

A LOAN FINANCING OF MICRO-ENTERPRISES (RETAIL SECTOR) DURING ECONOMIC FLUCTUATIONS

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Purpose: The study attempts to determine the extent to which the financing of micro-enterprises (from the retail sector) by a bank loan is dependent on current and expected changes in the unstable economic situation in Poland in 2019-2021 (sample period).

Design/methodology/approach: The study used the Pearson's correlation and the DTW methods to explain the relationship between the number and value of loans granted to micro-enterprises (from retail sector) and economic indicators.

Findings: The study shows a strong positive correlation between the change in a number and a value of working capital loans granted to micro-entrepreneurs and the assessment of a direction of change in the economic situation and an indication of a lack of barriers, a decrease in an importance of the barrier (a high competition) or an expected general economic situation of an enterprise. Using the DTW model, a strong adjustment of a change in the number of investment loans granted to micro-entrepreneurs to the assessment of a direction of changes: economic situation, market mechanism, barriers, towards high costs (staff and interest) was observed, and when a dominant sources of financing working capital loans were own funds, bank loans and trade credits.

Theoretical implications: The survey results confirm: unstable times require decisions to be based on a variety of economic factors.

Practical implications: The results of the study indicate a decision-making sensitivity of retail micro-sized enterprises regarding a choice of a type of bank loan in relation to the assessment of a direction of changes in an economic situation in the short term. They may help them build good business relationships with their suppliers. They may be used to banks and other financial providers for building a market offer and for forecasting a credit demand, too.

Originality/value: The value of the study is to present (from two perspectives) a correlation between a number and a value of loans granted to micro-entrepreneurs with changes in selected economic indicators. Conclusions have application value for banks and other financial institutions, as well as micro-entrepreneurs to determine an impact of specific economic indicators on a loan market.

Keywords: micro-enterprise, retail sector, working capital loan, investment loan, Dynamic Time Warping method (DTW).

Category of the paper: The research may involve the empirical and scientific research.

1. Introduction

Interest in micro-enterprises and their role in national economies has been analysed by economists for nearly 50 years. This is due to the fact they constitute the largest group of enterprises (e.g., in Poland in 2020 accounted for 97% of the total number of enterprises (PARP, 2022)) and play an important role in the economic development (Ayyagari, Beck, Demirgüç-Kunt, 2007), social and market (reducing an unemployment or a designing and introducing a product, a service and market innovations (Boyer, Régis, 2014)). In SME sector many employees gain their first professional experience (Zaleśna, 2015), and (in a relation to the entire economy), SMEs are a complementary element to large enterprises and the public sector through cooperation with these entities or activity in market niches that large enterprises are not interested (Kunicki, 2013). They need financing, too.

The study attempts to identify the determinants affecting a number and a value of working capital and investment loans obtained by retail micro-enterprises (during the period of unstable economic situation in Poland: 2019-2021) based on the degree of a dependence of their assessment of CSO's economic climate indicators and indicated loan volumes. There was used data from Central Statistical Office (abbr. CSO) and Credit Information Bureau (abbr. CIB) for these years and two methods: the Pearson's linear correlation coefficient and the Dynamic Time Warping (abbr. DTW). Some strong correlations were identified in the direction of changes in the economic situation and some barriers. The study can be used by banks and other financial institutions, as well as national governments, financial market regulators and micro-entrepreneurs to determine an impact of specific economic indicators on a loan market.

2. Literature review

SMEs have an advantage over large entities in terms of reaction to changing environmental conditions, innovation, fast information flows (PARP, 2010). The literature on the subject indicates that smaller enterprises (due to their flexibility of operation) are easier to adapt to changes in an economic situation, including crisis phenomena (Bartz, 2016). However, the fact SMEs are more easily able to adapt to it, that does not mean they do not feel their negative effects.

Empirical research confirms an activity of the SME sector - during a crisis – is characterized by a decrease in sales revenues (Kola-Bezka, 2011), in investments (Pyka, 2012), delays in payments (Zawadzka, 2010), and even long-term problems with settling liabilities. A form of financing is interesting, too. The enterprises activities can be financed with a capital from internal and external sources (Dylewski, 2016). Their selection depends on many factors,

