, which are also issuing companies in the debt market for the period 2015-2022. Conclusions are drawn, there are common institutional features in almost all the countries considered. Russia is characterized by an atypically large number of bonds placed, high market inertia, and high borrowing costs. On the Canadian market, the bond placement period is on average much shorter with a sufficiently large capital of organizations. In Canada, Denmark and Norway, there is a picture of hyper-concentration of the market with a focus on institutional investors. The situation is approximately similar with a much smaller number of bonds in Sweden, Iceland and Finland. The necessity of increasing the availability of the placed debt for private domestic investors was noted.

1. INTRODUCTION

Agricultural business and food production has a capital-intensive nature. It requires substantial investments in land, machinery, equipment, and technology. Existing research shows that access to financing for food companies increases their production. As pointed out by Osabohien et al, using the example of Nigeria (Osabohien et al, 2020), this is especially important for developing countries. This demonstrates that one of the components of solving global food problems may be to provide long-term and short-term financing for agricultural business (Jia et al., 2011). The use of various financing instruments ensures the economic growth of agricultural business, in particular through long-term strategies of innovative and technological development and short-term effective economic policy (Wang et al., 2022; Žičkienė et al., 2022).

Food production companies represent a special segment of agricultural business, since being the most labor-intensive and capital-intensive segment of agricultural

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busi-ness, they provide solutions to global food problems (Hendricks et al., 2023). This article analyzes the structure of the bond markets of food production companies and also discusses the reaction of the food production companies bond market to the financial crises of 2020-2023.
To obtain more reliable conclusions by considering a relatively equal external en-vironment, the authors focus on the bond markets of food production companies of the Arctic countries.

The research sample includes food production companies, which are also issuing companies in the debt market. The identification of general patterns of market functioning is carried out using indicators of financial statistics.

From an economic point of view, various entities involved in the processes of in-vestment solutions to global food problems build a portfolio of investments: private in-vestors; companies attracting investments from developed countries; issuing companies from developing countries. While the investment decisions of the last two entities may coincide or differ. For example, Larder et al (2015) argues that it is safer for large in-vestors to invest in food production companies locally distributed in developed countries than in companies operating in developing countries. Even though this conclusion seems obvious, the analysis of investment decision models when comparing these approaches is of interest (Tashmuradova & Hamdamov, 2020).

In developed countries, the management structure of companies is built in a more complex way than in developing countries (Kizi, 2023). This applies to various industries, in-cluding agricultural business. Companies with a complex management structure are more likely to use more complex financial instruments. Basha et al. (2023) showed that the capital structure of these companies depends more on the financial competence of managers, board of directors and audit committees, rather than on objective investment strategies and opportunities.

This factor should be attributed to the institutional determinants of investment de-cisions, and its importance increases when it comes to companies from countries located largely in the Arctic zone. Such companies need to attract long-term investments both to maintain current processes and to develop and expand activities. One of the ways to at-tract such investments is funding via bonds placement. Bonds usually have lower rates then corporate loans and allow to attract a range of institutional investors to the firm’s funding. From the point of view of institutional investors, bonds can be one of the most popular investment decision tools. CPI et al. (2013) show that bonds ac-count for up to half of the portfolio of all institutional investments.

On the other hand, as noted in De Fiore and Uhlig (2011), raising funds through bonds is cheaper, but also riskier for issuers than, for example, a bank loan. Thus, given the risky nature of food production companies business, the use of bonds becomes an additional risk management task for issuing companies. Modeling and measurement of return-based risk premium can be found, for example, in Cieslak and Povala (2015).

There are studies demonstrating the effect of reducing the risks of companies in a developing country using the example of Uzbekistan by attracting bond loans Khushakov (2023).

In the past decade in most developed countries there were a quite low interest rates that which also contributed to the easy attraction of funds through bonds. The situation changed with the end of politics of QE and the following interest rates grows all over the world. This interest rates grows makes it harder and more expensive for the firms to at-tract capital including through the placement of bonds. For example, the cumulative number of new placed corporate bonds in Europe for 5 first months of 2021 was 6835, in 2022 this number dropped to 4595, and in 2023 it is only 3875.

Along with a decrease in the number of issues, a noticeable feature of this period for most markets was a decrease in the maturity of the bonds issued. Normally, with an in-crease in the maturity, the issuer increases the coupon rate on the issued bonds, laying an additional premium for the risk of long-term circulation of the financial instrument (Dhar, 2016; Grishunin et al., 2023). Given the high rates of raising funds in 2023, the reduction of the maturity is aimed at lowering the cost of raising funds for issuing companies.

On the other hand, a reduction in the maturity when issuing new securities, as shown in a recent study by Krebbers et al. (2023), leads the issuing company to pay investors an additional premium for raising funds during the book building process. Flexible use of bond pricing, spreads and coupons helps manage risk, as illustrated by the recurring drought in Kenya by Sun et al. (2015). Thus, according to our assumption, a reduction in maturities and an increase in interest rates may constrain food producing companies' access to sources of financing and create ad-ditional risks for them as issuers. Therefore, these parameters are important for research and control.

A diversified portfolio of investments is the financial basis for sustainable production and economic activity of any company (Chen et al., 2018). The specifics of food production companies allow us to believe that bond loans are the most important tool for attracting investment in conditions of ensuring sustainable production and economic activity. The management of this external financing can be implemented mainly

through long-term or short-term bonds of various types. Different management tools provide different options of economic benefits in production and economic activities. The problem of this study is the possibility of revealing a set of options for managing external financing through bond loans of medium-sized food companies, aimed at sustaining their production and economic activities on the example of the countries of the Arctic region.

The Arctic as a geographical location was chosen because of two reasons. Firstly, this region is currently the object of close attention of researchers and economic entities. Secondly, Arctic countries face difficulties in financing agricultural production due to high risk and relatively low margins.

Thus, the object of the article is the bond markets of food producing compa-nies-issuers which are located in the Arctic countries (Denmark, Iceland, Canada, Norway, Russia, Finland).

The purpose of the article is to analyze the parameters of the use of bonds as a tool for external financing of production and economic activity by food producing compa-nies-issuers of Arctic countries in the conditions of long-term financing of agricultural business.

The following parameters of food producing companies-issuers bonds are selected for analysis: tenor of bonds, type of coupon payments (floating or fixed), the coupon in-terest rates, the volume of issues.

These analysis parameters are chosen because they are the most general and give an impression of the processes of the market as a whole without studying the characteristics of each loan separately. The structure of the company's portfolio strongly depends on the industry, in particular, the agricultural industry is the least developed in terms of at-tracting bonds, when compared with the industrial and service sectors (Sewpersadh, 2019).

