Reducing Road Freight Transport Carbonization Level and Problems of "Green Financing" by Commercial Banks in Latvia

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Abstract

In this article, the authors shall conduct a study of road freight transport impact on air pollution. The objective of the presented study shall conclude in reduction of carbonization level by the road freight transport in Latvia, and in attraction of Latvian commercial banks to "green financing".

In the course of the study, the authors have put forward the following hypotheses: the volume of investments in environmental protection shall be associated with EURIBOR interest rate: environmental pollution shall depend on the EURIBOR interest rate. The authors have demonstrated that 74% of the Latvian truck fleet has a high level of wear and tear, which shall lead to an increase in CO2 air pollution. This could be a direction for the "green financing" by the commercial banks. However, the commercial banks refuse to finance "green projects" due to unstable regulatory framework, political risks, as a result of which the "green financing" shall be in the "high risk" group, which, in its turn, shall entail the application of the higher interest rates. In the context of instability of business activity in the field of the road freight transport, the risk of non-repayment of borrowed funds shall increase. The following methods have been used for conduction of the study: the first empirical approach has been a modified method of group discussion, referring to accompanying literature study which represented the first part of triangulation as a study strategy. This has made it possible to put forward hypotheses. In the next stage of the triangulation, a quantitative preliminary study of statistical indicators has been conducted: volume of the road freight transport, air pollution, service life of the truck fleet, volume of the environmental financing and Euribor interest rate. The main focus of the quantitative preliminary and main study has been on the empirical collection of reproducible data. Based on a partial least square's structural equation modeling (PLS-SEM) approach has been testing of the proposed hypotheses. This procedure has been aimed at investigating cause-and-effect relationships.

Keywords – road freight transport, "green financing", commercial banks, financial risks, Latvia

Introduction

For successful implementation of Sustainable Development Goals (SDG 17), the UN Environment Programme actively works with countries, financial regulators and financial sector to align the financial systems with 2030 Agenda for Sustainable Development. To implement these, it shall be necessary to direct financial flows to support the achievement of the Sustainable Development Goals. At the heart of today's globalized economy are financial markets, through which banks and investors allocate capital to various sectors. The capital allocated today will shape the ecosystems and also production and consumption patterns of tomorrow.

The main areas of current work on the green financing shall be:

- Support of public sector in favourable environment creation
- Promoting public-private partnerships in the field of financing mechanisms such as "green bonds"
- Growing the capacity of community enterprises in the field of microcredit [1].

In the European Union, as in countries around the world, the development of the "green economy" continues. Military actions in Ukraine have led to an increase in the cost of the traditional energy resources, which, in its turn, has accelerated the development of the green financing in EU countries. However, existing barriers and problems hinder the solution of the "green financing" issues. In this article, the authors shall analyse the problems in the "green financing" by the commercial banks in Latvia, and also suggest ways to solve them.

Currently, one of the pressing tasks for the entire world and the EU in particular shall be the search for the alternative and additional "green financing", i.e. the "green projects". Tasks and plans set before the countries of the world and the EU for the transition to the sustainable development models of the world economies in the "green" direction obviously do not coincide with a possibility of obtaining financing for the implementation of all the established tasks. The necessary investments required for the implementation of all of the indicated projects for the G20 countries alone shall be estimated in the amount of tens of trillions of dollars [2].

Literature Review

A large number of scientists have been studying the problems associated with financing the "green projects" in the world. It shall be worth noting the work of the McKinsey Global Institute, which engaged with investments in global economic infrastructure in 2016, 2022, 2023 [3,4,5,6], the works of Johannes Truby, Pradeep Philip, Bernhard Lorentz who dealt with the problems of strategic financing of environmentally friendly energy [7], Porfirjev Boris who studied the pace of development of the global "green economy" [8,9], R. Della Croce, C. Kaminker, F. Stewart who dealt with the role of pension funds in financing the "green initiatives" [9], G. Inderst, C. Kaminker, F. Stewart engaged in definition and measurement of the "green investments" [10].