including economic ones. These may be factors related to a given entity, such as: a type of business, owned resources and their type, a purpose of financing, an economic strength or a creditworthiness (these are microeconomic factors) as well as factors like: an inflation, a level of economic growth, an unemployment rate, interest rates, a public debt (these are macroeconomic factors) (Duliniec, 2015; Wolański, 2015). The analyses indicate an existence of a relationship between a level of macroeconomic measures and the credit market (Calza, Gartner, Sousa, 2003), GDP and a level of interest rates, a demand and a supply of bank loans (Jiménez et al., 2012). It translates into a value and a number of loans granted (Thaker et al., 2013). Other studies confirm a relationship between a credit interest rate and CPI, and a number and a value of loans granted (Castro, 2013), an increase in a risk of loan default along with a decline in real GDP and stock price indices. This is because higher real GDP growth results in higher incomes, and it has a positive impact on borrowers' ability to service their debt (Saba, Kouser, Azeem, 2012). In the case of an economic slowdown: a risk of loan default increases as an unemployment increases and, as a result, difficulties in servicing liabilities increase (Beck, Jakubik, Piloiu, 2015). They are responsible for an increase in a share of non-performing loans (Rajan, Dhal, 2003). The studies determining a relationship between a level of inflation and a share of non-performing loans indicate – as a result of inflation. Credit liabilities become cheaper, what improves their repayment (Anastasiou, Louri, Tsionas, 2016). However, other analyses indicated: a level of non-performing loans increases with an increase in the inflation rate (Cappiello et al., 2010; Klein, 2013) (it contributes to an economic slowdown) or an increase in unemployment (Škarica, 2014).

Financial needs and available methods of financing vary depending on the phases of an enterprise's life cycle (Berger, Udell, 1998). Some studies confirm a thesis: a basic source of the SME sector financing is own funds (Chęciński, 2015; Janik, Gałązka, 2014; Zuzek, 2013). For example: the structure of financing sources of SME enterprises in Poland in 2020 was as follows: 68% were own funds, 9.7% - funds directly obtained from abroad, 9.0% - credits and loans, 4.5% - financial leasing, 3.2% - budget funds, 3.2% - other sources, and 2.4% - unfinanced expenditures (PARP, 2022). This applies above all to enterprises at an early stage of development (Huyghebaert, Van de Gucht, 2007), primarily micro-enterprises. Increased own funds is a better hedging against a risk (it constitutes an enterprise's guarantee base for potential creditors), more freedom in making investment decisions and greater independence of an enterprise in all areas of economic activity (each increase in equity triggers a possibility of obtaining external foreign capital to expand a scale of an enterprise's operations (Wilczyńska, 2016)). However, small amounts of own funds make it often difficult for SMEs to run their business. In subsequent stages of development, a demand for capital increases, SMEs also obtain more assets, they can be used as collateral for an external financing (e.g. bank credits). Assets serve to improve a creditworthiness and attract an attention of investors, who are willing to contribute a financial capital to enterprise for its development. As a consequence, SMEs were starting to replace internal financing sources with external ones, including investors and banks

(bank loans, loans, factoring). A bank loan is one of the most popular forms of external enterprises' financing in Poland (Domańska-Szaruga, Mazurek, 2021; Kozioł, Pitera, 2018; Smolińska, 2016) and throughout Europe (Sierpińska-Sawicz, 2018). Due to the purpose of financing, working capital and investment loans are distinguished (Heropolitańska, Nierodka, Zdziarski, 2020). The bank loan can be granted for various operational purposes (a working capital loan) and development (an investment loan). Commercial enterprises are usually characterized by a fact their asset structure is dominated by current assets, i.e., inventories, short-term receivables (incl. all from their customers) and short-term financial investments financed with own funds, bank loans (usually working capital loans) and trade credits. In economic practice, there are also companies who finance all current assets with variable, short-term capital and have no problems with settlement of liabilities timely (e.g., retail companies). In most enterprises, current assets are partly financed with fixed capital (own funds and long-term liabilities), and with variable capital partly (Janik, Paździor, 2011). Working capital loans are intended to finance current operations and are used to ensure financial liquidity. Investment loans are intended to finance expenditures on tangible fixed assets (they result in the creation of a new or a modernization of existing fixed assets). The credit amount is made available to a borrower according to his individual needs (Grudziński, 2010). There is the study that shows: if internal sources of financing are insufficient to fund planned investments, an enterprise first takes out loans or bank loans, and only after these opportunities are exhausted does it increase its own capital by raising external inflows (Wilczyńska, 2016).

The research indicates: banks are reluctant to lend during the crisis due to higher credit risk. This implies a potential decrease in a number and a value of loans granted to business, especially micro-enterprises (Adamowicz, 2013; Kozak, 2012; Nocoń, 2015). On the other hand, problems related to economic changes may result in an increased demand for loans enabling businesses to survive. In the long term, investment loans ensure that a burden of loan instalment payments is spread over time. Moreover, they can thus provide a stable source of financing in uncertain times.