Recent publications that analyze debt financing instruments are mainly focused on the topics of sustainable development, green economy, green bonds. These topics have become widespread both at the abstract level (Zhou & Cui, 2019; Tan et al., 2022; Yeow, & Ng, 2021) and in application to specific industries: energy (Mathews & Kidney, 2012), bioengineering (Kung et al., 2022). They have also been developed in the context of food production. Rangone and Ali, (2021) study how financing through green bonds can catalyze the development of ag-ribusiness in Italy and come to the conclusion that the provision of such funds is slow, despite the proliferation of impact funds and other types of investments focused on sustainable development and the direction of global capital flows to the agribusiness sector. This is partly due to the heterogeneous, multilevel, and fragmented nature of agricultural food production and supply chains, as well as poor knowledge of available new types of investments. The volume of investments in food and agricultural production focused on sustainable development is constrained due to the lack of confirmation of the positive role of such investments in the economies of specific countries. On the contrary, there are a number of publications demonstrating the negative role of such investments.

According to the data we have collected, food producing companies do not resort to the ESG bond tool, instead, contrary to the current trend, they use standard bonds to fi-nance projects and operational activities. In our opinion, considering that food security is one of the aspects of sustainable development, the study of the borrowing profile of food producing companies is a significant question, despite its being outside the contour of ESG discourse (Van Veelen, 2021).

In this paper, we analyze the state of the food producing companies bond market and identify its characteristic features in different Arctic countries.

The object of the study is the bond market of agricultural companies of the Arctic countries (except the USA) in the period 2015-2023. The Arctic countries (Denmark, Ice-land, Canada, Norway, Russia, Finland) have relatively similar limited favorable condi-tions for food production. Agriculture and food production in these countries is a fairly technologically intensive innovative sector that requires significant investment resources, but at the same time is not the main sector of the economy. The selected agricultural companies of the Arctic countries are large industrial and innovative, attracting signifi-cant investment resources in the bond market. The research sample does not include agricultural companies registered in the United States, since they are diversified holdings that operate in different industries. The sample also does not include companies from completely different economic and climatic conditions.

The selected companies had access to capital markets and borrowing markets during the study period. A feature of these years is a strong period of volatility associated with the COVID-19 pandemic (Albulescu, 2021).

2. MATERIAL AND METHOD

During this work 184 bonds of 55 issuers placed for the period from 2015 to the May of 2023 were analyzed. The sample includes only securities of countries related to the Arctic. These are Canada, Russia, Denmark, Iceland, Norway, Finland, Sweden.

The data source for the bond sample is the database of an international financial data provider Cbonds.com.

The sample of bonds is compiled using a filter by the issuer's in-dustry: the "Food and Beverage Production" and "Agriculture" are included.

Two databases are collected and used during the research. The description of these databases is given in Table 1 and Table 3.

The first database includes the reporting parameters of all the companies under consideration for the period from 2019 to 2022. These parameters are aimed at obtaining the characteristics of the average issuer, without which further analysis of the countries' bond markets is impossible. The second database includes the characteristics of 184 bonds issued for the period from 2015 to 2022, see Table 3.

Our estimations use tenor, the maturity of the bond, calculated as the number of days between the date of placement and the date of repayment. In some cases, the weighted average market rate is also calculated. To obtain this indicator, all securities with floating coupon rates are removed from the sample, then equivalents in USD are calculated for the remaining securities (based on the exchange rate on the date of calculation), then the weighted average value is calculated (bond volumes act as weights). To get a comparative metric for the entire market, the procedure is repeated from the generated sample of all securities. Studying this indicator is important to get an idea of the place of food producing company's bonds in the bond market of a country.

The analysis was conducted out in the context of the placement tenor, as well as the rates at which the bonds were placed.

To visualize the tenor data, strip charts were used, the length of the column on which reflects the tenor of each of the bond in days.

In the figures showing the tenor of bonds (1, 3, 5, 7, 9, 11, 12), each of the divisions of the vertical scale shows one bond issue in the country for the period. All divisions of the vertical scale are grouped by year of release. Horizontal lines show the duration of the issue in days. Figures 2, 4, 6, 8, 10 show the dynamics of the weighted average tenor.

The methods of averaging and data aggregation were used in the work. The averaged data on the debt markets of the respective countries served as the basis for comparing the obtained indicators.

The selection was made on the basis of the issuer's field of activity classifier provided by the Cbonds information agency, specialized in the bond's market activity. Only the "agriculture" and "food and beverage production" industries were used for analysis.

The structure of the article is a review of the situation in the bond market of each country, and then their grouping on the basis of common and distinctive features.

The data is processed using standard statistical methods. The article analyzes both the market as a whole and each country separately.

3. RESULTS

The average characteristics of the data sample are indicated by the country of regis-tration of the issuing company.

The number of issuing companies in the sample registered in a particular country is shown in Table 1 in the second column. The cumulative values for all companies for the period 2019-2022 are shown in columns 3-6. The average values of the indicators for a country sample are shown in columns 7-9. The total number of registered companies is: 31 in Russia, 8 in Norway, 5 in Denmark, 4 in Canada, 3 in Sweden, 2 in Iceland, 2 in Finland. For the period from 2015 to the May of 2023, the reviewed companies attracted 184 bonds.

The asymmetry in the number of companies in Table 1 indicates the differences in the structure of the agricultural sector in different countries, although the total volumes of traded sectors are quite comparable. For the period under consideration, 31 companies from Russia have the lowest average fixed assets volume on the market, but there is a distinctive spread in average values. Generally, there are three types of market segments: many relatively small companies from Russia, mainly medium-sized companies from Iceland, Norway, Finland and Sweden, and large companies from Denmark and Canada (the largest in the sample). Norwegian firms attracted the largest amount of investments, followed by Canada, Sweden and Denmark. At the same time, the volume of bonds is maximum in companies in Denmark and Canada. However, with a relatively small value of fixed assets, the revenue of Russian companies is comparable to companies from other countries, Table.1.

Firms in Norway and Sweden are distinguished by significant amounts of attracted borrowings compared to the volume of their own assets.

If the companies did not report in a particular period, then these values were taken as missing and were not averaged with the data of other companies in this country.

The data are given by the reporting years of issuers (2019-2022) in the corresponding market.

Table 1. Generalized and average characteristics of the sample of issuing companies in the context of the studied market countries for 2019-2022.