At the same time, all these studies have been limited to studying legislative restrictions in the implementation of development of the "green projects", as well as state and interstate financing attraction for the implementation of these projects. In rare cases, issues of possible financing by attracting the private pension funds have been touched upon. Simultaneously, in the research papers, unacceptably little attention have been paid to the possibilities of alternative financing through involvement of the commercial banks in this process, which, at this stage of the implementation of the processes of development of financing the “green projects”, prefer to take a wait-and-see position.

The EU adopts the document “A Sustainable Europe by 2030”, in which it sets ambitious goals for the implementation of environmental policy: the increase in CO2 emissions by 2030 should reach no more than 1.5% compared to the post-industrial period, and by 2050, the formation of a climate-neutral society [11]. As it is known, the transport industry has a significant impact on global warming processes, which is assessed by the level of pollution or the level of carbonization (CO2 emissions).

Results and Discussion

Latvia is a transportation and logistics hub between West and East, providing strategic access to both the EU market and to Central Asia [12], and the transport industry makes a significant impact on the country's economy as a whole. The volume of the transport and logistics industry in Latvia consists 7.0% of GDP in 2023 [13].

In the graph in Fig. 1, the authors have estimated the level of carbonization in Latvia, in the period from 2018-2021.

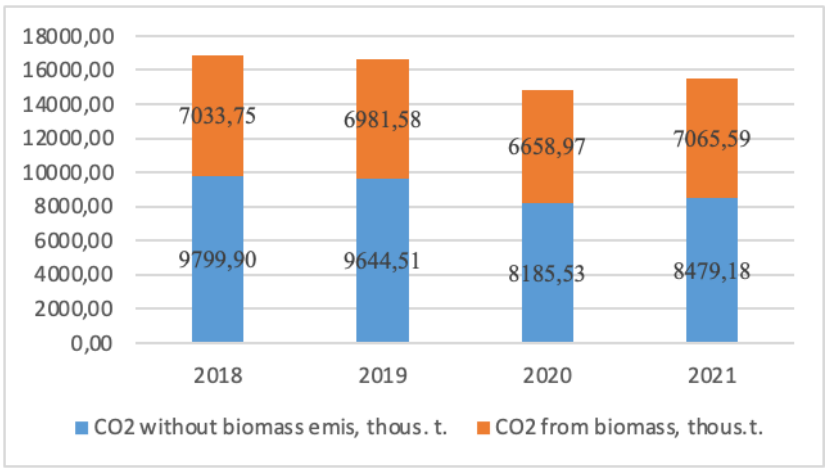


Fig. 1. Air Pollution in Latvia: CO2 From and Without Biomass, thous. Tons, developed by the authors

In the figure, the authors have shown the volume of CO2 in the air, both from biomass and without biomass, in the transport industry. As we can see, in Latvia, during the studied period, there is a tendency towards a decrease in CO2, but it shall be worth noting that during the pandemic, the number of the road transport shipments also decreased.

Considering the objective of our study, the authors shall propose to conduct an analysis of the road freight transport in the period from 2018 to 2023, Fig. 2. [14].

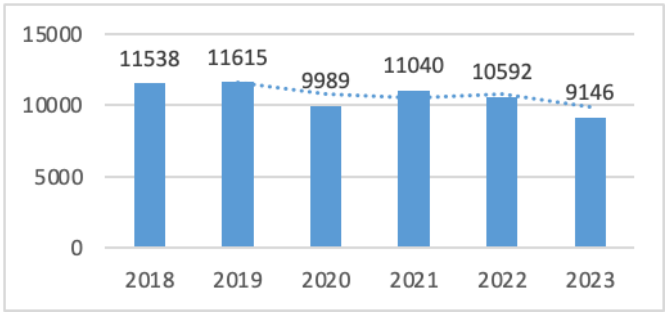


Fig. 2. Analysis of Road Freight Transport in Latvia, in Million Tons, developed by the authors.

As we can see, there was a decrease in the volume of the road freight transport in Latvia during the studied period; in 2020, in Latvia, the consequences of the pandemic led to a decrease in the road freight transport by almost 14% compared to 2018. However, the minimum value of transportation came in 2023 - 9146 million tons or by 21.2% less than in 2018. Of course, political factors - the military actions in Ukraine, have influenced trade relations between the countries.