The main purpose of the study is to attempts to determine the extent to which the financing of micro-enterprises (from the retail sector) by bank loan is dependent on current and expected changes in the economic situation in Poland in 2019-2021 (sample period). The following hypothesis was formulated: *the increase in a number and a value of working capital and investment loans granted to retail micro-enterprises strongly depended on their positive assessment of a direction of changes in an economic situation and a dominant source of financing, which was own funds, in Poland in 2019-2021.*

3. Methods

The survey of working capital and investment loans for retail micro-enterprises was concerned on their number and value. The data, obtained from CIB, were monthly. It has an information on the credit history of a total of 1.4 mln enterprises, farmers and other entities, including 845,000 microenterprises (BIK, 2022). In the study, the potential explanatory variables were business climate indicators taken from the "Economic business climate survey" conducted by CSO (GUS, 2018) and relating to microenterprises involved in retail. This survey is conducted monthly using the business test method with a simple and short questionnaire, which allows the data to be collected quickly and the results to be made available (which is its primary advantage). Responses are collected to questions about the entrepreneurs' opinions on selected factors affecting a current and future (in a three-month perspective) situation of the businesses they manage. The survey concerns such elements of business activity as: an economic situation, a demand and a supply of goods, prices, a general economic and financial situation, a competition, an employment, labor and financial costs, a legislation, encountering "other barriers" (GUS, 2018). The data from the aforementioned CSO survey was compared with a value and a number of working capital and investment loans (the data concerned only retail micro-enterprises). The research period covered 2019-2021, using monthly dynamic data. It should be emphasized that: [...] the indicated CSO studies provide information on the directions of changes observed in the economy, and not on the level of a given factor at a given moment, therefore they are used to analyze trends in economic development. [...] When presenting the results of economic climate surveys in a given month, it should be paid attention not only to whether the indicator in question has a positive or a negative value (which proves that the respondents' opinions are more optimistic or pessimistic, respectively), but mainly to what is the direction of changes observed in a given segment of the economy. [...] This principle applies to both diagnostic and prognostic indicators [...] (GUS, 2018, p. 22).

The analysis of the dynamics of mass phenomena is carried out, among others, on the basis of time series. These are sequences (Y_t) of values of the studied phenomenon observed in successive units of time (months, quarters, etc.), when time is the independent variable. DTW and (for comparison) the popular Pearson's linear correlation coefficient is used in the study. The latter (denoted as (r)) is a measure of the strength of a linear relationship between two variables and can take a range of values $[-1, 1]$ (Okwonu, Asaju, Arunaye, 2020). Reaching a value of $+1$ or -1 means that all data points are on the line of best fit. An absolute value of (r) between $0.5-0.7$ is assumed to mean the correlation between the variables is strong, and between $0.7-1$: a very strong (Statistics, 2022).

On the other hand, DTW stands for time series clustering (Laerd Statistics, 2022). It is a technique for finding the optimal fit between two given time-dependent sequences (to detect similar shapes with different phases), given certain constraints (Müller, 2007). Given two time series, DTW gives the optimal solution in time, with the only constraint being the need to sample at equally distant points in time. If the strings take values from a certain feature space, then a local distance measure (d) must be used to compare them. Intuitively, (d) has a small value when the sequences are similar and a large one when the sequences are different. The algorithm finds a matching path (minimum distance) that passes through low-cost areas (the 'valleys' on the cost matrix) (Georginio, 2022). The choice of this research method was dictated by the type of data, as CSO's indicators are opinions or expectations that may change over time in relation to the actual number and value of working capital and investment loans granted. The 'R' (software language) was used to illustrate the results (Biecek, 2011; Hafner, 2019). One of its strengths is the ease with which well-designed, high-quality charts can be created (Zagdański, Suchwałko, 2016).

4. Results

In the DTW formula, a selection of sequences from 0 to 6000 distances was made. On this basis, 23 combinations (a blue colour) were obtained from 80 combinations and compared with the Pearson's linear correlation coefficient (r . project, 2022) (Table 1). In this latter method, results in the range (0.6-1.0) and [(-1.0)-(-0.6)] were considered to be already quite strong and strong correlation respectively, of which 21 were obtained. The positive correlation (a dark blue colour) occurred in 15 cases (71.4%) most frequently when considering a number or an amount of working capital loans granted to microenterprises (93%) in conjunction with assessments of a direction of change: a CSO's general economic situation, an economic situation of an enterprise, a current general economic situation, a lack of barriers, a shortage of employees, too much competition in the market, current sales and an expected general economic situation of the enterprise. Only in one case was there a positive correlation between a number of investment loans granted to micro-enterprise (from retail sector) and too much competition in a market.