Country (N of companies)		Revenue	Volume of bonds, USD	Investments, USD	Assets, USD	Fixed assets, USD	Bonds / assets rate
1	2	3	4	5	6	7	8
Denmark (5)	mean	6,58E+09	1,66E+09	-3,28E+08	6,43E+09	1,89E+09	0,39
	St.dev.	5,33E+09	1,95E+09	2,50E+08	6,12E+09	1,55E+09	0,43
Iceland (2)	mean	4,38E+08	3,32E+07	-1,47E+07	5,99E+08	1,28E+08	0,06
	St.dev.	7,19E+07	6,41E+06	1,32E+07	3,38E+08	1,04E+08	0,03
Canada (4)	mean	1,22E+10	7,31E+08	-1,63E+08	7,16E+09	1,95E+09	0,16
	St.dev.	1,64E+10	8,00E+08	1,55E+08	7,90E+09	1,98E+09	0,11
Norway (8)	mean	2,04E+09	3,43E+08	-3,16E+10	2,83E+09	8,92E+08	49,77
	St.dev.	1,72E+09	2,45E+08	7,39E+10	2,39E+09	6,00E+08	120,52
Russia (31)	mean	2,50E+09	6,24E+07	-8,53E+06	8,07E+09	6,67E+07	0,20
	St.dev.	1,53E+10	1,20E+08	3,06E+07	3,19E+10	2,82E+08	0,21
Finland (2)	mean	1,90E+09	1,74E+08	-9,94E+07	1,10E+09	4,95E+08	0,16
	St.dev.	1,76E+08	6,75E+07	5,08E+07	5,56E+07	5,07E+07	0,06
Sweden (3)	mean	2,21E+09	2,04E+08	-1,37E+08	1,97E+09	5,53E+08	55,88
	St.dev.	2,82E+09	1,22E+08	1,30E+08	2,38E+09	7,62E+08	67,28
F (sign)		1,8 (0,101)	11,916 (0,000)	4,178 (0,001)	0,398 (0,880)	24,474 (0,000)	3,550 (0,003)

The last row of Table 1 – F (sign) – shows the value of the Fisher coefficient of var-iance analysis, indicating the significance of cross-country differences in the average values of the respective parameters; the significance level is given in parentheses. The value is considered significant when the significance level is < 0.05.

Robust verification of averages showed that the distribution of the variables Bounds_value, Investments_OS, OS, OO/Assets asymptotically significantly tends to the F-distribution (sign < 0.01). Therefore, the verification of averages using the analysis of variance can be carried out.

Duncan's and Scheffe's methods of dividing into homogeneous subsets by average values (Bonds_value, valuation of fixed assets) divided the countries into 2 groups. The first group includes Iceland, Russia, Finland, Sweden, Norway, companies in these countries have average values of bond loans. The second group includes Canada and Denmark, where companies are much larger and attract more investments through bonds. It should be noted that significant cross-country differences in investment generally distinguish only Canada and Norway. But the largest overhang of the average share of bond issuance to the average volume of assets of companies is observed in Sweden and Norway.

The data shown in Table 1 demonstrates a large variation in the values of the indi-cators of the issuers' operating statements. It is hardly possible to judge how much the attraction of bond loans affects operating activities, but it is possible to show how the variation of indicators is interrelated. Spearman's rank correlation coefficient was used to assess the relationship of indicators variation, since it is not tied to the mean values and does not require checking the normality and uniformity of distributions. In general, the indicators analyzed demonstrate a high level of significance of the relationship with the volume of attracted bonds, see Table 2. However, the share of bonds in the total value of companies' assets does not show such a connection.

Table 2. Spearman's rank correlation coefficient to the bond issue volume for the entire sample

Revenue	Revenue	Investments	Assets	FA	Bonds/Assets
Spearman's ρ	0,639**	-0,755**	0,645**	0,709**	0,147
Two-way meaning	0,000	0,000	0,000	0,000	0,089
N	132	101	134	125	134

The division of countries into groups revealed that the relationship between the volume of bonds and revenue is observed only in Canada (0.817**), Russia (0.524**) and Sweden (-0.843**). There is an inverse relationship in Sweden, meaning that companies with larger revenues attract fewer bond loans. In general, the countries are divided into three groups according to the relationship between the volume of bonds and investments in fixed assets, assets and fixed assets. The first group includes countries where this relationship is very high (above 0.8**), these are Denmark, Canada, Norway, Sweden. In Russia, the volume relationships remain significant, but not as high (below 0.6*). The third group of countries includes Finland and Iceland, where the spread is so

large that there is no relationship between these indicators and the volume of bonds.

The observations under consideration can be divided into two homogeneous subsets based on the behavior in the bond market. The first group, with medium and low values of bond loans, includes firms registered in Iceland, Russia, Finland, Sweden, Norway. The second group includes firms from Canada and Denmark, which are much larger and attract more investments through bonds.

Correlation analysis shows that larger companies virtually have more opportunities to enter the bond market in Denmark, Canada, Norway, Sweden and Russia. But their revenue increases only in firms registered in Canada and Russia; there is no such trend in Finland and Iceland.

For each of the companies involved in the analysis, the following parameters were identified: bonds issued; periods of attraction of bond loans (tenor, in the number of days); the number of floating-rate bonds; the number of fixed-rate bonds; the size of issues. The data are grouped by country, which makes it possible to give both a general comparative characteristic of the markets and to consider these markets separately. A total of 184 bonds were considered for the period from 2015 to 2022, see Table 3.

Table 3. Generalized and average characteristics of the sample of bonds in the context of the market countries studied for 2015-2023.

Country	N of bonds	Average, tenor, days	N of bonds with floating rates and fix-to-float	N of fixed rate bonds	Average amount of issue, mln USD	N of issuers
1	**2**	**3**	**4**	**5**	**6**	**7**
Denmark	22	2209.909	4	18	415.217	5
Iceland	2	1643.500	0	2	33.177	2
Canada	18	2349.944	1	17	268.931	6
Norway	56	2610.554	28	28	97.625	8
Russia	71	1553.676	8	63	38.897	33
Finland	4	1734.750	0	4	114.043	2
Sweden	11	1563.000	8	3	108.394	4

It was described and analyzed how national markets are built in terms of the effec-tiveness of attracting external borrowing, what are the national characteristics and some trends. On the charts 1, 3, 5, 7, 9, 11, the validity periods of the issued bonds are shown horizontally (in days), and the names of the issuing companies for the corresponding periods are shown vertically (in years). The weighted average terms of the issued bonds are shown vertically, the years of issue for the analyzed countries or groups of countries are shown horizontally on the charts 2, 4, 6, 8, 10, 12.

3.1. Russia

3.1.1. Tenor

Of all the countries under consideration, Russia is distinguished by an atypically large number of outstanding bonds and issuers attracting debt financing (fig. 1).

This fact can mainly be associated with the number and variety of economic agents operating in the Russian economy. The high degree of diversity is also reflected in the statistical description of Russian issuers. Russia is the only country from the sample where the standard deviation of the values of revenue and fixed assets is many times higher than the average.

In terms of the average characteristics of issuers, Russia holds an "average" position in the sample by assets, as according to most indicators there are countries that surpass or lag behind it. On the other hand, from the point of view of fixed assets, Russia is showing record indicators, thereby demonstrating that, despite the diversity and number of issuers, the main borrower through bonds in this country is big business.

Yet, with the size of companies comparable to other countries, the volume of borrowing through bonds in Russia remains one of the lowest. In our opinion, this factor may suggest that Russian issuers are not able to attract large amounts of financing and therefore create an opportunity for small investors to participate in their issues.