In recent years, thanks to national environmental protection programs adopted by states, manufacturers of both passenger and freight vehicles have been offering a new generation of vehicles on the market, either with an electric engine or with reduced CO2 emissions. Therefore, according to the authors, it shall be important to conduct an analysis of the truck fleet to assess the impact of Latvian motor transport on the environment.

So, according to the Road Traffic Safety Department in Latvia (RTSD), a service life of the majority of trucks registered in Latvia composes more than 11 years, up to 21 years, see Fig. 3. [15].

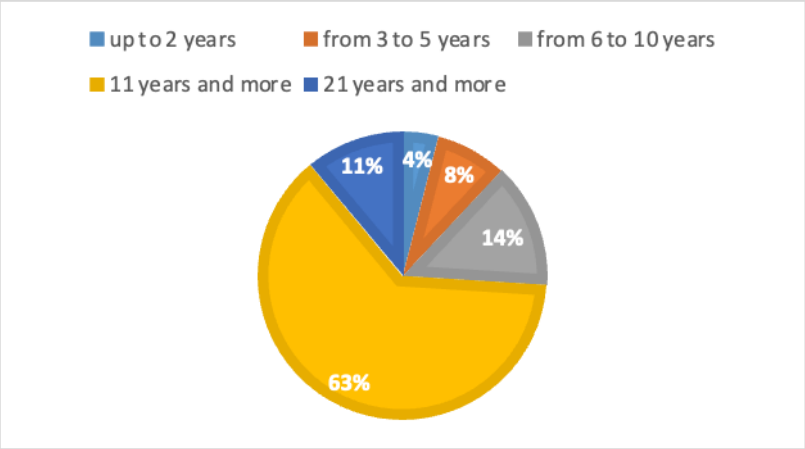


Fig.3 **The Number of Trucks of Latvia in 2020, by a Service Life,** calculated by the authors

If we add to this number the freight transport with a service life of more than 21 years, then we will end up with 74% of the freight transport older than 11 years. There shall be certainly a huge potential for financing the freight transport by the commercial banks.

When assessing the banking system of Latvia, it should be noted that the commercial banks have significant free resources on their balance sheets, which could be used for financing the "green projects". Why do commercial organizations behave this way? How can the commercial banks be involved in the processes of financing and lending to the "green projects"? The authors of this article have established themselves the task of answering these questions.

As the authors have already indicated previously, UNEP and the countries of the world have set themselves the ambitious goal of achieving zero greenhouse gas emissions by 2050, having frozen them at mark of 2030. According to the Deloitte Research Centre, it shall require annual investments of up to 7 trillion US dollars. At the same time, slightly more than 2 trillion US dollars are currently being invested [6]. At this rate, it shall not be possible to achieve the established goals in the specified time frame.

Following a survey conducted in 2020, the following challenges in the implementation of the "green financing" have been identified by International Finance Corporation, World Bank group:

- Vulnerability to climate-related risks.
- Limited insurance coverage for climate-related losses.
- Bank-dominated financial sectors, shallow financial markets [16].

The authors of the presented article shall in general agree with the specified list of the problematic issues. And they shall propose to consider them in the context of the possible "green financing" by the commercial banks.

It should be understood that the commercial banks are conservative institutions which very precisely measure the risks when issuing credit funds. The problem of the lending has been facing many EU countries for a long time. Thus, the President of the Bank of Latvia, Martinsh Kazaks, immediately after the end of the global coronavirus pandemic, began to raise issues of weak financing of projects, and not only of the “green projects”, by the commercial banks in Latvia. He has acknowledged that competition in the banking sector is insufficient - although the commercial banks have the capacity to lend and sufficient capital, there is excessive caution in issuing the loans. The banking sector has not used its lending potential [17].

It should be noted that the level of investment in ambient air and climate in Latvia has been increasing annually, so from 2018 to 2023 the amount of investment increased from 9503.5 million euros to 34853.7 million euros or by 366% (!). [18].