Table 1.

Comparison of selected data obtained with the DTW and the Pearson's linear correlation coefficient in retail micro-enterprises in Poland in 2019-2021

Types of loans	CSO Business Climate Indicators	Pearson's correlation coefficient (r)	R ²	DTW Distance
A working capital loan (amount)	A general economic situation of CSO	0,709460368	0,50	4461639.34
A working capital loan (number)	A general economic situation of CSO	0,783640329	0,61	32600.48
An investment loan (number)	A general economic situation of the CSO	0,461894918	0,21	4522.11
A working capital loan (number)	An economic situation of the enterprise 9	0,749930841	0,56	32602.61
An investment loan (number)	An economic situation of the enterprise 9	0,470308474	0,22	4524.56
An investment loan (number)	CPI	-0,632796175	0,40	4507.83
An investment loan (number)	PPI	-0,289225179	0,08	4480.96
A working capital loan (number)	A current general economic situation 9	0,71669701	0,51	32586.94
An investment loan (number)	A current general economic situation 9	0,39056568	0,15	4509.04
A working capital loan (number)	A lack of barriers 9	0,758905947	0,58	32607.85
An investment loan (number)	A lack of barriers 9	0,481680645	0,23	4529.16
A working capital loan (number)	A shortage of employees 9	0,761049198	0,58	32568.36
An investment loan (number)	A shortage of employees 9	0,543922812	0,30	4491.28
An investment loan (number)	A high labour costs 9	-0,254409014	0,06	4510.01
An investment loan (number)	A high credit interest 9	0,096075902	0,01	4528.07
An investment loan (number)	A high burden on the budget 9	-0,168149474	0,03	4497.89
A working capital loan (number)	Too much competition in the market 9	0,792711288	0,63	32607.06
An investment loan (number)	Too much competition in the market 9	0,722602885	0,52	4530.21
An investment loan (number)	Difficulties with counterparty settlements 9	-0,179445299	0,03	4545.94
An investment loan (number)	An unclear and unstable legislation 9	-0,669351669	0,45	4519.27
A working capital loan (amount)	Other barriers to operation 9	-0,684629784	0,47	4461164.36
A working capital loan (number)	Other barriers to operation 9	-0,725657161	0,53	32125.5
An investment loan (number)	Other barriers to operation 9	-0,38207749	0,15	<u>3981.2</u>
A working capital loan (number)	Current sales 9	0,659376641	0,43	33810.4
An investment loan (number)	A current goods stock 9	-0,045826933	0,00	4622.2
An investment loan (number)	A dominant sources of working capital financing: own funds 9	0,420420999	0,18	<u>561.86</u>

Cont. table 1.

An investment loan (number)	A dominant sources of working capital financing: bank loan 9	-0,032703593	0,00	<u>2965.8</u>
A working capital loan (number)	A dominant sources of working capital financing: trade loans 9	-0,668985492	0,45	31305.1
An investment loan (number)	A dominant sources of working capital financing: trade loans 9	-0,638979886	0,41	<u>3219.4</u>
A working capital loan (amount)	An expected general economic situation of the enterprise 9	0,683110154	0,47	4463438.66
A working capital loan (number)	An expected general economic situation of the enterprise 9	0,727118547	0,53	34399.8
An investment loan (number)	An expected general economic situation of the enterprise 9	0,498692064	0,25	5903.6

Note. A dark blue: a strong and a very strong positive correlation (samples); a blue – a fairly strong correlation; a grey - a strong and a very strong negative correlation.

Source: Own study based on GUS and BIK data.

The negative correlation (a grey colour) occurred in 6 cases only (28.6%) and applied equally to investment loans (a number) and working capital loans (a number mainly) provided to micro-enterprises in connection with assessments of a direction of change concerning: an inflation (CPI and PPI), an unclear and an unstable legislation, other barriers to operation (except e.g., a shortage of employees, high labour costs, credit interests, too much competition in the market) but also a dominant source of financing working capital in the form of trade credit. This may indicate a decrease in demand for investment and working capital loans in the event of a positive assessment in the market situation in the area of: price changes, laws or lowering barriers to operation.