At the same time, since 2017, the volume-weighted average term of borrowings among food producing companies-issuers has significantly exceeded the average term of borrowings in the market. From 2017 to 2019, for the entire market, the average borrowing period decreased due to the issuance of short debt instruments by financial institutions (without reducing the number of other financial instruments). For the food production industry, this trend has not turned out to be relevant because, as noted in the introduction, the main purpose of attracting financing here is to fund long-term infrastructure projects; and ordinary bonds are suitable for this purpose.

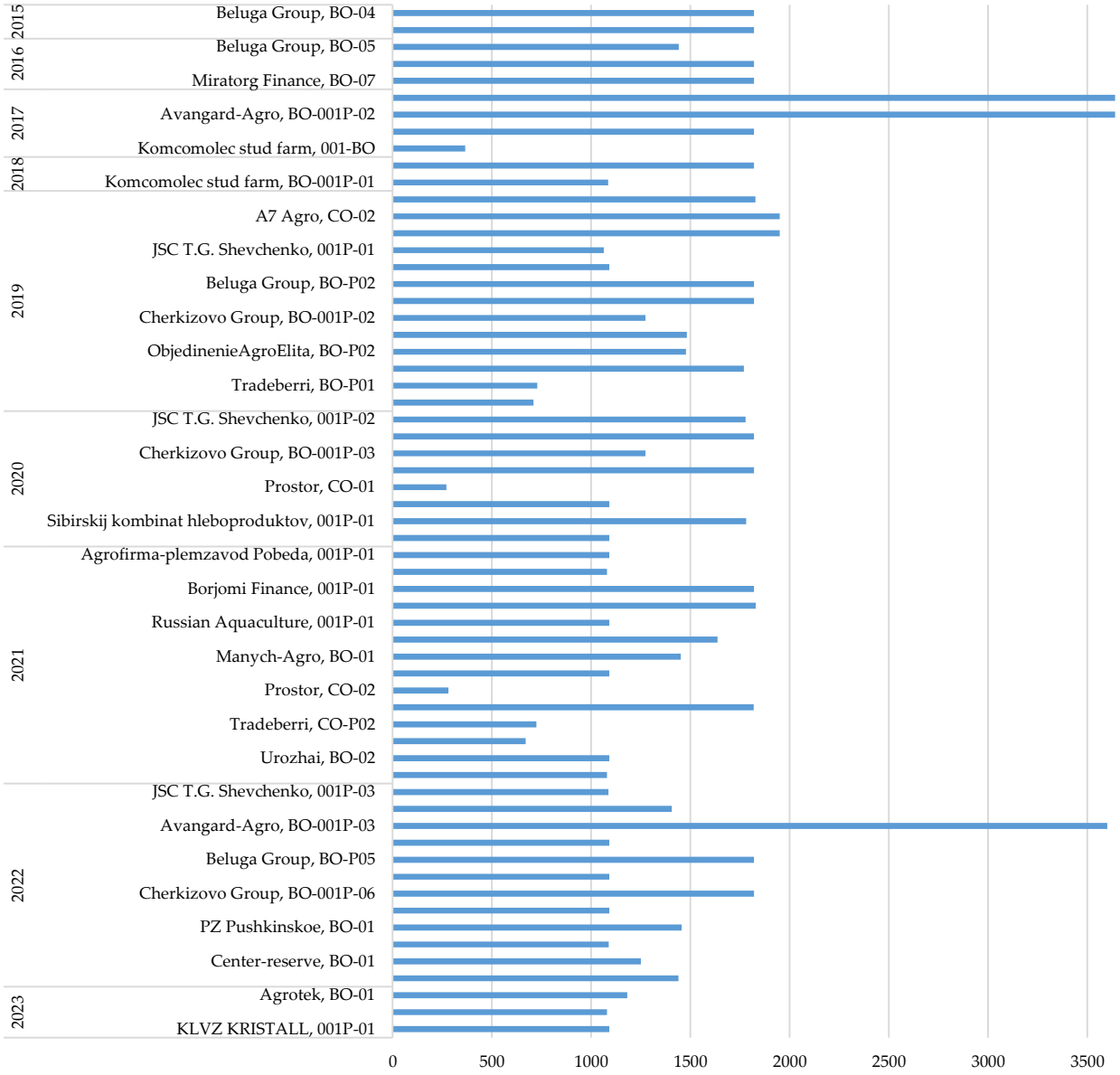

Figure 1. Tenor of Russian bonds by particular issue and year of issue

In 2022 and 2023, the average tenor of borrowing in the market decreased due to the rise in the cost of borrowing and internal economic problems caused by processes in the global economic system (fig. 2). In the first 5 months of 2023, the term for raising financing for food producers decreased to the lowest in 8 years due to the continued growth of rates. Thus, until 2023, food producing companies-issuers demonstrated some resistance to external conditions due to the "sluggishness" of their business. However, an excessive increase in rates of 2023 forced them to reconsider their approach.

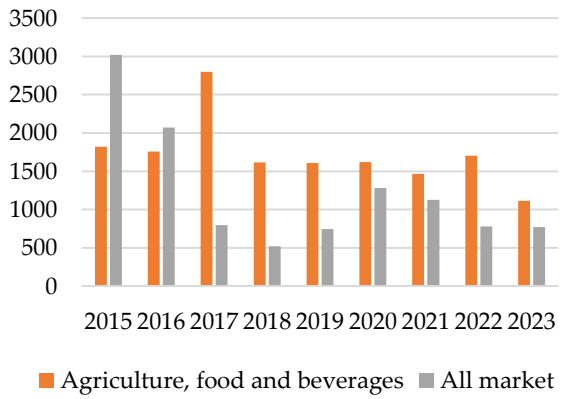

Figure 2. Weighted average tenor of bonds in Russia by the year of issue

3.1.2. Interest rates

Russian issuers differ from the global average not only in the size of the company, but also in working conditions. Under increased risks, companies place bond loans for shorter periods. As can be seen in Fig.2, the length of bonds placement did not become shorter in 2023: food producers retained the issue of bonds for standard terms but stopped using longer ones. All this suggests that the issuers (like everyone else) have cut their planning horizon.

On average, bond issuers from the industries under consideration have to put a premium in the rate for a successful issue; this is evidence of the presence of risk, see Table 4.

Table 4. Weighted average of fixed coupon rates in RUB

Year	Waighted average rate of bonds in agricultural and food production industry	Waighted average rate of bonds over all industries	Spread between 2 and 3
1	2	3	4
2015	0.131184	0.126366	0.004818
2016	0.117288	0.104962	0.012325
2017	0.094453	0.08728	0.007173
2018	0.140000	0.073734	0.066266
2019	0.086123	0.087771	-0.001650
2020	0.070292	0.058655	0.011636
2021	0.096795	0.078764	0.018031
2022	0.108016	0.082266	0.02575

One of the peculiarities of the considered market is the fixed coupon rates. In differs from the Scandinavian countries, where most of the considered bonds have floating rates.