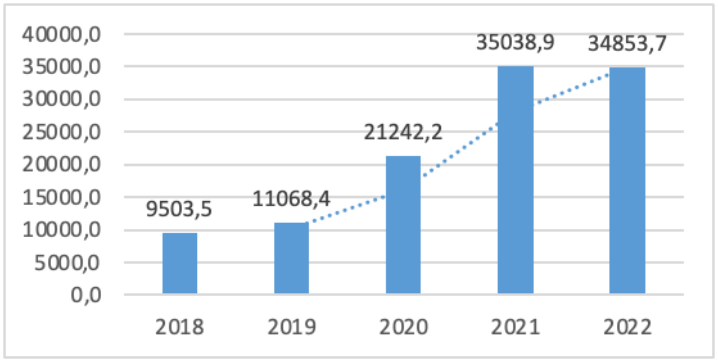


Fig. 4. Protection of Ambient Air and Climate, mln. EUR, calculated by the authors

Attracting foreign investment in Latvia's ecology is also complicated. Foreign investors assess the investment climate in Latvia with the lowest score of 1.9. Foreign investors’ assessment of the overall investment climate in Latvia has reached its lowest rating of 1.9 points out of 5. In comparison to 2022, the rating has fallen by 0.4 points. This is the conclusion of the “Sentiment Index 2023” research by the Foreign Investors’ [19].

The representative of Finance Latvia Association, Yanis Brazovsky, has emphasized that only 25% of enterprises in Latvia may be given loans. He has noted that in order to provide the more active loans, it shall be necessary to agree on risk sharing: the risk of financial losses will be partly borne by banks, partly by entrepreneurs, and partly by the state [20].

Thus, having conducted the analysis, the authors shall propose to summarize the experts’ conclusions:

1) The commercial banks provide weak financing, and not only for the “green” economic projects;
2) Part of the risk of the financial losses should be borne by the state. Then the commercial banks may be encouraged to start financing more risky projects, including the "green" ones;
3) It shall be impossible to force the commercial banks to lend;

Thus, Latvian commercial banks underfinance the "green projects", because the banks consider these projects too risky and low-profitable. Otherwise, they would use their free resources to issue the loans and make a profit.

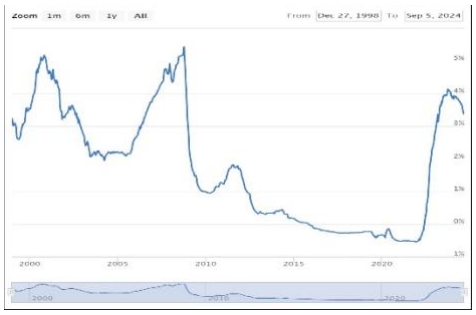
Therefore, it shall be necessary to analyse why the “green projects” are high-risk and low-return for the banks?

To answer this question, first of all, we shall need to understand why the “green loans” very often fall into the category of “high-risk projects” in the commercial bank projects?

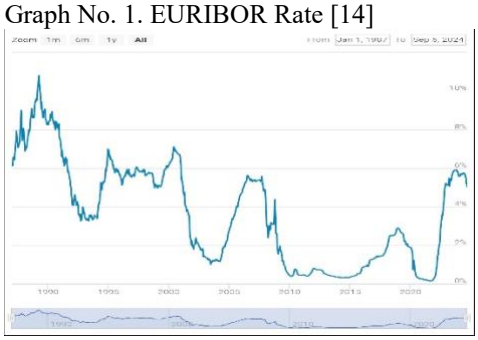
As experts note, there still persists the situation in many countries, when the lack of clear definitions of the “green financing” and rules of the game for market participants scares off potential investors [21]. Without clarity on these issues, it shall be impossible to adequately manage the risks of the “green investments”, conduct effective monitoring of project implementation, ensure proper control, accounting and reporting, and competently assess the socio-economic efficiency of program and project implementation [2].

The scientists' statements have clear justifications. For example, in Latvia, the introduction and generation of "green electricity" is accompanied by constant changes in legislation and tariffs at which the generated electricity is purchased from its producers. If funds are directed to the financing new trucks, it shall be also associated with a level of risk: the war in Ukraine led to a decrease in freight transportation in the country by more than 21% (Fig. 2), and therefore a decrease in the profits of entrepreneurs, difficulties in repaying loans, and ultimately to an increase in the risk of these investments.[2].

Next, it shall be necessary to analyse what loan interest rate shall be acceptable for the commercial banks for financing the high-risk projects, to which we shall relate the "green investments". To do this, we shall need to understand what the cost of money is for the commercial banks at the moment. Starting from 2023 and until the beginning of 2024, 6-month EURIBOR rate was more than 4% [22].