Using the DTW algorithm and analysing an obtained data, it was noted that the smallest distances (from 0 to 6000) occurred in 22 of the 80 combinations (a dark blue colour) between a number of investment loans granted to micro-enterprises and the assessments of: a business climate, a demand and a supply, PPI, barriers towards high costs (employee, interests and high budget burdens), a shortage of employees, difficulties in settling accounts with counterparties and others, and when a dominant sources of working capital financing were: own funds, bank and trade loans. Out of such a wide spectrum, the smallest distance arose in the relationship between a number of investment loans granted to micro-enterprises and the assessment of a direction of change of a dominant source of working capital financing, which was own funds in micro-enterprises (561.86). Another three "small" distances were observed in the case of the relationship between a number of investment loans and the assessment of a direction of change of a dominant source of financing working capital in the form of bank loan, trade loans and other business barriers (respectively: 2965.8, 3219.4, 3981.2). Only in one case was there a convergence of results using both testing methods. It was a number of investment loans granted to micro-enterprises in connection with too much competition in the market.

Thus, it can be concluded from: an increase in a number of loans granted for development activities was correlated with an optimistic search for market viability.

Referring to the smallest distance arose in the four relationships mentioned above, it was illustrated by using the *R-environment*. In the first case, it arose between a number of investment loans granted to micro-enterprises (series 1) and the assessment of a direction of change of a dominant source of a working capital funding in the form of own funds (series 2): 561.86 (Figure 1). There was some visual similarity between the data in Q2-Q4 2019, Q1-Q4 2020 and Q1-Q2 2021.

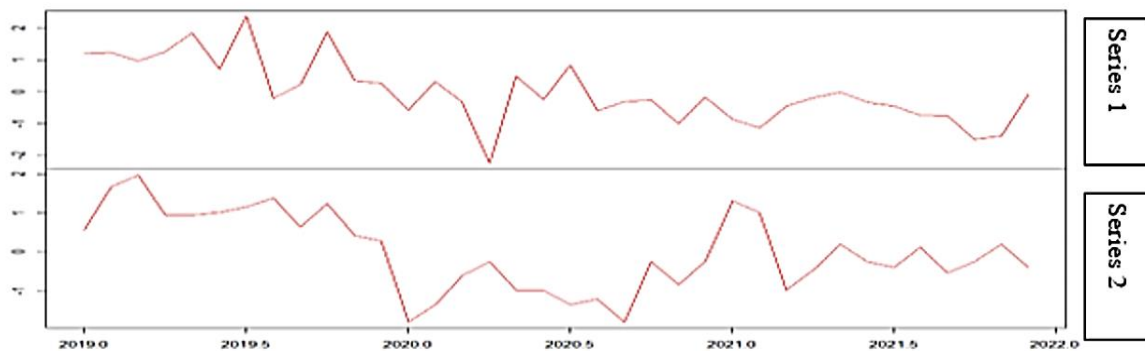


Figure 1. Evolution of a number of investment loans granted to micro-enterprises (series 1) and assessment of a dominant source of financing working capital funding in the form of own funds (series 2) in Poland in 2019-2021.

Source: Own compilation based on GUS and BIK data.

The fit of the data by the DTW algorithm was checked. The values of the tested time series were overlaid and the distances calculated by the DTW algorithm were taken into account. The algorithm found an alignment path (minimum distance) that runs through lowcost areas (Figure 2 – a blue line). The more the line resembles a straight line, the smaller the distances are (the similarity is greater).