The earlier assumption that the issuing companies have abandoned long infrastructure projects also supports the distribution of spreads. The Russian food companies borrowing market is characterized by the fact that they have to make more expensive loans than the market average. Moreover, it is obvious that they cannot reduce the terms of borrowing due to the binding to annual climate cycles. Therefore, they passed by the "boom" of short-term bond issuance in 2017-2019. For the same reason, it is difficult for them to reduce the term of attracting financing and economize on rates in 2023. Instead, issuers had to pay an almost record spread to the general market rate in 2022. Perhaps in 2023 in order not to continue paying the increased price, food companies already had to give up something and started issuing bonds only for the most necessary short periods. Thus, the borrowing market of food producers in Russia demonstrates inertness: the reaction to external shocks manifests itself for a long time and largely determines the possibility of participation or non-participation in certain projects. The other feature of the Russian market is the high diversity of the bond issuers. The number of issuers and their size. The number of issues is the largest in the considered countries – 30. The minimum asset value of the companies that attract investments via bonds as for 2022 was 2.3 mln USD.

All the above points to the assumption that the practice of attracting bond financing is sufficiently widespread for the Russian market of agricultural business. However, the main drawbacks of the current system are that economic agents refer to the food production as a sphere of increased risk, which leads to the need to pay bigger interest for issuers. For further development of the market, financial and non-financial measures are needed to increase transparency of reporting and reduce risk in the eyes of potential creditors. From the point of view of government regulation, steps can also be taken to reduce the spread that food producing companies have to pay.

3.2. Canada

Canada holds the record in terms of issuers' revenue. Canadian issuers are second only to Russia in terms of funds: as of 2022, the smallest volume of the issuer's assets is 95.8 billion US dollars.

3.2.1. Tenor

The Canadian markets represented by the 16 bonds issued only by 4 companies (fig. 3).

The tenors of bonds mainly between 1800 and 2500 days, this reflects the companies' need for working capital and refinancing of existing liabilities.

A notable feature of the Canadian market is that the maturity of food producers' bonds is significantly shorter than the average market values for domestic bonds (fig. 4). In 2022, the weighted average value for the food market was 2504 days, while in the whole market it was 3548.

The crisis year 2022 did not demonstrate significant changes in the period of bond placement. Two securities were issued with standard durations.

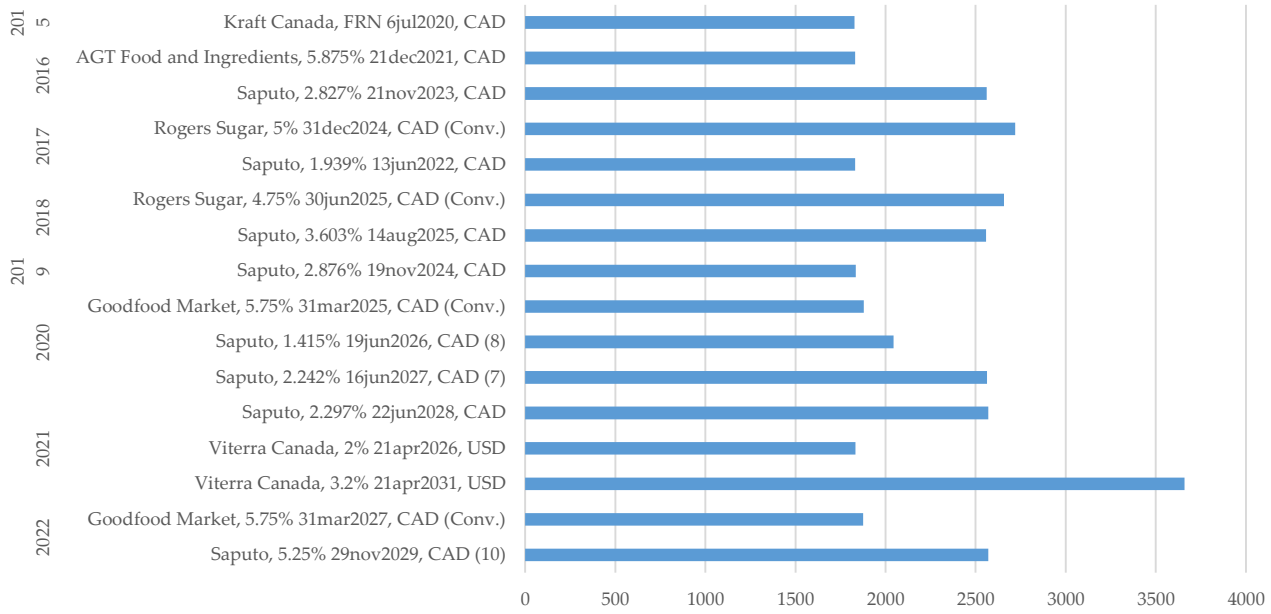

Figure 3. Tenor of Canadian bonds by particular issue and year of issue

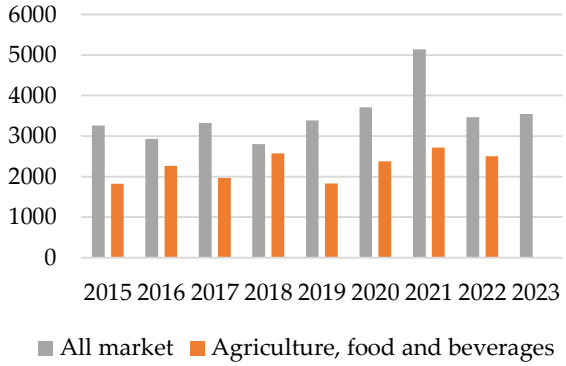

Figure 4. Weighted average tenor of bonds in Canada by the year of issue

A relatively large share of convertible bonds is another feature of the market. Convertible bonds are at the junction of debt and equity instruments and have several features, the consideration of which lies outside the plane of this study. For example, the pricing of this type of bond may be affected by the stock price. Convertible bonds are also often less accessible to private investors. The issue of convertible bonds can be considered as targeting institutional investors, since the latter are particularly interested in them, see for example (Dutordoir et al., 2022).

The issue of such instruments is available only to large companies and leads to an even greater increase in capital (see for example Liao et al., 2022).

3.2.2. Interest rates

The rates on Canadian agricultural producers' securities are lower than the market average. This indicates the high stability of the business that borrows money with bonds Table 2. On the one hand, this is a consequence of a small number of issuing companies, on the other hand, it suggests that only large companies resort to loans, and the market is inaccessible to small participants. In general, low rates and fairly large reporting indicators allow us to conclude that the Canadian market is hyper-concentrated around a number of large issuers. Without dwelling on this in detail, we assume that there are administrative or economic barriers for smaller companies to enter the bond market.