Graph No. 1. EURIBOR Rate [14]



Graph No 2. LIBOR Rate [15]

In its turn, 6-month LIBOR rate in 2023-2024 was almost 6% [23].

With the most moderate claims from the banks to cover possible losses on the risky loans, the rate at which it shall be possible to receive financing from the commercial banks for the “green projects” in Europe will be at least EURIBOR+3%, while in America, in its turn, LIBOR+3%. Thus, the interest rate only on a loan in Europe will be 7%, and in America -9% per annum. This shall be the rate without additional expenses for reviewing the loan, insurance, fees for reserving money, fees for issuing the loan, etc. If you add all these expenses, the real cost of the loan in Europe will increase to 8.5%, and in America it will exceed 10%.

According to experts in the field of lending for the "green projects", the profitability of these projects fluctuates around 6-9 percent per annum, and the payback period for these projects shall be 8-20 years [24]. With such profitability, it shall be impossible to obtain the bank financing, since the cost of money for the commercial banks is approximately analogous at present [22, 23]. It should be noted that at the moment there is a steady trend towards lower EURIBOR and LIBOR rates. It shall be possible that in a year or a year and a half, when rates fall below 3%, the banks will be more interested in lending to the "green projects".

Thus, to achieve the established goals – reducing the level of carbonization, the transport industry of Latvia shall need the “green investment" or “green financing” of the vehicle fleet. For transport and logistics companies, financing more modern trucks with minimal or zero CO2 emissions shall be necessary. However, in the current conditions, these '"green projects" shall be associated with the high risks for the commercial banks of Latvia. To identify the dependence between these indicators, the authors shall propose an approach based on a partial least square’s structural equation modelling (PLS-SEM).

Research methodology

To assess the empirical relationship between latent variables, the authors use the PLS-SEM method. This method was suggested by [25]. The evaluation method is based on the consistent use of orthogonalization and PLS-regression, and according to a number of scientists [26,27,28] has the following advantages, such as: conditions related to the object under study, volume, correlation, and normal distribution. This method processes a small amount of data, which increases statistical power. PLS-SEM tests complex theories using empirical data [29], which indicates that an important characteristic of PLS-SEM is that it provides latent variable scores as specific linear combinations of their manifestations.

Schubring and others [16] show that the success of PLS is due to its ability to estimate the parameter of complex models without many of the distributional and other limitations of traditional econometric models. PLS-SEM has become a common statistical method in many scientific fields [26, 27].

In the first procedure, latent variables are determined by the manifest indicators:

$$Yi = \sum_{h=1}^{p} (w_{jh} * x_{jh}) \quad (1)$$

The following equation illustrates a measurement model using composite indicators, where Y is a linear combination of indicators xj, each of which has a weight of wj.

In the second stage, each latent variable was estimated by other latent variables using the following formula:

$$Z(j) = \sum_{i=j}^{p} (e_{ij} * yi) \quad (2)$$

Where $e_{ij} =$ *sign cor* $(y_i\, y_j)$ $w_{yh} = cor\ (Z_j, xj_h)$

Then, we perform the previous steps until the algorithm converges. Finally, we have determined coefficients from least squares regression.

The structural model was then assessed as reliable and valid. An R^2 estimate is required for each endogenous latent variable. Pages J. and Tenenhaus M. [15] define R^2 as:

$$R^2 = \sum_{k=0}^{n} aj * correl\ (Yj\ xj) \quad (3)$$

A higher indicator of R^2 indicates a higher degree of prediction accuracy [26,27].

To achieve the goal, the authors put forward the following hypotheses:

H1: The volume of investments in environmental protection is related to the EURIBOR interest rate.

H2: Environmental pollution depends on the EURIBOR interest rate.

The calculation data is presented in table's №2- №4.

Table 2. Assessment results of the measurement model in Latvia.

Latent variable	Indicator	Loading	CR	AVE
Protection of climate	**Protection** of ambient air and climate, mln Eur	0.483	0.784	0.697

EURIBOR	EURIBOR, %	0.534	0.056	0.561
Air pollution	Air pollution, CO2 thous.ton	0.546	0.913	0.723

Reliability assessment is assessed by Composite Reliability (CR). The AVE is calculated as the mean of the squared loadings of each indicator associated with a construct. Statistically, convergent validity is established when the Average Variance Extracted (AVE) is >0.50. In our case all indicators more than 0.5.