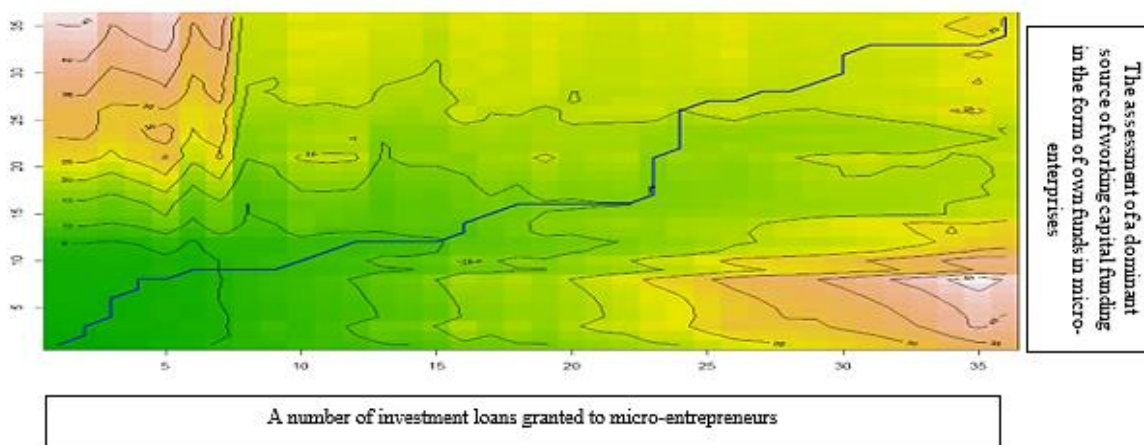
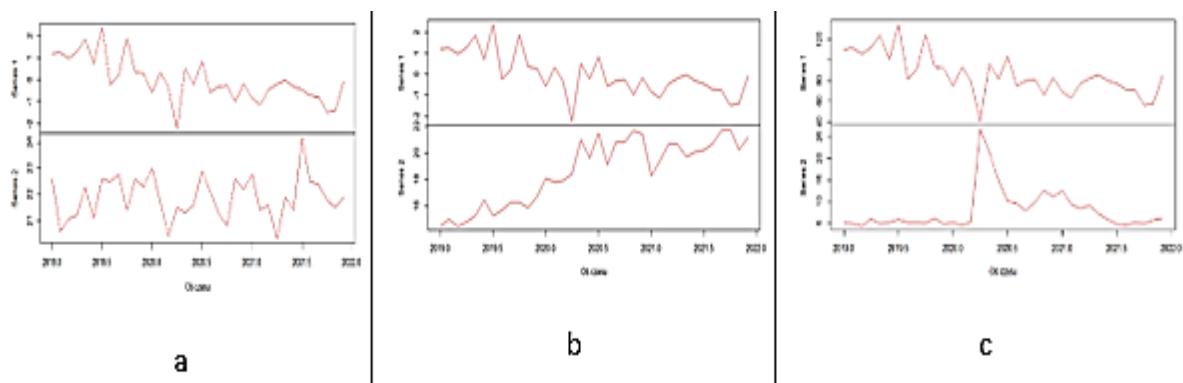


Figure 2. An alignment path for a number of investment loans granted to micro-entrepreneurs and the assessment of a dominant source of a working capital funding in the form of own funds in Poland in 2019-2021.

Source: Own compilation based on GUS and BIK data.

A 'perfect' straight line was not obtained over the entire period studied, but from the 5th to the 24th month a straight line could be drawn. It could indicate a rather strong similarity over this period in a development of a number of investment loans granted to micro-enterprises in relation to the assessment of a dominant source of working capital funding in the form of own funds. On this basis, it can be suggested that during the period of a big instability (the second half of 2019 and the whole of 2020), the entities surveyed tended to pursue a conservative policy of financing working capital assets in the form of maintaining fixed capital, i.e., stabilising sources of financing.

In the other indicated cases the smallest distance is no longer so visible and significant. It relates to the relationship between a number of investment loans granted to micro-entrepreneurs and the assessment of a dominant source of working capital financing in the form of bank loans and trade credits, and other business barriers (Figure 3). From this, it can be noted that there was in Figure 3a some visual similarity between the data in Q2 2019 - Q4 2020, Q4 2020 and Q4 2021, for Figure 3b: Q2 2020 - Q2 2021, and for Figure 3c: only Q4 2020 - Q1 2021.



Note.

- a number of investment loans granted to micro-entrepreneurs (Series 1) and the assessment of a dominant source of working capital funding in the form of bank loans (Series 2).
- a number of investment loans granted to micro-entrepreneurs (Series 1) and the assessment of a dominant source of working capital funding in the form of trade credits (Series 2).
- a number of investment loans granted to micro-entrepreneurs (Series 1) and other business barriers in micro-entrepreneurs (Series 2).

Figure 3. Evolution of a number of investment loans granted to micro-entrepreneurs (Series 1) and the assessment of a dominant source of working capital funding in the form of bank loans and trade credits, and other business barriers in micro-entrepreneurs (Series 2) in Poland in 2019-2021.

Source: Own compilation based on GUS and BIK data.

In these cases, an alignment path (minimum distance) was found - the closer was to the end of the period of the study (it includes a 'not very ideal' or 'ideal' straight line between 1 and 20 or 25 months) and the results were outside the green range. This may indicate a fairly strong similarity in the development of a number of investment loans granted to micro-enterprises in relation to the assessment of a direction of change of a dominant source of working capital funding in the form of bank loans and trade credits throughout 2019 and 2020 (with particular emphasis on the period before the COVID-19 pandemic). Unfortunately, such a relationship

was not observed in the case of the assessment of other barriers to entities' development against a number of investment loans granted. At the time, non-affected entities used these loans when assessments of the prevailing phenomenon were positive.