Table 5. Weighted average of fixed coupon rates in CAD

Year	Waighted average rate of bonds in agricultural and food production industry	Waighted average rate of bonds over all industries	Spread between 2 and 3
1	2	3	4
2016	0.022184336	0.040468	0.018283473
2017	0.026762145	0.024049	-0.002712889
2018	0.031552202	0.038292	0.006739741
2019	0.029289554	0.02876	-0.000529554
2020	0.026088433	0.020672	-0.005416208
2021	0.022980214	0.02297	-1.02143E-05
2022	0.038041157	0.052975	0.014934153
2023	0.0435807	-	-

3.3. Denmark

3.3.1. Tenor

In Denmark, all food producing companies (except Idavang issuer) issue international bonds (or Eurobonds), so we compared the market with Eurobonds, Fig. 5, 6. The concentration of the market in the Eurobond segment explains another fact – Denmark has the largest average volume of securities placement. This also signifies that large international organizations and funds are the target category of investors. On the one hand, the use of Eurobonds gives access to investors outside the country of origin, on the other hand, the use of large denominations and the complex process of entering international markets limit the inflow of money from local investors.

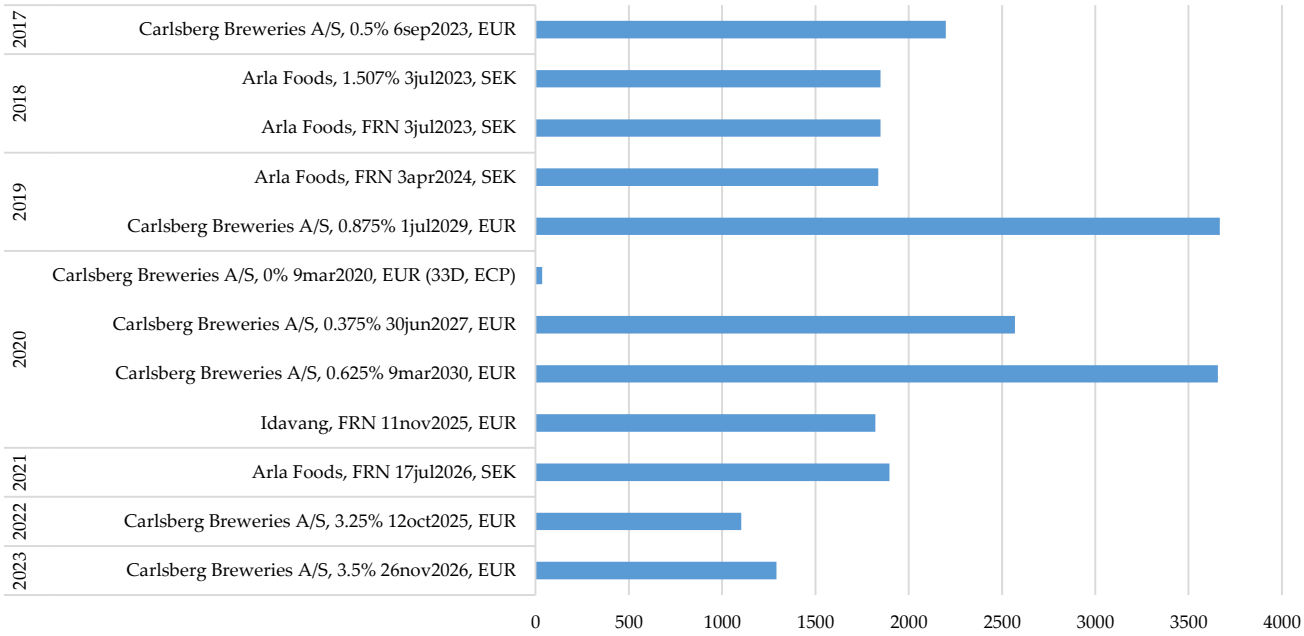

Figure 5. Tenor of Danish bonds by particular issue and year of issue

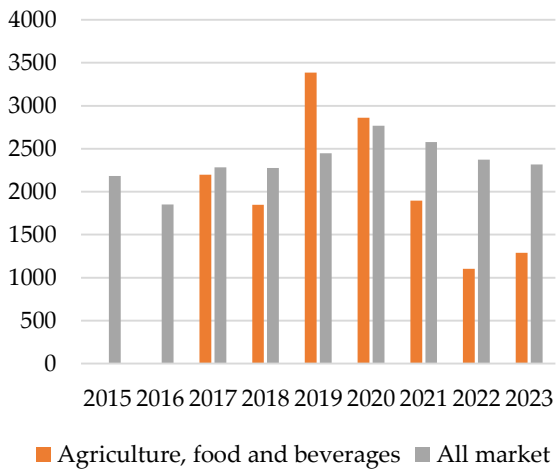

Figure 6. Weighted average tenor of bonds in Denmark by the year of issue

In Denmark, there is a similar pattern of hyper-concentration of the food producing companies bond market around several large issuers, such as the Carlsberg Group. The mentioned group of companies was the only to issue bonds in 2022 and 2023.

In addition, all issues on the market belong to only three large firms, demonstrating the inaccessibility of bond financing for small issuers. The small number of bonds does not allow analyzing data on the terms and rates of attracting financing in general, however, using the example of Carlsberg, we can note a decrease in the terms of attracting bond financing in 2022 and 2023. Another feature of Denmark is the attraction of financing through the instrument of international bonds. This feature, as well as convertible Canadian bonds, indicates that the issues are aimed specifically at institutional investors.

Summing up the interim results for Canada and Denmark, we note that both countries are characterized by a high concentration of the market, since here large companies issue debt instruments that are mostly inaccessible to retail investors.

For the development of the investment environment and the food producing companies in these countries, it would be fair to suggest directing efforts (including administrative) in two directions. The first is to increase the availability of smaller firms entering the bond market; their absence may indicate excessive regulation of the industry. The second (adjacent to the first) is to attract more private investors; the current state of the

market signals its focus on the institutional players of the financial sector. We also assume that the focus on institutional investors can explain the market's resilience to the economic shocks of 2022-2023.

3.4. Norway

Having average financial reporting indicators, Norway demonstrates the greatest (except for Russia) diversity of issuing companies and the number of issues. At the same time, a characteristic feature of this market is a big number of floating-rate bonds.

3.4.1. Tenor

As in Canada and Denmark, this market is divided between several major issuers, Fig. 7. In Norway, there are also barriers to entry to the market for private investors. However, unlike Canada and Denmark, these barriers are more of a financial nature. The bonds of food producers in Norway are mainly represented by domestic securities with floating coupon rates, that is they are not complex and do not require special qualifications for investment. However, a high nominal value of securities from 100,000 NOK (equivalent to about 10,000 USD) may be a factor complicating access for private investors. This is a very high indicator for debt issued on the domestic market in domestic currency. This fact also signals that the placement of bonds is aimed at attracting institutional investors.

In the realities of the Norwegian financial system, this orientation can be expressed in attracting investment from large domestic social funds. An indirect confirmation of this fact can be the absence of exchange trading on the securities that we consider. The absence of quotations means the absence of secondary market transactions; this implies that most of the considered securities on the domestic market are held by institutional investors until their maturity.