Table 3. Discriminant validity assessment

Fornell-Larcker Criterion			
	Protection of climate	EURIBOR	Air pollution
Protection of climate	0.318		
EURIBOR	0.423	1.000	0.679
Air pollution	0.891	0.597	1.000
Heterotrait-Monotrait Ratio (HTMT)			
	Protection of climate	EURIBOR	
Protection of climate	0.301		
EURIBOR	0.396	1.000	0.782
Air pollution	0.402	0.687	1.000

In Table 3, we present the structural model results. According to the Fronell-Larcker criterion, the square root of the average variance extracted by a construct must be greater than the correlation between the construct and any other construct. The acceptable level of discriminant validity the Heterotrait-Monotrait ratio of correlations (HTMT) is suggested to be less than 0.90 (Pages et al., 2001).

Table 4. Structural relationships and hypotheses testing

Hypotheses	Path coeff.	Stan. Error	T-Statitic	P-Value	Result
Protection of climate and EURIBOR	0.212	0.0995	3.806	0.003	Supported (H1)
Air pollution and EURIBOR	0.248	0.0995	3.254	0.002	Supported (H2)

All the path coefficients in table 4 related to the inner relations are shown as unstandardized, in particular, we obtain full support for H1 relative to the positive impact of EURIBOR on Protection of climate (green investment) (β = 0.212,

$p<0.01$). Similarly, the study discovered how EURIBOR are positively related to air pollution, and it is statistically significant at a 1% significance level.
The increase in EURIBOR is also leading to an increase in air pollution (CO2). The hypotheses put forward by the authors for H2 is also relative to the positive impact of device usage on e-waste ($\beta = 0.248$, $p<0.01$).

Conclusion

Basing on the conducted research, the authors of the article shall come to the following conclusions:

1) During the analysed period, the volume of the road transport in Latvia decreased, especially during the pandemic and military actions in Ukraine, by 21% in 2023 compared to 2018.
2) At the same time, the level of carbonation from motor vehicles has been decreasing.
3) The Latvian road freight transport sector is represented by a fleet of old vehicles, 63% of which are 11–21 years old, and 11% are over 21 years old. The car transport industry shall need a car fleet change or the “green financing”.
4) The "green financing" shall be a high-risk business project, since the legislative framework in Latvia which ensures the economic development of the "green financing" is poorly developed and constantly changing;
5) The profitability of the risky “green projects” in the amount of 6-9% per annum shall not correspond to the business model of the commercial banks and they cannot finance these projects without support from the state.
6) Part of the risk of financial losses should be borne by the state. Then the commercial banks can be stimulated to start financing more risky projects, including the "green ones".
7) The authors’ calculations based on the approach of the partial least square’s structural equation modelling (PLS-SEM) have proven the hypotheses put forward by the authors: the volume of CO2 in the transport industry shall be affected by EURIBOR interest rate, since the volume of the investments in the environment also depends on the EURIBOR level. This shall prove the need for a comprehensive approach to the sustainable development of the economies of countries: the “green finance” will be used more widely in a more stable economic situation in the countries, which is reflected in EURIBOR rate on the EU market.

Basing on the obtained conclusions, the authors of the study shall make the following suggestions:

1) The EU countries, like all countries in the world interested in the development of the "green economy" and "green finance", shall need to develop common legislation which would take into account the interests of all stakeholders in the "green finance". It shall be necessary to create all the regulatory conditions for the successful implementation of the "green finance", with clearly understandable and constant provisions for long-term interaction.

2)With a clear and understandable regulatory framework, the commercial banks will be able to develop the reliable long-term “green finance” business model, focused on a fixed interest rate not tied to EURIBOR and/or LIBOR.

Only under such conditions, the entrepreneurs will be able to receive the "green finance" and repay the loans issued to them for an updated vehicle fleet, reducing air pollution. At the same time, Latvian commercial banks will be able to transfer these loans from risky to reliable. This will allow the countries to fulfil their adopted SDG17 commitments and contribute to the sustainable development of our planet.

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