5. Discussion

Pursuant to the Entrepreneurs' Law (2018), a micro-entrepreneur is an entrepreneur who - in at least one of the last two financial years - met the following conditions: employed on average less than 10 employees (marked as 9) and achieved an annual net turnover or the total assets less than 2 mln EUR (according to the data of CSO, the number of micro-enterprises in Poland in 2020 was 2.194 mln, which accounted for over 97% of all enterprises, excl. farms) (PARP, 2022). The study concerned retail micro-enterprises (entities who declared the type of business as a retail and a repair of motor vehicles, incl. motorcycles (Section G of the Polish Classification of Activities) when applying for external financing). The data of Polish Agency for Enterprise Development (pol. PARP) shows that, in the industry structure of micro-enterprises and SMEs, the largest group was constituted by SMEs from the service sector in 2019-2021 (approx. 52.8%) and every fourth SME belonged to the trade sector (approx. 22%) (PARP, 2020, 2021, 2022) – Table 2. This means the share of the surveyed sector in the economy was significant.

Table 2.

Industry structure of micro, small and medium-sized enterprises in Poland in 2019-2021

Industry structure	2019	2020	2021*
Services	52,5%	52,9%	53%
Trade	22,4%	21,6%	22%
Construction	14,9%	15,4%	15%
Industry	10,1%	10,0%	10,0%
Other	0,10%	0,10%	0%
Total	100%	100%	100%

*Estimated data.

Source: (PARP, 2020; 2021; 2022).

The analyses carried out extend existing studies on the impact of macroeconomic factors on the development of demand for investment and working capital loans in the micro-enterprise retail sector. However, most available studies have used universal macroeconomic indicators. The literature indicates that economic growth and low inflation are key factors influencing credit demand reported by firms (Guo, Stepanyan, 2011; Jimenez et al., 2017). The use of the CSO's conjuncture indicators complements existing analyses and also allows for a better understanding of existing relationships. The results of our study are in line with studies carried out by Peel and Wilson (1996) and Cappiello et al. (2010), among others.

A positive correlation in the Pearson's linear correlation shows that the more positive was the assessment of changes in an economy and reduction of barriers, the more number or value of working capital loans was increased to traders. That could mean: when micro-enterprises were optimistic about a current situation and did not perceive significant barriers to doing business, the more they (most likely) increased the scale of their operations, in effect financing them with working capital loans (banks may also have been optimistic about their creditworthiness). So many correlations can indicate a wide range of dependencies, but also ... a lack of significant correlation. Indeed, working capital loans are common in practice, as long as the company has been in operation for at least two years (has a history with the bank). This general knowledge may, however, be important for banks and other providers of financing for current activities, as the occurrence of the indicated changes may be a source for building a market offer.

Only in one case was there a positive correlation between a number of investment loans granted to micro-enterprise (from retail sector) and too much competition in a market. That could mean: the surveyed enterprises, in order to gain a competitive advantage, invested in their development by acquiring an external, long-term source of financing. And then, knowledge of the industry by bank staff is critically needed to build long-term loan products matching to the market situation. The emergence of competitors in a given sector, in turn, may trigger the need for existing micro-entrepreneurs to implement a specific strategy (e.g. survival or growth).

To some extent, these results correspond with those of other researchers, among others, Zimny (2022) argues that the COVID-19 pandemic affected the financial performance of companies mainly through constraints that reduced demand for goods and services and because of changes in costs incurred. Wellalage et al. (2022) note that COVID-19 caused minor constraints for SMEs worldwide. More recent work provides evidence that the new coronavirus has affected SMEs more than large enterprises (Fabeil et al., 2020; Corredera-Catalán, 2021; Khan, 2022); given their relative financial fragility and disadvantaged position during economic downturns (Berg, Schrader, 2012; Demirgüç-Kunt et al., 2020).

A negative correlation in the Pearson's linear correlation shows that a number of investment loans and working capital loans is inversely proportional to assessments of a direction of change concerning: an inflation, an unclear and an unstable legislation, other barriers to operation (except e.g., employees, credit interests, too much competition in the market) but also a dominant source of financing working capital in the form of trade credit. This may indicate a decrease in demand for investment and working capital loans in the event of a positive assessment in the market situation in the area of: price changes, laws or lowering barriers to operation. This is rather a typical business situation. However, it allows financial intermediaries to offer, for example, savings and investment products at this time. For micro-enterprises, it allows to focus on building good business relationships with their suppliers.