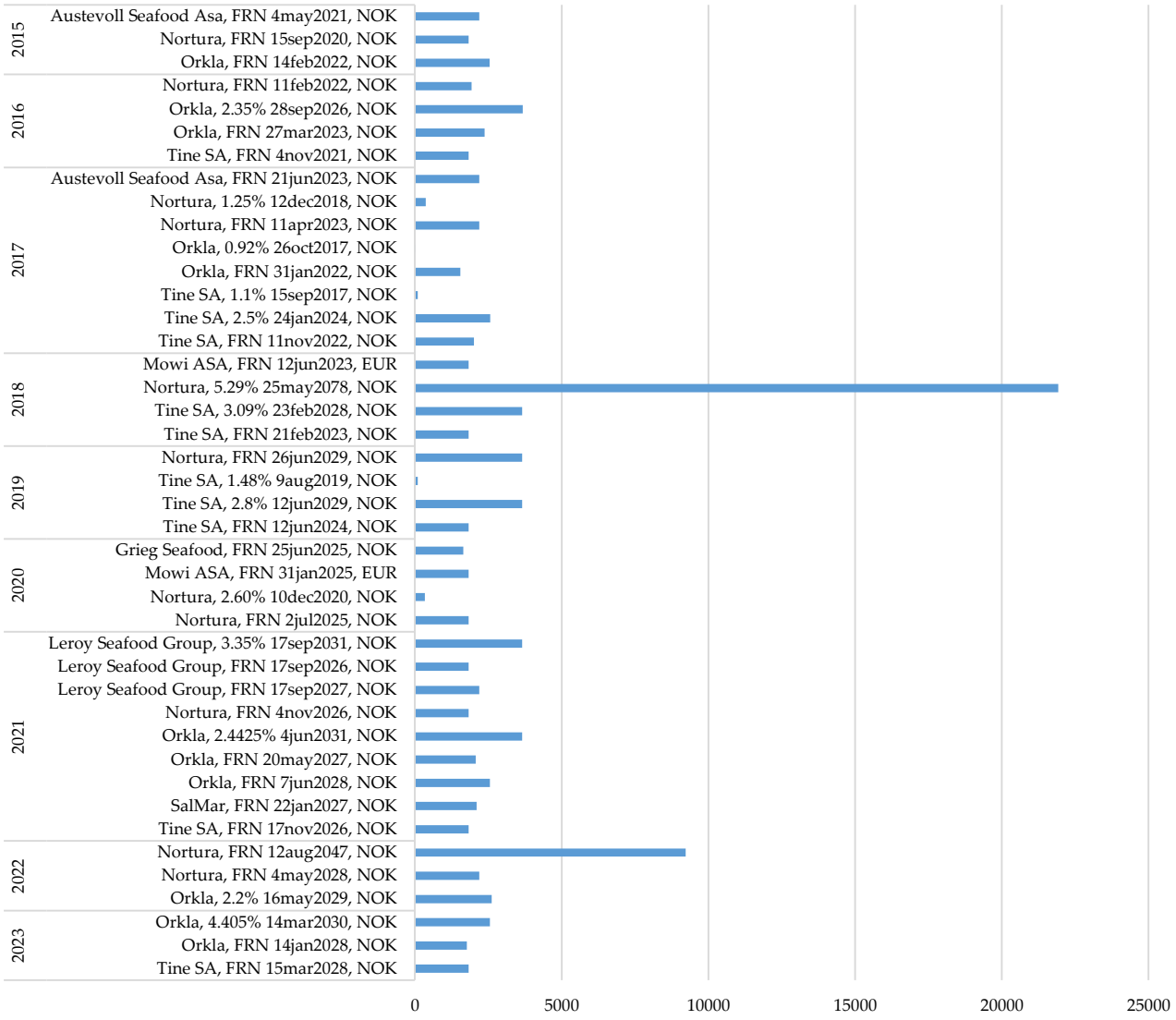

Figure 7. Tenor of Norwegian bonds by particular issue and year of issue

A notable feature of this market is that food companies' bonds are placed for a longer period than the market average, Fig.8. Interestingly, the dynamics of placement terms grew contrary to the global dynamics of 2021-2022, mainly due to the long issues of Nortura and Oakla.

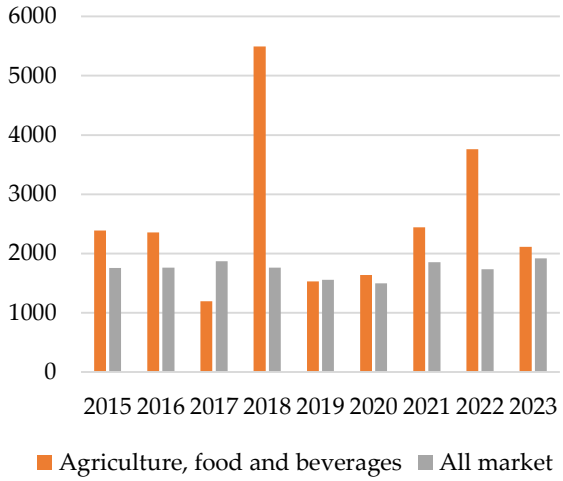

Figure 8. Weighted average tenor of bonds in Norway by the year of issue

Such dynamics can be explained by the fact that the market is mainly filled with bonds with floating rates, which have a built-in mechanism to protect the investor from changes in market conditions. Of course, servicing floating-rate debt has become more expensive for the issuer in 2022 and 2023. But this practice and experience of issuing debt instruments at a floating interest rate strengthens the market stability. In addition, the same mechanism that protects an investor from a fall in the value of a bond when market conditions worsen and interest rates rise, also protects the issuer from paying increased interest when rates fall in the global financial system. Thus, the issue of debt at a floating interest rate gives the issuer some confidence that in the event of a decrease of rates in the global financial system, the cost of debt servicing will also decrease.

3.5. Sweden

3.5.1. Tenor

Approximately a similar situation is observed in Sweden, but with a much smaller number of bonds, Fig.9. The analysis of companies shows that the average values of revenue and fixed assets are comparable with other countries. At the same time, the share of bonds in the volume of assets is the highest in the sample.