Using the Pearson's correlation method has shown the hypothesis was only partially confirmed with regard to working capital loans (in the very first part: a positive expectations of changes) in Poland in period 2019-2021. This indicates, among other things, the need to look for other research methods, e.g. the DTW one.

Using the DTW algorithm it was noted that the smallest distances occurred in 27,5% of the combinations between a number of investment loans granted to micro-enterprises and the assessments of several elements (like: a business climate, a demand and a supply, barriers towards high costs, difficulties in settling accounts with counterparties), and when a dominant sources of working capital financing were: own funds, bank and trade loans. Out of such a wide spectrum, the smallest distance arose in the relationship between a number of investment loans granted to micro-enterprises and the assessment of a direction of change of a dominant source of working capital financing, which was own funds in micro-enterprises. It may be indicative of the surveyed companies' desire to provide a stable source of financing - not only for fixed assets, but also for current assets in uncertain times. This is one way of financial management, called conservative. It is highlighted when describing micro-enterprises at the first stage of development. In Poland, however, the market for these entities is 35 years old. So maybe this is an effect of their life expectancy. The survival rate was in 2022. 67.0%, i.e. the first year of operation was survived by two out of three newly established companies (in 2022, 299,714 enterprises were established and started in Poland, and by 2023, 200,856 of them remained active on the market) (PARP, 2024). The research did not take into account the duration of micro-enterprises in the retail sector.

Only in one case was there a convergence of results using both testing methods. It was a number of investment loans granted to micro-enterprises in connection with too much competition in the market. Thus, it can be concluded from: an increase in a number of loans granted for development activities was correlated with an optimistic search for market viability.

That information means: the hypothesis was only partially confirmed with regard to a number of investment loans and the positive assessment of a direction of a dominant source of financing, which was own funds, in Poland in period 2019-2021. It appears, therefore, that unstable times require decisions to be based on a variety of economic factors. It would be necessary to test the impact of the indicators studied also on decisions in the construction and industrial sectors to confirm (or refuse) our hypothesis.

An important limitation of the study was the access to data related to the issuing of bank lending decisions, as it is interesting - from the point of view of volatility - to see the period after Russia's attack on Ukraine in February 2022 and the consequent changes in fuel and energy prices (increase in the cost of doing business), inflation rates, among others. They also face an energy and technology transition (PARP, 2023, 2024). Research in 2022-2024 would therefore be desirable to assess the testability of the hypothesis.

The research revealed differences in the characteristics of factors significantly affecting credit demand, of retail micro-enterprises depending on the type of loans. Banks and other financial institutions can use the results of the research to forecast credit demand for micro-enterprises in the retail sector, which will contribute to the modification of pricing and risk policies and, as a result, to the improvement of financial indicators. It will be a challenge for future research to verify whether economic indicators relevant to the level of demand for investment and working capital loans among Polish micro-enterprises are differentiated at the level of groups operating within a department. In addition, in the longer term, we would like to assess the impact of changes in selected economic indicators on the share of non-performing loans in loans granted to micro-enterprises in the retail sector in general.

6. Conclusions

The study considered retail micro-enterprises and covered the unstable period: 2019-2021 in Poland, taking into account the Pearson's correlation method and the DTW model. It indicated - based on the Pearson's correlation - a strong positive correlation between an increase in a number or an amount of working capital loans and positive expectations about a direction of change in a CSO's general economic situation and the enterprise, as well as several barriers relating to: employees, market competition and current sales. Using the DTW model, a strong correlation was observed between an increase in a number of investment loans and positive expectations about a direction of changes in: business climate (incl.: supply and demand, PPI), labour barriers, interest costs and budget burdens, difficulties in settling accounts with contractors, and when the dominant sources of working capital financing were: own funds, bank loans and trade credits.

The results testify, among others, to an increase in demand for working capital loans in the event of a positive assessment of a market situation (mainly based on external factors) and a desire to provide an additional, stable source of asset financing (investment loans) in an unstable period. There were also signs of positive expectations of changes in the economic situation in an unstable period in 2020-2021 (during the COVID-19 pandemic) translating into an increase in the interest of micro-enterprises in bank loans. The results of the study indicate a diverse and uneven correlation involving the direction of changes in the economic situation and some relevant barriers (the hypothesis has been partially confirmed), but also the difference in the results, when using the two methods.

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