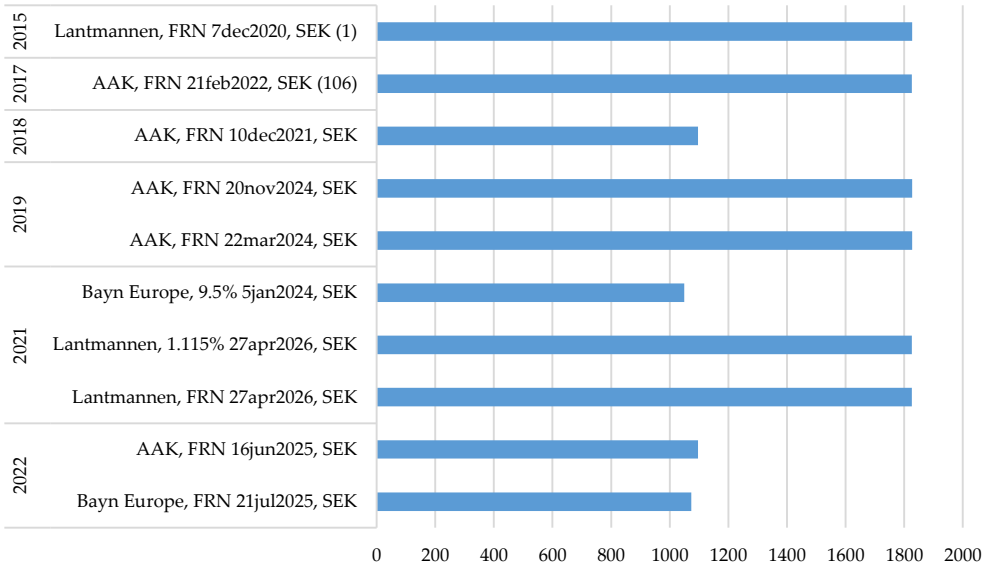

Figure 9. Tenor of Swedish bonds by particular issue and year of issue

As in the larger Norwegian market, debt is primarily denominated in local currency and placed at floating rates.

However, unlike Norway, a decrease in the average duration of placement occurred in Sweden in 2022, and in 2023 there were no issues at all, Fig. 10. This fact does not look surprising and fits into the logic of refinancing cycles of a small number of issuers, given that there were also no issues in 2016 and 2020.

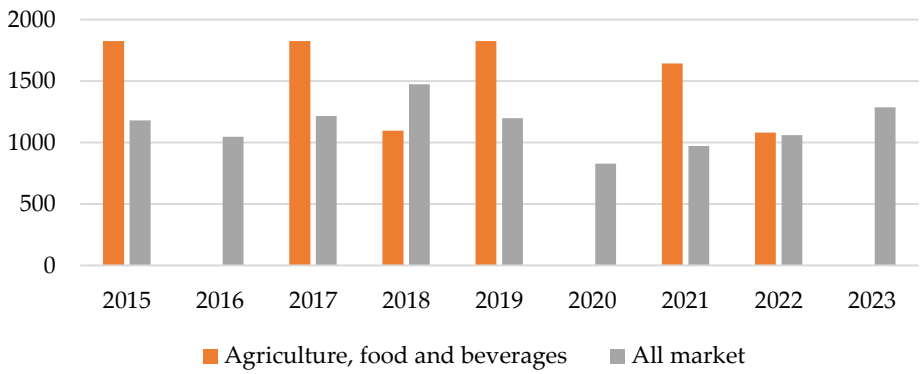

Figure 10. Weighted average tenor of bonds in Sweden by the year of issue

Possible recommendations for the development of the Swedish market consist, as for Norway, in increasing the availability of placed debt for private domestic investors. This fact acquires additional relevance due to the high per capita income. The types of instruments familiar to these countries are affordable and relatively safe even for investors without specific knowledge of the financial market (among other things, floating rates protect investors from asset depreciation).

Leaving aside investment through various funds and trust management, we assume that the admission of private investors to purchase bonds of food producing companies-issuers can give an additional impetus to the development of the agricultural industry in Sweden and Norway.

3.6. Iceland and Finland

3.6.1. Tenor

Approximately similar parameters are demonstrated by the smallest markets of the Arctic countries, see Fig.11, Fig.12. Iceland and Finland are characterized by the smallest sizes of assets and fixed assets in our sample.

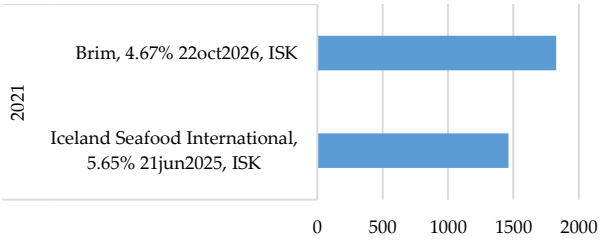

Figure 11. Tenor of Icelandic bonds by particular issue and year of issue

Food producing companies from Iceland and Finland have carried out literally a few issues (in 2017 and 2021). In Iceland, in 2021, food producers made just two issues at a percentage that, according to our calculations, significantly exceeded the weighted average market rate: 4.67% and 5.65% versus 2.57%. The nominal value of the securities was 151 thousand US dollars, which indicates a focus on institutional investors (as well as in other countries).

The observation we made earlier is also partly true for the situation on the market of Finland, Fig.12. In 2021, the average market rate of attracting financing for fixed-rate securities was 2.22%, while HKScan Corporation attracted financing at a rate of 5% with a significant spread. The nominal value of this paper was EUR 100,000, which again indicates the focus on institutional investors.

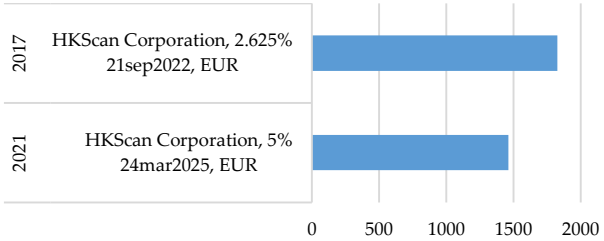

Figure 12. Tenor of Finish bonds by particular issue and year of issue

Despite the very high denominations, Iceland is characterized by a low average volume of bond issuance, comparable to Russia. Hence, this indicates that the focus is not even on large investors, but on a specific investor.

A large nominal value blocks the possibility of small investment companies and private investors to participate in the placement but allows a specific company or a group of companies to buy out the entire volume of bonds. This requires further study and at this stage should be left as an assumption.

4. Discussion

Since we have studied the average market indicators for most countries, there may be some inaccuracies in terms of the impact of the investment rating of the companies and their bond issues. However, from our point of view, such an approach allows us to assess the overall picture by comparing the cases of different countries, which would be impossible when considering investment ratings, since the scales of local rating agencies usually do not correspond to each other.

We also accept the fact that our analysis includes companies that do not operate in the Arctic zone. However, these food producers enter the financial market and attract financing under common legislation through the same institutional procedures.

5. Conclusions

The research allows us to draw some deductions. The focus of issuers on institutional investors, common in the bond markets of food producing companies of the European Arctic, may be related to the stability of these markets in Norway and Sweden; the additional stability is provided by the practice of using floating rates. However, from our point of view, this same orientation creates obstacles to attracting bond financing for small companies and leads to a slowdown in the development of the financial market, as well as reduces the availability of financing for food producing companies. Issuers of countries such as Finland, Sweden and Norway are on average comparable to issuers from Russia; at the same time, the Russian bond market can be considered more developed based on the number of issues. On the other hand, we suggest that the Russian market is unable to attract big capital for the development of infrastructure projects due to the practice of a large number of smaller issues.

Reducing financial and institutional barriers to issuing bonds and investing in them is anticipated to allow food producing companies to be more easily financed by attracting debt instruments (the example of Russia), and therefore increase their productivity.

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